Easergy MiCOM P139

Feeder Management and Bay Control

P139/EN M/R-83-A

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Technical Manual

Volume 2 of 2

Schneider Electric

A1 Function Groups

ARC	*Auto-reclosing control*
ASC	*Automatic synchronism check*
CBF	*Circuit breaker failure protection*
CBM	*Circuit breaker condition monitoring*
CMD_1	*Single-pole commands*
COMM1	*“Logical” communication interface 1*
COMM2	*“Logical” communication interface 2*
COMM3	*InterMiCOM interface*
COUNT	*Binary counts*
DEV01	*External device*
DEV02	*External device*
DEV03	*External device*
DEV04	*External device*
DEV05	*External device*
DEV06	*External device*
DEV07	*External device*
DEV08	*External device*
DEV09	*External device*
DEV10	*External device*
DTOC	*Definite-time overcurrent protection*
DVICE	*Device*
f<>	*Over-/underfrequency protection*
FT_DA	*Fault data acquisition*
FT_RC	*Fault recording*
GF_DA	*Ground fault data acquisition*
GF_RC	*Ground fault recording*
GFDSS	*Ground fault direction determination using steady-state values*
GOOSE	*Generic Object Orientated Substation Events*
I2>	*Unbalance protection*
IDMT1	*Inverse-time overcurrent protection*

IDMT2	*Inverse-time overcurrent protection*
IEC	*IEC 61850 Communication*
ILOCK	*Interlocking logic*
INP	*Binary input*
IRIGB	*IRIG-B interface*
LED	*LED indicators*
LIMIT	*Limit value monitoring*
LOC	*Local control panel*
LOG_2	*Programmable Logic*
LOGIC	*Programmable Logic*
MAIN	*Main function*
MCMON	*Measuring-circuit monitoring*
MEASI	*Measured data input*
MEASO	*Measured data output*
MP	*Motor protection*
MT_RC	*Monitoring signal recording*
OL_DA	*Overload data acquisition*
OL_RC	*Overload recording*
OP_RC	*Operating data recording*
OUTP	*Binary and analog output*
P<>	*Power directional protection*
PC	*PC link*
Pf<	*Underfrequency load shedding*
PSIG	*Protective signaling*
PSS	*Parameter subset selection*
QV	*Voltage controlled directional reactive power protection*
SCDD	*Short-circuit direction determination*
SFMON	*Self-monitoring*
SIG_1	*Single-pole signals*
SOTF	*Switch on to fault protection*
TGFD	*Transient ground fault direction determination*
THERM	*Thermal overload protection*

TIMER	*Real Timer*
TPD1	*Three Position Drive*
TPD2	*Three Position Drive*
TPD3	*Three Position Drive*
TPD4	*Three Position Drive*
V<>	*Time-voltage protection*

A2 Internal Signals

ARC: Block/reset HSR	Vol. 1, Fig. 3-182, (p. 3-232)
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ASC: Close enable w.block	Vol. 1, Fig. 3-192, (p. 3-248)
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DTOC: Block. Start. IN>>>	Vol. 1, Fig. 3-68, (p. 3-101)

DTOC: Block. Start. IN>>>>	Vol. 1, Fig. 3-68, (p. 3-101)
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DTOC: Block.Start. I>> Px	Vol. 1, Fig. 3-68, (p. 3-101)
DTOC: Block.Start. I>>> Px	Vol. 1, Fig. 3-68, (p. 3-101)
DTOC: Block.Start. I>>>> Px	Vol. 1, Fig. 3-68, (p. 3-101)
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LED: State Hxx red	Vol. 1, Fig. 3-48, (p. 3-78)
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MAIN: Start. I>,kIref,P>	Vol. 1, Fig. 3-80, (p. 3-113)
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P<>: P-	Vol. 1, Fig. 3-267, (p. 3-340)
P<>: P+	Vol. 1, Fig. 3-267, (p. 3-340)
P<>: Q	Vol. 1, Fig. 3-267, (p. 3-340)

P<>: Q-	Vol. 1, Fig. 3-267, (p. 3-340)
P<>: Q+	Vol. 1, Fig. 3-267, (p. 3-340)
QV: Bl.Start. QV	Vol. 1, Fig. 3-68, (p. 3-101)
SCDD: Bl.Direct. tIref,N>	Vol. 1, Fig. 3-164, (p. 3-209)
SCDD: Bl.Direct. tIref,P>	Vol. 1, Fig. 3-159, (p. 3-204)
SCDD: Block. direct. tI>	Vol. 1, Fig. 3-159, (p. 3-204)
SCDD: Block. direct. tI>>	Vol. 1, Fig. 3-159, (p. 3-204)
SCDD: Block. Direct. tI>>>	Vol. 1, Fig. 3-159, (p. 3-204)
SCDD: Block. Direct. tI>>>>	Vol. 1, Fig. 3-159, (p. 3-204)
SCDD: Block. direct. tIN>	Vol. 1, Fig. 3-164, (p. 3-209)
SCDD: Block. direct. tIN>>	Vol. 1, Fig. 3-164, (p. 3-209)
SCDD: Block. Direct. tIN>>>	Vol. 1, Fig. 3-164, (p. 3-209)
SCDD: Determin. N enabled	Vol. 1, Fig. 3-162, (p. 3-207)
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Signal 2 EXT	Vol. 1, Fig. 3-325, (p. 3-396)
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TGFD: IN,p triggered	Vol. 1, Fig. 3-223, (p. 3-282)
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THERM: With CTA	Vol. 1, Fig. 3-239, (p. 3-306)
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V<>: Vpos Vol. 1, Fig. 3-252, (p. 3-324)

A3 Glossary

Modules

A:	Communication module
B:	Digital bus module
L:	MMI module
N	Transient ground fault evaluation module
P:	Processor module
T:	Transformer module
V:	Power supply module
X:	Binary I/O module
Y:	Analog I/O module

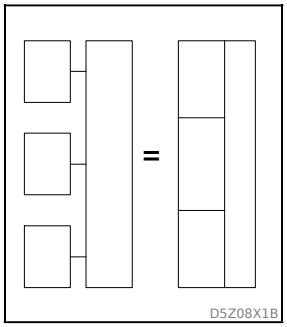
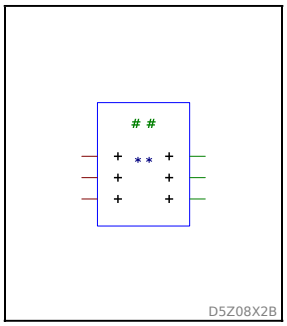
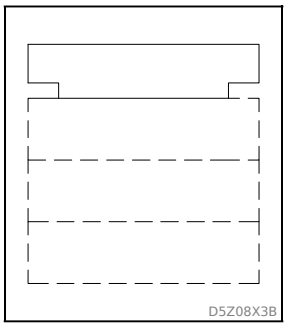
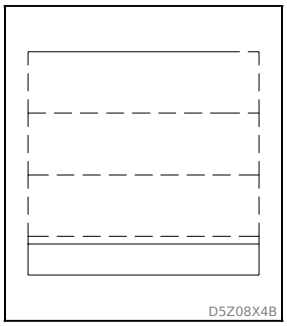
Symbols

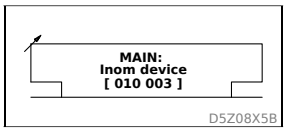
Graphic symbols for block diagrams

Binary elements in compliance with DIN 40900 part 12, September 1992, IEC 617-12: modified 1991

Analog information processing in compliance with DIN 40900 part 13, January 1981. To document the linking of analog and binary signals, additional symbols have been used, taken from several DIN documents.

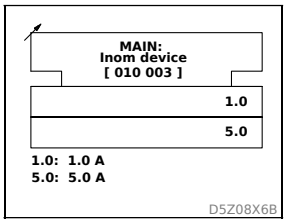
As a rule, direction of the signal flow is from left to right and from top to bottom. Other flow directions are marked by an arrow. Input signals are listed on the left side of the signal flow, output signals on the right side.

Symbol	Description
	To obtain more space for representing a group of related elements, contours of the elements may be joined or cascaded if the following rules are met: There is no functional linkage between elements whose common contour line is oriented in the signal flow direction. Note: This rule does not necessarily apply to configurations with two or more signal flow directions, such as for symbols with a control block and an output block. There exists at least one logical link between elements whose common contour line runs perpendicularly to the signal flow direction.
	**Components of a symbol** A symbol consists of a contour or contour combination and one or more qualifiers. **Description of the example symbol in the left column** ● Blue line: Contur ● Dark red lines: Inputs ● Green lines: Outputs ● Green hash characters: Preferred location for the general function qualifying symbol ● Dark blue asterisk characters: Alternative location for the general function qualifying symbol
	**Control block** A control block contains an input function common to several symbols. It is used for the collective setting of several trigger elements, for example.
	**Output block** An output block contains an output function common to several symbols.



Settable control block

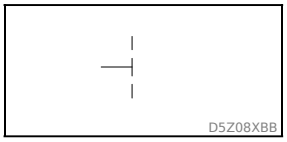
The 6 digits in square brackets represent the address under which the function shown in the text is implemented.



Settable control block with function blocks

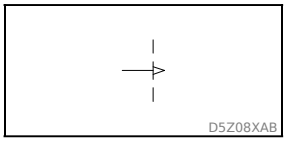
The digits in the function block show the settings that are possible for this function.

The text below the symbol assigns the corresponding unit or meaning to each setting.



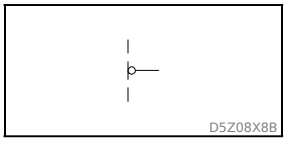
Static input

Only the state of the binary input variable is effective.



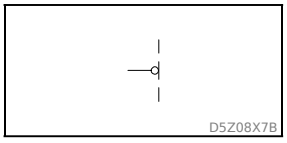
Dynamic input

Only the transition from value 0 to value 1 is effective.



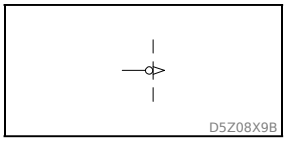
Negation of an output

The value up to the border line is negated at the output.



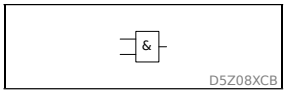
Negation of an input

The input value is negated before the border line.



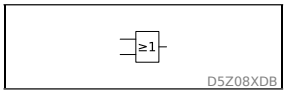
Dynamic input with negation

Only the transition from value 1 to value 0 is effective.



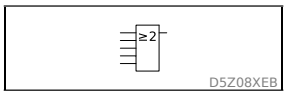
AND element

The output variable will be 1 only if all input variables are 1.



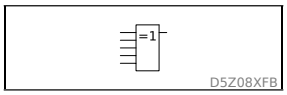
OR element

The output variable will be 1 only if at least one input variable is 1.



Threshold element

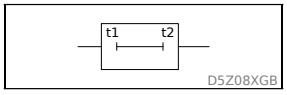
The output variable will be 1 only if at least two input variables are 1. The number in the symbol may be replaced by any other number.



(m out of n) element

The output variable will be 1 only if just one input variable is 1.

The number in the symbol may be replaced by any other number if the number of inputs is increased or decreased accordingly.

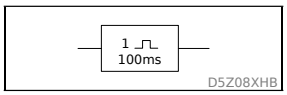


Delay element

The transition from value 0 to 1 at the output occurs after a time delay of t1 relative to the corresponding transition at the input.

The transition from value 1 to 0 at the output occurs after a time delay of t2 relative to the corresponding transition at the input.

t1 and t2 may be replaced by the actual delay values (in seconds or strobe ticks).

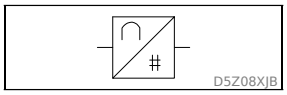


Monostable flip-flop

The output variable will be 1 only if the input variable changes to 1. The output variable will remain 1 for 100 ms, regardless of the duration of the input value 1 (non-retriggerable).

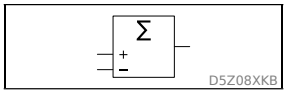
Without a 1 in the function block, the monostable flip-flop is retriggerable.

The time is 100 ms in this example, but it may be changed to any other duration.



Analog-digital converter

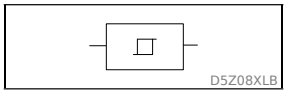
An analog input signal is converted to a binary signal.



Subtractor

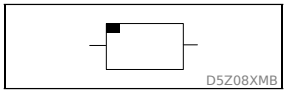
The output variable is the difference between the two input variables.

A **summing element** is obtained by changing the minus sign to a plus sign at the symbol input.



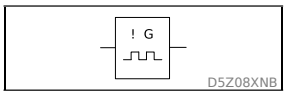
Schmitt Trigger with binary output signal

The binary output variable will be 1 if the input signal exceeds a specific threshold. The output variable remains 1 until the input signal drops below the threshold again.



Memory, general

Storage of a binary or analog signal.

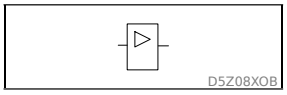


Non-stable flip-flop

When the input variable changes to 1, a pulse sequence is generated at the output.

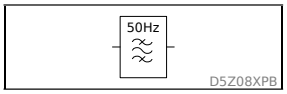
The ! to the left of the G indicates that the pulse sequence starts with the input variable transition (synchronized start).

If there is a ! to the right of the G, the pulse sequence ends with the ending of the 1 signal at the input (synchronized stop).



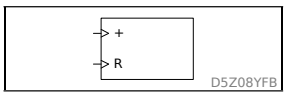
Amplifier

The output variable is 1 only if the input variable is also 1.



Band pass filter

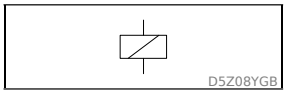
The output only transmits the 50 Hz component of the input signals. All other frequencies (above and below 50 Hz) are attenuated.



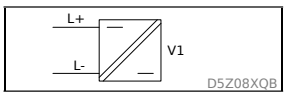
Counter

At the + input the input variable transitions from 0 to 1 are counted and stored in the function block.

At the R(eset) input a transition of the input variable from 0 to 1 resets the counter to 0.



Electromechanical drive in general, here a relay, for example.



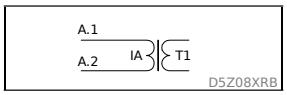
Signal level converter

with electrical isolation between input and output.

L+ = pos. voltage input

L− = neg. voltage input

U1 = device identifier



Input transformer with phase and item identifiers (according to DIN EN 60445)

Phase identifiers for current inputs:

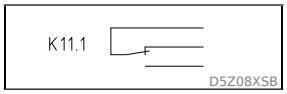
- for A: A1 and A2
- for B: B1 and B2
- for C: C1 and C2
- for N: N1 and N2

Phase identifiers for voltage inputs

- via transformer 1:
  - for A: 1U
  - for B: 1V
  - for C: 1W
  - for N: 1N
- via transformer 2:
  - for A: 2U
  - for B: 2V

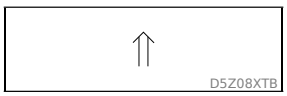
Item identifiers

- for current transformers:
  - for A: T1
  - for B: T2
  - for C: T3
  - for N: T4
- for voltage transformer 1:
  - for A: T5
  - for B: T6
  - for C: T7
  - for N: T8
- for $V_{G\text{-}N}$ transformer: T90
- for voltage transformer 2:
  - for A: T15



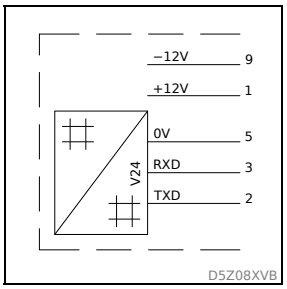
Change-over contact

with item identifier



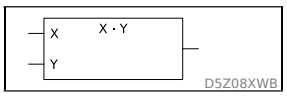
Special symbol

Output relay in normally-energized arrangement (“closed-circuit operation”).



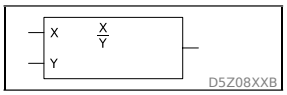
PC interface

with pin connections



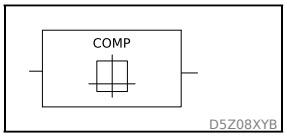
Multiplier

The output variable is the result of the multiplication of the two input variables.



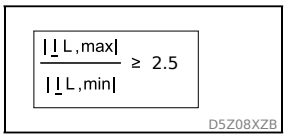
Divider

The output variable is the result of the division of the two input variables.



Comparator

The output variable becomes 1 only if the input variable(s) are equal to the function in the function block.



Formula block

The output variable becomes 1 only if the input variable(s) satisfy the equation in the function block

---

Examples of Signal Names

All settings and signals relevant for protection are shown in the block diagrams of Chapter “Operation” as follows:

Signal Name	Description
♦ FT_RC: Fault recording n 305 100	Internal signal names are not coded by a data model address. In the block diagrams they are marked with a diamond. The small figure underneath the signal name represents a code that is irrelevant to the user. The internal signal names used and their origins are listed in Appendix.
DIST: VNG>> triggered [036 015]	Signal names coded by a data model address are represented by their address (shown in square brackets). Their origin is given in Chapters “Setting” and “Information and Control Functions”.
MAIN: General reset USER [003 002] ↗1: Execute	A specific setting to be used later on is shown with its signal name, address, and the setting preceded by the setting arrow.

Symbols Used

Symbol	Meaning
t	Time duration
V	Voltage, potential difference
$\underline{V}$	Complex voltage
I	Electrical current
$\underline{I}$	Complex current
$\underline{Z}$	Complex impedance
$\lvert\underline{Z}\rvert$	Modulus of complex impedance
f	Frequency
δ	Temperature in °C
Σ	Sum, result
Ω	Unit of electrical resistance
α	Angle
φ, ϕ	Phase angle. With subscripts: specific angle between a defined current and a defined voltage.
τ	Time constant
ΔT	Temperature difference in K

A4 Telecontrol Interfaces

A4.1 Telecontrol Interface per EN 60870-5-101 or IEC 870-5-101 (Companion Standard)

This section incorporates Section 8 of EN 60870-5-101 (1996), which includes a general definition of the telecontrol interface for substation control systems.

A4.1.1 Interoperability

This application-based standard (companion standard) specifies parameter sets and other options from which subsets are to be selected in order to implement specific telecontrol systems. Certain parameters such as the number of bytes (octets) in the COMMON ADDRESS of the ASDU are mutually exclusive. This means that only one value of the defined parameter is allowed per system. Other parameters, such as the listed set of different process information in the command and monitor direction, permit definition of the total number or of subsets that are suitable for the given application. This section combines the parameters given in the previous sections in order to facilitate an appropriate selection for a specific application. If a system is made up of several system components supplied by different manufacturers, then it is necessary for all partners to agree on the selected parameters.

The boxes for the selected parameters should be checked *[see National Preface of EN 60870-5-101]*.

> *The overall definition of a system may also require individual selection of certain parameters for specific parts of a system such as individual selection of scaling factors for individually addressable measured values.*

A4.1.1.1 Network Configuration (Network-Specific Parameters)

[✓]	Point-to-point configuration	[✓]	Multipoint-party line configuration
[✓]	Multiple point-to-point configuration	[ ]	Multipoint-star configuration

A4.1.1.2 Physical Layer (Network-Specific Parameters)

(See National Preface of EN 60870-5-101.)

Transmission Rate (Control Direction)

(The transmission rates for control direction and monitor direction must be identical.)

Unbalanced interface V.24/V.28, Standardized	Unbalanced interface V.24/V.28, Recommended with > 1 200 bit/s	Balanced interface X.24/X.27
[ ] 100 bit/s	[✓] 2400 bit/s	[ ] 2400 bit/s
[ ] 200 bit/s	[✓] 4800 bit/s	[ ] 4800 bit/s
[ ] 300 bit/s	[✓] 9600 bit/s	[ ] 9600 bit/s
[✓] 600 bit/s		[ ] 19200 bit/s
[✓] 1200 bit/s		[ ] 38400 bit/s
		[ ] 56000 bit/s
		[ ] 64000 bit/s

Transmission Rate (Monitor Direction)

(The transmission rates for control direction and monitor direction must be identical.)

Unbalanced interface V.24/V.28, Standardized	Unbalanced interface V.24/V.28, Recommended with > 1 200 bit/s	Balanced interface X.24/X.27
[ ] 100 bit/s	[✓] 2400 bit/s	[ ] 2400 bit/s
[ ] 200 bit/s	[✓] 4800 bit/s	[ ] 4800 bit/s
[ ] 300 bit/s	[✓] 9600 bit/s	[ ] 9600 bit/s
[✓] 600 bit/s		[ ] 19200 bit/s
[✓] 1200 bit/s		[ ] 38400 bit/s
		[ ] 56000 bit/s
		[ ] 64000 bit/s

A4.1.1.3 Link Layer (Network-Specific Parameters)

(See National Preface of EN 60870-5-101.)

Frame format FT 1.2, single character 1, and the fixed time-out interval are used exclusively in this companion standard.

	Link Transmission Procedure
[✓]	Balanced transmission
[✓]	Unbalanced transmission

	Address Field of the Link
[✓]	Not present (balanced transmission only)
[✓]	One octet
[✓]	Two octets (balanced transmission only)
[✓]	Structured
[✓]	Unstructured

	Frame Length
[240]	Maximum length L (number of octets)

A4.1.1.4 Application Layer

(See National Preface of EN 60870-5-101.)

Transmission mode for application data

Mode 1 (least significant octet first), as defined in clause 4.10 of IEC 870-5-4, is used exclusively in this companion standard.

Common Address of ASDU (System-Specific Parameter)

[✓]	One octet	[✓]	Two octets

Information Object Address (System-Specific Parameter)

[✓]	One octet	[✓]	Structured
[✓]	Two octets	[✓]	Unstructured
[✓]	Three octets		

Cause of Transmission (System-Specific Parameter)

[✓]	One octet	[✓]	Two octets (with originator address)

Selection of Standard ASDUs

Process Information in Monitor Direction (Station-Specific Parameter)

[✓]	<1>	=	Single-point information	M_SP_NA_1
[✓]	<2>	=	Single-point information with time tag	M_SP_TA_1
[✓]	<3>	=	Double-point information	M_DP_NA_1
[✓]	<4>	=	Double-point information with time tag	M_DP_TA_1
[✓]	<5>	=	Step position information	M_ST_NA_1
[✓]	<6>	=	Step position information with time tag	M_ST_TA_1
[✓]	<7>	=	Bit string of 32 bit	M_BO_NA_1
[✓]	<8>	=	Bit string of 32 bit with time tag	M_BO_TA_1
[✓]	<9>	=	Measured value, normalized value	M_ME_NA_1
[✓]	<10>	=	Measured value, normalized value with time tag	M_ME_TA_1
[✓]	<11>	=	Measured value, scaled value	M_ME_NB_1
[✓]	<12>	=	Measured value, scaled value with time tag	M_ME_TB_1
[ ]	<13>	=	Measured value, short floating point value	M_ME_NC_1
[ ]	<14>	=	Measured value, short floating point value with time tag	M_ME_TC_1
[✓]	<15>	=	Integrated totals	M_IT_NA_1
[✓]	<16>	=	Integrated totals with time tag	M_IT_TA_1
[✓]	<17>	=	Event of protection equipment with time tag	M_EP_TA_1
[✓]	<18>	=	Packed start events of protection equipment with time tag	ME_EP_TB_1
[✓]	<19>	=	Packed output circuit information of protection equipment with time tag	M_EP_TC_1
[ ]	<20>	=	Packed single-point information with status change detection	M_PS_NA_1
[ ]	<21>	=	Measured value, normalized value without quality descriptor	M_ME_ND_1

Process Information in Monitor Direction (Station-Specific Parameter)

(Incorrectly identified with control direction in IEC 870-5-101.)

[✓]	<45>	=	Single command	C_SC_NA_1
[✓]	<46>	=	Double command	C_DC_NA_1
[✓]	<47>	=	Regulating step command	C_IT_NA_1
[ ]	<48>	=	Set point command, normalized value	C_RC_NA_1
[ ]	<49>	=	Set point command, scaled value	C_SE_NB_1
[ ]	<50>	=	Set point command, short floating point value	C_SE_NC_1
[ ]	<51>	=	Bit string of 32 bit	C_BO_NA_1

System Information in Monitor Direction (Station-Specific Parameter)

[✓]	<70>	=	End of initialization	ME_EI_NA_1

System Information in Control Direction (Station-Specific Parameter)

[✓]	<100>	=	Interrogation command	C_IC_NA_1
[✓]	<101>	=	Counter interrogation command	C_CI_NA_1
[✓]	<102>	=	Read command	C_RD_NA_1
[✓]	<103>	=	Clock synchronization command	C_CS_NA_1
[✓]	<104>	=	Test command	C_TS_NB_1
[ ]	<105>	=	Reset process command	C_RP_NC_1
[ ]	<106>	=	Delay acquisition command (See National Preface of EN 60870-5-101.)	C_CD_NA_1

Parameter in Control Direction (Station-Specific Parameter)

[✓]	<110>	=	Parameter of measured value, normalized value	P_ME_NA_1
[✓]	<111>	=	Parameter of measured value, scaled value	P_ME_NB_1
[ ]	<112>	=	Parameter of measured value, short floating point value	P_ME_NC_1
[ ]	<113>	=	Parameter activation	P_AC_NA_1

File Transfer (Station-Specific Parameter)

[ ]	<120>	=	File ready	F_FR_NA_1
[ ]	<121>	=	Section ready	F_SR_NA_1
[ ]	<122>	=	Call directory, select file, call file, call section	F_SC_NA_1
[ ]	<123>	=	Last section, last segment	F_LS_NA_1
[ ]	<124>	=	Ack file, ack section	F_AF_NA_1
[ ]	<125>	=	Segment	F_SG_NA_1
[ ]	<126>	=	Directory	F_DR_TA_1

A4.1.1.5 Basic Application Functions

(See National Preface of EN 60870-5-101.)

Station Initialization (Station-Specific Parameter)

[✓]	Remote initialization

General Interrogation (System- or Station-Specific Parameter)

[✓] Global

[✓] Group 1	[✓] Group 7	[✓] Group 13
[✓] Group 2	[✓] Group 8	[✓] Group 14
[✓] Group 3	[✓] Group 9	[✓] Group 15
[✓] Group 4	[✓] Group 10	[✓] Group 16
[✓] Group 5	[✓] Group 11	
[✓] Group 6	[✓] Group 12	

Addresses per group have to be defined.

Clock Synchronization (Station-Specific Parameter)

[✓]	Clock synchronization

Command Transmission (Object-Specific Parameter)

[✓]	Direct command transmission	[ ]	Select and execute command
[ ]	Direct set point command transmission	[ ]	Select and execute set point command
		[ ]	C_SE ACTTERM used

[✓]	No additional definition
[ ]	Short pulse duration (Execution duration determined by a system parameter in the outstation)
[ ]	Long pulse duration (Execution duration determined by a system parameter in the outstation)
[ ]	Persistent output

Transmission of Integrated Totals (Station- or Object-Specific Parameter)

[ ]	Counter request	[✓]	General request counter
[✓]	Counter freeze without reset	[✓]	Request counter group 1
[ ]	Counter freeze with reset	[✓]	Request counter group 2
[ ]	Counter reset	[✓]	Request counter group 3
		[✓]	Request counter group 4

Addresses per group have to be specified

Parameter Loading (Object-Specific Parameter)

[✓]	Threshold value
[ ]	Smoothing value
[ ]	Low limit for transmission of measured value
[ ]	High limit for transmission of measured value

Parameter Activation (Object-Specific Parameter)

[ ]	Act/deact of persistent cyclic or periodic transmission of the addressed object

File Transfer (Station-Specific Parameter)

[ ]	File transfer in monitor direction	F_FR_NA_1
[ ]	File transfer in control direction	F_FR_NA_1

A4.2 Communication Interface per IEC 60870-5-103

This section incorporates Section 8 of IEC 60870-5-103, including definitions applicable to the P139.

A4.2.1 Interoperability

A4.2.1.1 Physical Layer

A4.2.1.1.1 Electrical Interface

[✓]	EIA RS 485
[✓]	No. of loads: 32 for one device

Note: EIA RS 485 defines the loads in such a way that 32 of such loads can be operated on one line. For detailed information see EIA RS 485, Section 3.

A4.2.1.1.2 Optical Interface

[✓]	Glass fiber
[✓]	Plastic fiber
[✓]	F-SMA connector
[ ]	BFOC/2.5 connector

A4.2.1.1.3 Transmission Rate

[✓]	9600 bit/s
[✓]	19200 bit/s

A4.2.1.2 Link Layer

There are no selection options for the link layer.

A4.2.1.3 Application Layer

A4.2.1.3.1 Transmission Mode for Application Data

Mode 1 (least significant octet first) as defined in clause 4.10 of IEC 60870-5-4 is used exclusively in this companion standard.

A4.2.1.3.2 Common Address of ASDU

[✓]	One COMMON ADDRESS of ASDU (identical to the station address)
[ ]	More than one COMMON ADDRESS of ASDU

A4.2.1.3.3 Selection of Standard Information Numbers in Monitor Direction

System Functions in Monitor Direction

	INF	Description
[✓]	<0>	End of general interrogation
[✓]	<0>	Time synchronization
[✓]	<2>	Reset FCB
[✓]	<3>	Reset CU
[✓]	<4>	Start / restart
[ ]	<5>	Power on

Status Indications in Monitor Direction

	INF	Description	P139 Designations (Address) Description
[✓]	<16>	Auto-recloser active	(015 064) ARC: Enabled
[✓]	<17>	Teleprotection active	(015 008) PSIG: Enabled
[✓]	<18>	Protection active	(003 030) MAIN: Device on-line
[✓]	<19>	LED reset	(021 010) MAIN: Reset indicat. USER
[✓]	<20>	Blocking of monitor direction	(037 075) COMM1: Sig./meas.val.block.
[✓]	<21>	Test mode	(037 071) MAIN: Test mode
[ ]	<22>	Local parameter setting	
[✓]	<23>	Characteristic 1	(036 090) PSS: PS 1 active
[✓]	<24>	Characteristic 2	(036 091) PSS: PS 2 active
[✓]	<25>	Characteristic 3	(036 092) PSS: PS 3 active
[✓]	<26>	Characteristic 4	(036 093) PSS: PS 4 active
[✓]	<27>	Auxiliary input 1	(034 000) LOGIC: Input 01 EXT
[✓]	<28>	Auxiliary input 2	(034 001) LOGIC: Input 02 EXT
[✓]	<29>	Auxiliary input 3	(034 002) LOGIC: Input 03 EXT
[✓]	<30>	Auxiliary input 4	(034 003) LOGIC: Input 04 EXT

Monitoring Signals (Supervision Indications) in Monitor Direction

	INF	Description	P139 Designations (Address) Description
[✓]	<32>	Measurand supervision I	(040 087) MCMON: Meas. circ. I faulty
[✓]	<33>	Measurand supervision V	(038 023) MCMON: Meas. circ. V faulty
[✓]	<35>	Phase sequence supervision	(038 049) MCMON: Phase sequ. V faulty
[✓]	<36>	Trip circuit supervision (The message content is formed from the OR operation of the individual signals.)	(041 200) SFMON: Relay Kxx faulty
[ ]	<37>	I>> back-up operation	
[✓]	<38>	VT fuse failure	(004 061) MAIN: M.c.b. trip V EXT
[✓]	<39>	Teleprotection disturbed	(036 060) PSIG: Telecom. faulty
[✓]	<46>	Group warning	(036 100) SFMON: Warning (relay)
[✓]	<47>	Group alarm	(004 065) MAIN: Blocked/faulty

Earth Fault Indications in Monitor Direction

	INF	Description	P139 Designations (Address) Description
[✓]	<48>	Earth fault A	(041 054) MAIN: Ground fault A
[✓]	<49>	Earth fault B	(041 055) MAIN: Ground fault B
[✓]	<50>	Earth fault C	(041 056) MAIN: Ground fault C
[✓]	<51>	Earth fault forward, i.e. line	(041 088) MAIN: Gnd. fault forw./LS
[✓]	<52>	Earth fault reverse, i.e. busbar	(041 089) MAIN: Gnd. fault backw./BS

Fault Indications in Monitor Direction

	INF	Description	P139 Designations (Address) Description
[✓]	<64>	Start / pick-up A	(040 005) MAIN: Starting A
[✓]	<65>	Start / pick-up B	(040 006) MAIN: Starting B
[✓]	<66>	Start / pick-up C	(040 007) MAIN: Starting C
[✓]	<67>	Start / pick-up N	(040 008) MAIN: Starting GF
[✓]	<68>	General trip	(036 071) MAIN: Gen. trip command 1
[ ]	<69>	Trip A	
[ ]	<70>	Trip B	
[ ]	<71>	Trip C	
[ ]	<72>	Trip I>> (back-up operation)	
[✓]	<73>	Fault location X in ohms	(004 029) FT_DA: Fault react., prim.
[✓]	<74>	Fault forward/line	(036 018) SCDD: Fault P forward
[✓]	<75>	Fault reverse/busbar	(036 019) SCDD: Fault P backward
[✓]	<76>	Teleprotection signal transmitted	(036 035) PSIG: Send (signal)
[✓]	<77>	Teleprotection signal received	(037 029) PSIG: Receive (signal)
[ ]	<78>	Zone 1	
[ ]	<79>	Zone 2	
[ ]	<80>	Zone 3	
[ ]	<81>	Zone 4	
[ ]	<82>	Zone 5	
[ ]	<83>	Zone 6	
[✓]	<84>	General starting	(040 000) MAIN: General starting
[✓]	<85>	Breaker failure	(036 017) CBF: CB failure
[ ]	<86>	Trip measuring system A	
[ ]	<87>	Trip measuring system B	
[ ]	<88>	Trip measuring system C	
[ ]	<89>	Trip measuring system N	
[✓]	<90>	Trip I>	(040 042) MAIN: TripSig. tI>/tIrefP>
[✓]	<91>	Trip I>>	(040 011) DTOC: Trip signal tI>>

	INF	Description	P139 Designations (Address) Description
[✓]	<92>	Trip IN>	(040 043) MAIN: TripSig tIN>/tIrefN>
[✓]	<93>	Trip IN>>	(040 028) DTOC: Trip signal tIN>>

Auto-Reclosure Indications in Monitor Direction

	INF	Description	P139 Designations (Address) Description
[✓]	<128>	CB 'on' by AR	(037 007) ARC: (Re)close signal HSR
[✓]	<129>	CB 'on' by long-time AR	(037 006) ARC: (Re)close signal TDR
[✓]	<130>	AR blocked	(037 008) ARC: Not ready

Measurands in Monitor Direction

	INF	Description	P139 Designations (Address) Description
[✓]	<144>	Measurand I (only with setting COMM1: Transm.enab.cycl .dat to *ASDU 3.1 per IEC*)	(006 041) MAIN: Current B p.u.
[✓]	<145>	Measurands I, V (only with setting COMM1: Transm.enab.cycl .dat to *ASDU 3.2 per IEC*)	(006 041) MAIN: Current B p.u. (005 045) MAIN: Voltage A-B p.u.
[✓]	<146>	Measurands I, V, P, Q (only with setting COMM1: Transm.enab.cycl .dat to *ASDU 3.3 per IEC*)	(006 041) MAIN: Current B p.u. (005 045) MAIN: Voltage A-B p.u. (004 051) MAIN: Active power P p.u. (004 053) MAIN: Reac. power Q p.u.
[✓]	<147>	Measurands I_N, V_{EN} (only with setting COMM1: Transm.enab.cycl .dat to *ASDU 3.4 per IEC*)	(005 011) MAIN: Current Σ(IP) p.u. (005 013) MAIN: Volt. Σ(VPG)/√3 p.u.
[✓]	<148>	Measurands $I_{A,B,C}$, $V_{A,B,C}$, P, Q, f (only with setting COMM1: Transm.enab.cycl .dat to *ASDU 9 per IEC*)	(005 041) MAIN: Current A p.u. (006 041) MAIN: Current B p.u. (007 041) MAIN: Current C p.u. (005 043) MAIN: Voltage A-G p.u. (006 043) MAIN: Voltage B-G p.u. (007 043) MAIN: Voltage C-G p.u. (004 051) MAIN: Active power P p.u. (004 053) MAIN: Reac. power Q p.u. (004 040) MAIN: Frequency f

Generic Functions in Monitor Direction

	INF	Description
[ ]	<240>	Read headings of all defined groups
[ ]	<241>	Read values or attributes of all entries of one group
[ ]	<243>	Read directory of a single entry
[ ]	<244>	Read value or attribute of a single entry
[ ]	<245>	General interrogation of generic data
[ ]	<249>	Write entry with confirmation
[ ]	<250>	Write entry with execution
[ ]	<251>	Write entry abort

A4.2.1.3.4 Selection of Standard Information Numbers in Control Direction

System Functions in Control Direction

	INF	Description
[✓]	<0>	Initiation of general interrogation
[✓]	<0>	Time synchronization

General Commands in Control Direction

	INF	Description	P139 Designations (Address) Description
[✓]	<16>	Auto-recloser on/off	(015 064) ARC: Enabled
[✓]	<17>	Teleprotection on/off	(015 004) PSIG: General enable USER
[✓]	<18>	Protection on/off	(003 030) MAIN: Device on-line
[✓]	<19>	LED reset	(021 010) MAIN: Reset indicat. USER
[✓]	<23>	Activate characteristic 1 (Switches PSS: Param.subs.sel. USER to *Parameter subset 1*.)	(003 060) PSS: Param.subs.sel. USER
[✓]	<24>	Activate characteristic 2 (Switches PSS: Param.subs.sel. USER to *Parameter subset 2*.)	(003 060) PSS: Param.subs.sel. USER
[✓]	<25>	Activate characteristic 3 (Switches PSS: Param.subs.sel. USER to *Parameter subset 3*.)	(003 060) PSS: Param.subs.sel. USER
[✓]	<26>	Activate characteristic 4 (Switches PSS: Param.subs.sel. USER to *Parameter subset 4*.)	(003 060) PSS: Param.subs.sel. USER

Generic Functions in Control Direction

	INF	Description
[ ]	<240>	Read headings of all defined groups
[ ]	<241>	Read values or attributes of all entries of one group
[ ]	<243>	Read directory of a single entry
[ ]	<244>	Read value or attribute of a single entry
[ ]	<245>	General interrogation of generic data
[ ]	<248>	Write entry
[ ]	<249>	Write entry with confirmation
[ ]	<250>	Write entry with execution
[ ]	<251>	Write entry abort

A4.2.1.3.5 Basic Application Functions

[✓]	Test mode
[✓]	Blocking of monitor direction
[✓]	Disturbance data
[ ]	Generic services
[✓]	Private data

A4.2.1.3.6 Miscellaneous

Measured values are transmitted both with ASDU 3 and ASDU 9. As defined in Sec. 7.2.6.8, the maximum MVAL can be either 1.2 or 2.4 times the rated value. In ASDU 3 and ASDU 9, different ratings may not be used; in other words, there is only one choice for each measurand.

Measured value	**Max. MVAL = nom. value multiplied by**		
	1.2	or	2.4
Current A	[ ]		[✓]
Current B	[ ]		[✓]
Current C	[ ]		[✓]
Voltage A-G	[ ]		[✓]
Voltage B-G	[ ]		[✓]
Voltage C-G	[ ]		[✓]
Enabled power P	[ ]		[✓]
Reactive power Q	[ ]		[✓]
Frequency f	[ ]		[✓]
Voltage A-B	[ ]		[✓]

A5 List of Bay Types

A5.1 Key to the List of Bay Types

Supported Bay Types

In general, the selection of a bay type (via MAIN: Type of bay) is accepted by the P139 only if all of the following requirements are fulfilled:

- The selected ID number is known by the P139, i. e. is either available as a pre-defined standard bay type, or matches a bay type definition that has been loaded as a customized bay type into the P139 memory in file transfer mode.
- A binary I/O module has been fitted to slot 6 (40 TE case) or 12 (84 TE case).
- The hardware (in particular the set of all binary I/O modules and power supply) has got a sufficient number of inputs and outputs as required by the selected bay type.
- None of the inputs/outputs required by the selected bay type has been previously assigned to a non-control function.

In case of the setting MAIN: Auto-assignment I/O = Yes, the following two constraints must be noted:

- The activation of a new bay type overwrites all DEVxx / SIG_1 / CMD_1 assignments to I/O elements that have been previously made (for the previous bay type definition).
- If the automatic I/O assignment fails because some required inputs and outputs have been assigned to a non-control function, or because the number of I/O elements available is not sufficient, then the previously selected bay type remains active and an error message “Signal from device: Hardware module not fitted (0x8063)” is reported in the “`kommprot.txt`” log file.

Sorting the Bay Types

The bay types are sorted by the criteria listed below. These criteria are encoded in the first three characters of the bay type code (example: **A11.100.R01**) given in brackets after the Bay Type No. (example: **2**). Sorting is first by “Type of bay” in the order given below, then within each group by the second and third character in ascending order.

- Type of bay
  - A – Feeder bays
  - L – Bus sectionalizer bay
  - Q –Bus coupler bay
  - K – Bus coupler and sectionalizer bay
  - M – Busbar measurement bay
  - E – Busbar grounding bay
  - X – Other bay type
- Number of busbars
  - 1 – Single busbar
  - 2 – Double busbar
  - 9 – Without busbar / other configurations
- Equipment
  - 1 – Bays with switch truck or withdrawable switchgear assembly
  - 2 – Bays with two circuit breakers or switch disconnectors on switch trucks or withdrawable switchgear assembly
  - 3 – Bays with stationary switchgear units
  - 5 – Bays with stationary switchgear units and three-position disconnector
  - 9 – Other bay types

Key

Bay Type No.: This number indicates the value to be set at MAIN: Type of bay (Menu branch *Par/Conf*) in order to configure the unit for the selected bay type.

Special Designations for External Devices:

- *Mot.relay*: Motor relay
- *Shunt wd.*: Shunt winding

Table “Assignment of Binary Inputs and Output Relays”:

Column *“Switchgear unit”*: This column begins with the designation for the external device (switchgear unit). The function group follows in brackets. The function group encompasses all setting options for monitoring the switchgear unit and its signals. “Open” and “Close(d)” indicate the signal message or control direction of the switchgear unit.

Column *“Binary Input”*: The “Open” or “Closed” signal should be connected to the binary input U xxxx. The connection points of the binary input U xxxx are shown in the terminal connection diagrams.

Column *“Output relay”*: The “Open” or “Close” control of the switchgear unit is effected via output relay K xxxx. The connection points of the output relay K xxxx are shown in the terminal connection diagrams.

Table “Bay Interlock Equations for Operation without Station Interlocking”:

The interlock equations are stored at substation control level, not at unit level.

Symbols used in the Boolean interlock equations:

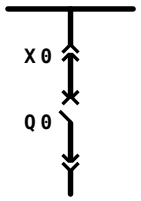
- **/**: Negation
- **0**: Switchgear unit “Open”
- **I** : Switchgear unit “Closed”
- **X**: Switchgear unit in intermediate position
- **FctBl1**: Function block 1, configuration at MAIN: Inp.asg. fct.block.1 (menu branch *Par/Func/Cont*)
- **FctBl2**: Function block 1, configuration at MAIN: Inp.asg. fct.block.2 (menu branch *Par/Func/Cont*)

A5.2 Predefined Bay Types

A5.2.1 Feeder Bays

A5.2.1.1 Bay type No. 2: Feeder bay with circuit breaker, single busbar

A11.100.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	

Tab. A5-1: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

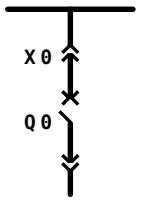
Tab. A5-2: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-3: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.2 Bay type No. 3: Feeder bay with circuit breaker, single busbar

A11.100.R02

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	

Tab. A5-4: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

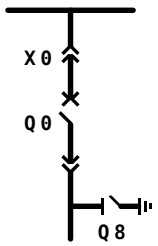
Tab. A5-5: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

Tab. A5-6: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.3 Bay type No. 546: Feeder bay with circuit breaker, single busbar, direct motor control

A11.101.M03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-7: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

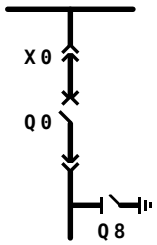
Tab. A5-8: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-9: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.4 Bay type No. 4: Feeder bay with circuit breaker, single busbar

A11.101.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q8 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	

Tab. A5-10: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

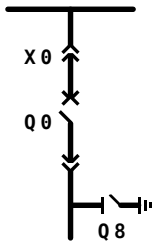
Tab. A5-11: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-12: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.5 Bay type No. 5: Feeder bay with circuit breaker, single busbar

A11.101.R02

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	

Tab. A5-13: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

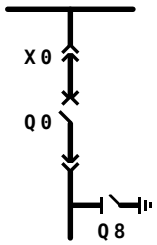
Tab. A5-14: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-15: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.6 Bay type No. 6: Feeder bay with circuit breaker, single busbar

A11.101.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	

Tab. A5-16: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

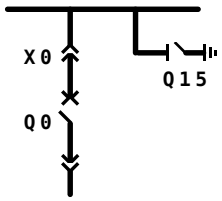
Tab. A5-17: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-18: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.7 Bay type No. 523: Feeder bay with circuit breaker, single busbar

A11.108.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q15 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	

Tab. A5-19: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & (*Q15*=0) & /(FctBl1=I) & /(FctBl2=I)

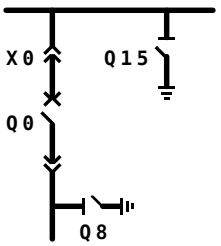
Tab. A5-20: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & (*Q15*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-21: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.8 Bay type No. 549: Feeder bay with circuit breaker, single busbar, direct motor control

A11.109.M03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q8 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X0 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q15 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-22: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & (*Q15*=0) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0) & (*Q15*=0)

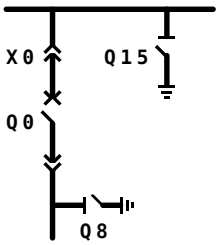
Tab. A5-23: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & (*Q15*=0) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0) & (*Q15*=0)

Tab. A5-24: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.9 Bay type No. 244: Feeder bay with circuit breaker, single busbar

A11.109.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q8 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q15 (*DEV07*)	Open	U C01	/	
	Close(d)	U C02	/	

Tab. A5-25: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

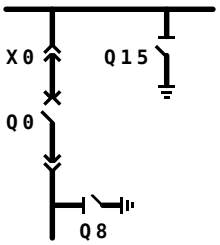
Tab. A5-26: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-27: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.10 Bay type No. 544: Feeder bay with circuit breaker, single busbar

A11.109.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q15 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-28: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & (*Q15*=0) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0) & (*Q15*=0)

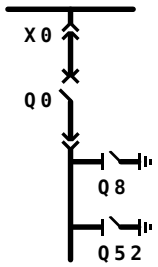
Tab. A5-29: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & (*Q15*=0) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0) & (*Q15*=0)

Tab. A5-30: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.11 Bay type No. 567: Feeder bay with circuit breaker, single busbar

A11.132.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q8 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q52 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-31: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

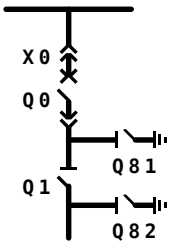
Tab. A5-32: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-33: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.12 Bay type No. 521: Feeder bay with circuit breaker, single busbar

A11.134.R02.1

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q1 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q81 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q82 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-34: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(*Q1*=X) & (*Q82*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q81*=0) & (*Q82*=0)

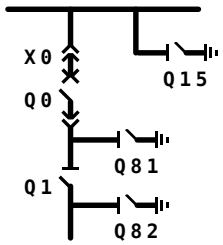
Tab. A5-35: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(*Q1*=X) & (*Q82*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q81*=0) & (*Q82*=0)

Tab. A5-36: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.13 Bay type No. 519: Feeder bay with circuit breaker, single busbar

A11.135.R02.1

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q1 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q81 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q82 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	
Q15 (*DEV06*)	Open	U B05	/	
	Close(d)	U B06	/	

Tab. A5-37: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(*Q1*=X) & (*Q15*=0) & (*Q82*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q81*=0) & (*Q82*=0)

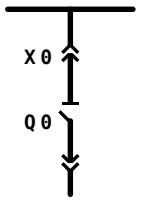
Tab. A5-38: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(*Q1*=X) & (*Q15*=0) & (*Q82*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q81*=0) & (*Q82*=0)

Tab. A5-39: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.14 Bay type No. 7: Feeder bay with switch disconnector, single busbar

A11.200.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	

Tab. A5-40: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

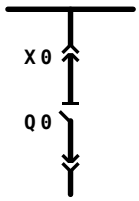
Tab. A5-41: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-42: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.15 Bay type No. 8: Feeder bay with switch disconnector, single busbar

A11.200.R02

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	

Tab. A5-43: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

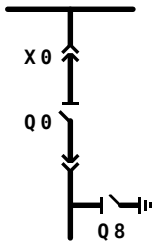
Tab. A5-44: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

Tab. A5-45: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.16 Bay type No. 9: Feeder bay with switch disconnector, single busbar

A11.201.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q8 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	

Tab. A5-46: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

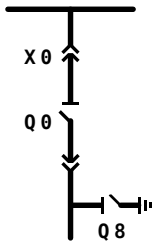
Tab. A5-47: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-48: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.17 Bay type No. 10: Feeder bay with switch disconnector, single busbar

A11.201.R02

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	

Tab. A5-49: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

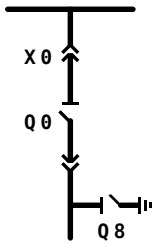
Tab. A5-50: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-51: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.18 Bay type No. 11: Feeder bay with switch disconnector, single busbar

A11.201.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	

Tab. A5-52: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

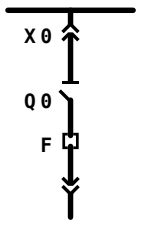
Tab. A5-53: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-54: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.19 Bay type No. 12: Feeder bay with switch disconnector / fuse unit, single busbar

A11.400.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-55: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

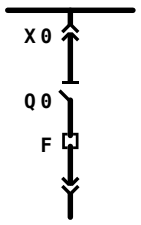
Tab. A5-56: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-57: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.20 Bay type No. 13: Feeder bay with switch disconnector / fuse unit, single busbar

A11.400.R02

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-58: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

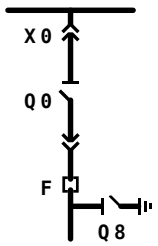
Tab. A5-59: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

Tab. A5-60: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.21 Bay type No. 14: Feeder bay with switch disconnector / fuse unit, single busbar

A11.401.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q8 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-61: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

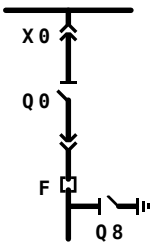
Tab. A5-62: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-63: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.22 Bay type No. 15: Feeder bay with switch disconnector / fuse unit, single busbar

A11.401.R02

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-64: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

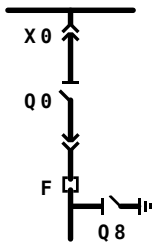
Tab. A5-65: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-66: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.23 Bay type No. 16: Feeder bay with switch disconnector / fuse unit, single busbar

A11.401.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-67: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

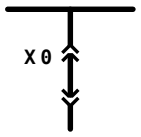
Tab. A5-68: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-69: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.24 Bay type No. 17: Feeder bay with other switchgear unit, single busbar

A11.900.R01

Switchgear unit		Binary input	Output relay	
X0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	

Tab. A5-70: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

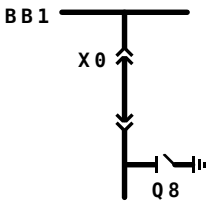
Tab. A5-71: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-72: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.25 Bay type No. 504: Feeder bay with other switchgear unit, single busbar

A11.901.R00

Switchgear unit		Binary input	Output relay	
X0 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q8 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	

Tab. A5-73: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

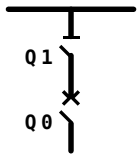
Tab. A5-74: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-75: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.26 Bay type No. 541: Feeder bay with circuit breaker, single busbar

A13.104.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	

Tab. A5-76: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(FctBl1=I) & /(FctBl2=I)

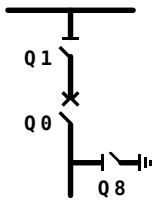
Tab. A5-77: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(FctBl1=I) & /(FctBl2=I)

Tab. A5-78: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.27 Bay type No. 18: Feeder bay with circuit breaker, single busbar, direct motor control

A13.105.M03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-79: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0)

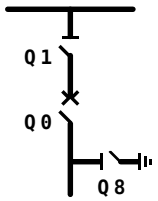
Tab. A5-80: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0)

Tab. A5-81: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.28 Bay type No. 19: Feeder bay with circuit breaker, single busbar

A13.105.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q8 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	

Tab. A5-82: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

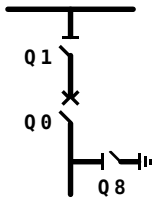
Tab. A5-83: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-84: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.29 Bay type No. 20: Feeder bay with circuit breaker, single busbar

A13.105.R02

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	

Tab. A5-85: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

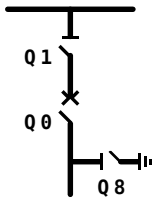
Tab. A5-86: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-87: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.30 Bay type No. 21: Feeder bay with circuit breaker, single busbar

A13.105.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	

Tab. A5-88: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0)

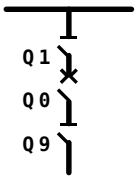
Tab. A5-89: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0)

Tab. A5-90: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.31 Bay type No. 557: Feeder bay with circuit breaker, single busbar

A13.106.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q9 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	

Tab. A5-91: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

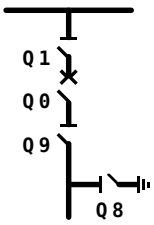
Tab. A5-92: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

Tab. A5-93: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.32 Bay type No. 22: Feeder bay with circuit breaker, single busbar, direct motor control

A13.107.M04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q9 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-94: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q8	Close(d)	(*Q9*=0)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

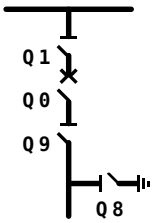
Tab. A5-95: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q8	Close(d)	(*Q9*=0)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-96: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.33 Bay type No. 23: Feeder bay with circuit breaker, single busbar

A13.107.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q9 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q8 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-97: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)

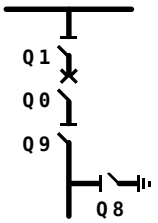
Tab. A5-98: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-99: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.34 Bay type No. 24: Feeder bay with circuit breaker, single busbar

A13.107.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q9 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-100: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

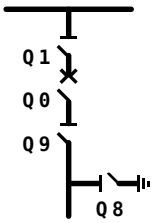
Tab. A5-101: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-102: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.35 Bay type No. 25: Feeder bay with circuit breaker, single busbar

A13.107.R04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q9 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	

Tab. A5-103: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q8	Close(d)	(*Q9*=0)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

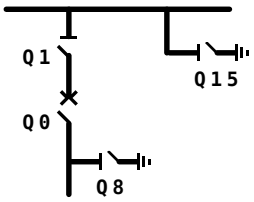
Tab. A5-104: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q8	Close(d)	(*Q9*=0)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-105: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.36 Bay type No. 508: Feeder bay with circuit breaker, single busbar

A13.111.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q15 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-106: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & (*Q15*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0) & (*Q15*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0)

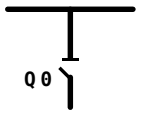
Tab. A5-107: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & (*Q15*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0) & (*Q15*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0)

Tab. A5-108: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.37 Bay type No. 26: Feeder bay with switch disconnector, single busbar

A13.200.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	

Tab. A5-109: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

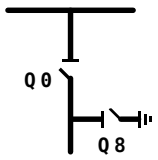
Tab. A5-110: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-111: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.38 Bay type No. 27: Feeder bay with switch disconnector, single busbar, direct motor control

A13.201.M02

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q8 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-112: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	(*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*Q0*=0)

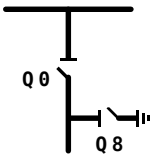
Tab. A5-113: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	(*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*Q0*=0)

Tab. A5-114: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.39 Bay type No. 28: Feeder bay with switch disconnector, single busbar

A13.201.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q8 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	

Tab. A5-115: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	(*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

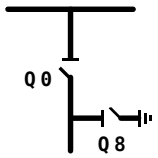
Tab. A5-116: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	(*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-117: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.40 Bay type No. 29: Feeder bay with switch disconnector, single busbar

A13.201.R02

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q8 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	

Tab. A5-118: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	(*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*Q0*=0)

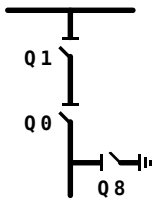
Tab. A5-119: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	(*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*Q0*=0)

Tab. A5-120: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.41 Bay type No. 30: Feeder bay with switch disconnector, single busbar, direct motor control

A13.205.M03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-121: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0)

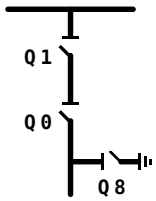
Tab. A5-122: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0)

Tab. A5-123: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.42 Bay type No. 31: Feeder bay with switch disconnector, single busbar

A13.205.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q8 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	

Tab. A5-124: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

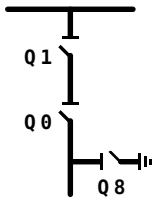
Tab. A5-125: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-126: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.43 Bay type No. 32: Feeder bay with switch disconnector, single busbar

A13.205.R02

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	

Tab. A5-127: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

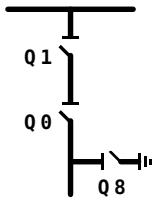
Tab. A5-128: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-129: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.44 Bay type No. 33: Feeder bay with switch disconnector, single busbar

A13.205.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	

Tab. A5-130: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0)

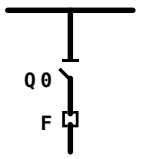
Tab. A5-131: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0)

Tab. A5-132: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.45 Bay type No. 34: Feeder bay with switch disconnector / fuse unit, single busbar

A13.400.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-133: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

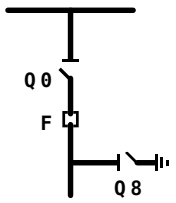
Tab. A5-134: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-135: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.46 Bay type No. 35: Feeder bay with switch disconnector / fuse unit, single busbar, direct motor control

A13.401.M02

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q8 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
F (SIG_1: Signal S011 EXT)		U B05	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-136: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	(*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*Q0*=0)

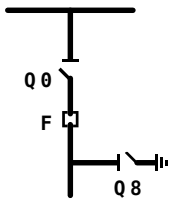
Tab. A5-137: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	(*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*Q0*=0)

Tab. A5-138: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.47 Bay type No. 36: Feeder bay with switch disconnector / fuse unit, single busbar

A13.401.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q8 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-139: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	(*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

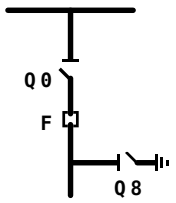
Tab. A5-140: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	(*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-141: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.48 Bay type No. 37: Feeder bay with switch disconnector / fuse unit, single busbar

A13.401.R02

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q8 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-142: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	(*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*Q0*=0)

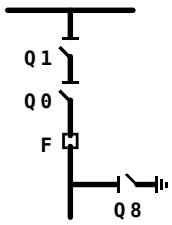
Tab. A5-143: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	(*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*Q0*=0)

Tab. A5-144: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.49 Bay type No. 38: Feeder bay with switch disconnector / fuse unit, single busbar, direct motor control

A13.405.M03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
F (SIG_1: Signal S011 EXT)		U B05	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-145: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0)

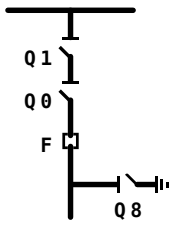
Tab. A5-146: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0)

Tab. A5-147: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.50 Bay type No. 39: Feeder bay with switch disconnector / fuse unit, single busbar

A13.405.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q8 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-148: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

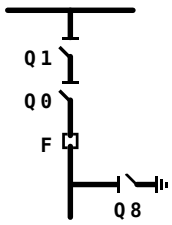
Tab. A5-149: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-150: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.51 Bay type No. 40: Feeder bay with switch disconnector / fuse unit, single busbar

A13.405.R02

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-151: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

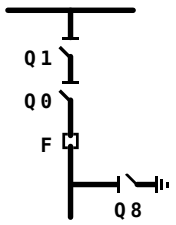
Tab. A5-152: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-153: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.52 Bay type No. 41: Feeder bay with switch disconnector / fuse unit, single busbar

A13.405.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-154: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0)

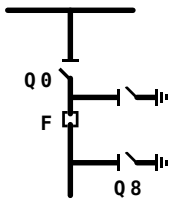
Tab. A5-155: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0)

Tab. A5-156: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.53 Bay type No. 503: Feeder bay with switch disconnector / fuse unit, single busbar

A13.432.R02

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q8 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-157: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	(*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*Q0*=0)

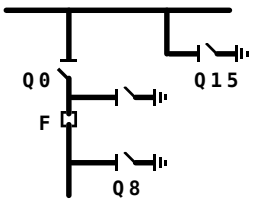
Tab. A5-158: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	(*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*Q0*=0)

Tab. A5-159: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.54 Bay type No. 507: Feeder bay with switch disconnector / fuse unit, single busbar

A13.433.R02

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q8 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q15 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-160: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	(*Q8*=0) & (*Q15*=0) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*Q0*=0)

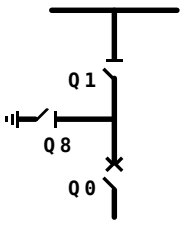
Tab. A5-161: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	(*Q8*=0) & (*Q15*=0) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*Q0*=0)

Tab. A5-162: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.55 Bay type No. 220: Feeder bay with circuit breaker, single busbar, direct motor control

A15.105.M02

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-163: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

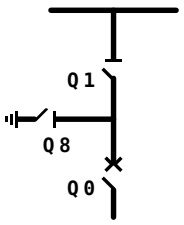
Tab. A5-164: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-165: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.56 Bay type No. 42: Feeder bay with circuit breaker, single busbar, direct motor control

A15.105.M03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-166: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q8	Open	(*Q0*=I)
	Close(d)	(*Q0*=0) & (*Q1*=0) & /(FctBl1=I) & /(FctBl2=I)

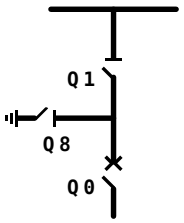
Tab. A5-167: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q8	Open	(*Q0*=I)
	Close(d)	(*Q0*=0) & (*Q1*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-168: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.57 Bay type No. 43: Feeder bay with circuit breaker, single busbar

A15.105.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q8 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	

Tab. A5-169: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

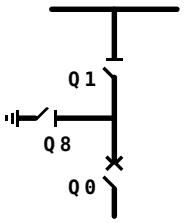
Tab. A5-170: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-171: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.58 Bay type No. 221: Feeder bay with circuit breaker, single busbar

A15.105.R02

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	

Tab. A5-172: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

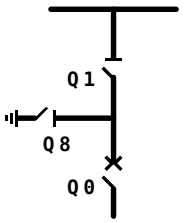
Tab. A5-173: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

Tab. A5-174: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.59 Bay type No. 44: Feeder bay with circuit breaker, single busbar

A15.105.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	

Tab. A5-175: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q8	Open	(*Q0*=I)
	Close(d)	(*Q0*=0) & (*Q1*=0) & /(FctBl1=I) & /(FctBl2=I)

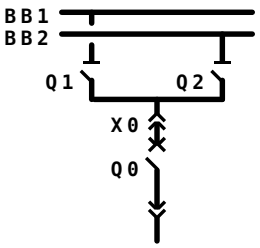
Tab. A5-176: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q8	Open	(*Q0*=I)
	Close(d)	(*Q0*=0) & (*Q1*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-177: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.60 Bay type No. 45: Feeder bay with circuit breaker, double busbar, direct motor control

A21.104.M04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-178: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

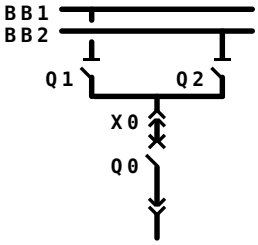
Tab. A5-179: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

Tab. A5-180: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.61 Bay type No. 46: Feeder bay with circuit breaker, double busbar

A21.104.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q2 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
X0 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-181: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

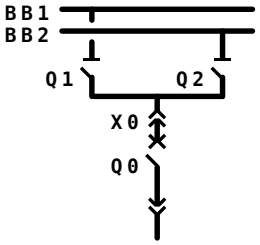
Tab. A5-182: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-183: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.62 Bay type No. 47: Feeder bay with circuit breaker, double busbar

A21.104.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-184: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)

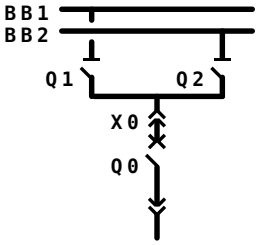
Tab. A5-185: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-186: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.63 Bay type No. 48: Feeder bay with circuit breaker, double busbar

A21.104.R04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	

Tab. A5-187: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

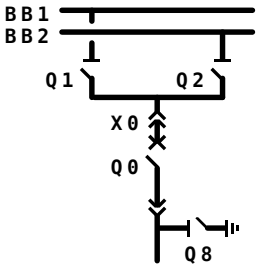
Tab. A5-188: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

Tab. A5-189: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.64 Bay type No. 49: Feeder bay with circuit breaker, double busbar, direct motor control

A21.105.M05

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q8 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-190: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & (*Q8*=0)

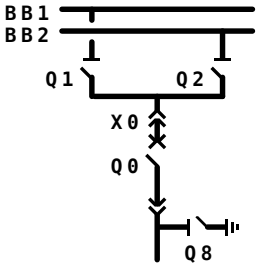
Tab. A5-191: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & (*Q8*=0)

Tab. A5-192: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.65 Bay type No. 50: Feeder bay with circuit breaker, double busbar

A21.105.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q2 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
X0 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q8 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-193: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

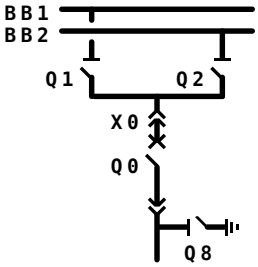
Tab. A5-194: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-195: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.66 Bay type No. 51: Feeder bay with circuit breaker, double busbar

A21.105.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q8 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-196: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)

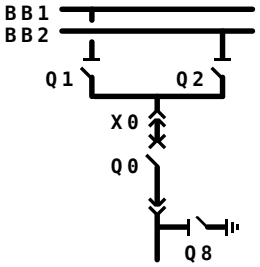
Tab. A5-197: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-198: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.67 Bay type No. 52: Feeder bay with circuit breaker, double busbar

A21.105.R04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q8 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-199: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & (*Q8*=0)

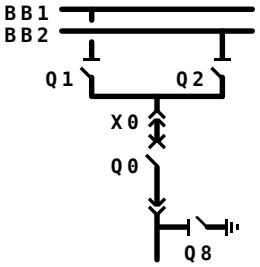
Tab. A5-200: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & (*Q8*=0)

Tab. A5-201: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.68 Bay type No. 53: Feeder bay with circuit breaker, double busbar

A21.105.R05

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q8 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	

Tab. A5-202: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & (*Q8*=0)

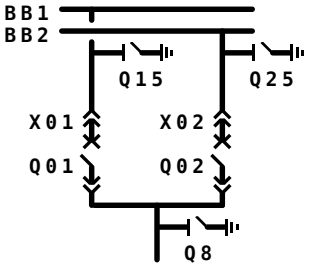
Tab. A5-203: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & (*Q8*=0)

Tab. A5-204: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.69 Bay type No. 526: Feeder bay with circuit breaker, double busbar

A21.125.R02

Switchgear unit		Binary input	Output relay	
Q01 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q02 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
X02 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q8 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	
Q15 (*DEV06*)	Open	U B05	/	
	Close(d)	U B06	/	
Q25 (*DEV07*)	Open	U C01	/	
	Close(d)	U C02	/	

Tab. A5-205: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	/(*X01*=X) & /(*X02*=X) & (*Q15*=0) & (*Q25*=0) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	/(*X01*=X) & /(*X02*=X) & (*Q15*=0) & (*Q25*=0) & /(FctBl1=I) & /(FctBl2=I)

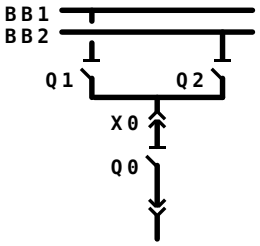
Tab. A5-206: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	/(*X01*=X) & /(*X02*=X) & (*Q15*=0) & (*Q25*=0) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	/(*X01*=X) & /(*X02*=X) & (*Q15*=0) & (*Q25*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-207: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.70 Bay type No. 54: Feeder bay with switch disconnector, double busbar, direct motor control

A21.204.M04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-208: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

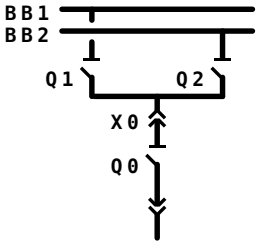
Tab. A5-209: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

Tab. A5-210: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.71 Bay type No. 55: Feeder bay with switch disconnector, double busbar

A21.204.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q2 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
X0 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-211: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

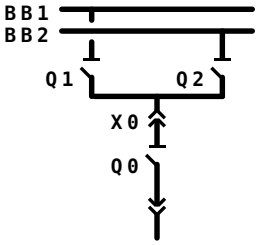
Tab. A5-212: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-213: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.72 Bay type No. 56: Feeder bay with switch disconnector, double busbar

A21.204.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-214: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)

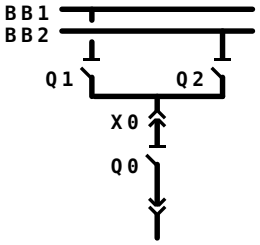
Tab. A5-215: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-216: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.73 Bay type No. 57: Feeder bay with switch disconnector, double busbar

A21.204.R04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	

Tab. A5-217: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

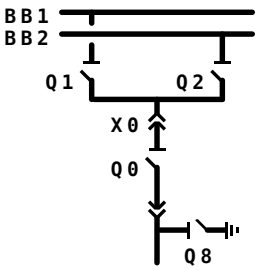
Tab. A5-218: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

Tab. A5-219: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.74 Bay type No. 58: Feeder bay with switch disconnector, double busbar, direct motor control

A21.205.M05

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q8 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-220: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & (*Q8*=0)

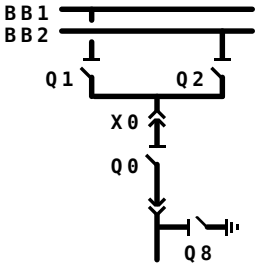
Tab. A5-221: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & (*Q8*=0)

Tab. A5-222: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.75 Bay type No. 59: Feeder bay with switch disconnector, double busbar

A21.205.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q2 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
X0 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q8 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-223: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

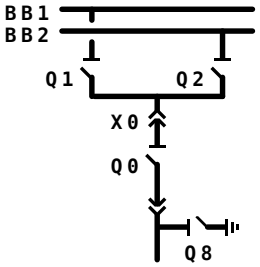
Tab. A5-224: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-225: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.76 Bay type No. 60: Feeder bay with switch disconnector, double busbar

A21.205.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q8 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-226: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)

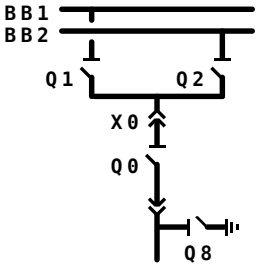
Tab. A5-227: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-228: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.77 Bay type No. 61: Feeder bay with switch disconnector, double busbar

A21.205.R04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q8 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-229: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & (*Q8*=0)

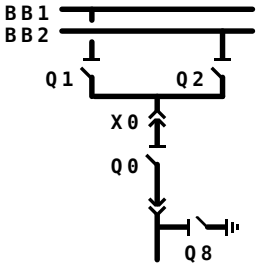
Tab. A5-230: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & (*Q8*=0)

Tab. A5-231: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.78 Bay type No. 62: Feeder bay with switch disconnector, double busbar

A21.205.R05

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q8 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	

Tab. A5-232: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & (*Q8*=0)

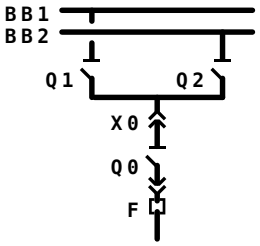
Tab. A5-233: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & (*Q8*=0)

Tab. A5-234: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.79 Bay type No. 63: Feeder bay with switch disconnector / fuse unit, double busbar, direct motor control

A21.404.M04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
F (SIG_1: Signal S011 EXT)		U B05	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-235: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

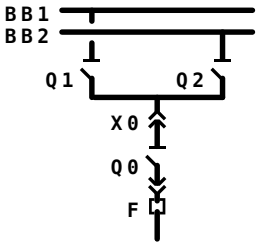
Tab. A5-236: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

Tab. A5-237: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.80 Bay type No. 64: Feeder bay with switch disconnector / fuse unit, double busbar

A21.404.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q2 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
X0 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-238: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

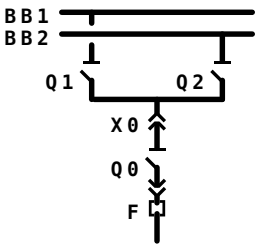
Tab. A5-239: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-240: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.81 Bay type No. 65: Feeder bay with switch disconnector / fuse unit, double busbar

A21.404.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-241: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)

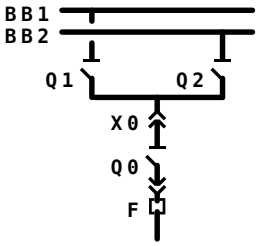
Tab. A5-242: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-243: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.82 Bay type No. 66: Feeder bay with switch disconnector / fuse unit, double busbar

A21.404.R04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-244: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

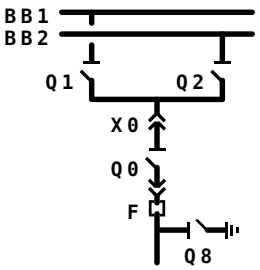
Tab. A5-245: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

Tab. A5-246: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.83 Bay type No. 67: Feeder bay with switch disconnector / fuse unit, double busbar, direct motor control

A21.405.M05

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q8 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	
F (SIG_1: Signal S011 EXT)		U B05	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-247: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & (*Q8*=0)

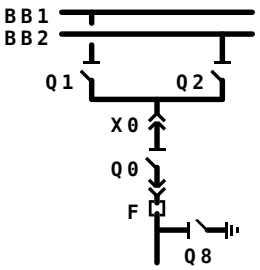
Tab. A5-248: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & (*Q8*=0)

Tab. A5-249: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.84 Bay type No. 68: Feeder bay with switch disconnector / fuse unit, double busbar

A21.405.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q2 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
X0 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q8 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-250: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

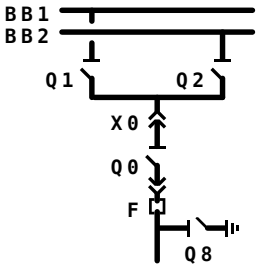
Tab. A5-251: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-252: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.85 Bay type No. 69: Feeder bay with switch disconnector / fuse unit, double busbar

A21.405.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q8 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-253: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)

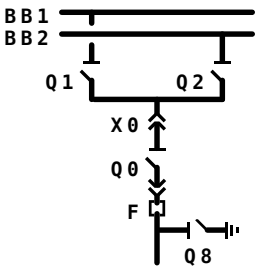
Tab. A5-254: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-255: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.86 Bay type No. 70: Feeder bay with switch disconnector / fuse unit, double busbar

A21.405.R04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q8 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-256: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & (*Q8*=0)

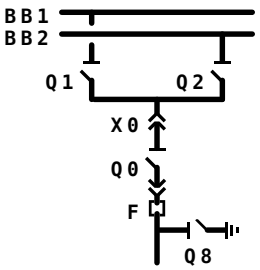
Tab. A5-257: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & (*Q8*=0)

Tab. A5-258: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.87 Bay type No. 71: Feeder bay with switch disconnector / fuse unit, double busbar

A21.405.R05

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q8 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-259: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & (*Q8*=0)

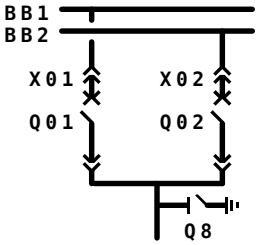
Tab. A5-260: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X0*=0)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & (*Q8*=0)

Tab. A5-261: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.88 Bay type No. 72: Feeder bay with circuit breaker, double busbar

A22.101.R02

Switchgear unit		Binary input	Output relay	
Q01 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q02 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
X02 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q8 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-262: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	(*Q02*=0) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	(*Q01*=0) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)

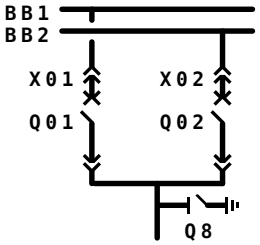
Tab. A5-263: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-264: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.89 Bay type No. 73: Feeder bay with circuit breaker, double busbar

A22.101.R04

Switchgear unit		Binary input	Output relay	
Q01 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q02 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X02 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q8 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-265: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	(*Q02*=0) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	(*Q01*=0) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
X01	Open	(*Q01*=0)
	Close(d)	(*Q01*=0) & (*Q8*=0)
X02	Open	(*Q02*=0)
	Close(d)	(*Q02*=0) & (*Q8*=0)

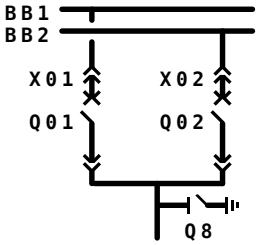
Tab. A5-266: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
X01	Open	(*Q01*=0)
	Close(d)	(*Q01*=0) & (*Q8*=0)
X02	Open	(*Q02*=0)
	Close(d)	(*Q02*=0) & (*Q8*=0)

Tab. A5-267: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.90 Bay type No. 74: Feeder bay with circuit breaker, double busbar

A22.101.R05

Switchgear unit		Binary input	Output relay	
Q01 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q02 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X02 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q8 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	

Tab. A5-268: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	(*Q02*=0) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	(*Q01*=0) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X01*=0) & (*X02*=0)
X01	Open	(*Q01*=0)
	Close(d)	(*Q01*=0) & (*Q8*=0)
X02	Open	(*Q02*=0)
	Close(d)	(*Q02*=0) & (*Q8*=0)

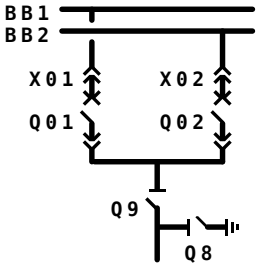
Tab. A5-269: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X01*=0) & (*X02*=0)
X01	Open	(*Q01*=0)
	Close(d)	(*Q01*=0) & (*Q8*=0)
X02	Open	(*Q02*=0)
	Close(d)	(*Q02*=0) & (*Q8*=0)

Tab. A5-270: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.91 Bay type No. 75: Feeder bay with circuit breaker, double busbar

A22.103.R02

Switchgear unit		Binary input	Output relay	
Q01 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q02 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
X02 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q9 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	
Q8 (*DEV06*)	Open	U B05	/	
	Close(d)	U B06	/	

Tab. A5-271: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	(*Q02*=0) & /(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	(*Q01*=0) & /(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)

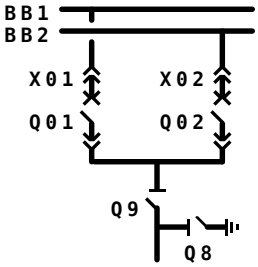
Tab. A5-272: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	/(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	/(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-273: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.92 Bay type No. 76: Feeder bay with circuit breaker, double busbar

A22.103.R03

Switchgear unit		Binary input	Output relay	
Q01 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q02 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
X02 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q9 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	
Q8 (*DEV06*)	Open	U B05	/	
	Close(d)	U B06	/	

Tab. A5-274: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	(*Q02*=0) & /(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	(*Q01*=0) & /(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q9	Open	(*Q01*=0) & (*Q02*=0)
	Close(d)	(*Q01*=0) & (*Q02*=0) & (*Q8*=0)

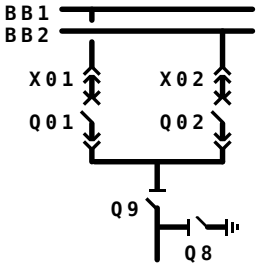
Tab. A5-275: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	/(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	/(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q9	Open	(*Q01*=0) & (*Q02*=0)
	Close(d)	(*Q01*=0) & (*Q02*=0) & (*Q8*=0)

Tab. A5-276: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.93 Bay type No. 77: Feeder bay with circuit breaker, double busbar

A22.103.R05

Switchgear unit		Binary input	Output relay	
Q01 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q02 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X02 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q9 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	
Q8 (*DEV06*)	Open	U B05	/	
	Close(d)	U B06	/	

Tab. A5-277: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	(*Q02*=0) & /(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	(*Q01*=0) & /(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q9	Open	(*Q01*=0) & (*Q02*=0)
	Close(d)	(*Q01*=0) & (*Q02*=0) & (*Q8*=0)
X01	Open	(*Q01*=0)
	Close(d)	(*Q01*=0)
X02	Open	(*Q02*=0)
	Close(d)	(*Q02*=0)

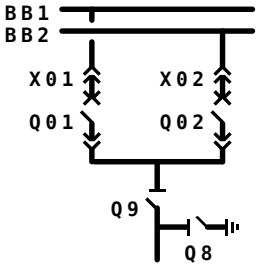
Tab. A5-278: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	/(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	/(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q9	Open	(*Q01*=0) & (*Q02*=0)
	Close(d)	(*Q01*=0) & (*Q02*=0) & (*Q8*=0)
X01	Open	(*Q01*=0)
	Close(d)	(*Q01*=0)
X02	Open	(*Q02*=0)
	Close(d)	(*Q02*=0)

Tab. A5-279: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.94 Bay type No. 78: Feeder bay with circuit breaker, double busbar

A22.103.R06

Switchgear unit		Binary input	Output relay	
Q01 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q02 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X02 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q9 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	
Q8 (*DEV06*)	Open	U B05	K B05	
	Close(d)	U B06	K B06	

Tab. A5-280: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	(*Q02*=0) & /(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	(*Q01*=0) & /(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*Q9*=0)
Q9	Open	(*Q01*=0) & (*Q02*=0)
	Close(d)	(*Q01*=0) & (*Q02*=0) & (*Q8*=0)
X01	Open	(*Q01*=0)
	Close(d)	(*Q01*=0)
X02	Open	(*Q02*=0)
	Close(d)	(*Q02*=0)

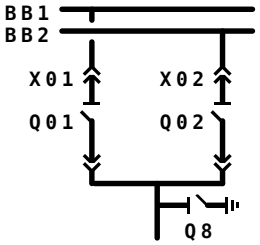
Tab. A5-281: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	/(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	/(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*Q9*=0)
Q9	Open	(*Q01*=0) & (*Q02*=0)
	Close(d)	(*Q01*=0) & (*Q02*=0) & (*Q8*=0)
X01	Open	(*Q01*=0)
	Close(d)	(*Q01*=0)
X02	Open	(*Q02*=0)
	Close(d)	(*Q02*=0)

Tab. A5-282: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.95 Bay type No. 79: Feeder bay with switch disconnector, double busbar

A22.201.R02

Switchgear unit		Binary input	Output relay	
Q01 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q02 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
X02 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q8 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-283: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	(*Q02*=0) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	(*Q01*=0) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)

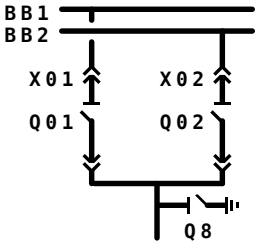
Tab. A5-284: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-285: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.96 Bay type No. 80: Feeder bay with switch disconnector, double busbar

A22.201.R04

Switchgear unit		Binary input	Output relay	
Q01 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q02 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X02 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q8 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-286: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	(*Q02*=0) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	(*Q01*=0) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
X01	Open	(*Q01*=0)
	Close(d)	(*Q01*=0) & (*Q8*=0)
X02	Open	(*Q02*=0)
	Close(d)	(*Q02*=0) & (*Q8*=0)

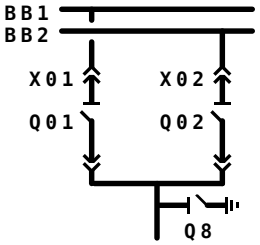
Tab. A5-287: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
X01	Open	(*Q01*=0)
	Close(d)	(*Q01*=0) & (*Q8*=0)
X02	Open	(*Q02*=0)
	Close(d)	(*Q02*=0) & (*Q8*=0)

Tab. A5-288: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.97 Bay type No. 81: Feeder bay with switch disconnector, double busbar

A22.201.R05

Switchgear unit		Binary input	Output relay	
Q01 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q02 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X02 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q8 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	

Tab. A5-289: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	(*Q02*=0) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	(*Q01*=0) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X01*=0) & (*X02*=0)
X01	Open	(*Q01*=0)
	Close(d)	(*Q01*=0) & (*Q8*=0)
X02	Open	(*Q02*=0)
	Close(d)	(*Q02*=0) & (*Q8*=0)

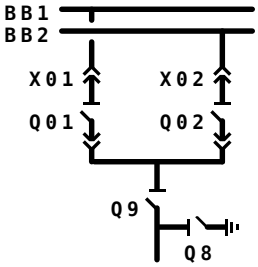
Tab. A5-290: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X01*=0) & (*X02*=0)
X01	Open	(*Q01*=0)
	Close(d)	(*Q01*=0) & (*Q8*=0)
X02	Open	(*Q02*=0)
	Close(d)	(*Q02*=0) & (*Q8*=0)

Tab. A5-291: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.98 Bay type No. 82: Feeder bay with switch disconnector, double busbar

A22.203.R02

Switchgear unit		Binary input	Output relay	
Q01 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q02 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
X02 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q9 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	
Q8 (*DEV06*)	Open	U B05	/	
	Close(d)	U B06	/	

Tab. A5-292: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	(*Q02*=0) & /(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	(*Q01*=0) & /(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)

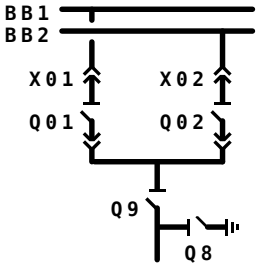
Tab. A5-293: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	/(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	/(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-294: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.99 Bay type No. 83: Feeder bay with switch disconnector, double busbar

A22.203.R03

Switchgear unit		Binary input	Output relay	
Q01 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q02 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
X02 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q9 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	
Q8 (*DEV06*)	Open	U B05	/	
	Close(d)	U B06	/	

Tab. A5-295: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	(*Q02*=0) & /(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	(*Q01*=0) & /(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q9	Open	(*Q01*=0) & (*Q02*=0)
	Close(d)	(*Q01*=0) & (*Q02*=0) & (*Q8*=0)

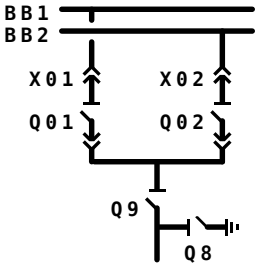
Tab. A5-296: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	/(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	/(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q9	Open	(*Q01*=0) & (*Q02*=0)
	Close(d)	(*Q01*=0) & (*Q02*=0) & (*Q8*=0)

Tab. A5-297: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.100 Bay type No. 84: Feeder bay with switch disconnector, double busbar

A22.203.R05

Switchgear unit		Binary input	Output relay	
Q01 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q02 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X02 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q9 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	
Q8 (*DEV06*)	Open	U B05	/	
	Close(d)	U B06	/	

Tab. A5-298: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	(*Q02*=0) & /(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	(*Q01*=0) & /(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q9	Open	(*Q01*=0) & (*Q02*=0)
	Close(d)	(*Q01*=0) & (*Q02*=0) & (*Q8*=0)
X01	Open	(*Q01*=0)
	Close(d)	(*Q01*=0)
X02	Open	(*Q02*=0)
	Close(d)	(*Q02*=0)

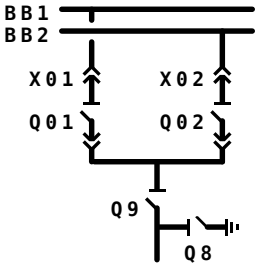
Tab. A5-299: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	/(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	/(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q9	Open	(*Q01*=0) & (*Q02*=0)
	Close(d)	(*Q01*=0) & (*Q02*=0) & (*Q8*=0)
X01	Open	(*Q01*=0)
	Close(d)	(*Q01*=0)
X02	Open	(*Q02*=0)
	Close(d)	(*Q02*=0)

Tab. A5-300: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.101 Bay type No. 85: Feeder bay with switch disconnector, double busbar

A22.203.R06

Switchgear unit		Binary input	Output relay	
Q01 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q02 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X02 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q9 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	
Q8 (*DEV06*)	Open	U B05	K B05	
	Close(d)	U B06	K B06	

Tab. A5-301: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	(*Q02*=0) & /(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	(*Q01*=0) & /(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*Q9*=0)
Q9	Open	(*Q01*=0) & (*Q02*=0)
	Close(d)	(*Q01*=0) & (*Q02*=0) & (*Q8*=0)
X01	Open	(*Q01*=0)
	Close(d)	(*Q01*=0)
X02	Open	(*Q02*=0)
	Close(d)	(*Q02*=0)

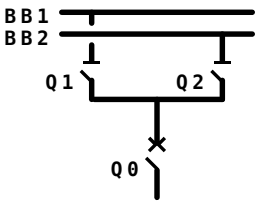
Tab. A5-302: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	/(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	/(*Q9*=X) & /(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*Q9*=0)
Q9	Open	(*Q01*=0) & (*Q02*=0)
	Close(d)	(*Q01*=0) & (*Q02*=0) & (*Q8*=0)
X01	Open	(*Q01*=0)
	Close(d)	(*Q01*=0)
X02	Open	(*Q02*=0)
	Close(d)	(*Q02*=0)

Tab. A5-303: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.102 Bay type No. 86: Feeder bay with circuit breaker, double busbar, direct motor control

A23.104.M03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-304: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)

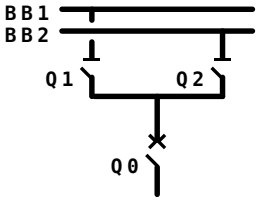
Tab. A5-305: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-306: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.103 Bay type No. 87: Feeder bay with circuit breaker, double busbar

A23.104.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q2 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	

Tab. A5-307: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(FctBl1=I) & /(FctBl2=I)

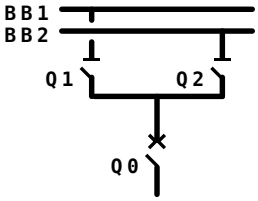
Tab. A5-308: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-309: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.104 Bay type No. 88: Feeder bay with circuit breaker, double busbar

A23.104.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	

Tab. A5-310: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)

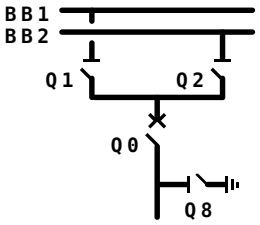
Tab. A5-311: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-312: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.105 Bay type No. 89: Feeder bay with circuit breaker, double busbar, direct motor control

A23.105.M04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-313: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0) & (*Q8*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

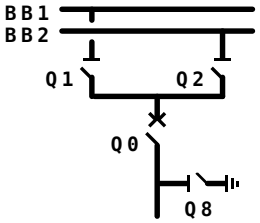
Tab. A5-314: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Close(d)	(*Q8*=0)
Q2	Close(d)	(*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

Tab. A5-315: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.106 Bay type No. 90: Feeder bay with circuit breaker, double busbar

A23.105.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q2 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q8 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-316: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

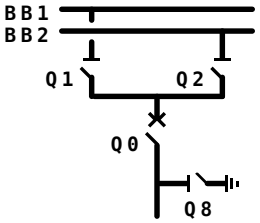
Tab. A5-317: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-318: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.107 Bay type No. 91: Feeder bay with circuit breaker, double busbar

A23.105.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-319: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0) & (*Q8*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q8*=0)

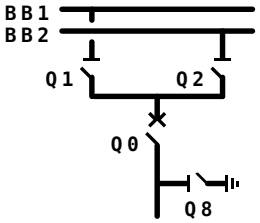
Tab. A5-320: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Close(d)	(*Q8*=0)
Q2	Close(d)	(*Q8*=0)

Tab. A5-321: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.108 Bay type No. 92: Feeder bay with circuit breaker, double busbar

A23.105.R04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	

Tab. A5-322: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0) & (*Q8*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

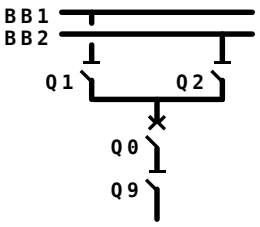
Tab. A5-323: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Close(d)	(*Q8*=0)
Q2	Close(d)	(*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

Tab. A5-324: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.109 Bay type No. 93: Feeder bay with circuit breaker, double busbar, direct motor control

A23.106.M04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q9 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-325: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

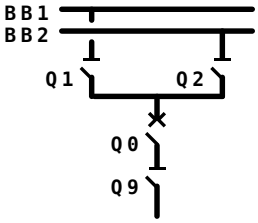
Tab. A5-326: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

Tab. A5-327: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.110 Bay type No. 94: Feeder bay with circuit breaker, double busbar

A23.106.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q2 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q9 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-328: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)

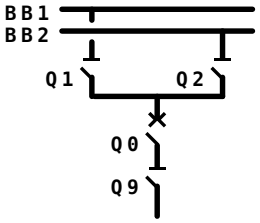
Tab. A5-329: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-330: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.111 Bay type No. 95: Feeder bay with circuit breaker, double busbar

A23.106.R04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q9 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	

Tab. A5-331: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

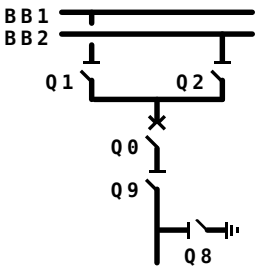
Tab. A5-332: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

Tab. A5-333: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.112 Bay type No. 96: Feeder bay with circuit breaker, double busbar, direct motor control

A23.107.M05

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q9 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q8 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-334: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
Q8	Close(d)	(*Q9*=0)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

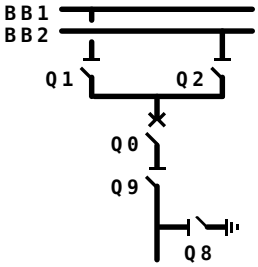
Tab. A5-335: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*Q9*=0)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-336: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.113 Bay type No. 97: Feeder bay with circuit breaker, double busbar

A23.107.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q2 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q9 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q8 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-337: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)

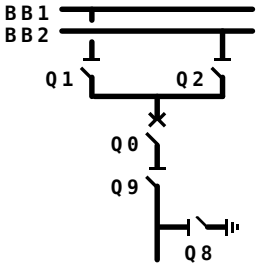
Tab. A5-338: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-339: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.114 Bay type No. 98: Feeder bay with circuit breaker, double busbar

A23.107.R04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q9 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q8 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-340: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

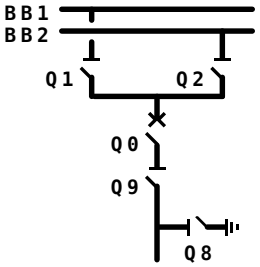
Tab. A5-341: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-342: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.115 Bay type No. 99: Feeder bay with circuit breaker, double busbar

A23.107.R05

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q9 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q8 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	

Tab. A5-343: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
Q8	Close(d)	(*Q9*=0)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

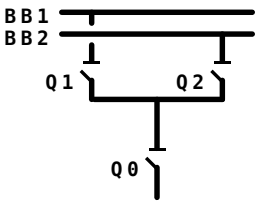
Tab. A5-344: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*Q9*=0)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-345: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.116 Bay type No. 100: Feeder bay with switch disconnector, double busbar, direct motor control

A23.204.M03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-346: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)

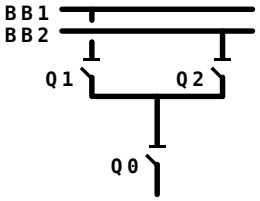
Tab. A5-347: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-348: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.117 Bay type No. 101: Feeder bay with switch disconnector, double busbar

A23.204.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q2 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	

Tab. A5-349: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(FctBl1=I) & /(FctBl2=I)

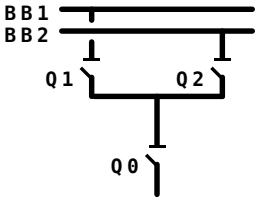
Tab. A5-350: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-351: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.118 Bay type No. 102: Feeder bay with switch disconnector, double busbar

A23.204.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	

Tab. A5-352: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)

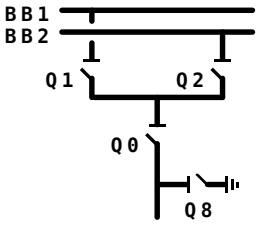
Tab. A5-353: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-354: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.119 Bay type No. 103: Feeder bay with switch disconnector, double busbar, direct motor control

A23.205.M04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-355: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0) & (*Q8*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

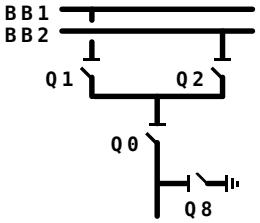
Tab. A5-356: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Close(d)	(*Q8*=0)
Q2	Close(d)	(*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

Tab. A5-357: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.120 Bay type No. 104: Feeder bay with switch disconnector, double busbar

A23.205.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q2 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q8 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-358: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

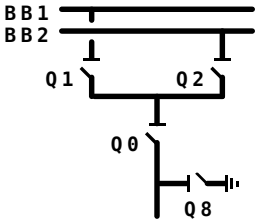
Tab. A5-359: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-360: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.121 Bay type No. 105: Feeder bay with switch disconnector, double busbar

A23.205.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-361: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0) & (*Q8*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q8*=0)

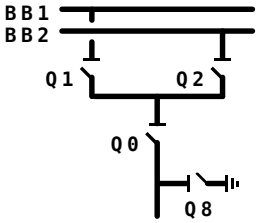
Tab. A5-362: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Close(d)	(*Q8*=0)
Q2	Close(d)	(*Q8*=0)

Tab. A5-363: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.122 Bay type No. 106: Feeder bay with switch disconnector, double busbar

A23.205.R04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	

Tab. A5-364: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0) & (*Q8*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

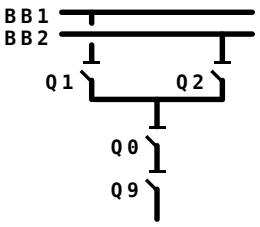
Tab. A5-365: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Close(d)	(*Q8*=0)
Q2	Close(d)	(*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

Tab. A5-366: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.123 Bay type No. 107: Feeder bay with switch disconnector, double busbar, direct motor control

A23.206.M04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q9 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-367: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

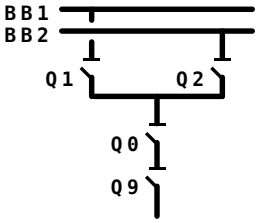
Tab. A5-368: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

Tab. A5-369: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.124 Bay type No. 108: Feeder bay with switch disconnector, double busbar

A23.206.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q2 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q9 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-370: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)

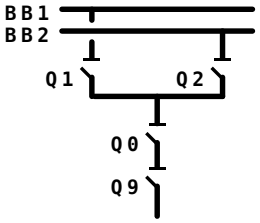
Tab. A5-371: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-372: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.125 Bay type No. 109: Feeder bay with switch disconnector, double busbar

A23.206.R04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q9 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	

Tab. A5-373: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

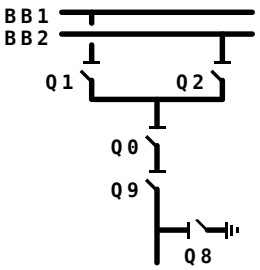
Tab. A5-374: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

Tab. A5-375: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.126 Bay type No. 110: Feeder bay with switch disconnector, double busbar, direct motor control

A23.207.M05

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q9 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q8 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-376: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
Q8	Close(d)	(*Q9*=0)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

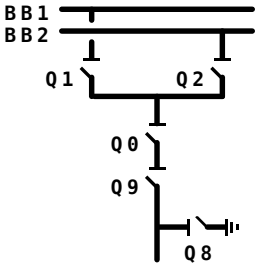
Tab. A5-377: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*Q9*=0)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-378: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.127 Bay type No. 111: Feeder bay with switch disconnector, double busbar

A23.207.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q2 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q9 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q8 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-379: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)

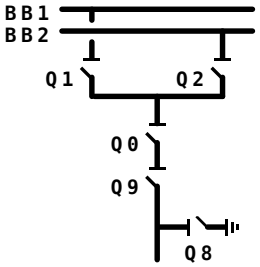
Tab. A5-380: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-381: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.128 Bay type No. 112: Feeder bay with switch disconnector, double busbar

A23.207.R04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q9 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q8 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-382: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

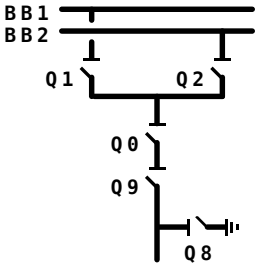
Tab. A5-383: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-384: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.129 Bay type No. 113: Feeder bay with switch disconnector, double busbar

A23.207.R05

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q9 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q8 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	

Tab. A5-385: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
Q8	Close(d)	(*Q9*=0)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

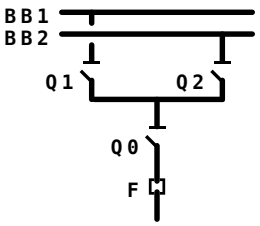
Tab. A5-386: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*Q9*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*Q9*=0)
Q9	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-387: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.130 Bay type No. 114: Feeder bay with switch disconnector / fuse unit, double busbar, direct motor control

A23.404.M03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
F (SIG_1: Signal S011 EXT)		U B05	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-388: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)

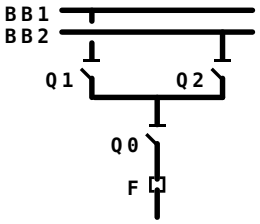
Tab. A5-389: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-390: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.131 Bay type No. 115: Feeder bay with switch disconnector / fuse unit, double busbar

A23.404.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q2 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-391: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(FctBl1=I) & /(FctBl2=I)

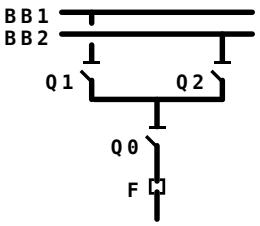
Tab. A5-392: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-393: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.132 Bay type No. 116: Feeder bay with switch disconnector / fuse unit, double busbar

A23.404.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-394: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)

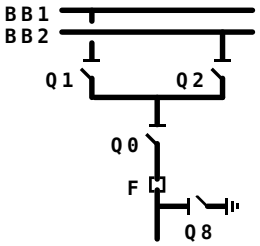
Tab. A5-395: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-396: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.133 Bay type No. 117: Feeder bay with switch disconnector / fuse unit, double busbar, direct motor control

A23.405.M04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
F (SIG_1: Signal S011 EXT)		U B05	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-397: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0) & (*Q8*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

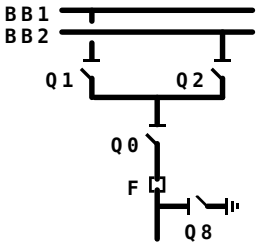
Tab. A5-398: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Close(d)	(*Q8*=0)
Q2	Close(d)	(*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

Tab. A5-399: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.134 Bay type No. 118: Feeder bay with switch disconnector / fuse unit, double busbar

A23.405.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q2 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q8 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-400: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

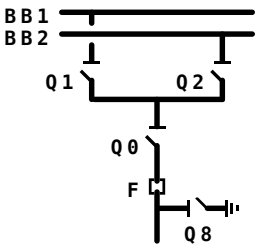
Tab. A5-401: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-402: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.135 Bay type No. 119: Feeder bay with switch disconnector / fuse unit, double busbar

A23.405.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-403: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0) & (*Q8*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q8*=0)

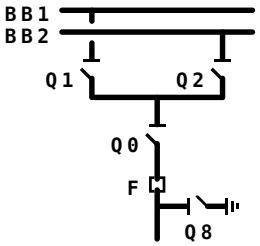
Tab. A5-404: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Close(d)	(*Q8*=0)
Q2	Close(d)	(*Q8*=0)

Tab. A5-405: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.136 Bay type No. 120: Feeder bay with switch disconnector / fuse unit, double busbar

A23.405.R04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-406: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0) & (*Q8*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

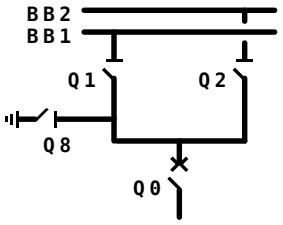
Tab. A5-407: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Close(d)	(*Q8*=0)
Q2	Close(d)	(*Q8*=0)
Q8	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0)

Tab. A5-408: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.137 Bay type No. 222: Feeder bay with circuit breaker, double busbar, direct motor control

A25.105.M03.1

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-409: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0) & (*Q8*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q8*=0)

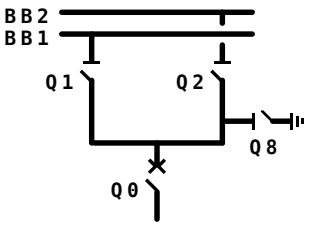
Tab. A5-410: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Close(d)	(*Q8*=0)
Q2	Close(d)	(*Q8*=0)

Tab. A5-411: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.138 Bay type No. 223: Feeder bay with circuit breaker, double busbar, direct motor control

A25.105.M03.2

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-412: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0) & (*Q8*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q8*=0)

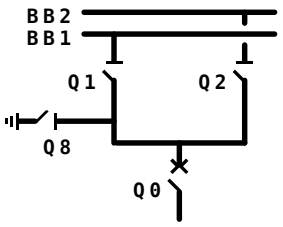
Tab. A5-413: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Close(d)	(*Q8*=0)
Q2	Close(d)	(*Q8*=0)

Tab. A5-414: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.139 Bay type No. 121: Feeder bay with circuit breaker, double busbar, direct motor control

A25.105.M04.1

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-415: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0) & (*Q8*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q8*=0)
Q8	Open	(*Q0*=I) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & /(FctBl1=I) & /(FctBl2=I)

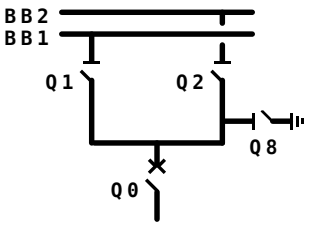
Tab. A5-416: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Close(d)	(*Q8*=0)
Q2	Close(d)	(*Q8*=0)
Q8	Open	(*Q0*=I) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-417: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.140 Bay type No. 122: Feeder bay with circuit breaker, double busbar, direct motor control

A25.105.M04.2

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-418: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0) & (*Q8*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q8*=0)
Q8	Open	(*Q0*=I) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & /(FctBl1=I) & (FctBl2=I)

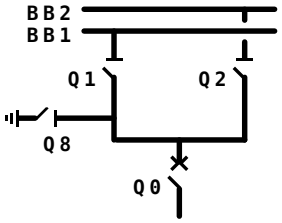
Tab. A5-419: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Close(d)	(*Q8*=0)
Q2	Close(d)	(*Q8*=0)
Q8	Open	(*Q0*=I) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-420: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.141 Bay type No. 123: Feeder bay with circuit breaker, double busbar

A25.105.R01.1

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q2 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q8 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-421: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

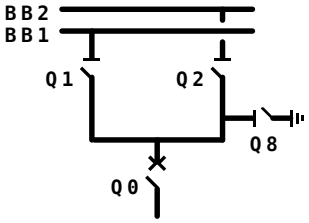
Tab. A5-422: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-423: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.142 Bay type No. 124: Feeder bay with circuit breaker, double busbar

A25.105.R01.2

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q2 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q8 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-424: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

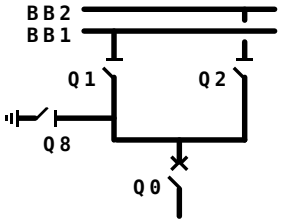
Tab. A5-425: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-426: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.143 Bay type No. 224: Feeder bay with circuit breaker, double busbar

A25.105.R03.1

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-427: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0) & (*Q8*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q8*=0)

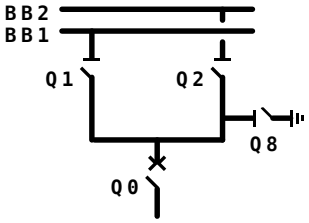
Tab. A5-428: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Close(d)	(*Q8*=0)
Q2	Close(d)	(*Q8*=0)

Tab. A5-429: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.144 Bay type No. 225: Feeder bay with circuit breaker, double busbar

A25.105.R03.2

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-430: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0) & (*Q8*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q8*=0)

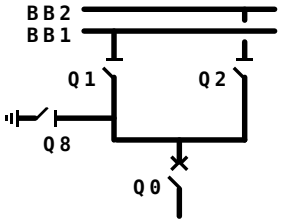
Tab. A5-431: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Close(d)	(*Q8*=0)
Q2	Close(d)	(*Q8*=0)

Tab. A5-432: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.145 Bay type No. 125: Feeder bay with circuit breaker, double busbar

A25.105.R04.1

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	

Tab. A5-433: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0) & (*Q8*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q8*=0)
Q8	Open	(*Q0*=I) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & /(FctBl1=I) & /(FctBl2=I)

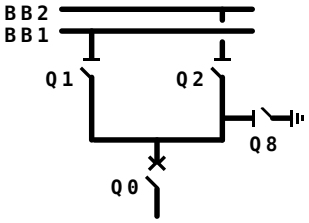
Tab. A5-434: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Close(d)	(*Q8*=0)
Q2	Close(d)	(*Q8*=0)
Q8	Open	(*Q0*=I) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-435: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.146 Bay type No. 126: Feeder bay with circuit breaker, double busbar

A25.105.R04.2

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	

Tab. A5-436: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0) & (*Q8*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q8*=0)
Q8	Open	(*Q0*=I) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & /(FctBl1=I) & /(FctBl2=I)

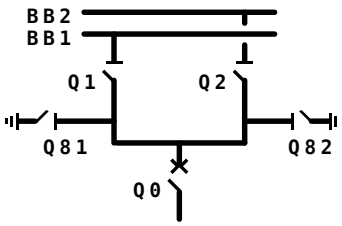
Tab. A5-437: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Close(d)	(*Q8*=0)
Q2	Close(d)	(*Q8*=0)
Q8	Open	(*Q0*=I) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-438: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.147 Bay type No. 127: Feeder bay with circuit breaker, double busbar

A25.128.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q2 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q81 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q82 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-439: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q81*=0) & (*Q82*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q81*=0) & (*Q82*=0) & /(FctBl1=I) & /(FctBl2=I)

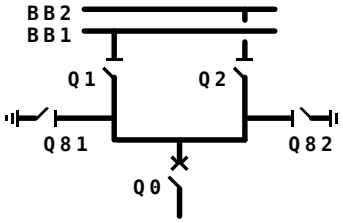
Tab. A5-440: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q81*=0) & (*Q82*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q81*=0) & (*Q82*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-441: Bay Interlock Equations for Operation with Station Interlocking

A5.2.1.148 Bay type No. 128: Feeder bay with circuit breaker, double busbar

A25.128.R05

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q81 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q82 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	

Tab. A5-442: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q81*=0) & (*Q82*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q81*=0) & (*Q82*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0) & (*Q81*=0) & (*Q82*=0)
Q2	Open	(*Q0*=0) & (*Q1*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q81*=0) & (*Q82*=0)
Q81	Open	(*Q0*=I) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & /(FctBl1=I) & /(FctBl2=I)
Q82	Open	(*Q0*=I) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-443: Bay Interlock Equations for Operation without Station Interlocking

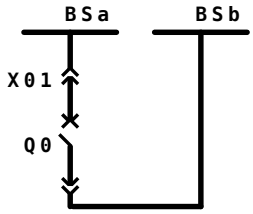
Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q81*=0) & (*Q82*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q81*=0) & (*Q82*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Close(d)	(*Q81*=0) & (*Q82*=0)
Q2	Close(d)	(*Q81*=0) & (*Q82*=0)
Q81	Open	(*Q0*=I) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & /(FctBl1=I) & /(FctBl2=I)
Q82	Open	(*Q0*=I) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-444: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2 Bus Sectionalizer Bays

A5.2.2.1 Bay type No. 133: Bus sectionalizer bay with circuit breaker, single busbar

L11.100.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X01 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	

Tab. A5-445: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(FctBl1=I) & /(FctBl2=I)

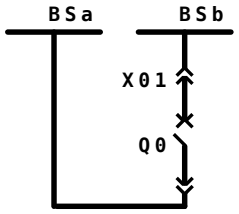
Tab. A5-446: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-447: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.2 Bay type No. 553: Bus sectionalizer bay with circuit breaker, single busbar

L11.100.R01.2

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X01 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	

Tab. A5-448: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(FctBl1=I) & /(FctBl2=I)

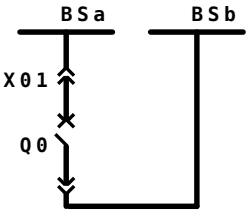
Tab. A5-449: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-450: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.3 Bay type No. 134: Bus sectionalizer bay with circuit breaker, single busbar

L11.100.R02

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X01 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	

Tab. A5-451: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(FctBl1=I) & /(FctBl2=I)
X01	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

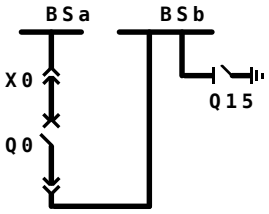
Tab. A5-452: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(FctBl1=I) & /(FctBl2=I)
X01	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

Tab. A5-453: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.4 Bay type No. 528: Bus sectionalizer bay with circuit breaker, single busbar

L11.102.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q15 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	

Tab. A5-454: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & (*Q15*=0) & /(FctBl1=I) & /(FctBl2=I)

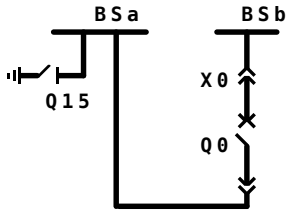
Tab. A5-455: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & (*Q15*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-456: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.5 Bay type No. 542: Bus sectionalizer bay with circuit breaker, single busbar

L11.102.R01.2

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q15 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	

Tab. A5-457: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & (*Q15*=0) & /(FctBl1=I) & /(FctBl2=I)

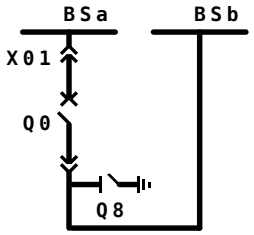
Tab. A5-458: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & (*Q15*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-459: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.6 Bay type No. 135: Bus sectionalizer bay with circuit breaker, single busbar

L11.104.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X01 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q8 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	

Tab. A5-460: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(FctBl1=I) & /(FctBl2=I)

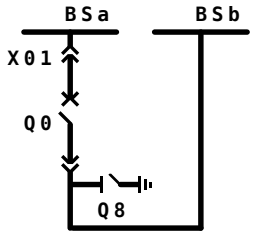
Tab. A5-461: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-462: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.7 Bay type No. 136: Bus sectionalizer bay with circuit breaker, single busbar

L11.104.R02

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X01 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	

Tab. A5-463: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(FctBl1=I) & /(FctBl2=I)
X01	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

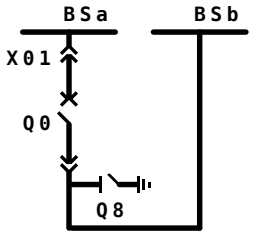
Tab. A5-464: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(FctBl1=I) & /(FctBl2=I)
X01	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-465: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.8 Bay type No. 137: Bus sectionalizer bay with circuit breaker, single busbar

L11.104.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X01 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q8 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	

Tab. A5-466: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X01*=0) & (*Q8*=I)
X01	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

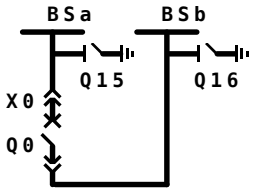
Tab. A5-467: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X01*=0)
X01	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-468: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.9 Bay type No. 547: Bus sectionalizer bay with circuit breaker, single busbar, direct motor control

L11.112.M04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q15 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q16 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-469: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & (*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)
Q15	Close(d)	(*Q15*=I)
Q16	Close(d)	(*Q16*=I)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0) & (*Q16*=0)

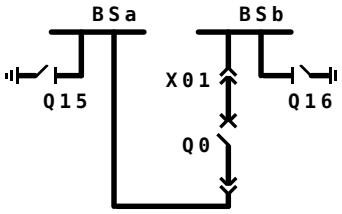
Tab. A5-470: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & (*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0) & (*Q16*=0)

Tab. A5-471: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.10 Bay type No. 564: Bus sectionalizer bay with circuit breaker, single busbar

L11.112.R01.2

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X01 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q15 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q16 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-472: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & (*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)

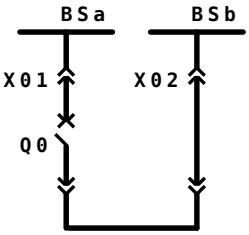
Tab. A5-473: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-474: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.11 Bay type No. 138: Bus sectionalizer bay with circuit breaker, single busbar

L11.116.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X01 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
X02 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	

Tab. A5-475: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)

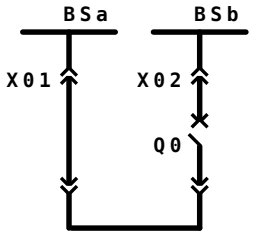
Tab. A5-476: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-477: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.12 Bay type No. 545: Bus sectionalizer bay with circuit breaker, single busbar

L11.116.R01.2

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X01 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
X02 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	

Tab. A5-478: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)

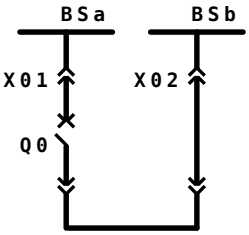
Tab. A5-479: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-480: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.13 Bay type No. 139: Bus sectionalizer bay with circuit breaker, single busbar

L11.116.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X01 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X02 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	

Tab. A5-481: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
X01	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
X02	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

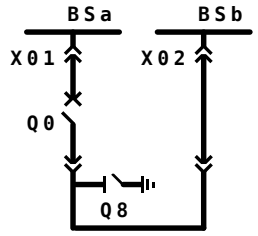
Tab. A5-482: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
X01	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
X02	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

Tab. A5-483: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.14 Bay type No. 548: Bus sectionalizer bay with circuit breaker, single busbar, direct motor control

L11.120.M03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q8 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X02 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-484: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X01*=0) & (*X02*=0)
X01	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

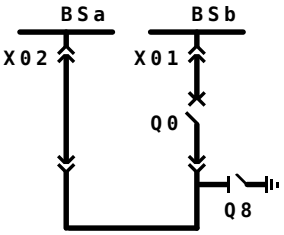
Tab. A5-485: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X01*=0) & (*X02*=0)
X01	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-486: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.15 Bay type No. 552: Bus sectionalizer bay with circuit breaker, single busbar, direct motor control

L11.120.M03.2

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q8 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X02 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-487: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X01*=0) & (*X02*=0)
X01	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

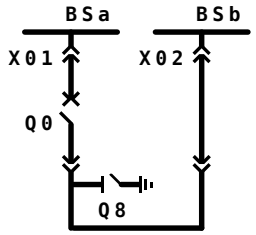
Tab. A5-488: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X01*=0) & (*X02*=0)
X01	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-489: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.16 Bay type No. 140: Bus sectionalizer bay with circuit breaker, single busbar

L11.120.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X01 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
X02 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q8 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-490: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)

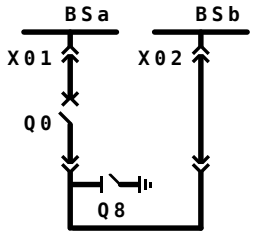
Tab. A5-491: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-492: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.17 Bay type No. 141: Bus sectionalizer bay with circuit breaker, single busbar

L11.120.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X01 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X02 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-493: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
X01	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
X02	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

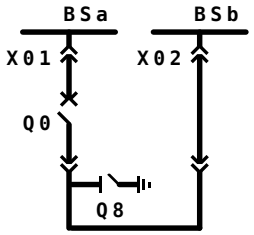
Tab. A5-494: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
X01	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
X02	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-495: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.18 Bay type No. 543: Bus sectionalizer bay with circuit breaker, single busbar

L11.120.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X01 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X02 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q8 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	

Tab. A5-496: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X01*=0) & (*X02*=0)
X01	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

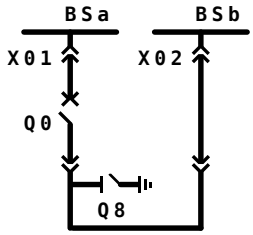
Tab. A5-497: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X01*=0) & (*X02*=0)
X01	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-498: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.19 Bay type No. 142: Bus sectionalizer bay with circuit breaker, single busbar

L11.120.R04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X01 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X02 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	

Tab. A5-499: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X01*=0) & (*X02*=0)
X01	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
X02	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

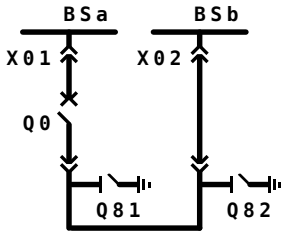
Tab. A5-500: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)
Q8	Close(d)	(*X01*=0) & (*X02*=0)
X01	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
X02	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-501: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.20 Bay type No. 558: Bus sectionalizer bay with circuit breaker, single busbar

L11.128.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X01 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
X02 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q81 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q82 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-502: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)

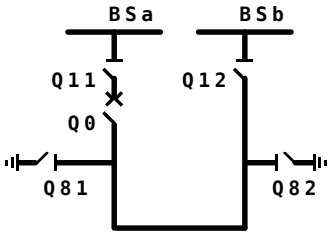
Tab. A5-503: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-504: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.21 Bay type No. 143: Bus sectionalizer bay with circuit breaker, single busbar, direct motor control

L13.113.M03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q11 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q12 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q81 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q82 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-505: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q81*=0) & (*Q82*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q81*=0) & (*Q82*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q81*=0) & (*Q82*=0)

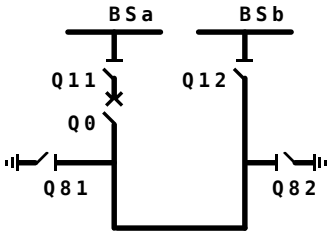
Tab. A5-506: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q81*=0) & (*Q82*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q81*=0) & (*Q82*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q81*=0) & (*Q82*=0)

Tab. A5-507: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.22 Bay type No. 144: Bus sectionalizer bay with circuit breaker, single busbar, direct motor control

L13.113.M05

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q11 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q12 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q81 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q82 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-508: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q81*=0) & (*Q82*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q81*=0) & (*Q82*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q81*=0) & (*Q82*=0)
Q81	Close(d)	(*Q0*=0) & (*Q11*=0) & (*Q12*=0)
Q82	Close(d)	(*Q0*=0) & (*Q11*=0) & (*Q12*=0)

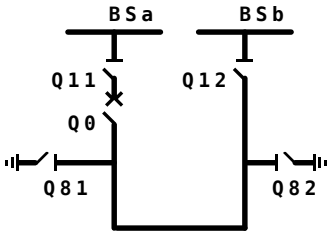
Tab. A5-509: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q81*=0) & (*Q82*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q81*=0) & (*Q82*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q81*=0) & (*Q82*=0)
Q81	Close(d)	(*Q0*=0) & (*Q11*=0) & (*Q12*=0)
Q82	Close(d)	(*Q0*=0) & (*Q11*=0) & (*Q12*=0)

Tab. A5-510: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.23 Bay type No. 145: Bus sectionalizer bay with circuit breaker, single busbar

L13.113.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q11 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q12 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q81 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q82 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-511: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q81*=0) & (*Q82*=0) & /(FctBl1=I) & /(FctBl2=I)

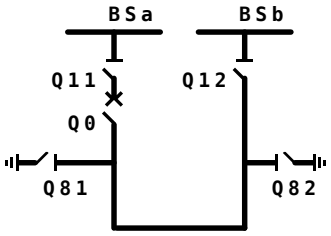
Tab. A5-512: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q81*=0) & (*Q82*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-513: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.24 Bay type No. 146: Bus sectionalizer bay with circuit breaker, single busbar

L13.113.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q11 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q12 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q81 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q82 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-514: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q81*=0) & (*Q82*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q81*=0) & (*Q82*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q81*=0) & (*Q82*=0)

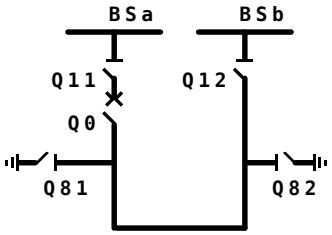
Tab. A5-515: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q81*=0) & (*Q82*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q81*=0) & (*Q82*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q81*=0) & (*Q82*=0)

Tab. A5-516: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.25 Bay type No. 517: Bus sectionalizer bay with circuit breaker, single busbar

L13.113.R03.2

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q11 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q12 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q81 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q82 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-517: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q81*=0) & (*Q82*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q81*=0) & (*Q82*=0)
Q81	Close(d)	(*Q0*=0) & (*Q11*=0) & (*Q12*=0)

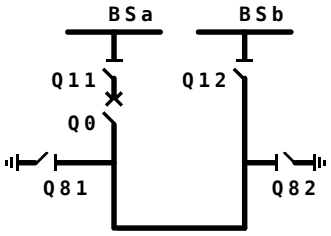
Tab. A5-518: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q81*=0) & (*Q82*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q81*=0) & (*Q82*=0)
Q81	Close(d)	(*Q0*=0) & (*Q11*=0) & (*Q12*=0)

Tab. A5-519: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.26 Bay type No. 147: Bus sectionalizer bay with circuit breaker, single busbar

L13.113.R05

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q11 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q12 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q81 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q82 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	

Tab. A5-520: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q81*=0) & (*Q82*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q81*=0) & (*Q82*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q81*=0) & (*Q82*=0)
Q81	Close(d)	(*Q0*=0) & (*Q11*=0) & (*Q12*=0)
Q82	Close(d)	(*Q0*=0) & (*Q11*=0) & (*Q12*=0)

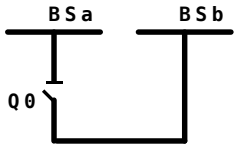
Tab. A5-521: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q81*=0) & (*Q82*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q81*=0) & (*Q82*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q81*=0) & (*Q82*=0)
Q81	Close(d)	(*Q0*=0) & (*Q11*=0) & (*Q12*=0)
Q82	Close(d)	(*Q0*=0) & (*Q11*=0) & (*Q12*=0)

Tab. A5-522: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.27 Bay type No. 148: Bus sectionalizer bay with switch disconnector, single busbar

L13.200.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	

Tab. A5-523: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

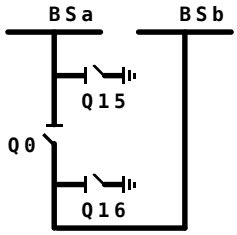
Tab. A5-524: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-525: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.28 Bay type No. 149: Bus sectionalizer bay with switch disconnector, single busbar

L13.202.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q15 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q16 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	

Tab. A5-526: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	(*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)

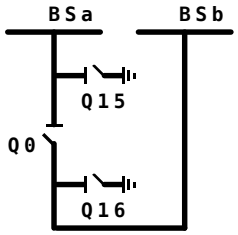
Tab. A5-527: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	(*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-528: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.29 Bay type No. 150: Bus sectionalizer bay with switch disconnector, single busbar

L13.202.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q15 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q16 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	

Tab. A5-529: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	(*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)
Q15	Close(d)	(*Q0*=0) & (*Q15*=I)
Q16	Close(d)	(*Q0*=0) & (*Q16*=I)

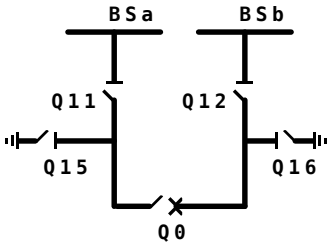
Tab. A5-530: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	(*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)
Q15	Close(d)	(*Q0*=0)
Q16	Close(d)	(*Q0*=0)

Tab. A5-531: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.30 Bay type No. 226: Bus sectionalizer bay with circuit breaker, single busbar, direct motor control

L15.113.M03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q11 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q12 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q15 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q16 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-532: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q16*=0)
	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q16*=0)

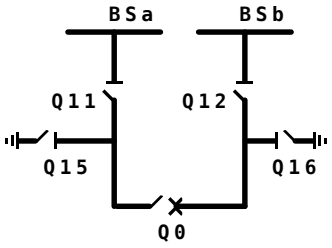
Tab. A5-533: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q16*=0)
	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q16*=0)

Tab. A5-534: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.31 Bay type No. 151: Bus sectionalizer bay with circuit breaker, single busbar, direct motor control

L15.113.M05

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q11 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q12 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q15 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q16 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-535: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q16*=0)
	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q16*=0)
Q15	Open	(*Q0*=I) & (*Q12*=I)
	Close(d)	(*Q0*=0) & (*Q11*=0) & (*Q12*=I) & /(FctBl1=I) & /(FctBl2=I) & (*Q15*=I)
Q16	Open	(*Q0*=I) & (*Q11*=I)
	Close(d)	(*Q0*=0) & (*Q12*=0) & (*Q11*=I) & /(FctBl1=I) & /(FctBl2=I) & (*Q16*=I)

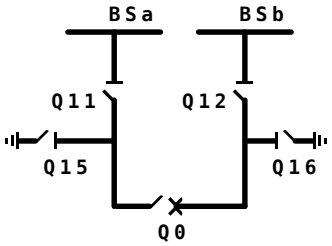
Tab. A5-536: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q16*=0)
	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q16*=0)
Q15	Open	(*Q0*=I) & (*Q12*=I)
	Close(d)	(*Q0*=0) & (*Q11*=0) & (*Q12*=I) & /(FctBl1=I) & /(FctBl2=I)
Q16	Open	(*Q0*=I) & (*Q11*=I)
	Close(d)	(*Q0*=0) & (*Q12*=0) & (*Q11*=I) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-537: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.32 Bay type No. 152: Bus sectionalizer bay with circuit breaker, single busbar

L15.113.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q11 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q12 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q15 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q16 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-538: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q16*=0)
	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)

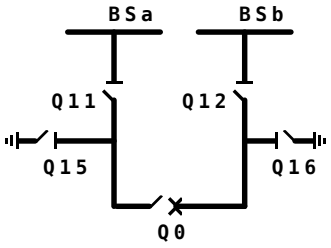
Tab. A5-539: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q16*=0)
	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-540: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.33 Bay type No. 227: Bus sectionalizer bay with circuit breaker, single busbar

L15.113.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q11 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q12 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q15 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q16 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-541: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q16*=0)
	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q16*=0)

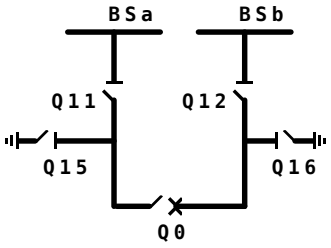
Tab. A5-542: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q16*=0)
	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q16*=0)

Tab. A5-543: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.34 Bay type No. 153: Bus sectionalizer bay with circuit breaker, single busbar

L15.113.R05

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q11 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q12 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q15 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q16 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	

Tab. A5-544: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q16*=0)
	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q16*=0)
Q15	Open	(*Q0*=I) & (*Q12*=I)
	Close(d)	(*Q0*=0) & (*Q11*=0) & (*Q12*=I) & /(FctBl1=I) & /(FctBl2=I) & (*Q15*=I)
Q16	Open	(*Q0*=I) & (*Q11*=I)
	Close(d)	(*Q0*=0) & (*Q12*=0) & (*Q11*=I) & /(FctBl1=I) & /(FctBl2=I) & (*Q16*=I)

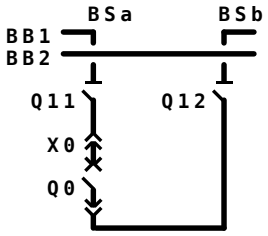
Tab. A5-545: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q16*=0)
	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q16*=0)
Q15	Open	(*Q0*=I) & (*Q12*=I)
	Close(d)	(*Q0*=0) & (*Q11*=0) & (*Q12*=I) & /(FctBl1=I) & /(FctBl2=I)
Q16	Open	(*Q0*=I) & (*Q11*=I)
	Close(d)	(*Q0*=0) & (*Q12*=0) & (*Q11*=I) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-546: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.35 Bay type No. 154: Bus sectionalizer bay with circuit breaker, double busbar, direct motor control

L21.101.M04.1

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q11 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q12 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-547: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q11*=X) & /(*Q12*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
X0	Open	(*Q0*=0) & (*Q11*=0) & (*Q12*=0)
	Close(d)	(*Q0*=0) & (*Q11*=0) & (*Q12*=0)

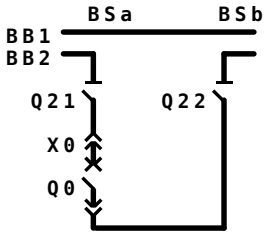
Tab. A5-548: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q11*=X) & /(*Q12*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
X0	Open	(*Q0*=0) & (*Q11*=0) & (*Q12*=0)
	Close(d)	(*Q0*=0) & (*Q11*=0) & (*Q12*=0)

Tab. A5-549: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.36 Bay type No. 155: Bus sectionalizer bay with circuit breaker, double busbar, direct motor control

L21.101.M04.2

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q21 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q22 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-550: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q21*=X) & /(*Q22*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q21	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q22	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
X0	Open	(*Q0*=0) & (*Q21*=0) & (*Q22*=0)
	Close(d)	(*Q0*=0) & (*Q21*=0) & (*Q22*=0)

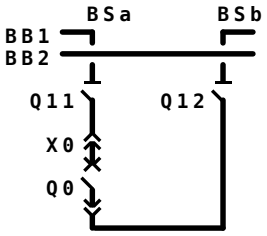
Tab. A5-551: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q21*=X) & /(*Q22*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q21	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q22	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
X0	Open	(*Q0*=0) & (*Q21*=0) & (*Q22*=0)
	Close(d)	(*Q0*=0) & (*Q21*=0) & (*Q22*=0)

Tab. A5-552: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.37 Bay type No. 156: Bus sectionalizer bay with circuit breaker, double busbar

L21.101.R01.1

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q11 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q12 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
X0 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-553: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q11*=X) & /(*Q12*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

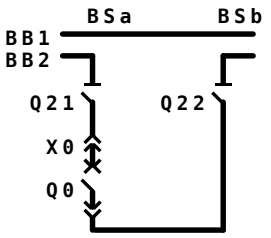
Tab. A5-554: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q11*=X) & /(*Q12*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-555: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.38 Bay type No. 157: Bus sectionalizer bay with circuit breaker, double busbar

L21.101.R01.2

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q21 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q22 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
X0 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-556: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q21*=X) & /(*Q22*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

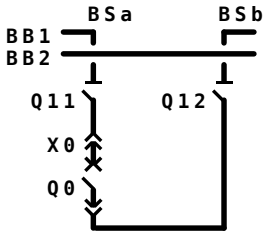
Tab. A5-557: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q21*=X) & /(*Q22*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-558: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.39 Bay type No. 158: Bus sectionalizer bay with circuit breaker, double busbar

L21.101.R03.1

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q11 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q12 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-559: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q11*=X) & /(*Q12*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

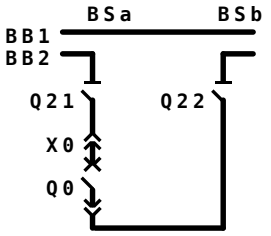
Tab. A5-560: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q11*=X) & /(*Q12*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

Tab. A5-561: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.40 Bay type No. 159: Bus sectionalizer bay with circuit breaker, double busbar

L21.101.R03.2

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q21 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q22 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-562: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q21*=X) & /(*Q22*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q21	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q22	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

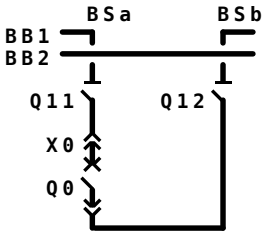
Tab. A5-563: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q21*=X) & /(*Q22*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q21	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q22	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

Tab. A5-564: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.41 Bay type No. 160: Bus sectionalizer bay with circuit breaker, double busbar

L21.101.R04.1

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q11 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q12 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	

Tab. A5-565: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q11*=X) & /(*Q12*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
X0	Open	(*Q0*=0) & (*Q11*=0) & (*Q12*=0)
	Close(d)	(*Q0*=0) & (*Q11*=0) & (*Q12*=0)

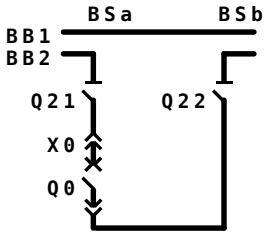
Tab. A5-566: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q11*=X) & /(*Q12*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
X0	Open	(*Q0*=0) & (*Q11*=0) & (*Q12*=0)
	Close(d)	(*Q0*=0) & (*Q11*=0) & (*Q12*=0)

Tab. A5-567: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.42 Bay type No. 161: Bus sectionalizer bay with circuit breaker, double busbar

L21.101.R04.2

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q21 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q22 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	

Tab. A5-568: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q21*=X) & /(*Q22*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q21	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q22	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
X0	Open	(*Q0*=0) & (*Q21*=0) & (*Q22*=0)
	Close(d)	(*Q0*=0) & (*Q21*=0) & (*Q22*=0)

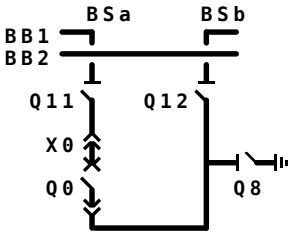
Tab. A5-569: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q21*=X) & /(*Q22*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q21	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q22	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
X0	Open	(*Q0*=0) & (*Q21*=0) & (*Q22*=0)
	Close(d)	(*Q0*=0) & (*Q21*=0) & (*Q22*=0)

Tab. A5-570: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.43 Bay type No. 513: Bus sectionalizer bay with circuit breaker, double busbar

L21.109.R03.1

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q11 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q12 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q8 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-571: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q11*=X) & /(*Q12*=X) & /(*X0*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

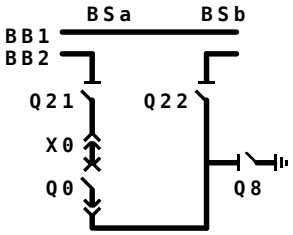
Tab. A5-572: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q11*=X) & /(*Q12*=X) & /(*X0*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-573: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.44 Bay type No. 514: Bus sectionalizer bay with circuit breaker, double busbar

L21.109.R03.2

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q21 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q22 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q8 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-574: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q21*=X) & /(*Q22*=X) & /(*X0*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q21	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q22	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

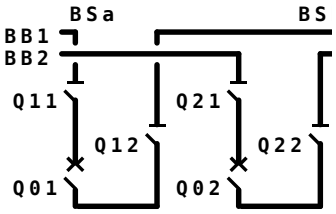
Tab. A5-575: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q21*=X) & /(*Q22*=X) & /(*X0*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q21	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q22	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-576: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.45 Bay type No. 162: Bus sectionalizer bay with circuit breaker, double busbar

L23.101.R02

Switchgear unit		Binary input	Output relay	
Q01 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q02 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q11 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q12 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q21 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	
Q22 (*DEV06*)	Open	U B05	/	
	Close(d)	U B06	/	

Tab. A5-577: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	/(*Q11*=X) & /(*Q12*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	/(*Q21*=X) & /(*Q22*=X) & /(FctBl1=I) & /(FctBl2=I)

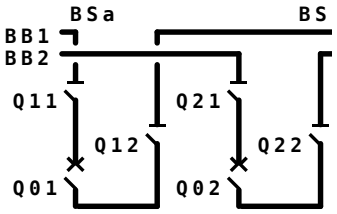
Tab. A5-578: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	/(*Q11*=X) & /(*Q12*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	/(*Q21*=X) & /(*Q22*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-579: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.46 Bay type No. 163: Bus sectionalizer bay with circuit breaker, double busbar

L23.101.R06

Switchgear unit		Binary input	Output relay	
Q01 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q02 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q11 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q12 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q21 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	
Q22 (*DEV06*)	Open	U B05	K B05	
	Close(d)	U B06	K B06	

Tab. A5-580: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	/(*Q11*=X) & /(*Q12*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	/(*Q21*=X) & /(*Q22*=X) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q01*=0)
	Close(d)	(*Q01*=0)
Q12	Open	(*Q01*=0)
	Close(d)	(*Q01*=0)
Q21	Open	(*Q02*=0)
	Close(d)	(*Q02*=0)
Q22	Open	(*Q02*=0)
	Close(d)	(*Q02*=0)

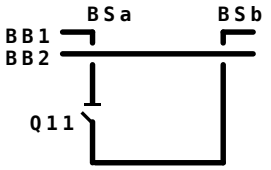
Tab. A5-581: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q01	Close(d)	/(*Q11*=X) & /(*Q12*=X) & /(FctBl1=I) & /(FctBl2=I)
Q02	Close(d)	/(*Q21*=X) & /(*Q22*=X) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q01*=0)
	Close(d)	(*Q01*=0)
Q12	Open	(*Q01*=0)
	Close(d)	(*Q01*=0)
Q21	Open	(*Q02*=0)
	Close(d)	(*Q02*=0)
Q22	Open	(*Q02*=0)
	Close(d)	(*Q02*=0)

Tab. A5-582: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.47 Bay type No. 554: Bus sectionalizer bay with other switchgear unit, double busbar, direct motor control

L23.901.M01.1

Switchgear unit		Binary input	Output relay	
Q11 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-583: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

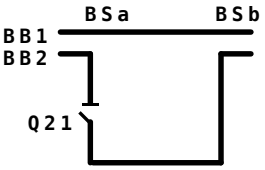
Tab. A5-584: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-585: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.48 Bay type No. 555: Bus sectionalizer bay with other switchgear unit, double busbar, direct motor control

L23.901.M01.2

Switchgear unit		Binary input	Output relay	
Q21 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-586: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

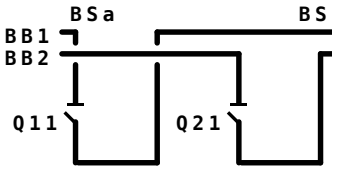
Tab. A5-587: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-588: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.49 Bay type No. 164: Bus sectionalizer bay with other switchgear unit, double busbar

L23.901.R02

Switchgear unit		Binary input	Output relay	
Q11 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q21 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	

Tab. A5-589: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q11	Open	(*Q11*=0)
	Close(d)	(*Q11*=I)
Q21	Open	(*Q21*=0)
	Close(d)	(*Q21*=I)

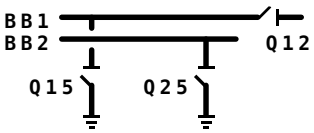
Tab. A5-590: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-591: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.50 Bay type No. 242: Bus sectionalizer bay with other switchgear unit, double busbar, direct motor control

L23.903.M01.3

Switchgear unit		Binary input	Output relay	
Q12 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q15 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q25 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-592: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q12	Open	(*Q12*=0)
	Close(d)	(*Q12*=I)

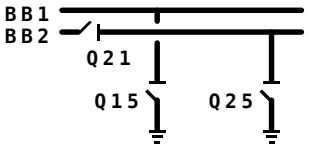
Tab. A5-593: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-594: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.51 Bay type No. 243: Bus sectionalizer bay with other switchgear unit, double busbar, direct motor control

L23.903.M01.4

Switchgear unit		Binary input	Output relay	
Q21 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q15 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q25 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-595: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q21	Open	(*Q21*=0)
	Close(d)	(*Q21*=I)

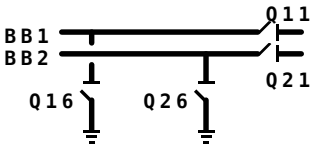
Tab. A5-596: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-597: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.52 Bay type No. 511: Bus sectionalizer bay with other switchgear unit, double busbar, direct motor control

L23.903.M02

Switchgear unit		Binary input	Output relay	
Q11 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q21 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q16 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q26 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-598: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q11	Open	(*Q11*=0)
	Close(d)	(*Q11*=I)
Q21	Open	(*Q21*=0)
	Close(d)	(*Q21*=I)

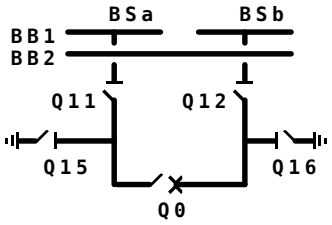
Tab. A5-599: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-600: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.53 Bay type No. 228: Bus sectionalizer bay with circuit breaker, double busbar, direct motor control

L25.113.M03.1

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q11 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q12 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q15 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q16 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-601: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q16*=0)
	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q16*=0)

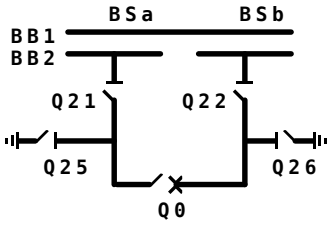
Tab. A5-602: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q16*=0)
	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q16*=0)

Tab. A5-603: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.54 Bay type No. 229: Bus sectionalizer bay with circuit breaker, double busbar, direct motor control

L25.113.M03.2

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q21 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q22 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q25 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q26 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-604: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q25*=0) & (*Q26*=0)
	Close(d)	/(*Q21*=X) & /(*Q22*=X) & (*Q25*=0) & (*Q26*=0) & /(FctBl1=I) & /(FctBl2=I)
Q21	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q25*=0)
Q22	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q26*=0)

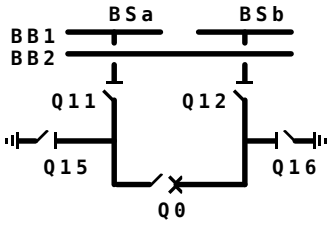
Tab. A5-605: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q25*=0) & (*Q26*=0)
	Close(d)	/(*Q21*=X) & /(*Q22*=X) & (*Q25*=0) & (*Q26*=0) & /(FctBl1=I) & /(FctBl2=I)
Q21	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q25*=0)
Q22	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q26*=0)

Tab. A5-606: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.55 Bay type No. 165: Bus sectionalizer bay with circuit breaker, double busbar, direct motor control

L25.113.M05.1

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q11 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q12 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q15 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q16 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-607: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q16*=0)
	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q16*=0)
Q15	Open	(*Q0*=I) & (*Q12*=I)
	Close(d)	(*Q0*=0) & (*Q11*=0) & (*Q12*=I) & /(FctBl1=I) & /(FctBl2=I) & (*Q15*=I)
Q16	Open	(*Q0*=I) & (*Q11*=I)
	Close(d)	(*Q0*=0) & (*Q12*=0) & (*Q11*=I) & /(FctBl1=I) & /(FctBl2=I) & (*Q16*=I)

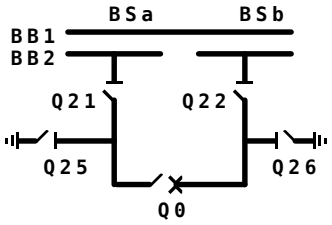
Tab. A5-608: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q16*=0)
	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q16*=0)
Q15	Open	(*Q0*=I) & (*Q12*=I)
	Close(d)	(*Q0*=0) & (*Q11*=0) & (*Q12*=I) & /(FctBl1=I) & /(FctBl2=I)
Q16	Open	(*Q0*=I) & (*Q11*=I)
	Close(d)	(*Q0*=0) & (*Q12*=0) & (*Q11*=I) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-609: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.56 Bay type No. 166: Bus sectionalizer bay with circuit breaker, double busbar, direct motor control

L25.113.M05.2

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q21 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q22 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q25 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q26 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-610: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q25*=0) & (*Q26*=0)
	Close(d)	/(*Q21*=X) & /(*Q22*=X) & (*Q25*=0) & (*Q26*=0) & /(FctBl1=I) & /(FctBl2=I)
Q21	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q25*=0)
Q22	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q26*=0)
Q25	Open	(*Q0*=I) & (*Q22*=I)
	Close(d)	(*Q0*=0) & (*Q21*=0) & (*Q22*=I) & /(FctBl1=I) & /(FctBl2=I) & (*Q25*=I)
Q26	Open	(*Q0*=I) & (*Q21*=I)
	Close(d)	(*Q0*=0) & (*Q22*=0) & (*Q21*=I) & /(FctBl1=I) & /(FctBl2=I) & (*Q26*=I)

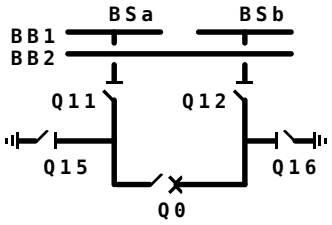
Tab. A5-611: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q25*=0) & (*Q26*=0)
	Close(d)	/(*Q21*=X) & /(*Q22*=X) & (*Q25*=0) & (*Q26*=0) & /(FctBl1=I) & /(FctBl2=I)
Q21	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q25*=0)
Q22	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q26*=0)
Q25	Open	(*Q0*=I) & (*Q22*=I)
	Close(d)	(*Q0*=0) & (*Q21*=0) & (*Q22*=I) & /(FctBl1=I) & /(FctBl2=I)
Q26	Open	(*Q0*=I) & (*Q21*=I)
	Close(d)	(*Q0*=0) & (*Q22*=0) & (*Q21*=I) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-612: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.57 Bay type No. 167: Bus sectionalizer bay with circuit breaker, double busbar

L25.113.R01.1

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q11 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q12 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q15 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q16 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-613: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q16*=0)
	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)

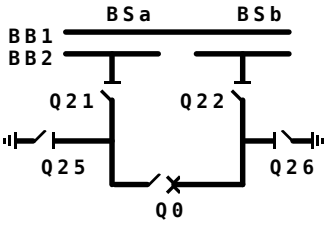
Tab. A5-614: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q16*=0)
	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-615: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.58 Bay type No. 168: Bus sectionalizer bay with circuit breaker, double busbar

L25.113.R01.2

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q21 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q22 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q25 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q26 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-616: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q25*=0) & (*Q26*=0)
	Close(d)	/(*Q21*=X) & /(*Q22*=X) & (*Q25*=0) & (*Q26*=0) & /(FctBl1=I) & /(FctBl2=I)

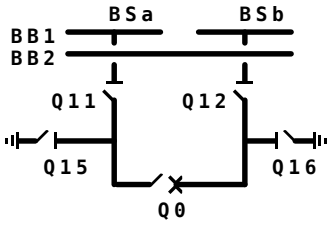
Tab. A5-617: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q25*=0) & (*Q26*=0)
	Close(d)	/(*Q21*=X) & /(*Q22*=X) & (*Q25*=0) & (*Q26*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-618: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.59 Bay type No. 230: Bus sectionalizer bay with circuit breaker, double busbar

L25.113.R03.1

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q11 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q12 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q15 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q16 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-619: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q16*=0)
	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q16*=0)

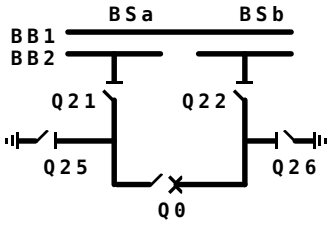
Tab. A5-620: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q16*=0)
	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q16*=0)

Tab. A5-621: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.60 Bay type No. 231: Bus sectionalizer bay with circuit breaker, double busbar

L25.113.R03.2

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q21 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q22 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q25 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q26 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-622: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q25*=0) & (*Q26*=0)
	Close(d)	/(*Q21*=X) & /(*Q22*=X) & (*Q25*=0) & (*Q26*=0) & /(FctBl1=I) & /(FctBl2=I)
Q21	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q25*=0)
Q22	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q26*=0)

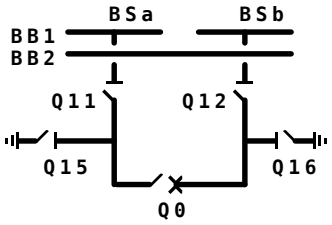
Tab. A5-623: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q25*=0) & (*Q26*=0)
	Close(d)	/(*Q21*=X) & /(*Q22*=X) & (*Q25*=0) & (*Q26*=0) & /(FctBl1=I) & /(FctBl2=I)
Q21	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q25*=0)
Q22	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q26*=0)

Tab. A5-624: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.61 Bay type No. 169: Bus sectionalizer bay with circuit breaker, double busbar

L25.113.R05.1

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q11 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q12 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q15 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q16 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	

Tab. A5-625: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q16*=0)
	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q16*=0)
Q15	Open	(*Q0*=I) & (*Q12*=I)
	Close(d)	(*Q0*=0) & (*Q11*=0) & (*Q12*=I) & /(FctBl1=I) & /(FctBl2=I) & (*Q15*=I)
Q16	Open	(*Q0*=I) & (*Q11*=I)
	Close(d)	(*Q0*=0) & (*Q12*=0) & (*Q11*=I) & /(FctBl1=I) & /(FctBl2=I) & (*Q16*=I)

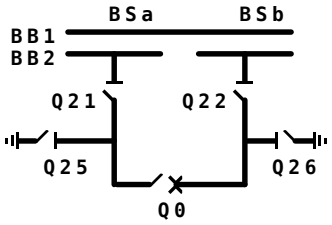
Tab. A5-626: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q16*=0)
	Close(d)	/(*Q11*=X) & /(*Q12*=X) & (*Q15*=0) & (*Q16*=0) & /(FctBl1=I) & /(FctBl2=I)
Q11	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q12	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q16*=0)
Q15	Open	(*Q0*=I) & (*Q12*=I)
	Close(d)	(*Q0*=0) & (*Q11*=0) & (*Q12*=I) & /(FctBl1=I) & /(FctBl2=I)
Q16	Open	(*Q0*=I) & (*Q11*=I)
	Close(d)	(*Q0*=0) & (*Q12*=0) & (*Q11*=I) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-627: Bay Interlock Equations for Operation with Station Interlocking

A5.2.2.62 Bay type No. 170: Bus sectionalizer bay with circuit breaker, double busbar

L25.113.R05.2

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q21 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q22 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q25 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q26 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	

Tab. A5-628: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q25*=0) & (*Q26*=0)
	Close(d)	/(*Q21*=X) & /(*Q22*=X) & (*Q25*=0) & (*Q26*=0) & /(FctBl1=I) & /(FctBl2=I)
Q21	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q25*=0)
Q22	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q26*=0)
Q25	Open	(*Q0*=I) & (*Q22*=I)
	Close(d)	(*Q0*=0) & (*Q21*=0) & (*Q22*=I) & /(FctBl1=I) & /(FctBl2=I) & (*Q25*=I)
Q26	Open	(*Q0*=I) & (*Q21*=I)
	Close(d)	(*Q0*=0) & (*Q22*=0) & (*Q21*=I) & /(FctBl1=I) & /(FctBl2=I) & (*Q26*=I)

Tab. A5-629: Bay Interlock Equations for Operation without Station Interlocking

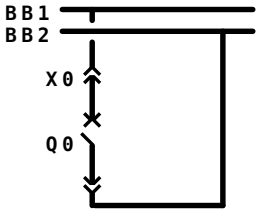
Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q25*=0) & (*Q26*=0)
	Close(d)	/(*Q21*=X) & /(*Q22*=X) & (*Q25*=0) & (*Q26*=0) & /(FctBl1=I) & /(FctBl2=I)
Q21	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q25*=0)
Q22	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q26*=0)
Q25	Open	(*Q0*=I) & (*Q22*=I)
	Close(d)	(*Q0*=0) & (*Q21*=0) & (*Q22*=I) & /(FctBl1=I) & /(FctBl2=I)
Q26	Open	(*Q0*=I) & (*Q21*=I)
	Close(d)	(*Q0*=0) & (*Q22*=0) & (*Q21*=I) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-630: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3 Bus Coupler Bays

A5.2.3.1 Bay type No. 505: Bus coupler bay with circuit breaker, double busbar

Q21.100.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	

Tab. A5-631: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

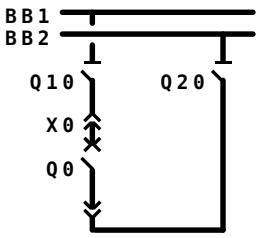
Tab. A5-632: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-633: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.2 Bay type No. 197: Bus coupler bay with circuit breaker, double busbar, direct motor control

Q21.101.M04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q20 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-634: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
X0	Open	(*Q0*=0) & (*Q10*=0) & (*Q20*=0)
	Close(d)	(*Q0*=0) & (*Q10*=0) & (*Q20*=0)

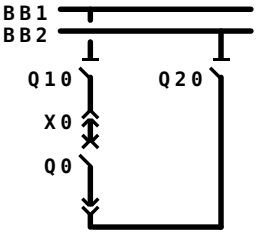
Tab. A5-635: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
X0	Open	(*Q0*=0) & (*Q10*=0) & (*Q20*=0)
	Close(d)	(*Q0*=0) & (*Q10*=0) & (*Q20*=0)

Tab. A5-636: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.3 Bay type No. 198: Bus coupler bay with circuit breaker, double busbar

Q21.101.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q20 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
X0 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-637: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

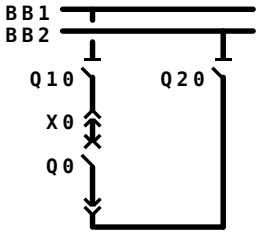
Tab. A5-638: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-639: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.4 Bay type No. 199: Bus coupler bay with circuit breaker, double busbar

Q21.101.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q20 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-640: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

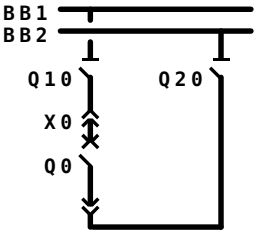
Tab. A5-641: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

Tab. A5-642: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.5 Bay type No. 200: Bus coupler bay with circuit breaker, double busbar

Q21.101.R04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q20 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	

Tab. A5-643: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
X0	Open	(*Q0*=0) & (*Q10*=0) & (*Q20*=0)
	Close(d)	(*Q0*=0) & (*Q10*=0) & (*Q20*=0)

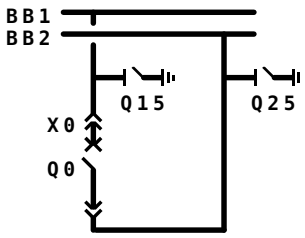
Tab. A5-644: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
X0	Open	(*Q0*=0) & (*Q10*=0) & (*Q20*=0)
	Close(d)	(*Q0*=0) & (*Q10*=0) & (*Q20*=0)

Tab. A5-645: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.6 Bay type No. 556: Bus coupler bay with circuit breaker, double busbar, direct motor control

Q21.112.M04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q15 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q25 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-646: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & (*Q15*=0) & (*Q25*=0) & /(FctBl1=I) & /(FctBl2=I)
Q15	Close(d)	(*Q15*=I)
Q25	Close(d)	(*Q25*=I)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

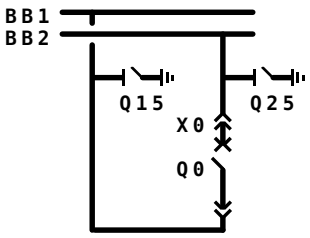
Tab. A5-647: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & (*Q15*=0) & (*Q25*=0) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

Tab. A5-648: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.7 Bay type No. 565: Bus coupler bay with circuit breaker, double busbar, direct motor control

Q21.112.M04.2

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q15 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q25 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X0 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-649: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & (*Q15*=0) & (*Q25*=0) & /(FctBl1=I) & /(FctBl2=I)
Q15	Close(d)	(*Q15*=I)
Q25	Close(d)	(*Q25*=I)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

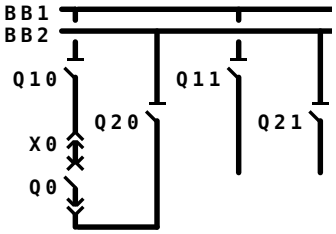
Tab. A5-650: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & (*Q15*=0) & (*Q25*=0) & /(FctBl1=I) & /(FctBl2=I)
X0	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

Tab. A5-651: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.8 Bay type No. 201: Bus coupler bay with circuit breaker, double busbar

Q21.117.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q20 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q11 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q21 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	
X0 (*DEV06*)	Open	U B05	/	
	Close(d)	U B06	/	

Tab. A5-652: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

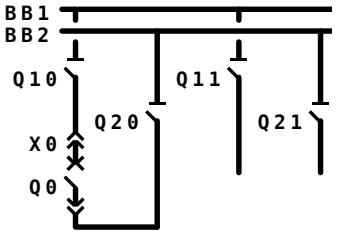
Tab. A5-653: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-654: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.9 Bay type No. 202: Bus coupler bay with circuit breaker, double busbar

Q21.117.R05

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q20 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q11 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q21 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	
X0 (*DEV06*)	Open	U B05	/	
	Close(d)	U B06	/	

Tab. A5-655: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

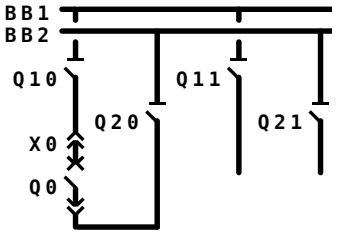
Tab. A5-656: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

Tab. A5-657: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.10 Bay type No. 203: Bus coupler bay with circuit breaker, double busbar

Q21.117.R06

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q20 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q11 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q21 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	
X0 (*DEV06*)	Open	U B05	K B05	
	Close(d)	U B06	K B06	

Tab. A5-658: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
X0	Open	(*Q0*=0) & (*Q10*=0) & (*Q20*=0)
	Close(d)	(*Q0*=0) & (*Q10*=0) & (*Q20*=0)

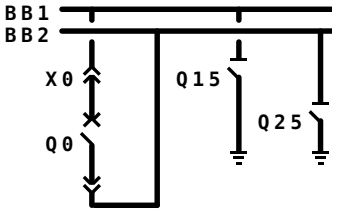
Tab. A5-659: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
X0	Open	(*Q0*=0) & (*Q10*=0) & (*Q20*=0)
	Close(d)	(*Q0*=0) & (*Q10*=0) & (*Q20*=0)

Tab. A5-660: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.11 Bay type No. 245: Bus coupler bay with circuit breaker, double busbar

Q21.132.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q15 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q25 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-661: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

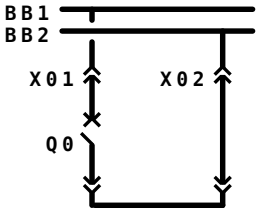
Tab. A5-662: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X0*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-663: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.12 Bay type No. 563: Bus coupler bay with circuit breaker, double busbar

Q21.133.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X01 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
X02 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	

Tab. A5-664: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)

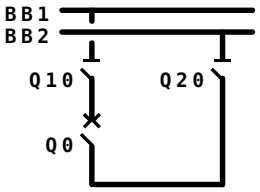
Tab. A5-665: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*X01*=X) & /(*X02*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-666: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.13 Bay type No. 204: Bus coupler bay with circuit breaker, double busbar, direct motor control

Q23.101.M03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q20 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-667: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

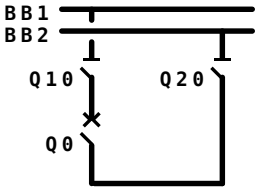
Tab. A5-668: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

Tab. A5-669: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.14 Bay type No. 205: Bus coupler bay with circuit breaker, double busbar

Q23.101.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q20 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	

Tab. A5-670: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(FctBl1=I) & /(FctBl2=I)

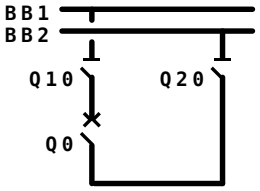
Tab. A5-671: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-672: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.15 Bay type No. 206: Bus coupler bay with circuit breaker, double busbar

Q23.101.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q20 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	

Tab. A5-673: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

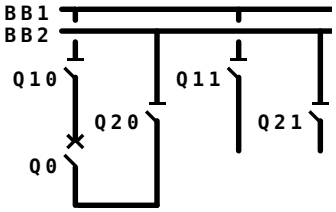
Tab. A5-674: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

Tab. A5-675: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.16 Bay type No. 207: Bus coupler bay with circuit breaker, double busbar

Q23.117.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q20 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q11 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q21 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-676: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(FctBl1=I) & /(FctBl2=I)

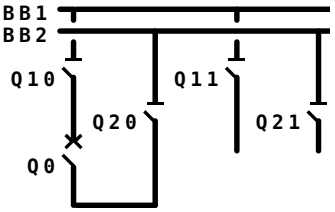
Tab. A5-677: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-678: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.17 Bay type No. 208: Bus coupler bay with circuit breaker, double busbar

Q23.117.R05

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q20 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q11 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q21 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	

Tab. A5-679: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

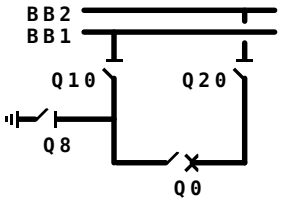
Tab. A5-680: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q10*=X) & /(*Q20*=X) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0)

Tab. A5-681: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.18 Bay type No. 236: Bus coupler bay with circuit breaker, double busbar, direct motor control

Q25.105.M03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q20 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-682: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

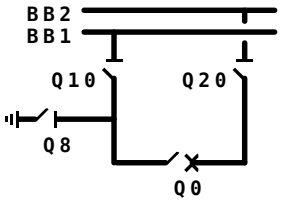
Tab. A5-683: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q8*=0) & /(FctBI1=I) & /(FctBI2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q20	Open	(*Q0*=0) & (*Q8*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-684: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.19 Bay type No. 209: Bus coupler bay with circuit breaker, double busbar, direct motor control

Q25.105.M04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q20 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-685: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q8	Open	(*Q0*=I) & (*Q20*=I)
	Close(d)	(*Q0*=0) & (*Q10*=0) & (*Q20*=I) & /(FctBl1=I) & /(FctBl2=I) & (*Q8*=I)

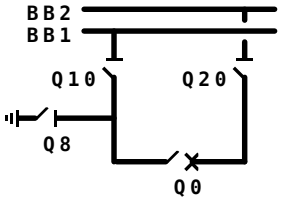
Tab. A5-686: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q20	Open	(*Q0*=0) & (*Q8*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q8	Open	(*Q0*=I) & (*Q20*=I)
	Close(d)	(*Q0*=0) & (*Q10*=0) & (*Q20*=I) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-687: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.20 Bay type No. 210: Bus coupler bay with circuit breaker, double busbar

Q25.105.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q20 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q8 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-688: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

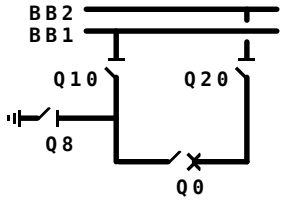
Tab. A5-689: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-690: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.21 Bay type No. 237: Bus coupler bay with circuit breaker, double busbar

Q25.105.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q20 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-691: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

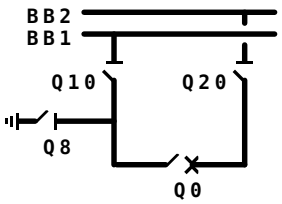
Tab. A5-692: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-693: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.22 Bay type No. 211: Bus coupler bay with circuit breaker, double busbar

Q25.105.R04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q20 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	

Tab. A5-694: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q8	Open	(*Q0*=I) & (*Q20*=I)
	Close(d)	(*Q0*=0) & (*Q10*=0) & (*Q20*=I) & /(FctBl1=I) & /(FctBl2=I) & (*Q8*=I)

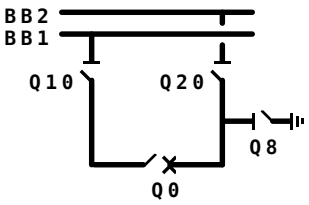
Tab. A5-695: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q8	Open	(*Q0*=I) & (*Q20*=I)
	Close(d)	(*Q0*=0) & (*Q10*=0) & (*Q20*=I) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-696: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.23 Bay type No. 238: Bus coupler bay with circuit breaker, double busbar, direct motor control

Q25.109.M03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q20 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-697: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

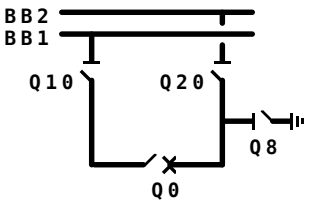
Tab. A5-698: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q8*=0) & /(FctBI1=I) & /(FctBI2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-699: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.24 Bay type No. 212: Bus coupler bay with circuit breaker, double busbar, direct motor control

Q25.109.M04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q20 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-700: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q8	Open	(*Q0*=I) & (*Q10*=I)
	Close(d)	(*Q0*=0) & (*Q20*=0) & (*Q10*=I) & /(FctBl1=I) & /(FctBl2=I) & (*Q8*=I)

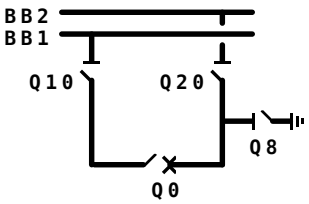
Tab. A5-701: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q8	Open	(*Q0*=I) & (*Q10*=I)
	Close(d)	(*Q0*=0) & (*Q20*=0) & (*Q10*=I) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-702: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.25 Bay type No. 213: Bus coupler bay with circuit breaker, double busbar

Q25.109.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q20 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q8 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-703: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

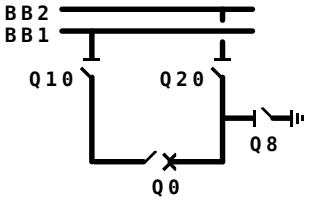
Tab. A5-704: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-705: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.26 Bay type No. 239: Bus coupler bay with circuit breaker, double busbar

Q25.109.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q20 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-706: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

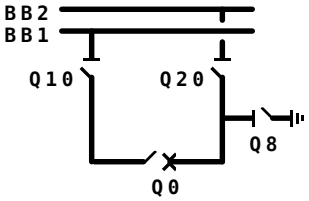
Tab. A5-707: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)

Tab. A5-708: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.27 Bay type No. 214: Bus coupler bay with circuit breaker, double busbar

Q25.109.R04

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q20 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q8 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	

Tab. A5-709: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q8	Open	(*Q0*=I) & (*Q10*=I)
	Close(d)	(*Q0*=0) & (*Q20*=0) & (*Q10*=I) & /(FctBl1=I) & /(FctBl2=I) & (*Q8*=I)

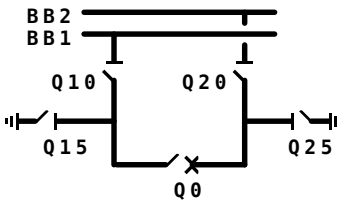
Tab. A5-710: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q8*=0) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q8*=0)
Q8	Open	(*Q0*=I) & (*Q10*=I)
	Close(d)	(*Q0*=0) & (*Q20*=0) & (*Q10*=I) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-711: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.28 Bay type No. 240: Bus coupler bay with circuit breaker, double busbar, direct motor control

Q25.113.M03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q20 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q15 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q25 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-712: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q25*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q15*=0) & (*Q25*=0) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q25*=0)

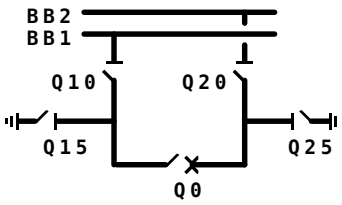
Tab. A5-713: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q25*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q15*=0) & (*Q25*=0) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q25*=0)

Tab. A5-714: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.29 Bay type No. 215: Bus coupler bay with circuit breaker, double busbar, direct motor control

Q25.113.M05

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q20 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q15 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q25 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-715: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q25*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q15*=0) & (*Q25*=0) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q15	Open	(*Q0*=I) & (*Q20*=I)
	Close(d)	(*Q0*=0) & (*Q10*=0) & (*Q20*=I) & /(FctBl1=I) & /(FctBl2=I) & (*Q15*=I)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q25*=0)
Q25	Open	(*Q0*=I) & (*Q10*=I)
	Close(d)	(*Q0*=0) & (*Q20*=0) & (*Q10*=I) & /(FctBl1=I) & /(FctBl2=I) & (*Q25*=I)

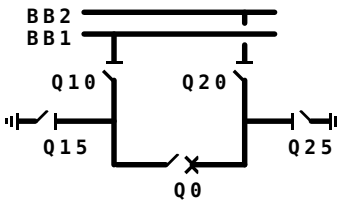
Tab. A5-716: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q25*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q15*=0) & (*Q25*=0) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q15	Open	(*Q0*=I) & (*Q20*=I)
	Close(d)	(*Q0*=0) & (*Q10*=0) & (*Q20*=I) & /(FctBl1=I) & /(FctBl2=I)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q25*=0)
Q25	Open	(*Q0*=I) & (*Q10*=I)
	Close(d)	(*Q0*=0) & (*Q20*=0) & (*Q10*=I) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-717: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.30 Bay type No. 216: Bus coupler bay with circuit breaker, double busbar

Q25.113.R01

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Q20 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q15 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q25 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-718: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q25*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q15*=0) & (*Q25*=0) & /(FctBl1=I) & /(FctBl2=I)

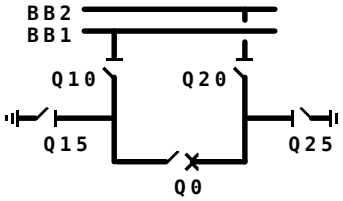
Tab. A5-719: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q25*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q15*=0) & (*Q25*=0) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-720: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.31 Bay type No. 241: Bus coupler bay with circuit breaker, double busbar

Q25.113.R03

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q20 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q15 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q25 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	

Tab. A5-721: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q25*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q15*=0) & (*Q25*=0) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q25*=0)

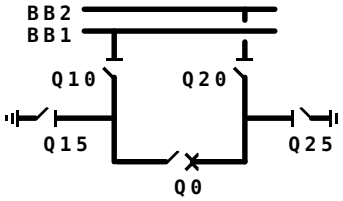
Tab. A5-722: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q25*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q15*=0) & (*Q25*=0) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q25*=0)

Tab. A5-723: Bay Interlock Equations for Operation with Station Interlocking

A5.2.3.32 Bay type No. 217: Bus coupler bay with circuit breaker, double busbar

Q25.113.R05

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q10 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q20 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q15 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q25 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	

Tab. A5-724: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q25*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q15*=0) & (*Q25*=0) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q15	Open	(*Q0*=I) & (*Q20*=I)
	Close(d)	(*Q0*=0) & (*Q10*=0) & (*Q20*=I) & /(FctBl1=I) & /(FctBl2=I) & (*Q15*=I)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q25*=0)
Q25	Open	(*Q0*=I) & (*Q10*=I)
	Close(d)	(*Q0*=0) & (*Q20*=0) & (*Q10*=I) & /(FctBl1=I) & /(FctBl2=I) & (*Q25*=I)

Tab. A5-725: Bay Interlock Equations for Operation without Station Interlocking

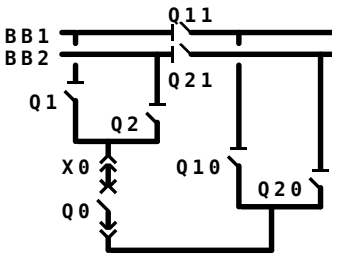
Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q25*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q15*=0) & (*Q25*=0) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q15	Open	(*Q0*=I) & (*Q20*=I)
	Close(d)	(*Q0*=0) & (*Q10*=0) & (*Q20*=I) & /(FctBl1=I) & /(FctBl2=I)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q25*=0)
Q25	Open	(*Q0*=I) & (*Q10*=I)
	Close(d)	(*Q0*=0) & (*Q20*=0) & (*Q10*=I) & /(FctBl1=I) & /(FctBl2=I)

Tab. A5-726: Bay Interlock Equations for Operation with Station Interlocking

A5.2.4 Bus Coupler and Sectionalizer Bays

A5.2.4.1 Bay type No. 218: Bus coupler and sectionalizer bay with circuit breaker, double busbar

K29.101.R02

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	/	
	Close(d)	U A02	/	
Q10 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q20 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q11 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Q21 (*DEV05*)	Open	U B03	/	
	Close(d)	U B04	/	
X0 (*DEV06*)	Open	U B05	/	
	Close(d)	U B06	/	
Q1 (*DEV07*)	Open	U C01	/	
	Close(d)	U C02	/	
Q2 (*DEV08*)	Open	U C03	/	
	Close(d)	U C04	/	

Tab. A5-727: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q20*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q10*=0)

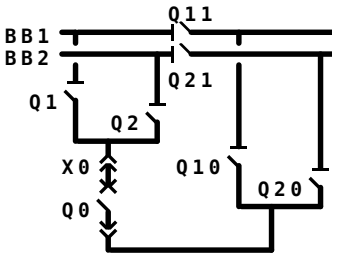
Tab. A5-728: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q20*=0)
Q20	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q10*=0)

Tab. A5-729: Bay Interlock Equations for Operation with Station Interlocking

A5.2.4.2 Bay type No. 219: Bus coupler and sectionalizer bay with circuit breaker, double busbar

K29.101.R06

Switchgear unit		Binary input	Output relay	
Q0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q1 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q2 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q11 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Q21 (*DEV05*)	Open	U B03	K B03	
	Close(d)	U B04	K B04	
X0 (*DEV06*)	Open	U B05	K B05	
	Close(d)	U B06	K B06	
Q10 (*DEV07*)	Open	U C01	/	
	Close(d)	U C02	/	
Q20 (*DEV08*)	Open	U C03	/	
	Close(d)	U C04	/	

Tab. A5-730: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(*Q10*=X) & /(*Q20*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q11	Open	(*Q0*=I) & (*Q1*=I) & (*Q10*=I) & (*X0*=I)
	Close(d)	(*Q0*=I) & (*Q1*=I) & (*Q10*=I) & (*X0*=I)
Q2	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
Q21	Open	(*Q0*=I) & (*Q2*=I) & (*Q20*=I) & (*X0*=I)
	Close(d)	(*Q0*=I) & (*Q2*=I) & (*Q20*=I) & (*X0*=I)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & (*Q10*=0) & (*Q20*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & (*Q10*=0) & (*Q20*=0)

Tab. A5-731: Bay Interlock Equations for Operation without Station Interlocking

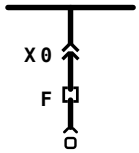
Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(*Q10*=X) & /(*Q20*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q11	Open	(*Q0*=I) & (*Q1*=I) & (*Q10*=I) & (*X0*=I)
	Close(d)	(*Q0*=I) & (*Q1*=I) & (*Q10*=I) & (*X0*=I)
Q2	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0)
Q21	Open	(*Q0*=I) & (*Q2*=I) & (*Q20*=I) & (*X0*=I)
	Close(d)	(*Q0*=I) & (*Q2*=I) & (*Q20*=I) & (*X0*=I)
X0	Open	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & (*Q10*=0) & (*Q20*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*Q2*=0) & (*Q10*=0) & (*Q20*=0)

Tab. A5-732: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5 Busbar Measurement Bays

A5.2.5.1 Bay type No. 171: Busbar measurement bay with fuse unit, single busbar

M11.300.R00

Switchgear unit		Binary input	Output relay	
X0 (*DEV01*)	Open	U A01	/	
	Close(d)	U A02	/	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-733: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

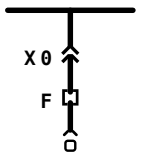
Tab. A5-734: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-735: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.2 Bay type No. 172: Busbar measurement bay with fuse unit, single busbar

M11.300.R01

Switchgear unit		Binary input	Output relay	
X0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-736: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

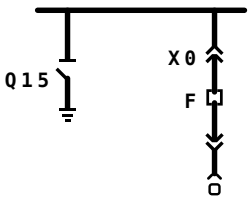
Tab. A5-737: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-738: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.3 Bay type No. 540: Busbar measurement bay with fuse unit, single busbar

M11.304.R02

Switchgear unit		Binary input	Output relay	
Q15 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
X0 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-739: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q15	Close(d)	(*Q15*=I)

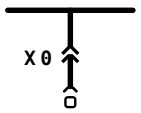
Tab. A5-740: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-741: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.4 Bay type No. 173: Busbar measurement bay with other switchgear unit, single busbar

M11.900.R00

Switchgear unit		Binary input	Output relay	
X0 (*DEV01*)	Open	U A01	/	
	Close(d)	U A02	/	

Tab. A5-742: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

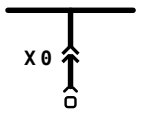
Tab. A5-743: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-744: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.5 Bay type No. 174: Busbar measurement bay with other switchgear unit, single busbar

M11.900.R01

Switchgear unit		Binary input	Output relay	
X0 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	

Tab. A5-745: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

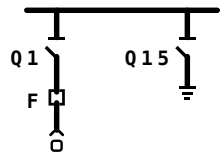
Tab. A5-746: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-747: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.6 Bay type No. 175: Busbar measurement bay with fuse unit, single busbar, direct motor control

M13.312.M02

Switchgear unit		Binary input	Output relay	
Q1 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q15 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
F (SIG_1: Signal S011 EXT)		U B05	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-748: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q15	Close(d)	(*Q15*=I)

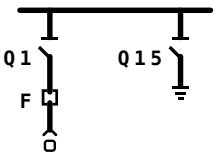
Tab. A5-749: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-750: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.7 Bay type No. 176: Busbar measurement bay with fuse unit, single busbar

M13.312.R01

Switchgear unit		Binary input	Output relay	
Q1 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q15 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-751: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

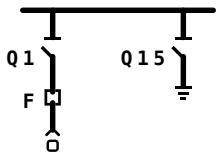
Tab. A5-752: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-753: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.8 Bay type No. 177: Busbar measurement bay with fuse unit, single busbar

M13.312.R02

Switchgear unit		Binary input	Output relay	
Q1 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q15 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
F (SIG_1: Signal S011 EXT)		U B05	/	

Tab. A5-754: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q15	Close(d)	(*Q15*=I)

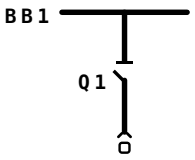
Tab. A5-755: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-756: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.9 Bay type No. 506: Busbar measurement bay with other switchgear unit, single busbar

M13.902.R00

Switchgear unit		Binary input	Output relay	
Q1 (*DEV01*)	Open	U A01	/	
	Close(d)	U A02	/	

Tab. A5-757: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

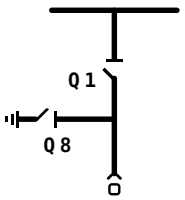
Tab. A5-758: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-759: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.10 Bay type No. 232: Busbar measurement bay with other switchgear unit, single busbar, direct motor control

M15.903.M01

Switchgear unit		Binary input	Output relay	
Q1 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q8 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-760: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q1	Close(d)	(*Q8*=0)

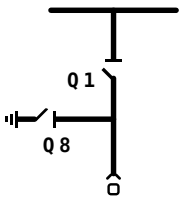
Tab. A5-761: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q1	Close(d)	(*Q8*=0)

Tab. A5-762: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.11 Bay type No. 178: Busbar measurement bay with other switchgear unit, single busbar, direct motor control

M15.903.M02

Switchgear unit		Binary input	Output relay	
Q1 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q8 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-763: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q1	Close(d)	(*Q8*=0)
Q8	Close(d)	(*Q1*=0)

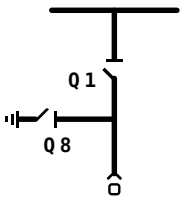
Tab. A5-764: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q1	Close(d)	(*Q8*=0)
Q8	Close(d)	(*Q1*=0)

Tab. A5-765: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.12 Bay type No. 233: Busbar measurement bay with other switchgear unit, single busbar

M15.903.R01

Switchgear unit		Binary input	Output relay	
Q1 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q8 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	

Tab. A5-766: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q1	Close(d)	(*Q8*=0)

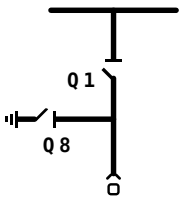
Tab. A5-767: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q1	Close(d)	(*Q8*=0)

Tab. A5-768: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.13 Bay type No. 179: Busbar measurement bay with other switchgear unit, single busbar

M15.903.R02

Switchgear unit		Binary input	Output relay	
Q1 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q8 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	

Tab. A5-769: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q1	Close(d)	(*Q8*=0)
Q8	Close(d)	(*Q1*=0)

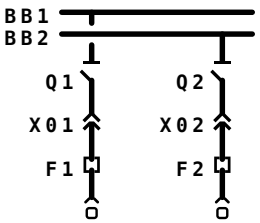
Tab. A5-770: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q1	Close(d)	(*Q8*=0)
Q8	Close(d)	(*Q1*=0)

Tab. A5-771: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.14 Bay type No. 180: Busbar measurement bay with fuse unit, double busbar

M21.302.R02

Switchgear unit		Binary input	Output relay	
Q1 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q2 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
X02 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
F1 (SIG_1: Signal S011 EXT)		U B05	/	
F2 (SIG_1: Signal S012 EXT)		U B06	/	

Tab. A5-772: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

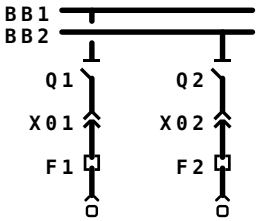
Tab. A5-773: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-774: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.15 Bay type No. 181: Busbar measurement bay with fuse unit, double busbar

M21.302.R04

Switchgear unit		Binary input	Output relay	
Q1 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q2 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X02 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
F1 (SIG_1: Signal S011 EXT)		U B05	/	
F2 (SIG_1: Signal S012 EXT)		U B06	/	

Tab. A5-775: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
X01	Open	(*Q1*=0)
	Close(d)	(*Q1*=0)
X02	Open	(*Q2*=0)
	Close(d)	(*Q2*=0)

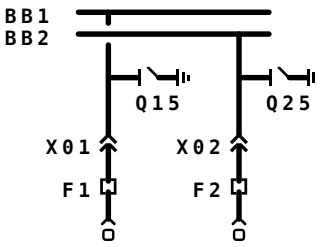
Tab. A5-776: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
X01	Open	(*Q1*=0)
	Close(d)	(*Q1*=0)
X02	Open	(*Q2*=0)
	Close(d)	(*Q2*=0)

Tab. A5-777: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.16 Bay type No. 182: Busbar measurement bay with fuse unit, double busbar

M21.312.R02

Switchgear unit		Binary input	Output relay	
Q15 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q25 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
X02 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
F1 (SIG_1: Signal S011 EXT)		U B05	/	
F2 (SIG_1: Signal S012 EXT)		U B06	/	

Tab. A5-778: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q15	Close(d)	(*Q15*=I)
Q25	Close(d)	(*Q25*=I)

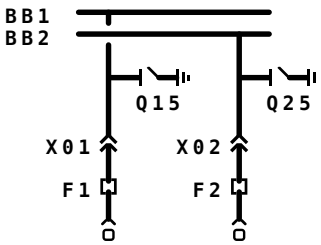
Tab. A5-779: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-780: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.17 Bay type No. 183: Busbar measurement bay with fuse unit, double busbar

M21.312.R04

Switchgear unit		Binary input	Output relay	
Q15 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q25 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X02 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
F1 (SIG_1: Signal S011 EXT)		U B05	/	
F2 (SIG_1: Signal S012 EXT)		U B06	/	

Tab. A5-781: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q15	Close(d)	(*Q15*=I)
Q25	Close(d)	(*Q25*=I)

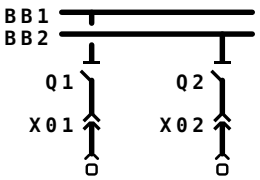
Tab. A5-782: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-783: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.18 Bay type No. 184: Busbar measurement bay with other switchgear unit, double busbar

M21.902.R02

Switchgear unit		Binary input	Output relay	
Q1 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q2 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
X02 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-784: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

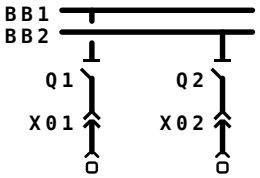
Tab. A5-785: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-786: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.19 Bay type No. 185: Busbar measurement bay with other switchgear unit, double busbar

M21.902.R04

Switchgear unit		Binary input	Output relay	
Q1 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q2 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X02 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	

Tab. A5-787: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
X01	Open	(*Q1*=0)
	Close(d)	(*Q1*=0)
X02	Open	(*Q2*=0)
	Close(d)	(*Q2*=0)

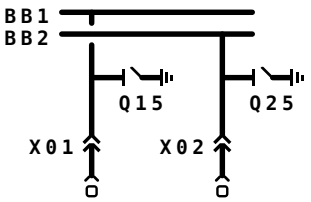
Tab. A5-788: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
X01	Open	(*Q1*=0)
	Close(d)	(*Q1*=0)
X02	Open	(*Q2*=0)
	Close(d)	(*Q2*=0)

Tab. A5-789: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.20 Bay type No. 186: Busbar measurement bay with other switchgear unit, double busbar

M21.912.R02

Switchgear unit		Binary input	Output relay	
Q15 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q25 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
X02 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-790: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q15	Close(d)	(*Q15*=I)
Q25	Close(d)	(*Q25*=I)

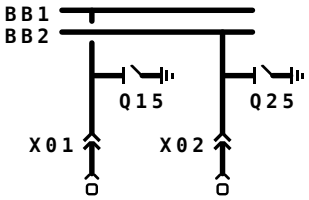
Tab. A5-791: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-792: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.21 Bay type No. 187: Busbar measurement bay with other switchgear unit, double busbar

M21.912.R04

Switchgear unit		Binary input	Output relay	
Q15 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q25 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
X01 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
X02 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	

Tab. A5-793: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q15	Close(d)	(*Q15*=I)
Q25	Close(d)	(*Q25*=I)

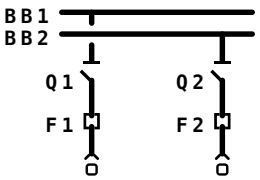
Tab. A5-794: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-795: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.22 Bay type No. 188: Busbar measurement bay with fuse unit, double busbar

M23.302.R02

Switchgear unit		Binary input	Output relay	
Q1 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q2 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
F1 (SIG_1: Signal S011 EXT)		U B05	/	
F2 (SIG_1: Signal S012 EXT)		U B06	/	

Tab. A5-796: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

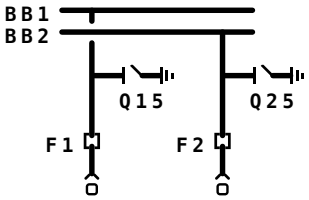
Tab. A5-797: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-798: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.23 Bay type No. 189: Busbar measurement bay with fuse unit, double busbar

M23.312.R02

Switchgear unit		Binary input	Output relay	
Q15 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q25 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
F1 (SIG_1: Signal S011 EXT)		U B05	/	
F2 (SIG_1: Signal S012 EXT)		U B06	/	

Tab. A5-799: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q15	Close(d)	(*Q15*=I)
Q25	Close(d)	(*Q25*=I)

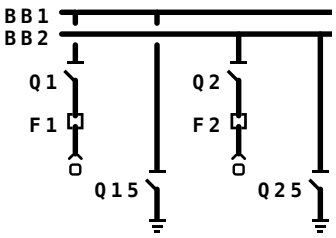
Tab. A5-800: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-801: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.24 Bay type No. 190: Busbar measurement bay with fuse unit, double busbar, direct motor control

M23.328.M04

Switchgear unit		Binary input	Output relay	
Q1 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q2 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q15 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q25 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
F2 (SIG_1: Signal S010 EXT)		U B04	/	
F1 (SIG_1: Signal S011 EXT)		U B05	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-802: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q15	Close(d)	(*Q15*=I)
Q25	Close(d)	(*Q25*=I)

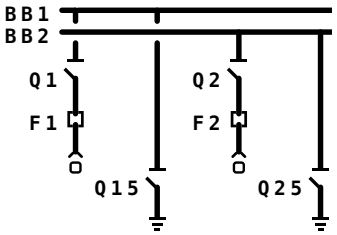
Tab. A5-803: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-804: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.25 Bay type No. 191: Busbar measurement bay with fuse unit, double busbar

M23.328.R02

Switchgear unit		Binary input	Output relay	
Q1 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q2 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q15 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q25 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
F1 (SIG_1: Signal S011 EXT)		U B05	/	
F2 (SIG_1: Signal S012 EXT)		U B06	/	

Tab. A5-805: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

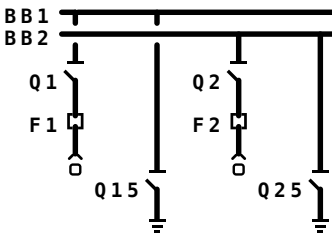
Tab. A5-806: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-807: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.26 Bay type No. 192: Busbar measurement bay with fuse unit, double busbar

M23.328.R04

Switchgear unit		Binary input	Output relay	
Q1 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q2 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q15 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q25 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
F1 (SIG_1: Signal S011 EXT)		U B05	/	
F2 (SIG_1: Signal S012 EXT)		U B06	/	

Tab. A5-808: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q15	Close(d)	(*Q15*=I)
Q25	Close(d)	(*Q25*=I)

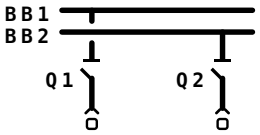
Tab. A5-809: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-810: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.27 Bay type No. 193: Busbar measurement bay with other switchgear unit, double busbar

M23.902.R02

Switchgear unit		Binary input	Output relay	
Q1 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q2 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	

Tab. A5-811: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

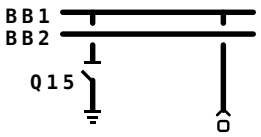
Tab. A5-812: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-813: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.28 Bay type No. 559: Busbar measurement bay with other switchgear unit, double busbar

M23.904.R00

Switchgear unit		Binary input	Output relay	
Q15 (*DEV01*)	Open	U A01	/	
	Close(d)	U A02	/	

Tab. A5-814: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

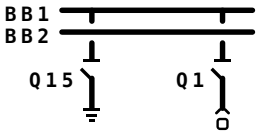
Tab. A5-815: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-816: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.29 Bay type No. 509: Busbar measurement bay with other switchgear unit, double busbar, direct motor control

M23.906.M01

Switchgear unit		Binary input	Output relay	
Q1 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q15 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-817: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

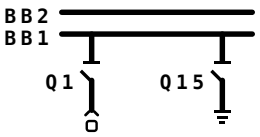
Tab. A5-818: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-819: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.30 Bay type No. 529: Busbar measurement bay with other switchgear unit, double busbar, direct motor control

M23.906.M02

Switchgear unit		Binary input	Output relay	
Q1 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q15 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-820: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q15	Close(d)	(*Q15*=I)

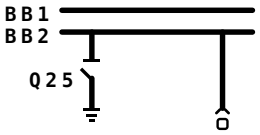
Tab. A5-821: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-822: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.31 Bay type No. 560: Busbar measurement bay with other switchgear unit, double busbar

M23.908.R00

Switchgear unit		Binary input	Output relay	
Q25 (*DEV01*)	Open	U A01	/	
	Close(d)	U A02	/	

Tab. A5-823: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

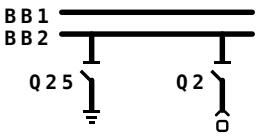
Tab. A5-824: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-825: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.32 Bay type No. 510: Busbar measurement bay with other switchgear unit, double busbar, direct motor control

M23.910.M01

Switchgear unit		Binary input	Output relay	
Q2 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q25 (*DEV02*)	Open	U A03	/	
	Close(d)	U A04	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-826: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

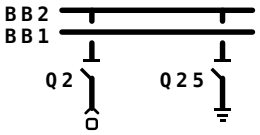
Tab. A5-827: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-828: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.33 Bay type No. 530: Busbar measurement bay with other switchgear unit, double busbar, direct motor control

M23.910.M02

Switchgear unit		Binary input	Output relay	
Q2 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q25 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-829: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q25	Close(d)	(*Q25*=I)

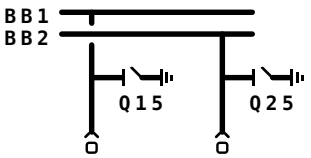
Tab. A5-830: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-831: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.34 Bay type No. 194: Busbar measurement bay with other switchgear unit, double busbar

M23.912.R02

Switchgear unit		Binary input	Output relay	
Q15 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q25 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	

Tab. A5-832: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q15	Close(d)	(*Q15*=I)
Q25	Close(d)	(*Q25*=I)

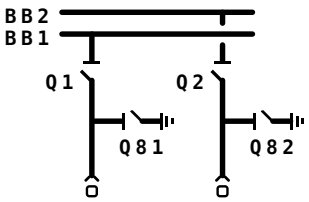
Tab. A5-833: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-834: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.35 Bay type No. 234: Busbar measurement bay with other switchgear unit, double busbar, direct motor control

M25.903.M02

Switchgear unit		Binary input	Output relay	
Q1 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q2 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q81 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q82 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-835: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q1	Close(d)	(*Q81*=0)
Q2	Close(d)	(*Q82*=0)

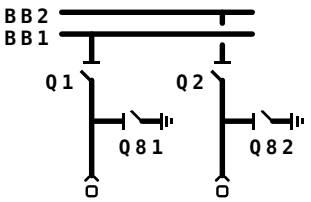
Tab. A5-836: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q1	Close(d)	(*Q81*=0)
Q2	Close(d)	(*Q82*=0)

Tab. A5-837: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.36 Bay type No. 195: Busbar measurement bay with other switchgear unit, double busbar, direct motor control

M25.903.M04

Switchgear unit		Binary input	Output relay	
Q1 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q2 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q81 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q82 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-838: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q1	Close(d)	(*Q81*=0)
Q2	Close(d)	(*Q82*=0)
Q81	Close(d)	(*Q1*=0)
Q82	Close(d)	(*Q2*=0)

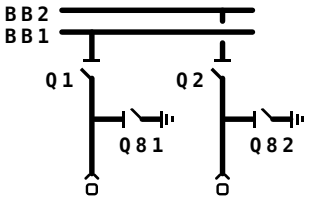
Tab. A5-839: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q1	Close(d)	(*Q81*=0)
Q2	Close(d)	(*Q82*=0)
Q81	Close(d)	(*Q1*=0)
Q82	Close(d)	(*Q2*=0)

Tab. A5-840: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.37 Bay type No. 235: Busbar measurement bay with other switchgear unit, double busbar

M25.903.R02

Switchgear unit		Binary input	Output relay	
Q1 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q2 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q81 (*DEV03*)	Open	U A05	/	
	Close(d)	U A06	/	
Q82 (*DEV04*)	Open	U B01	/	
	Close(d)	U B02	/	

Tab. A5-841: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q1	Close(d)	(*Q81*=0)
Q2	Close(d)	(*Q82*=0)

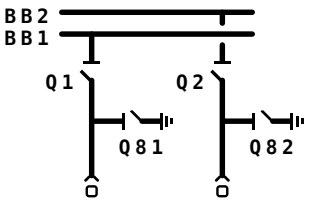
Tab. A5-842: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q1	Close(d)	(*Q81*=0)
Q2	Close(d)	(*Q82*=0)

Tab. A5-843: Bay Interlock Equations for Operation with Station Interlocking

A5.2.5.38 Bay type No. 196: Busbar measurement bay with other switchgear unit, double busbar

M25.903.R04

Switchgear unit		Binary input	Output relay	
Q1 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q2 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Q81 (*DEV03*)	Open	U A05	K A05	
	Close(d)	U A06	K A06	
Q82 (*DEV04*)	Open	U B01	K B01	
	Close(d)	U B02	K B02	

Tab. A5-844: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q1	Close(d)	(*Q81*=0)
Q2	Close(d)	(*Q82*=0)
Q81	Close(d)	(*Q1*=0)
Q82	Close(d)	(*Q2*=0)

Tab. A5-845: Bay Interlock Equations for Operation without Station Interlocking

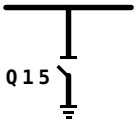
Switchgear unit	Control O/C	Interlock equation
Q1	Close(d)	(*Q81*=0)
Q2	Close(d)	(*Q82*=0)
Q81	Close(d)	(*Q1*=0)
Q82	Close(d)	(*Q2*=0)

Tab. A5-846: Bay Interlock Equations for Operation with Station Interlocking

A5.2.6 Busbar Grounding Bays

A5.2.6.1 Bay type No. 129: Busbar grounding bay with other switchgear unit, single busbar, direct motor control

E13.901.M01

Switchgear unit		Binary input	Output relay	
Q15 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-847: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q15	Close(d)	(*Q15*=I)

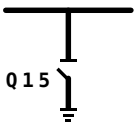
Tab. A5-848: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-849: Bay Interlock Equations for Operation with Station Interlocking

A5.2.6.2 Bay type No. 130: Busbar grounding bay with other switchgear unit, single busbar

E13.901.R01

Switchgear unit		Binary input	Output relay	
Q15 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	

Tab. A5-850: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q15	Close(d)	(*Q15*=I)

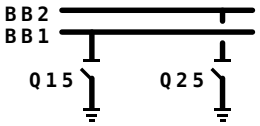
Tab. A5-851: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-852: Bay Interlock Equations for Operation with Station Interlocking

A5.2.6.3 Bay type No. 131: Busbar grounding bay with other switchgear unit, double busbar, direct motor control

E23.903.M02

Switchgear unit		Binary input	Output relay	
Q15 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q25 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	
Motor relay (SIG_1: Signal S012 EXT)		U B06	/	
Shunt winding (CMD_1: Command C011)		/	K B05	
Motor relay (CMD_1: Command C012)		/	K B06	

Tab. A5-853: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q15	Close(d)	(*Q15*=I)
Q25	Close(d)	(*Q25*=I)

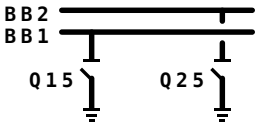
Tab. A5-854: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-855: Bay Interlock Equations for Operation with Station Interlocking

A5.2.6.4 Bay type No. 132: Busbar grounding bay with other switchgear unit, double busbar

E23.903.R02

Switchgear unit		Binary input	Output relay	
Q15 (*DEV01*)	Open	U A01	K A01	
	Close(d)	U A02	K A02	
Q25 (*DEV02*)	Open	U A03	K A03	
	Close(d)	U A04	K A04	

Tab. A5-856: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
Q15	Close(d)	(*Q15*=I)
Q25	Close(d)	(*Q25*=I)

Tab. A5-857: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-858: Bay Interlock Equations for Operation with Station Interlocking

A5.2.7 Other Bay Types

A5.2.7.1 Bay type No. 1: Other bay type with other switchgear unit, without busbar

X99.901.R00

Switchgear unit	Binary input	Output relay	
—			

Tab. A5-859: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-860: Bay Interlock Equations for Operation without Station Interlocking

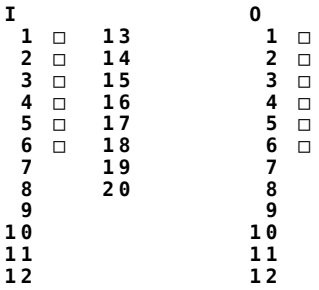
Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-861: Bay Interlock Equations for Operation with Station Interlocking

A5.2.7.2 Bay type No. 980: Other bay type with other switchgear unit, without busbar

X99.902.R06.2

Switchgear unit	Binary input	Output relay	
S001 (SIG_1: Signal S001 EXT)	U A01	/	
S002 (SIG_1: Signal S002 EXT)	U A02	/	
S003 (SIG_1: Signal S003 EXT)	U A03	/	
S004 (SIG_1: Signal S004 EXT)	U A04	/	
S005 (SIG_1: Signal S005 EXT)	U A05	/	
S006 (SIG_1: Signal S006 EXT)	U A06	/	
C001 (CMD_1: Command C001)	/	K A01	
C002 (CMD_1: Command C002)	/	K A02	
C003 (CMD_1: Command C003)	/	K A03	
C004 (CMD_1: Command C004)	/	K A04	
C005 (CMD_1: Command C005)	/	K A05	
C006 (CMD_1: Command C006)	/	K A06	



Tab. A5-862: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

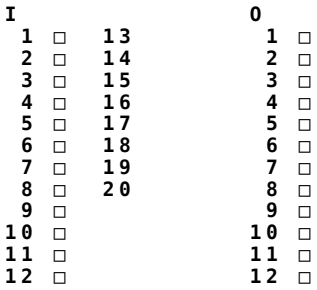
Tab. A5-863: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-864: Bay Interlock Equations for Operation with Station Interlocking

A5.2.7.3 Bay type No. 981: Other bay type with other switchgear unit, without busbar

X99.903.R12.2

Switchgear unit	Binary input	Output relay	
S001 (SIG_1: Signal S001 EXT)	U A01	/	
S002 (SIG_1: Signal S002 EXT)	U A02	/	
S003 (SIG_1: Signal S003 EXT)	U A03	/	
S004 (SIG_1: Signal S004 EXT)	U A04	/	
S005 (SIG_1: Signal S005 EXT)	U A05	/	
S006 (SIG_1: Signal S006 EXT)	U A06	/	
S007 (SIG_1: Signal S007 EXT)	U B01	/	
S008 (SIG_1: Signal S008 EXT)	U B02	/	
S009 (SIG_1: Signal S009 EXT)	U B03	/	
S010 (SIG_1: Signal S010 EXT)	U B04	/	
S011 (SIG_1: Signal S011 EXT)	U B05	/	
S012 (SIG_1: Signal S012 EXT)	U B06	/	
C001 (CMD_1: Command C001)	/	K A01	
C002 (CMD_1: Command C002)	/	K A02	
C003 (CMD_1: Command C003)	/	K A03	
C004 (CMD_1: Command C004)	/	K A04	
C005 (CMD_1: Command C005)	/	K A05	
C006 (CMD_1: Command C006)	/	K A06	
C007 (CMD_1: Command C007)	/	K B01	
C008 (CMD_1: Command C008)	/	K B02	
C009 (CMD_1: Command C009)	/	K B03	
C010 (CMD_1: Command C010)	/	K B04	
C011 (CMD_1: Command C011)	/	K B05	
C012 (CMD_1: Command C012)	/	K B06	

Tab. A5-865: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

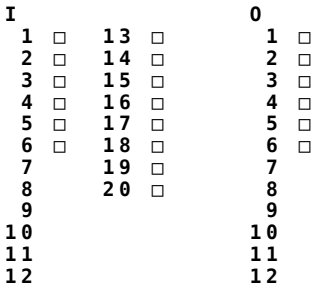
Tab. A5-866: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-867: Bay Interlock Equations for Operation with Station Interlocking

A5.2.7.4 Bay type No. 982: Other bay type with other switchgear unit, without busbar

X99.904.R06.2

Switchgear unit	Binary input	Output relay	
S001 (SIG_1: Signal S001 EXT)	U A01	/	
S002 (SIG_1: Signal S002 EXT)	U A02	/	
S003 (SIG_1: Signal S003 EXT)	U A03	/	
S004 (SIG_1: Signal S004 EXT)	U A04	/	
S005 (SIG_1: Signal S005 EXT)	U A05	/	
S006 (SIG_1: Signal S006 EXT)	U A06	/	
S007 (SIG_1: Signal S007 EXT)	U C01	/	
S008 (SIG_1: Signal S008 EXT)	U C02	/	
S009 (SIG_1: Signal S009 EXT)	U C03	/	
S010 (SIG_1: Signal S010 EXT)	U C04	/	
S011 (SIG_1: Signal S011 EXT)	U C05	/	
S012 (SIG_1: Signal S012 EXT)	U C06	/	
S013 (SIG_1: Signal S013 EXT)	U C07	/	
S014 (SIG_1: Signal S014 EXT)	U C08	/	
C001 (CMD_1: Command C001)	/	K A01	
C002 (CMD_1: Command C002)	/	K A02	
C003 (CMD_1: Command C003)	/	K A03	
C004 (CMD_1: Command C004)	/	K A04	
C005 (CMD_1: Command C005)	/	K A05	
C006 (CMD_1: Command C006)	/	K A06	

Tab. A5-868: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

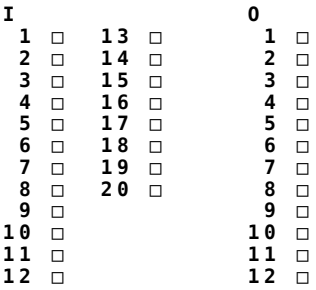
Tab. A5-869: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-870: Bay Interlock Equations for Operation with Station Interlocking

A5.2.7.5 Bay type No. 983: Other bay type with other switchgear unit, without busbar

X99.905.R12.2

Switchgear unit	Binary input	Output relay	
S001 (SIG_1: Signal S001 EXT)	U A01	/	
S002 (SIG_1: Signal S002 EXT)	U A02	/	
S003 (SIG_1: Signal S003 EXT)	U A03	/	
S004 (SIG_1: Signal S004 EXT)	U A04	/	
S005 (SIG_1: Signal S005 EXT)	U A05	/	
S006 (SIG_1: Signal S006 EXT)	U A06	/	
S007 (SIG_1: Signal S007 EXT)	U B01	/	
S008 (SIG_1: Signal S008 EXT)	U B02	/	
S009 (SIG_1: Signal S009 EXT)	U B03	/	
S010 (SIG_1: Signal S010 EXT)	U B04	/	
S011 (SIG_1: Signal S011 EXT)	U B05	/	
S012 (SIG_1: Signal S012 EXT)	U B06	/	
S013 (SIG_1: Signal S013 EXT)	U C01	/	
S014 (SIG_1: Signal S014 EXT)	U C02	/	
S015 (SIG_1: Signal S015 EXT)	U C03	/	
S016 (SIG_1: Signal S016 EXT)	U C04	/	
S017 (SIG_1: Signal S017 EXT)	U C05	/	
S018 (SIG_1: Signal S018 EXT)	U C06	/	
S019 (SIG_1: Signal S019 EXT)	U C07	/	
S020 (SIG_1: Signal S020 EXT)	U C08	/	

Switchgear unit	Binary input	Output relay	
C001 (CMD_1: Command C001)	/	K A01	
C002 (CMD_1: Command C002)	/	K A02	
C003 (CMD_1: Command C003)	/	K A03	
C004 (CMD_1: Command C004)	/	K A04	
C005 (CMD_1: Command C005)	/	K A05	
C006 (CMD_1: Command C006)	/	K A06	
C007 (CMD_1: Command C007)	/	K B01	
C008 (CMD_1: Command C008)	/	K B02	
C009 (CMD_1: Command C009)	/	K B03	
C010 (CMD_1: Command C010)	/	K B04	
C011 (CMD_1: Command C011)	/	K B05	
C012 (CMD_1: Command C012)	/	K B06	

Tab. A5-871: Assignment of Binary Inputs and Output Relays

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-872: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
		—

Tab. A5-873: Bay Interlock Equations for Operation with Station Interlocking

A6 Version History

A6.1 Version History – MiCOM P30

A6.1.1 P139 -301 -401 -601 … -315 -4xx -655-701

A6.1.1.1 P139 -301 -401 -601

Release: 2001–04–27

Initial product release.

A6.1.1.2 P139 -302 -402/403/404 -602

Release: 2002–02–07

Hardware

As an alternative slot 4 can now be equipped with the 5-pole voltage transformer module T (for the Automatic Synchronism Check function).

Additional to the 40 TE case variant with pin-terminal connection there is now an 84 TE case variant with ring-terminal connection as well as a 40 TE case variant with a combination of pin- and ring-terminal connection (transformer module: for ring-terminal connection; other modules: for pin-terminal connection)

The binary (I/O) module X(6xO) is now optionally available with rapid-response output by 4 thyristors.

Diagram

The updated connection diagrams now include the 5-pole voltage transformer module T and show the variants with ring-terminal connection:

- P139 -402 (for 40 TE case, with pin-terminal connection)
- P139 -403 (for 84 TE case, with ring-terminal connection)
- P139 -404 (for 40 TE case, transformer module: with ring-terminal connection; other modules: with pin-terminal connection)

Software

LOC

Measurands previously missing are now included in the selection of the Operation Panel, Overload Panel and Ground Fault Panel:

- (004 134) MEASI: Current IDC
- (004 135) MEASI: Current IDC p.u.
- (004 136) MEASI: Curr. IDC,lin. p.u.
- (005 100) MEASO: Current A-1
- (005 099) MEASO: Current A-2

Bug fixing:

- Control actions from the local control panel are now no longer rejected in the DNP3 protocol.

PC

User-defined signal selections for the PC interface can now be made by setting (003 189) PC: Select. spontan.sig., and these selected signals are spontaneously transmitted in addition to the VDEW signals.

The PC interface "Time-out" can now be set with the parameter (003 188) PC: Time-out.

COMM1	The COURIER protocol has now been implemented. User-defined signal selections for the protocol IEC 60870-5-103 can now be made by setting (003 179) COMM1: Select. spontan.sig., and these selected signals are spontaneously transmitted in addition to the VDEW signals.werden.
COMM2	“Logical” communication interface 2 (function group COMM2) added to communication.
OUTP, LED	Addition of function assignment to output relays and LED indicators with these signals: SFMON: Defect.module slot 1 (097 000) to SFMON: Defect.module slot20 (097 019) Now defective modules can be indicated by output relays for instance.
MEASI	Addition of this per unit measurand ● (004 017) THERM: Therm. replica p.u.

MAIN

The following signals were added to the parameter setting selection tables for the trip command blocking signals:

- (003 173) COMM1: Command block. EXT
- (037 074) COMM1: Sig./meas. block EXT
- (040 014) OUTP: Block outp.rel. EXT
- (037 070) MAIN: Test mode EXT
- (036 045) MAIN: Trip cmd. block. EXT

The following signals were added to the selection table for:

- (097 004) SFMON: Defect.module slot 5
- (097 017) SFMON: Defect.module slot18
- (097 118) to (097 123) SFMON: Defect.module slot19 ... SFMON: Error K 1206

The following settings for the 5th VT input were added to the MAIN function group:

- (010 100) MAIN: Vref,nom V.T. prim.
- (031 052) MAIN: Vref,nom V.T. sec.
- (011 034) MAIN: Meas. val. rel. Vref

The direct time output signals of the 32 logic equations are now available to the function assignment of trip command 1 and trip command 2.

In addition to the standard procedure to determine energy output a second procedure is now available. The selection of the procedure depends on the given load ratio and is made by setting (010 138) MAIN: Op. mode energy cnt..

The physical communication channel assignment to the "logical" communication interfaces COMM1 and COMM2 can be set with the parameter (003 169) MAIN: Chann.assign.COMM1/2.

Addition of two measured operating values:

- (005 046) MAIN: Voltage Vref prim.
- (005 047) MAIN: Voltage Vref p.u.

Incorrect termination is now fixed for the close commands issued by the control function and terminated with the starting of the trip command.

Time switching to setting “Daylight saving time” (003 095) MAIN: Time switching is now stored so that it will remain valid after a warm restart.

The multiple signal (036 251) MAIN: Gen. trip signal is now supported.

Bug fixing:

- Rated current setting is changed from 1 A to 5 A when electro-magnetic interference occurs. To confirm settings the internal values of (010 003) MAIN: Inom device and (010 026) MAIN: IN,nom device are overwritten by the set values once every software cycle.
- A disabled residual current system protection, which is displayed by the signal (040 134) MAIN: System IN disabled is now considered by the DTOC and IDMT residual current stages.
- During incrementation of the overflow counter for active and reactive energy output and input a negative value of the integrated count is now prevented.

MAIN, ARC, ASC, PSIG	In addition to enabling or disabling of the functions Auto-Reclosing Control, Automatic Synchronism Check, Protective Signaling and Residual Current System protection by using two binary signal inputs it is now possible to use just one binary signal input for enabling or disabling. If, for example, only the signal (037 010) ARC: Enable EXT is assigned to one binary signal input, the function is enabled by the rising edge and disabled by the falling edge of the input signal.
DTOC	Step size for thresholds I>, I>> and I>>> reduced from 0.1 Inom to 0.01 Inom.
ARC	New function Automatic Synchronism Check (ASC) is taken into account by the Auto-Reclosing Control (ARC) function. The signal (037 077) ARC: (Re)close request is used in this context to have ASC triggered by ARC.
ASC	Function Automatic Synchronism Check (ASC) has been added: The voltage and synchronism conditions are checked before an automatic or manual closing occurs. The transformer module T with a fifth VT is required to provide a reference voltage.
GFDSS	A fixed time delayed reset of 80 ms is now implemented for the stage (016 062) GFDSS: VNG>.
THERM	Addition of these per unit measurands: ● (004 017) THERM: Therm. replica p.u. ● (004 178) THERM: Coolant temp. p.u. ● (004 179) THERM: Object temp. p.u.
f<>	Bug fixing: ● With the selection of a measurement loop the amplitude of the phase-to-ground loops was incorrectly rated by the factor √3.
MCMON	Reference voltage monitoring is now included in the measuring-circuit monitoring function with the signals ● (038 100) MCMON: FF, Vref triggered ● (040 078) MCMON: M.circ. V,Vref flty.
SIG_1	Bug fixing: ● When the VDEW addition to the protocol IEC 60870-5-103 was used single-pole signals were signaled in the data byte with the value “0” (end) or “1” (start).
COUNT	The unit (min) was added to the parameter (217 007) COUNT: Cycle t.count transm in the data model.

SFMON	Because of the addition of a fifth VT these warning signals were added: ● (098 022) SFMON: FF, Vref triggered ● (098 023) SFMON: M.circ. V,Vref flty. Addition of function assignment to warnings by the delayed and direct time signals from logic equations 30 to 32. The following signals that are included in the function selection of warnings are fully supported now: ● (098 026) SFMON: Open circ. 20mA inp. ● (098 024) SFMON: PT100 open circuit ● (098 025) SFMON: Overload 20 mA input

A6.1.1.3 **P139 -302 -402/403/404 -602-701**

Release: 2002−05−13

Hardware

No changes.

Diagram

No changes.

Software

SFMON	Decreased severity for entries in the monitoring signal memory during short-time supply voltage dipping.

A6.1.1.4 **P139 -302 -402/403/404 -602-702**

Release: 2002−07−26

Hardware

No changes.

Diagram

No changes.

Software

IDMT	Accuracy of tripping time is improved. Particularly the characteristic “IEC extremely inverse” is now within the claimed tolerance range.

A6.1.1.5 **P139 -302 -402/403/404 -603**

Release: 2002−08−29

Hardware

No changes.

Diagram

No changes.

Software

LOC	The signals (221 005) LOC: Loc.acc.block.active and (221 004) LOC: Rem.acc.block.active are now sent spontaneously as individual signals with the protocol IEC 60870-5-103.
INP	The function assignment of the binary signal inputs U 1001 to U 1006, which are not present on slot 10, have been removed from the data model.

A6.1.1.6 P139 -302 -402/403/404 -604

Release: 2002–12–20

Hardware

Device is prepared for the supplementary fitting with the new temperature p/c board (RTD module), which will become available as of version P139 -304-405/406/407-605.

Diagram

No changes.

Software

COMM1	The measurand (005 047) MAIN: Voltage Vref p.u. has been added to the selection for the cyclic ILS telegram. The unnecessary parameter (003 168) COMM1: Address mode is now hidden.
LOC	The measurand (005 046) MAIN: Voltage Vref prim. has been added to the function assignment for the Operation Panel, the Overload Panel and the numerical display. The measurand (005 047) MAIN: Voltage Vref p.u. has been added to the function assignment for the Operation Panel, the Overload Panel and the bar chart display.
MEASI, THERM, LIMIT, SFMON	Functions have been enhanced in preparation for the supplementary fitting with the new temperature p/c board (RTD module). For THERM protection this includes direct temperature monitoring, temperature measurement, coolant temperature acquisition, and open-circuit monitoring of the individual resistance thermometers.
MAIN, ARC, ASC, PSIG	The functionality of equal-priority enabling or disabling a function via any device interface is modified now in that way, that the functions are enabled by default.
IDMT	The setting ranges for parameters $I_{ref,neg}$ and $I_{ref,N}$ as well as $I_{ref,neg\ dynamic}$ and $I_{ref,N\ dynam}$ have been increased from 0.1 – 4.00 I_{nom} to 0.01 – 4.00 I_{nom}.
PSS	Bug fixing: ● After a warm restart of the device an externally set parameter subset fell back to the user set parameter subset. The signal (036 102) PSS: Control via user changed from “Yes” to “No” after a warm restart.

ASC

Setting to continuous synchronism test procedure after a test close request:

When a test close request is issued the operative time is not terminated by the starting of the close enable but will continue until it has reached its set time duration. Synchronism is continuously checked, even after the first close enable, as long as the operative time is running. The signal (037 083) ASC: Close enable (if synchronism conditions are met) and the delta measured values are continuously updated and periodically transmitted by the device interfaces. The cycle time to transmit the telegram with the measured values is set at:

- (101 212) ASC: Transm.cycle,meas.v.

The signal close enable is signaled spontaneously both as “start” and as “end” and must therefore be included in a general scan.

The signal (037 086) ASC: Close rejection is issued only after the operative time has elapsed and there is then no synchronism. This signal is also issued after a test close request if, during the operative time, a close enable is temporarily signaled.

The number of test close requests and the number of close rejections after test close requests are not counted, e.g. the counters (009 033) ASC: No. close requests and (009 034) ASC: No. close rejections will only consider “authentic” close requests.

If during the operative time (after a test close request) there is an authentic close request issued by the device control function (HMI) or from the interfaces (or the ARC) the test run is terminated and ASC is restarted. Then, after the first close enable is reached, the close command is issued and the operative time is terminated. The signal (037 086) ASC: Close rejection is issued when the set operative time has elapsed without synchronism conditions having been met and the circuit breaker is not switched.

The setting range for the operative time was increased from 0.00 – 60.00 s to 0.0 – 6000.0 s and the step range was reduced from 0.01 s to 0.1 s.

The settable reset times for the signals (0XX 241) ASC: tClose enable Volt.PSx, (0XX 240) ASC: tClose enable syn.PSx have been replaced by fixed minimum times of 100 ms.

These measured event values have been added to the Automatic Synchronism Check:

- (004 087) ASC: Voltage Vref
- (004 088) ASC: Volt. sel. meas.loop

The measuring range of the measured event value:

- (004 091) ASC: Volt. magnit. diff.

has been changed from 0.000 – 3.000 V_{nom} to −3.000 ... 3.000 V_{nom}.

LIMIT

If the temperature measurand T was set to *not measured* the stages T< and T<< in the limit value monitoring function would start.

A6.1.1.7 P139 -304 -405/406/407 -605

Release: 2003–11–28

Hardware

A new communication module A, providing the InterMiCOM protective interface COMM3 (InterMiCOM), is available now as an ordering option.

A new temperature p/c board (RTD module) can now be fitted in slot 3, instead of the transient ground fault detection module N (TGFD module).

As an alternative to the conventional transformer modules for analog input signals there is now a new CT/VT-board with NCIT available. Details are available on request.

Binary signal inputs with a higher switching threshold are now available. Installation is only recommended if the application specifically requires such binary signal inputs.

Diagram

The new connection diagrams include the InterMiCOM communication interface (function group COMM3), the temperature p/c board (RTD module) and the CT/VT-board with NCIT.

- P139 -405 (for 40 TE case, with pin-terminal connection)
- P139 -406 (for 40 TE case, transformer module: with ring-terminal connection; other modules: with pin-terminal connection)
- P139 -407 (for 84 TE case, with ring-terminal connection)

Software

LOC

Customized binary signal panels can now be created.

A customized Bay Panel can be sub-divided into up to eight images.

The selection table for the Operation Panel was extended.

Bug fixing:

- The signals M037 to M040 can now be configured as image variables.
- When, after a switchgear unit had been selected locally, local control was switched over to remote control, the selection of local switching actions could continue to be made up to the termination of the reset time.

COMM1

The fault location (004 029) FT_DA: Fault react., prim. (Function Type 80h, Information Number 49h), will no longer be sent spontaneously, if its value is *Not measured*.

With the fault values transmission the scaling factor for the primary value of channel VNG was corrected by a factor of 1/√3.

Bug fixing:

- DNP3: Multiple telegrams are prevented.
- The protocol per IEC 60850-5-101 incorrectly transmitted negative operating values.
- IEC 60870-5-101: In the data model there was an incorrect selection for parameter (003 198) COMM1: Time tag length. Furthermore 3 Bytes were used irrespective of the setting.
- IEC 60870-5-103: For the reclose commands of high-speed and time-delayed reclosing (Function Type 80h, Information Numbers 80h and 81h), the status changes “On” to “Off” were signaled spontaneously and were transmitted as part of the response to a general scan.

COMM3

New function group COMM3 (InterMiCOM protection interface) permits end-end channel-aided schemes to be configured, without the need of discrete carrier equipment.

INP

Further reset commands were added to the function assignment of binary signal inputs.

MEASO

Scaling of the BCD coded output of measurands now allows the setting of an output values range. This feature is required if signed event measurands are assigned to the BCD output (like fault location or short-circuit reactance,...).

MAIN

Sensitivity for the setting of this parameter was increased to 0.01 s: (017 054) MAIN: Suppress start. sig..

The determination of the faulty phase during a ground fault in Petersen coil compensated power systems is improved to avoid incorrect signaling at the end of the ground fault.

These measured operating values have been added:

- (005 025) MAIN: Appar. power S prim.
- (005 026) MAIN: Appar. power S p.u.
- (005 009) MAIN: Angle ΣVPG vs. IN

The delay time for the Running Time Monitoring of manually operated switchgear can now be set: (221 079) MAIN: Delay Man.Op.Superv..

Bug fixing:

- All energy counters were reset by a general starting (GS).
- The values set for the primary transformer voltages were reset to their default values when a warm restart of the device occurred.
- If a device or switchgear designation was omitted in a customized panel then the device went out of order when such a panel was selected.

MAIN, ARC, ASC, PSIG	The stored status is no longer reset with a warm restart of the device, when specific functions are enabled or disabled through a binary signal input.
FT_DA	The determination of measured fault values during short fault times is improved. Bug fixing: ● Fault locations of numerical values >655.35% were falsely displayed as small values. ● When a residual current starting occurs without a phase current starting all measured fault values dependent on a measurement loop are set to *Not measured*.
FT_RC	Direction signaling for the short-circuit direction determination function was added to the selection table for the fault recording trigger (003 085) FT_RC: Fct. assig. trigger.
DTOC	Three negative-sequence current stages were added to the definite-time overcurrent protection.
IDMT	Bug fixing: ● The trip signals from the residual current stage and the negative-sequence current stage were not reset with the release of starting.
ARC	Bug fixing: ● The HSR and TDR counters could only be acknowledged/cleared by a cold restart.
ASC	Bug fixing: ● With a close request the counter (009 003) GFDSS: No. GF (curr. meas) was incremented by a count of 8 instead of 1. ● When a test close request was issued in the operating mode “synchronism-checked” a chattering of the ASC enable signal could occur.
TGFD	The setting range of (016 042) TGFD: IN,p> is extended down to 0.03 I_{nom}. The pick-up delay of the measuring circuit monitoring signal (093 094) SFMON: TGFD mon. triggered is now increased from 5 s to 65 s.
P<>	The power directional protection now includes overload stages for active and reactive power. The starting signals from the power directional protection stages now feature direction dependency. The setting range for the parameter (017 172) P<>: Release delay Q> PSx is now extended to max. 100.00 s.
LIMIT	Reference voltage monitoring was added to the Limit Value Monitoring function.

LOGIC	Bug fixing: ● The time dependent logic outputs – (042 033) LOGIC: Output 1 (t) to (042 095) LOGIC: Output 32 (t) – were reset for a short period during parameter subset selection.
DEVxx (x=1 to 10)	Bug fixing: ● When the additions to the protocol IEC 60870-5-103 were applied, the return signal identification was missing in the acknowledgment of commands to switchgear.
CMD_1	Single commands, created with the bay editor from the PC Access Software **MiCOM S1**, can now also be configured to output relays on the output module X(6O) in slot 10 (with 40 TE cases) or slot 18 (with 84 TE cases).
SIG_1	Bug fixing: ● A concurrent use of signals M001 and M033 was not possible. ● The wrong selection table for communication in the data model was assigned to the signal (226 077) SIG_1: Logic signal S010.
SFMON	To prevent the risk of contention problems because of the simultaneous disruption of the supply voltage and the auxiliary voltage for the binary signal inputs m.c.b. trip signals are now delayed internally for 300 ms. Bug fixing: ● Sporadic triggering of the internal monitoring of the 15 V and 24 V voltages without a fault in the power supply module being present was eliminated.

A6.1.1.8 P139 -305 -408/409/410 -610

Release: 2005–05–20

This is a preliminary IEC 61850 version which is project-specific and only available on request!

Hardware

The new Ethernet module for communication per IEC 61850 is now available and may be fitted to slot 2 as an alternative to communication module A.

Diagram

The updated connection diagrams now include the Ethernet module communication interface.

- P139 -408 (for 40 TE case, with pin-terminal connection)
- P139 -409 (for 40 TE case, transformer module: with ring-terminal connection; other modules: with pin-terminal connection)
- P139 -410 (for 84 TE case, with ring-terminal connection)

Software

LOC	Addition of the event counter to the selection for the Fault Panel ASC: No. RC aft. man.clos (004 009). Addition of the measured value to the selection for the Operation Panel MEASI: Scaled value IDC,lin (004 180).
COMM1	The selection of register assignments for signals in the MODBUS protocol has been extended with the signal SCDD: Fault P backward (036 019) erweitert. Time stamping of status signals from external devices has been adapted to the DNP3 protocol. Bug fixing: ● A change of a communication parameter will no longer lead to a sporadic warm restart of the device, when the Courier protocol is used.
COMM3	After a warm restart with COMM3 activated, the entry at SFMON: Hardware error COMM3 (093 143) will now only occur if there actually is such a hardware error.
IEC	Initial implementation of the IEC 61850 communication protocol.
GSSE	In conjunction with the IEC 61850 communication protocol a communication procedure has been implemented that is compatible with previous UCA2 GOOSE for the exchange of binary information within an Ethernet network section.

SFMON	A number of device bugs previously led to a blocking with the second entry to the monitoring signal memory (i. e. if the recurring fault was already stored in the monitoring signal memory – see Chapter “Troubleshooting” in the Technical Manual). This reaction was modified in such a manner that device blocking will only occur if a renewed appearance of the same device fault lies within a set “memory retention time” (021 018) SFMON: Mon.sig. retention. This makes it possible to tolerate sporadic faults, resulting from control actions, without having to clear the monitoring signal memory in the interim. The significance of the time stamp was modified to accommodate this new feature. The time stamp now represents the last appearance of the fault.
OUTP, LED	Addition of the signal (034 018) ASC: Close request to the selection of freely configurable LED indicators and output relays.
FT_RC	The duration of the disturbance record is limited to 1 minute so as to avoid a record of an endless disturbance. The signal (036 050) ARC: Blocking EXT is now stored in the fault recording (previously only the resulting signal (004 069) ARC: Blocked was recorded).
MEASI	Open-circuit monitoring of the 20 mA input and the “PT 100” input has been improved.

MAIN

Parameters from the MAIN function, which could previously only be set in the branch "General Functions" of the menu tree, have been transferred to the parameter subsets.

- MAIN: Neutr.pt. treat. PSx
- MAIN: Hld time dyn.par.PSx
- MAIN: Bl.tim.st.IN,neg PSx
- MAIN: Gen. start. mode PSx
- MAIN: Op. rush restr. PSx
- MAIN: Rush I(2fn)/I(fn)PSx
- MAIN: I>lift rush restrPSx
- MAIN: Suppr.start.sig. PSx
- MAIN: tGS PSx

With this improvement it is now possible to consider operational changes by selecting the appropriate parameter subset.

The parameter (010 048) MAIN: Neutr.pt. treat. PSx used only in conjunction with the ASC is now visible if the ASC function has been configured. Furthermore the selections at various neutral point treatments that occur by this parameter have now been reduced to a selection relevant to the application.

The primary source for synchronizing the date and time can now be selected. Available are COMM1, COMM2/PC, IRIG-B or a binary input for minute signal pulses. A backup source may additionally be selected.

- (103 210) MAIN: Prim.Source TimeSync
- (103 211) MAIN: BackupSourceTimeSync

For bay control function signals detected via binary signal inputs and conditioned with debouncing it is now possible to select whether the time tag for the signal is to be issued after debouncing (or when the first pulse edge is detected). The setting (221 083) MAIN: TimeTagAfterDebounce is provided for this purpose.

Bug fixing:

- The enabling or disabling of the ground protection via a binary signal input was incorrectly inverted.

PSIG

Bug fixing:

- The enabling or disabling of the protective signaling via a binary signal input was incorrectly inverted.

ARC

Bug fixing:

- The enabling or disabling of the ARC function via a binary signal input was incorrectly inverted.
- The DTOC negative-sequence current stage started the ARC by triggering the ARC trip time of the IDMT negative-sequence current stage.

ASC

Selecting the CB assignment to an external device has been adapted to the maximum possible number of external devices.

Bug fixing:

- The enabling or disabling of the ASC function via a binary signal input was incorrectly inverted.

GFDSS

The setting parameters for the function GFDSS are now included in the parameter subsets and can be changed, according to operating conditions, by selecting the appropriate parameter subset. It is also possible to individually enable this function in each parameter subset.

Processing of the function GFDSS now occurs with a higher priority in order to obtain reduced reaction times with less fluctuation. This is a response to the increased application of ground fault direction signaling as a tripping condition.

Bug fixing:

- The cause for faulty or unstable directional decisions with the operate delay $t_{VNG>}$ set below 60 ms has been removed.
- The operate delays LS and BS are now accurate, even with set values > 65 s.

TGFD

The setting parameters for the function TGFD are now included in the parameter subsets and can be changed, according to operating conditions, by selecting the appropriate parameter subset. It is also possible to individually enable this function in each parameter subset.

THERM

Bug fixing:

- In the event of an open circuit in the 20 mA current loop when using this to measure temperatures there was no automatic activation of the corresponding backup temperature sensor.

P<>

The setting range for the following parameters was extended from max. 0.5 S_{nom} to now max. 1.5 S_{nom}:

- (017 120) P<>: P> PSx
- (017 140) P<>: P>> PSx
- (017 160) P<>: Q> PSx
- (017 180) P<>: Q>> PSx

Bug fixing:

- When setting a high operate value as well as a high disengaging ratio for the P< or Q< stages an internal overflow was possible that led to a lower disengaging ratio than that which had been set.
- When the stage P< (P<<, Q< or Q<<) was triggered the signal P<>: Fault P< (P<<, Q< or Q<<) was issued even though the operate delay for the stage was blocked.

CBM

Function group circuit breaker monitoring (CBM) has been added.

LIMIT

Parameter cells and signals related to V_{ref} are only visible when the device has been fitted with a fifth VT to measure V_{ref} .

A6.1.1.9 **P139 -305 -408/409/410 -610-704**

Release: 2005−07−08

This is a preliminary IEC 61850 version which is project-specific and only available on request!

Hardware

No changes.

Diagram

No changes.

Software

IEC	With regard to IEC 61850-8-1 the data type for the quality of measured values and signals has been changed from 14 bit to 13 bit.

A6.1.1.10 **P139 -306 -408/409/410 -611**

Release: 2005−11−07

Hardware

Further variants with binary signal inputs with a higher operate threshold are now available. This makes the following selections available:

- >18 V (standard variant) (Without order extension No.)
- >90 V (60...70% of $V_{A,nom}$ = 125 ... 150 V) (Order ext. No. 461)
- >155 V (60...70% of $V_{A,nom}$ = 220 ... 250 V) (Order ext. No. 462)
- >73 V (67% of $V_{A,nom}$ = 110 V) (Order ext. No. 463)
- >146 V (67% of $V_{A,nom}$ = 220 V) (Order ext. No. 464)

Standard variant recommended if higher pickup threshold is not specifically required by application.

Diagram

No changes.

Software

LOC	Extensive expansion of the parameter selection (080 110) LOC: Assignment read key. Instead of selecting only one assigned protocol by pressing the READ key there are now up to 16 different addresses assigned which can be selected by pressing the READ key more than once in succession (menu jump function).
COMM1, COMM2	With the IEC 60870-5-103 protocol, the selection of measured operating values has been extended for the cyclic ILS telegram.
IEC	General expansion of the Logical Nodes according to the IEC 61850 data model. For access by the support software S1 via Ethernet the function “Setting by Tunneling” has been implemented.
GOOSE	For the exchange of binary information in an Ethernet network section the IEC 61850 communication procedure (IEC-GOOSE) has been implemented.
SFMON	Change of the English signal designation for this signal: (098 072) SFMON: CB faulty EXT

MAIN

The following per unit measured operating values have been added:

- (009 016) MAIN: Current Ipos p.u.
- (009 015) MAIN: Current Ineg p.u.
- (009 018) MAIN: Voltage Vpos p.u.
- (009 017) MAIN: Voltage Vneg p.u.
- (004 070) MAIN: Frequency f p.u.
- (005 072) MAIN: Angle VPG/IN p.u.
- (005 073) MAIN: Load angle phi A p.u
- (005 074) MAIN: Load angle phi B p.u
- (005 075) MAIN: Load angle phi C p.u
- (005 076) MAIN: Angle phi N p.u.

The parameter (010 049) MAIN: Rotary field was renamed to (010 049) MAIN: Phase sequence. In addition the parameter selection for *clockwise* and *anticlockwise* was also changed to *A-B-C* and *A-C-B*.

Change of the English signal designation for the following parameters:

- (103 210) MAIN: Prim.Source TimeSync
- (103 211) MAIN: BackupSourceTimeSync

FT_RC

The signal (002 002) FT_RC: Record.trig active has been implemented, which shows that a fault-recording trigger is present.

FT_DA

When a fault location is outside the measuring range it could happen that the fault location was measured as too small by the fault measurand (004 027) FT_DA: Fault locat. percent.

DTOC

A fourth overcurrent stage (residual current stage) $I_{N>>>>}$ with an extended setting range has been integrated.

Because of its extended setting range this stage always uses the residual current calculated from the three phase currents.

IDMT2

A second inverse-time overcurrent protection function has been added.

SCDD

A voltage memory has been added to the short-circuit direction determination function. In general SCDD will operate as previously with the non-faulted voltages. Now the device offers a voltage memory from which the SCDD function can obtain necessary voltage information for direction determination when 3-pole faults with a large 3-phase voltage drop have occurred.

MP

The motor protection function has been extended by these per unit measured operating values:

- (005 071) MP: Therm. repl. MP p.u.
- (005 086) MP: St-ups st. perm.p.u.

THERM

The parameters THERM: Bl. f. CTA fault PSx have been replaced by the parameters with an extended setting range THERM: Funct.f.CTA fail.PSx.

In order to obtain improved visibility control of the parameters for the relative and absolute replica the previous parameter (022 063) THERM: Operating mode has been replaced by:

- (022 064) THERM: Relative replica
- (022 065) THERM: Absolute replica

It should be remembered that an explicit selection – relative or absolute replica – for the thermal overload protection must be carried out. If no such explicit selection – relative or absolute replica – is carried out the thermal overload protection will be blocked and the warning signal (039 110) THERM: Setting error,block. is issued.

These parameters are now available to set the over temperature and the warning temperature in the absolute replica:

- THERM: O/T f.Iref pers. PSx
- THERM: Warning temp. PSx

The following signals have been added to the thermal overload protection:

- (039 024) THERM: Reclosure blocked
- (040 035) THERM: Not ready

V<>

The over-/undervoltage function may now be optionally operated with an enable threshold based on the minimum current monitor for the undervoltage stages ($V_<$, $V_{<<}$, $V_{pos<}$, $V_{pos<<}$).

The undervoltage stages are blocked if during active monitoring the set threshold of at least one phase is not exceeded by the phase currents. There are two new setting parameters to activate the operating mode for minimum current monitoring and to set the enable threshold:

- V<>: Op. mode V< mon. PSx (001 162)
- V<>: I enable V< PSx (001 155)

f<>

Bug fixing:

- The cause for imprecise frequency measurements, when 6 cycles were selected for the evaluation time, has now been eliminated.

CBF

The complete revision of the circuit breaker failure protection function now includes a current breaking-off criterion.

The previous signal (036 017) CBF: CB failure has been replaced by the following signals:

- (038 215) CBF: Trip signal t1
- (038 219) CBF: Trip signal t2

(Note: The signal (036 017) CBF: CB failure becomes available again as of version -613.)

CBM	An incorrect internally active wear characteristic lead to an incorrect calculation of the number of CB operations remaining, when at least one of these parameters was set to *blocked*: ● (022 014) CBM: Med. curr. Itrip,CB or ● (022 015) CBM: Perm. CB op. Imed,CB

A6.1.1.11 P139 -306 -408/409/410 -611-706

Release: 2005–12–21

This is a preliminary IEC 61850 version, which is project-specific and only available on request!

Hardware

No changes.

Diagram

No changes.

Software

ASC

Bug fixing:

- When the automatic synchronism check (ASC) was linked to the control of an external device and a close command was issued to this external device from the local control panel, the external device was always blocked from closing by the ASC function. This error occurred only when the communication protocol per IEC 61850 was used with the protection and control unit.

A6.1.1.12 P139 -306 -408/409/410 -611-707

Release: 2006–02–16

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- The range of the internal values assigned to the various operating modes of the parameter IEC: DEV control model (221 081) now starts with a “1” instead of a “0”.

INP

The request routine for binary signal inputs has been enhanced to suppress external interference.

A6.1.1.13 P139 -307 -411/412/413 -612

Release: 2006–09–07

Hardware

As an ordering option for the 40 TE and 84 TE model versions there is now a variant available with a detachable HMI. The detachable HMI is always supplied with a case width of 40 TE. The freely configurable LED indicators H4 to H16 on the detachable HMI are provided as multi-color LEDs.

The ordering option Ethernet module with 100 Mbit/s glass fiber and ST connector has replaced the ordering option Ethernet module with 10 Mbit/s glass fiber and ST connector.

Diagram

The updated connection diagrams now include the interfaces to connect the detachable HMI.

- P139 -411 (for 40 TE case, with pin-terminal connection)
- P139 -412 (for 40 TE case, transformer module: ring-terminal connection; other modules: pin-terminal connection)
- P139 -413 (for 84 TE case, with ring-terminal connection)

Software

DVICE, LOC	Because of the ordering option “detachable HMI” these additional Device Identification parameters are now available: ● (002 131) DVICE: SW version DHMI ● (002 132) DVICE: SW version DHMI DM ● (221 099) LOC: Local HMI exists
LOC	Additional item in the selection table for the operation panel: (217 100) COUNT: Count 1.
COMM1	When the protocols per IEC 60870-5-101 or IEC 60870-5-103 are used, the message (221 100) COMM1: Buffer overrun is issued when an internal buffer overrun of the spontaneous control function signals has occurred.

IEC

Implementation of active monitoring of the communications data links to logged-on clients with the parameter (104 062) IEC: TCP keep-alive timer. This active monitoring now replaces previous passive monitoring by parameter (104 050) IEC: Inactivity timer.

Implementation of an automatic switchover to daylight saving time, activated by parameter (104 219) IEC: Switch.dayl.sav.time. Switchover times for the automatic switch to daylight saving time are governed by the following settings:

- (104 220) IEC: Dayl.sav.time start
- (104 221) IEC: Dayl.sav.time st. d
- (104 222) IEC: Dayl.sav.time st. m
- (104 223) IEC: Dayl.sav.t.st.0:00 +
- (104 225) IEC: Dayl.sav.time end
- (104 226) IEC: Dayl.sav.time end d
- (104 227) IEC: Dayl.sav.time end m
- (104 228) IEC: Dayl.sav.t.end 0:00+

A second SNTP server may now be applied for time synchronization. Should no answer be transmitted by the first SNTP server the next request is automatically transferred to the second SNTP server (backup function).

- (104 202) IEC: SNTP server 1 IP
- (104 210) IEC: SNTP server 2 IP

Instead of setting a router address and target network, so as to establish a communication link to a client situated exterior to the local network, now only the setting of the gateway address is required via (104 011) IEC: Gateway address.

Now “unbuffered reports” are available for all logical nodes.

GOOSE

VLAN priority for GOOSE is set via (106 007) GOOSE: VLAN Priority.

The dataset reference for GOOSE is displayed via the measured value (106 008) GOOSE: DataSet Reference.

INP

Bug fixing:

- The input signal (037 018) MAIN: Man. trip cmd. EXT did not operate when it was set as a receive signal for COMM3, GSSE or GOOSE and triggered via this communication link. (Triggering via a binary signal input operated correctly.)

LED

The operating mode for the LED indicators has been extended by the operating mode LED flashing.

Configuration, operating mode and physical state of the permanently configured LED indicators H1 and H17 are now displayed via configuration parameters and physical state signals.

The freely configurable LED indicators H4 to H16 may now be assigned two signals, each with a different color (red or green). If both assigned signals are active the resulting LED color will be “amber”.

MAIN

The parameter (221 098) MAIN: Time tag has replaced the previous parameter (221 083) MAIN: TimeTagAfterDebounce. In addition there is a third operating mode available for selection.

COUNT	The settable debouncing time for count value acquisition is no longer required.

A6.1.1.14 **P139 -306 -408/409/410 -611-709**

Release: 2006−10−05

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- If communication was interrupted during control access via the Ethernet interface using the operating program MiCOM S1, renewed control access was only possible after a warm restart of the P139.
- If a “Select” or “Operate” command for an external device, in which the interlock bit had been set, was sent from a client to the protection and control unit it could occur that such a command was rejected.

A6.1.1.15 **P139 -307 -411/412/413 -612-710**

Release: 2006−12−14

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- If communication was interrupted during control access via the Ethernet interface using the operating program MiCOM S1, renewed control access was only possible after a warm restart of the P139.

A6.1.1.16 **P139 -306 -408/409/410 -611-711**

Release: 2007–02–14

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- Previously a break in the client-server communications link could occur after approximately 49 days for about 20 minutes. GOOSE and GSSE are not affected.

A6.1.1.17 **P139 -307 -411/412/413 -612-712**

Release: 2007–02–14

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- Previously a break in the client-server communications link could occur after approximately 49 days for about 20 minutes. GOOSE and GSSE are not affected.

A6.1.1.18 P139 -307 -411/412/413 -613

Release: 2007–07–10

This version is not released!

Hardware

No changes.

Diagram

No changes.

Software

With this version resetting options have been extended such that now there is a corresponding external signal available for each manual reset function; now the respective counter or memory can be reset by an appropriately assigned binary signal.

Similar to this all manual reset parameters have been renamed by adding the phrase “USER” to the descriptive text (it may be abbreviated so that the max number of characters allowed is not exceeded).

Example:

- MAIN: General reset was renamed to MAIN: General reset USER.

LOC

A selection of memories to be reset may now be assigned (with the new parameter LOC: Assignment reset key) to the CLEAR key situated on the local control panel. Now each time the CLEAR key is pressed not only the LED indicators and the display are reset but the selected memory is also reset immediately.

Additionally two menu jump lists are now available that can have functions assigned by setting these new parameters:

- LOC: Fct. menu jmp list 1 and
- LOC: Fct. menu jmp list 2

SCDD

For earth fault direction evaluation it is now settable, whether the measured or the calculated displacement voltage is used for the direct evaluation.

ARC

In case of a starting shorter than the set trip time during an ARC cycle the reclaim time resettled with the beginning of the starting is set again instead of interruption of the ARC cycle as before.

Selective determination of phase- and earth faults implemented. Only selective starting signals with activated ARC trip time will be considered for ARC trip.

All parameters containing the phrase “Ineg>” in the descriptive text have been renamed and now use the term “Iref,neg”. Similarly the terms “kIref>” and “kINref>” were renamed to “IrefP>” and “IrefN>”.

SFMON

The parameter (093 075) SFMON: Inval. SW vers.COMM1 was renamed to SFMON: Inval. SW COMM1/IEC (093 075).

MEASI	In case a hardware fault on the temperature p/c board (RTD module) is detected then the parameter MEASI: RTD HW Failure (006 102) is set. When a hardware fault is detected on the analog I/O module Y the parameter MEASI: I/O HW Failure (006 103) is set.
DEVxx	The state signals are now stored in the operating data memory: ● (218 000) DEV01: Open cmd. received (...etc for DEV02,...) ● (218 001) DEV01: Close cmd. received (...etc for DEV02,...) Supporting of 3 position disconnector / earthing switch.
CBF	The signal (036 017) CBF: CB failure was not supported in previous version.
IEC	IEC: Deadband value (104 051) was divided into several individual settings: ● (104 229) IEC: Update Measurements ● (104 230) IEC: Dead band IP ● (104 231) IEC: Dead band IN ● (104 232) IEC: Dead band VPP ● (104 233) IEC: Dead band VPG ● (104 234) IEC: Dead band f ● (104 235) IEC: Dead band P ● (104 236) IEC: Dead band phi ● (104 237) IEC: Dead band Z ● (104 238) IEC: Dead band min/max ● (104 239) IEC: Dead band ASC ● (104 240) IEC: Dead band temp. ● (104 241) IEC: Dead band 20mA Bug fixing: ● Correction in the modeling of: DtpPhsPTOC3, DtpEftPTOC3, DtpEftPTOC4, ItpPhsPTOC2, DtpEftPTOC2 and RREC1: ModOper
GOOSE	The number of addressable external devices was increased from 16 to 32. The parameter GOOSE: Dataset Cfg.Revision (106 005) was renamed to GOOSE: DataSet Cfg.Revision (106 009) and all parameters GOOSE: Ext.Devxx interm.pos (xx=1 to 16) are now available as GOOSE: Ext.Devyy interm.pos (yy=01 to 32).

MAIN

Two group reset parameters implemented, each of which will reset several memories "simultaneously” with configurable assignment of eligible memories. The group reset is now issued by a manual reset from the local control panel, and may also be created by linking it to a binary signal input or a function key.

The parameter (006 096) MAIN: Meas. P,Q,COS allows for setting the sign of the following measured operating data values for active and reactive power:

- (004 050) MAIN: Active power P prim.
- (004 052) MAIN: Reac. power Q prim.
- (004 051) MAIN: Active power P p.u.
- (004 052) MAIN: Reac. power Q p.u.

The following logic state signals are issued depending on the respective control point position:

- (221 101) MAIN: Cmd. fr. comm.interf
- (221 102) MAIN: Command from HMI
- (221 103) MAIN: Cmd. fr. electr.ctrl

COMM1/IEC, COMM2/PC, IRIG-B or a minute pulse input may now be selected as the primary source to synchronize the date and time (MAIN: Prim.Source TimeSync (103 210)).

COMM1/IEC, COMM2/PC, IRIG-B or a minute pulse input continue to be available as the backup source (MAIN: BackupSourceTimeSync (103 211)).

THERM

The descriptive text in English for the following parameter has been changed:

THERM: Rset therm.repl.USER to THERM: Reset replica USER (022 061)

A6.1.1.19 **P139 -307 -411/412/413 -613-713**

Release: 2007−08−01

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- If a client sent two SBO commands in fast succession for two different switch gears, without waiting the acknowledgement, the first switch gear could not be controlled.

A6.1.1.20 **P139 -307 -411/412/413 -612-714**

Release: 2007−08−01

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- A communications fault occurred, if the K200 relay was not wired correctly in bays with motor controlling.
- Reports from SIG1 to SIG40 were lost when events changed in just a few milliseconds.
- If a client sent two SBO commands in fast succession for two different switch gears, without waiting the acknowledgement, the first switch gear could not be controlled.

A6.1.1.21 P139 -307 -411/412/413 -613-716

Release: 2007−11−16

Hardware

No changes.

Diagram

No changes.

Software

IEC

Added to the communication protocol IEC 61850 are:

- MmuPriMMXN1 Voltage Vref prim
- MmuSecMMXN1 Voltage Vref p. u.
- MmuPriMMXN2 Current IN prim
- MmuSecMMXN2 Frequency f p.u.
- RBRF1 Breaker failure OpEx
- RBRF2 Breaker failure OpEx, OpIn

Bug fixing:

- A communications fault occurred, if the K200 relay was not wired correctly in bays with motor controlling.
- Freezing of operation measurements reports after 65536 × 2seconds (36.4 hours).

SCDD

Bug fixing:

- Correction in evaluation of measured displacement voltage for earth fault direction evaluation.

TGFD

New version of the software module for Transient Ground Direction Determination.

A6.1.1.22 P139 -307 -411/412/413 -613-717

Release: 2008−02−13

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- The current value in IEC 61850 Comtrade file was 5× smaller if the nominal current was set to 5 A. (See parameter (010 003) MAIN: Inom device).

A6.1.1.23 P139 -307 -411/412/413 -614

Release: 2008–04–01

Hardware

No changes.

Diagram

No changes.

Software

LOC

The parameter LOC: Assignment read key (080 110) was renamed to LOC: Fct. read key

MAIN

The following measured operating data for delayed/stored phase current values have been added:

- MAIN: IA prim,demand (006 226)
- MAIN: IB prim,demand (006 227)
- MAIN: IC prim,demand (006 228)
- MAIN: IA prim,demand stor. (006 223)
- MAIN: IB prim,demand stor. (006 224)
- MAIN: IC prim,demand stor. (006 225)
- MAIN: IA p.u.,demand (006 235)
- MAIN: IB p.u.,demand (006 236)
- MAIN: IC p.u.,demand (006 237)
- MAIN: IA p.u.,demand stor. (006 232)
- MAIN: IB p.u.,demand stor. (006 233)
- MAIN: IC p.u.,demand stor. (006 234)

The label of the parameter MAIN: Meas. P,Q,COS, that has been introduced with version -613 and that allows for changing the sign of the displayed values of the active and reactive power, has been changed to: MAIN: Meas. direction P,Q.

The descriptive text in English for the following parameters has been changed:

- MAIN: IP,maxprim,demand.st (005 034)
- MAIN: IP,maxp.u.,demand.st (005 035)
- MAIN: IP,max prim.,demand (005 036)
- MAIN: IP,max p.u.,demand (005 037)
- MAIN: Ph. err. VCG,2 NCIT (010 194)

INP

The setting INP: Filter (010 220) is now available for conformity with standard IEC 60255-22-7, class A.

MP

Now the device features an “hours run” counter and this includes a comparison to the corresponding set upper limit.

The descriptive text in English for the following parameter has been changed: MP: Rset therm.repl.USER to MP: Reset replica USER (022 073).

CBF	The signal CBF: CB failure (036 017) is now available again. The parameter designation for (022 160) CBF: I> was changed to (022 160) CBF: I<.

A6.1.1.24 P139 -307 -411/412/413 -614-718

Release: 2008–08–04

Hardware

No changes.

Diagram

No changes.

Software

IEC

Added to the communication protocol IEC 61850 are:

- MmuPriMMXU1/PhV.neut Voltage VNG prim.
- MmuPriMMXU1/PhV.res Volt. ∑(VPG)/3 prim.
- MmuPriMMXU1/A.res Current ∑IP prim.
- MmuSecMMXU1./PhV.neut Voltage VNG p.u.
- MmuSecMMXU1/PhV.res Volt. ∑(VPG)/3 p.u.
- MmuSecMMXU1/A.neut Current IN p.u.
- MmuSecMXU1/A.res Current ∑IP p.u.

Bug fixing:

- Reports from SIG1 to SIG40 were lost when events changed in just a few milliseconds.

LOC

Bug fixing:

- On the Detachable HMI, the Spanish character set was displayed instead of the selected French character set.

A6.1.1.25 P139 -307 -411/412/413 -614-719

Release: 2008–09–04

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- A communications fault occurred when fast successive command signals were received (SPC’s system / SPCOx).

CBF

Bug fixing:

- A bug occurring upon initialization of 3-phase startup has been fixed.

A6.1.1.26 P139 -308 -414/415/416 -630

Release: 2008–11–15

Hardware

Three optional new binary I/O modules are now available:

- Bi6Bo6H: Control board with 6 binary signal inputs and 6 output relays with heavy duty contacts
- Bo4H: Binary output relay board with 4 heavy duty contacts
- Bi6Bo3: Control board with 6 binary signal inputs and 3 output relays

Diagram

The updated connection diagrams now include the interfaces with the new binary I/O modules.

- P139-414 (for 40TE case, with pin-terminal connection)
- P139-415 (for 40TE case, transformer module: with ring-terminal connection; other modules: with pin-terminal connection)
- P139-416 (for 84TE case, with ring-terminal connection)

Software

LOC

New address for the hold-time of the measured value display added. (031 072) LOC: Hold-t. meas.v.displ

Values range from 1 to 60 seconds.

Default setting *blocked,* therefore the behavior is backward-compatible (new functionality disabled).

Functionality: With the Bay Panel display the next or the previous configured measured value may be selected by pressing the keys “cursor down” or “cursor up”. The new feature is that the next value will appear after the set time period has elapsed. When set to *blocked* the selected value will always be displayed.

Bug fixing:

- The Password Display mode was not supported during a startup.

COMM1

Communications protocol IEC 60870-5-103: When checking during test operations it is now possible to trigger signals (SIG) and contact positions (DEV) from the control part (previously only possible from the protection part).

These new addresses were added:

- (221 105) COMM1: Sel. pos. dev.test
  - *Not assigned*
  - *DEVxx*
- (221 106) COMM1: Test position dev.
  - *don't execute*
  - *execute open*
  - *execute close*
  - *execute intermed.*

Bug fixing:

- Communications protocol DNP3: Contact positions were transmitted twice.

THERM

The new measured operating value “Thermal current” has been implemented as a part of function group THERM.

$$I_{\text{therm,prim}} = \sqrt{\frac{\text{Status}_{\text{therm,repl}}}{100}} \cdot I_{\text{ref}} \cdot I_{\text{nom,CT,prim}}$$

I,therm,prim: THERM: Current I,therm prim (007 220)

*Status therm repl:*THERM: Status THERM replica (004 016)

Iref: THERM: Iref PSx (072 179, 073 179, 074 179, 075 179)

Inom CT prim: MAIN: Inom C.T. prim. (010 001)

The per-unit thermal current is displayed as a variable referred to Iref:

$$I_{\text{therm},p.u.} = \frac{I_{\text{therm,prim}}}{I_{\text{ref}} \cdot I_{\text{nom,CT,prim}}}$$

I,therm,p.u.: THERM: Current I,therm p.u (007 221)

In a measured values message the thermal current is processed as a per-unit variable referred to Iref.

V<>

The stages $V_{ref>}$, $V_{ref>>}$ and $V_{ref<}$, $V_{ref<<}$ have been added to the time-voltage protection function:

New parameters:

- V<>: Vref> PSx
  - (007 064, 007 071, 007 075, 007 079)
- V<>: Vref>> PSx
  - (007 065, 007 068, 007 072, 007 076)
- V<>: tVref> PSx
  - (007 066, 007 069, 007 073, 007 077)
- V<>: tVref>> PSx
  - (007 067, 007 070, 007 074, 007 078)
- V<>: Vref< PSx
  - (007 086, 007 097, 007 101, 007 105)
- V<>: Vref<< PSx
  - (007 087, 007 098, 007 102, 007 106)
- V<>: tVref< PSx
  - (007 088, 007 099, 007 103, 007 107)
- V<>: tVref<< PSx
  - (007 096, 007 100, 007 104, 007 108)

F_KEY

Bug fixing:

- The function key selection (function group F_KEY) has been removed from the configuration.

MAIN	Measured operating values are now also calculated during a general starting condition and no longer set to “not measured”. New addresses with a 32 bit measured value display have been added for the 4 energy measured values: ● (008 065) MAIN: Act.energy outp.prim ◦ *0 ... 6,553,500.00 MWh* ● (008 066) MAIN: Act.energy inp. prim ◦ *0 ... 6,553,500.00 MWh* ● (008 067) MAIN: React.en. outp. prim ◦ *0 ... 6,553,500.00 Mvar h* ● (008 068) MAIN: React. en. inp. prim ◦ *0 ... 6,553,500.00 Mvar h* The 4 addresses with the 16 bit display and overrun counter have been removed.
IEC, GOOSE	Phase 2 of the IEC 61850 communications protocol has been implemented.

A6.1.1.27 P139 -307 -411/412/413 -614-720

Release: 2009–02–03

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- After some 15000 close/open commands, the client aborted communication.

MAIN

Bug fixing:

- Without external clock synchronization (IRIG-B or via communication protocol) there were leaps (typ. 7 hours) in the system time.

LIMIT

Bug fixing:

- Incorrect operation of Vref>,>>,<,<< fixed. The error occured if loop A-G, B-G or C-G was selected as the measurement loop in ASC Vref.

A6.1.1.28 P139 -307 -411/412/413 -614-721

Release: 2009–04–23

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- Commands are now rejected with signal “Command already in execution”, and the position of the circuit breaker contacts is transmitted correctly to the control system.

A6.1.1.29 P139 -308 -414/415/416 -615

Release: 2009–04–30

Hardware

The following three new binary I/O modules are now available as ordering options:

- Bi6Bo6H: Binary module with 6 binary signal inputs and 6 high-power contacts
- Bo4H: Binary module with 4 high-power contacts
- Bi6Bo3: Binary module with 6 binary signal inputs and 3 output relays

Diagram

The updated connection diagrams include the wiring configuration for the new binary I/O modules.

- P139 -414 (for case 40TE, pin-terminal connection)
- P139 -415 (for case 40TE, CT/VT ring-, all other modules pin-terminal connection)
- P139 -416 (for case 84TE, ring-terminal connection)

Software

Bug fixing:

- All parameters of function group FKEY (which is not supported by this device) were removed. (Since the HMI of the P139 does not have any function keys, these parameters were invalid.)

LOC

New parameter for the hold-time of the measured values display.

- (031 072) LOC: Hold-t. meas.v.displ

Range: 1 to 60 seconds.

The default value is *blocked*, so that the behavior is backward-compatible (i.e. the new functionality is deactivated).

Functionality: On the Bay Panel, one can select the previous or next configured measured value by pressing the “Up” or “Down” key, respectively. This works exactly like before. The new feature is that always after the set time the display automatically steps forward to the next value. If the parameter is set to *blocked,* the selected measured value is always displayed.

Bug fixing:

- The Password Display mode was not supported during a startup.

COMM1

Communications protocol IEC 60870-5-103: When checking during test operations it is now possible to trigger signals (SIG) and contact positions (DEV) from the control part (previously only possible from the protection part).

These new addresses were added:

- (221 105) COMM1: Sel. pos. dev.test
  - *Not assigned*
  - *DEVxx*
- (221 106) COMM1: Test position dev.
  - *don't execute*
  - *execute open*
  - *execute close*
  - *execute intermed.*

Bug fixing:

- Communications protocol DNP3: Contact positions were transmitted twice.

MAIN

Measured operating values are now also calculated during a general starting condition and no longer set to “not measured”.

New addresses with a 32 bit measured value display have been added for the 4 energy measured values:

- (008 065) MAIN: Act.energy outp.prim
  - *0 ... 6,553,500.00 MWh*
- (008 066) MAIN: Act.energy inp. prim
  - *0 ... 6,553,500.00 MWh*
- (008 067) MAIN: React.en. outp. prim
  - *0 ... 6,553,500.00 Mvar h*
- (008 068) MAIN: React. en. inp. prim
  - *0 ... 6,553,500.00 Mvar h*

The 4 addresses with the 16 bit display and overrun counter have been removed.

V<>

The setting range for $V_{neg>}$ and $V_{neg>>}$ has been extended. New setting range: 0.02 to 1.5 Vnom/√3 (previously: 0.2 to 1.5 Vnom/√3). This affects the following parameters:

- V<>: Vneg> PSx
- V<>: Vneg>> PSx

DEV01 ... DEV10

User-defined names can now be used as device identifiers. In the parameter DEVxx: Designat. ext. dev., the new option *Device Name User* is available. Then the text for the device's name, entered by the user at each of the DEVxx: DEV-Name User parameters, will be used as the device’s designation. (The maximum length is 4 characters, as with the fixed identifiers. Any longer text entered is truncated to 4 characters internally.) The following parameters are new:

(218 101) DEV01: DEV-Name User

to

(218 110) DEV10: DEV-Name User

A6.1.1.30 **P139 -308 -414/415/416 -616**

Release: 2009–06–01

Hardware

No changes.

Diagram

No changes.

Software

Bug fixing:

- For those parameters which allow for setting options dependent on the fitted modules, slot 18 was visible for 40 TE cases, too, although this particular slot does not exist for this case size.

LOC

Bug fixing:

- The Detachable HMI could freeze in case of a warm restart with activated LED reset.
- During operation with no (D)HMI connected to the device the processing cycle frequently got prolonged to about 100 ... 150 ms.
- An external LED reset with a device selected in the control panel could deactivate the flashing of the selected device on the display.
- After an external LED reset some characters could be displayed incorrectly or not at all.

A6.1.1.31 **P139 -307 -411/412/414 -614-722+723**

Release: 2009–09–02

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- Contact position is transmitted correctly after a cancel command.
- The cause of the “Undefined opcode” message that appeared during a switch command was resolved.

A6.1.1.32 **P139 -309 -414/415/416 -631**

Release: 2010–01–19

Hardware

As a further ordering option the Chinese character set is now available for the HMI.

Diagram

No changes.

Software

DEV01 ... DEV10	User-defined names can now be used as device identifiers. In the parameter DEVxx: Designat. ext. dev., the new option *Device Name User* is available. Then the text for the device's name, entered by the user at each of the DEVxx: DEV-Name User parameters, will be used as the device's designation. (The maximum length is 4 characters, as with the fixed identifiers. Any longer text entered is truncated to 4 characters internally.) The following parameters are new: (218 101) DEV01: DEV-Name User to (218 110) DEV10: DEV-Name User
LOGIC	Increase of the number of logic inputs from 16 to 40.
LOC	Recording of motor startups: During a motor startup, the time taken for the startup, the startup current and the startup heating can be displayed on the Operation Panel. Parameters: ● OL_DA: T.taken f.startup,MP (005 096) ● OL_DA: Heat.dur.start-up,MP (005 097) ● OL_DA: Start-up current, MP (005 098) The names of busbars and BB-sections can now be edited by the user. One has to select *BB-User Name* for „Designation busbar #“ or *BB_Sect.User Name* for „Designat. bus sect.#“, respectively. Then the user name is entered as text value of the respective parameter “Busbar#-NameUser“/“BB Sect.#-NameUser“. The maximum length is 3characters, longer texts will be internally truncated. Parameters: ● LOC: Busbar1 Name by User (218 191) ● LOC: Busbar2-NameUser (218 192 ● LOC: Busbar3-NameUser (218 193) ● LOC: BB Sect.1-NameUser (218 195) ● LOC: BB Sect.2-NameUser (218 196)

MAIN

The phase sequence for the current, given by the active parameter subset with the setting at MAIN: Phase reversal I PSx (010 200, 010 201, 010 202, 010 203), may be reversed by triggering a binary signal input configured at MAIN: Phase reversal I EXT (007 248).

To enable the function a phase sequence for normal operation must be set in the parameter. (Setting selection: *A-B swapped, B-C swapped, C-A swapped*.) The default setting is *No swap*, which disables the function.

Note: This feature is primarily designed for motor protection applications with “left/right” motor rotation control by phase reversal with parallel circuit breakers (one CB with phase reversal). Here the voltage is measured on the busbar side and the current down-stream between CB and motor. Dependent on the operating mode the current can therefore be measured in phase reversal to the voltage.

The values range for the 3 power measured values has been expanded:

- (005 025) MAIN: Appar. power S prim.
  - -3,199.9 – 3,200 MVA
- (004 050) MAIN: Active power P prim.
  - -3,199.9 – 3,200 MW
- (004 052) MAIN: Reac. power Q prim.
  - -3,199.9 – 3,200 Mvar

DTOC

The “IN Measured” or “IN Calculated” setting, which was previously available only globally for all three residual current stages $I_{N>}$, $I_{N>>}$ and $I_{N>>>}$ together, can now be set individually for each residual current stage.

Parameters:

- DTOC: Eval. IN>> PSx
  - (007 239, 007 240, 007 241, 007 242)
- DTOC: Eval. IN>>> PSx
  - (007 243, 007 244, 007 245, 007 246)

The setting parameter previously valid for all three residual current stages, DTOC: Eval. IN>, >>, >>> PSx (072 128, 073 128, 074 128, 075 128), has been renamed to DTOC: Eval. IN> PSx (072 128, 073 128, 074 128, 075 128) and will now only operate with the first residual current stage.

DTOC, IDMT1

Applies to direction-dependent starting / tripping:

The new parameters permit the selection whether the timer stages for phase or residual current stages are triggered with a starting or direction-dependent ('With direction'). The default for the parameter is the previous 'With starting' standard setting.

Parameters:

- DTOC: Mode Timer start PSx
  - (002 138, 002 139, 002 142, 002 143)
- IDMT1: Mode Timer start PSx
  - (007 226, 007 227, 007 228, 007 229)

DTOC, IDMT1, IDMT2

The inrush stabilization has been extended by DTOC: IN> PSx and IDMT1: Iref,N PSx, IDMT2: Iref,N PSx.

DTOC, IDMT

When a phase starting is present then a subsequent triggering of the inrush stabilization is not taken into account anymore.

Note: When a change from a single-pole fault to a two-phase fault or from a two-phase fault to a three-phase fault occurred it was possible that, because of transients during the change, the inrush stabilization was momentarily triggered which would reset the starting and the timer.

IDMT1

For all IP, Ineg and IN types of characteristics the enable threshold for the IDMT1 protection starting can now be set with the factor KI (values range: 1 to 10) dependent on I_{ref}. This factor KI will result in a linear shifting of the enable threshold along the X-axis of the respective characteristic. The factor will not result in a shifting of the characteristic itself.

Parameters:

- IDMT1: Factor KI,P PSx
  - (007 250, 007 251, 007 252, 007 253)
- IDMT1: Factor KI,neg PSx
  - (007 254, 007 255, 008 002, 008 005)
- IDMT1: Factor KI,N PSx
  - (001 173, 001 174, 001 175, 001 176)

SCDD

Enhanced tripping times with short-circuit direction determination.

Short-circuit direction determination has been extended for the DTOC stages $I_{>>>}$ and $I_{N>>>}$.

Parameters:

- SCDD: Direction tI>>> PSx
  - (007 230, 007 231, 007 232, 007 233)
- SCDD: Direction tIN>>> PSx
  - (007 235, 007 236, 007 237, 007 238)

ASC

Function ASC now provides a choice as to whether the CB operating time (tCB), as configured at Function Parameters/Global/MAIN, is to be taken into account for the precisely synchronized reclosure (AR) or not.

Parameters:

- MAIN: tCB,close
  - (000 032); value range: 0.06s ... 1s
- ASC: AR with tCB PSx
  - (000 038, 000 039, 000 050, 000 051)

FT_RC

An additional analog recording channel for the frequency has been implemented.

Parameter:

- FT_RC: Rec. analog chann.10 (035 169)

Default is *Without*, optional setting is *fnom*.

CBM

The correction acquisition time can now be set separately to be triggered by the open command and by the position signal issued by the CB auxiliary contacts.

Differing inherent delay times from the two command chains can now be configured independently of each other so as to achieve optimum time adjustment.

Parameter:

- CBM: Corr. acqu.time trip
  - (007 249); values range: 0 to 0.2 s

The previous common selection parameter CBM: Corr. acquis. time (022 018) values range: (-0.2 s to 0.2 s), has been renamed to CBM: Corr.acqu.t. CB sig. and is now only a correction acquisition time value affecting the position signal issued by the CB auxiliary contacts.

SFMON

The SFMON: TGFD mon. triggered signal is now no longer permanently listed in the alarm signal list.

Depending on the application this signal can now be configured using parameterSFMON: Fct. assign. warning (021 030).

V<>

The minimum value for the parameters below was changed from 0.2 to 0.02:

- V<>: Vneg> PSx
  - (076 023, 077 023, 078 023, 079 023)
- V<>: Vneg>> PSx
  - (076 024, 077 024, 078 024, 079 024)

Change of label text for the reference voltage (separate input) from “Vnom” to “Vref,nom”.

MP

In case of parameter switching (e.g. via LIMIT) the number of permitted motor startups (3/2 – 2/1) is now correctly detected. The thermal replica, however, is lost in this case.

I2>

The settable lower limit for I2> is now $0.02 \cdot I_{nom}$ (2%).

BTC

Bug fixing:

- The contact position is now shown correctly for 3pos circuit breakers.

IEC

Bug fixing:

- Comtrade in ASCII format; fault selection in IEC 61850 did not work correctly.
- The first configured element was not transmitted in GOOSE.

A6.1.1.33 **P139 -308 -414/415/416 -616-724**

Release: 2010–02–05

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- After an abort command with a wrong frame format the state of external devices was no longer transmitted.
- The cause for the signal *"Undefined opcode"* during rapid successive switching commands has been fixed.
- During a warm restart incorrect date and time data (initialization values) was transmitted for a short time.

MP

When switching between parameter subsets (e.g. via LIMIT) the number of permitted motor startups (3/2 – 2/1) is now determined accurately. However, the thermal replica is lost in this case.

ARC

The ARC counter is reset with a supply voltage drop.

A6.1.1.34 **P139 -309 -414/415/416 -631-726**

Release: 2010–04–28

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- Measured values were not always updated in GOOSE messages.
- The position of switchgear units (XSWI,XCBR) was transmitted by GOOSE with the attribute *'invalid'*.
- During a warm restart incorrect date and time data (initialization values) was transmitted for a short time.

CBF

Bug fixing:

- The associated signal CBF: Current flow Phx would sometimes jitter during an open command.

A6.1.1.35 **P139 -308 -414/415/416 -617**

Release: 2010–07–05

Hardware

No changes.

Diagram

No changes.

Software

MAIN

In the case of direct motor control by motor relay K200 monitoring has been modified.

With previous P139 software versions, the direction control contacts would open in the following case: The K200 contacts have not opened until the end of the command to the motor when the set monitoring time-delay had expired (monitoring via binary signal input –U 706, signal SIG_1: Signal S012 EXT as the standard setting). This reaction by the P139 (the previously permanent feature) would result in interrupting the motor control command circuit and thereby preventing an undefined switch position. However, this would involve the danger of contact burn.

By setting the new selection parameter (221 111) MAIN: Cmd.end f.K200 fail. it is now possible to select whether the previous reaction (setting = *Yes*) or a new behavior (setting = *No*) is effected.

In this new implementation option, the P139 issues respective fault signals when the monitoring time delay has expired and the direction control contacts will remain closed. (Note: This new feature bears the danger of an undefined switch position!)

For this new implementation option, the following new logic state signals have been added:

- (221 108) MAIN: K200 fail. cmd. end - This signal is issued if the K200 contacts have not opened after the set monitoring time-delay has elapsed.
- (221 109) MAIN: K200 fail. cmd.start - This signal is issued if the K200 contacts have not closed after the set monitoring time-delay has elapsed.
- (221 110) MAIN: DEV op.time exceeded - This fault signal is issued (as a group signal) when no positive position signal (status signal) has been received from the external device after a command has been issued and the set running time-delay has elapsed.

For further processing each of these new fault signals may be configured to selection parameters from the function groups LED (assignment to LED indicators), OUTP (assignment to output relays), LOGIC (processing by the programmable logic function), COMMx / IEC / GOOSE (signaling via the control system) or they may be mapped to the signal panel as an alarm signal. Acknowledging from the local control panel HMI is done by pressing the CLEAR (C) key.

The four 16 bit energy measured values, that existed for earlier software versions and were then replaced by 32 bit energy measured values, have been re-introduced, so that as of now, both the 16 bit and 32 bit values are available.

- (005 061) MAIN: Act.energy outp.prim
- (005 062) MAIN: Act.energy inp. prim
- (005 063) MAIN: React.en. outp. prim
- (005 064) MAIN: React. en. inp. prim

LOC

Freely selectable designations (similar to user defined external device designations implemented with P139 -615) may now be assigned to busbars and busbar sections. The designation wanted may be defined as open text at:

- (218 191) LOC: Busbar1 Name by User
- (218 192) LOC: Busbar2-NameUser
- (218 193) LOC: Busbar3-NameUser
- (218 195) LOC: BB Sect.1-NameUser
- (218 196) LOC: BB Sect.2-NameUser

Bug notice:

- These parameters are only visible but not prepared for configuration. Full functionality is supported as of P139 –631.

Bug fixing:

- The display Local/Remote in fields with the three position switches was sometimes incorrect.

A6.1.1.36 **P139 -308 -414/415/416 -614-725**

Release: 2010–07–15

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- During a warm restart incorrect date and time data (initialization values) was transmitted for a short time.
- It could occur sometimes that when the Ethernet switch was turned on the Ethernet communication would not set in.

A6.1.1.37 **P139 -308 -414/415/416 -617-727**

Release: 2010–08–20

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- During a warm restart incorrect date and time data (initialization values) was transmitted for a short time.
- It could occur sometimes that when the Ethernet switch was turned on the Ethernet communication would not set in.
- Switching between parameter subsets could sometimes lead to an interruption of communications.

LOC

Bug fixing:

- When the ENTER key was pressed immediately after a cold restart incorrect symbols could appear below the menu text on the display.

A6.1.1.38 P139 -309 -414/415/416 -632

Release: 2010–08–24

Hardware

No changes.

Diagram

No changes.

Software

MAIN

The four 16 bit energy measured values, that existed for earlier software versions and were then replaced by 32 bit energy measured values, have been re-introduced, so that as of now, both the 16 bit and 32 bit values are available.

- (005 061) MAIN: Act.energy outp.prim
- (005 062) MAIN: Act.energy inp. prim
- (005 063) MAIN: React.en. outp. prim
- (005 064) MAIN: React. en. inp. prim

LOC

The descriptive text in English for the following parameters has been changed:

- (218 192) LOC: Busbar2 Name by User
- (218 193) LOC: Busbar3 Name by User

The previous English descriptive texts – LOC: Busbar#-NameUser, # = 2,3 – differed from those used for LOC: Busbar1 Name by User which made harmonization necessary.

Bug fixing:

- The display Local/Remote in fields with the three position switches was sometimes incorrect.
- In case of a cold restart incorrect symbols could appear for a short time on the display.

IEC

Bug fixing:

- The IEC 61850 signal *RBRF1 OpEx* was not detected correctly.

SCDD

Bug fixing:

- In operating mode SCDD: VNG> PSx = *Measured,* the enabling threshold was not considered correctly.

A6.1.1.39 **P139 -308 -414/415/416 -614-728**

Release: 2010–09–17

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- During a warm/cold restart incorrect position signals for external devices could be transmitted up to the time when the respective correct positions had been determined and transmitted.
- Single-pole commands were rejected with the *R & L <-> L* operating mode.

A6.1.1.40 **P139 -308 -414/415/416 -618**

Release: 2011–02–07

Hardware

New Schneider Electric design for the local control panel (HMI).

Diagram

No changes.

Software

PC	The following parameter has been removed: PC: Name of manufacturer (003 183). Note: Compatibility even with older versions of the operating program continues to be guaranteed.
COMM1	The data point (003 178) COMM1: -103 prot. variant may now be used to select between the -103 protocol variants *Private* and *Compatible*. The protocol variant *Compatible* corresponds to the VDEW implementation. Note: As before this setting is hidden unless an IEC 60870-5 protocol is enabled. The data point (003 214) COMM1: MODBUS prot. variant may now be used to select between the MODBUS protocol variants *Private* and *Compatible*. The protocol variant *Compatible* corresponds to the MODBUS implementation in the MiCOM Px20 and Px40 protection devices. The protocol variant *Private* corresponds to the first implementation of the MODBUS protocol. Note: As before this setting is hidden unless the MODBUS protocol is enabled. Bug fixing: ● Measured energy values were not transmitted by the MODBUS protocol.
COMM1, COMM2	The menu points (003 161) COMM1: Name of manufacturer and (103 161) COMM2: Name of manufacturer can no longer be set by using a selection list but, for reasons of compatibility, they may now be defined as free text. The default is *SE* but, in individual cases, it may become necessary to enter texts differing from the default. Notes: ● These parameters can only be set using the operating program and it is not possible to set them locally using the integrated local control panel (HMI). The maximum text length is 8 characters and designations exceeding this will be truncated. ● The parameter COMM1: Name of manufacturer is hidden unless an IEC 60870-5 protocol is enabled.
IEC	Bug fixing: ● Single-pole commands were rejected by the IEC 61850 server when the control point in the device is set to *“R & L”* (local and remote control) operating mode. ● Time initialization problems with IEC 61850.

MCMON	Setting menu point (017 023) MCMON: Operate delay = *Blocked* is now supported. Enhanced accuracy with monitoring of $V_{min<}$. Bug fixing: ● Monitoring of $V_{min<}$ was stopped by (040 000) MAIN: General starting.
I2>	The threshold for the input current was decreased from $0.1 \cdot I_{nom}$ to $0.01 \cdot I_{nom}$.

A6.1.1.41 **P139 -309 -414/415/416 -633**

Release: 2011–02–07

Hardware

New Schneider Electric design for the local control panel (HMI).

Diagram

No changes.

Software

IEC

Bug fixing:

- Measured values were not always updated in GOOSE messages.
- Single-pole commands were rejected by the IEC 61850 server when the control point in the device is set to *"R & L"* (local and remote control) operating mode.
- Time initialization problems with IEC 61850.
- Underfrequency protection signals were not transmitted.

PC

The following parameter has been removed: PC: Name of manufacturer (003 183).

Note: Compatibility even with older versions of the operating program continues to be guaranteed.

COMM1

The data point (003 178) COMM1: -103 prot. variant may now be used to select between the -103 protocol variants *Private* and *Compatible*. The protocol variant *Compatible* corresponds to the VDEW implementation.

Note: As before this setting is hidden unless an IEC 60870-5 protocol is enabled.

The data point (003 214) COMM1: MODBUS prot. variant may now be used to select between the MODBUS protocol variants *Private* and *Compatible*. The protocol variant *Compatible* corresponds to the MODBUS implementation in the MiCOM Px20 and Px40 protection devices. The protocol variant *Private* corresponds to the first implementation of the MODBUS protocol.

Note: As before this setting is hidden unless the MODBUS protocol is enabled.

Bug fixing:

- Measured energy values were not transmitted by the MODBUS protocol.

COMM1, COMM2

The menu points (003 161) COMM1: Name of manufacturer and (103 161) COMM2: Name of manufacturer can no longer be set by using a selection list but, for reasons of compatibility, they may now be defined as free text. The default is *SE* but, in individual cases, it may become necessary to enter texts differing from the default.

Notes:

- These parameters can only be set using the operating program and it is not possible to set them locally using the integrated local control panel (HMI). The maximum text length is 8 characters and designations exceeding this will be truncated.
- The parameter COMM1: Name of manufacturer is hidden unless an IEC 60870-5 protocol is enabled.

DTOC

Bug fixing:

- The setting options *Calculated* / *Measured* for the following parameters were operational only when these parameters were set differently from each other: (072 128) DTOC: Eval. IN> PSx, (007 239) DTOC: Eval. IN>> PSx, (007 243) DTOC: Eval. IN>>> PSx.

MCMON

Setting menu point (017 023) MCMON: Operate delay = *Blocked* is now supported.

Enhanced accuracy with monitoring of $V_{min<}$.

Bug fixing:

- Monitoring of $V_{min<}$ was stopped by (040 000) MAIN: General starting.
- The value set for menu point (014 012) MCMON: Oper. delay FF, Vref was ignored (e.g. the “Fuse Failure” monitoring function of the reference voltage was triggered without delay).

GOOSE

Bug fixing:

- Contact positions from switchgear units (XSWI, XCBR) were transmitted by GOOSE with the attribute *invalid.*

A6.1.1.42 P139 -308 -414/415/416 -618-729

Release: 2011–11–14

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- If single-pole signals of function group SIG_1 were active during device startup, this could lead to an aborted initialization of the Ethernet communication module.

A6.1.1.43 P139 -310 -417/418/419 -634

Release: 2011−11−24

Hardware

Slot 3 of the P139 can now also be fitted with the binary module X(24I) or with the analog module Y(4I). (See the Supporting Document for details.)

The P139 is now by default available with the serial graphical display and with multi-colored LEDs.

(The variant with detachable graphical display (DHMI) is available as an alternative option.)

Diagram

The diagrams document the new fitting variants, which are described above.

- P139 -417: case 40 TE, pin-terminal connection
- P139 -418: case 40 TE, CT/VT ring-, I/O pin-terminal connection
- P139 -419: case 84 TE, ring-terminal connection

Software

This software version is available in the following language variants:

- German + English (order option -801),
- French + English (order option -802),
- Spanish + English (order option -803),
- Polish + English (order option -804),
- Russian + English (order option -805).

MAIN

In the case of direct motor control by motor relay K200 monitoring has been modified.

With previous P139 software versions, the direction control contacts would open in the following case: The K200 contacts have not opened until the end of the command to the motor when the set monitoring time-delay had expired (monitoring via binary signal input –U 706, signal SIG_1: Signal S012 EXT as the standard setting). This reaction by the P139 (the previously permanent feature) would result in interrupting the motor control command circuit and thereby preventing an undefined switch position. However, this would involve the danger of contact burn.

By setting the new selection parameter (221 111) MAIN: Cmd.end f.K200 fail. it is now possible to select whether the previous reaction (setting = *Yes*) or a new behavior (setting = *No*) is effected.

In this new implementation option, the P139 issues respective fault signals when the monitoring time delay has expired and the direction control contacts will remain closed. (Note: This new feature bears the danger of an undefined switch position!)

For this new implementation option, the following new logic state signals have been added:

- (221 108) MAIN: K200 fail. cmd. end - This signal is issued if the K200 contacts have not opened after the set monitoring time-delay has elapsed.
- (221 109) MAIN: K200 fail. cmd.start - This signal is issued if the K200 contacts have not closed after the set monitoring time-delay has elapsed.
- (221 110) MAIN: DEV op.time exceeded - This fault signal is issued (as a group signal) when no positive position signal (status signal) has been received from the external device after a command has been issued and the set running time-delay has elapsed.

For further processing each of these new fault signals may be configured to selection parameters from the function groups LED (assignment to LED indicators), OUTP (assignment to output relays), LOGIC (processing by the programmable logic function), COMMx / IEC / GOOSE (signaling via the control system) or they may be mapped to the signal panel as an alarm signal. Acknowledging from the local control panel HMI is done by pressing the CLEAR (C) key.

Bug fixing:

- The minimum value was corrected for the following power measurement parameters:
  - (005 025) MAIN: Appar. power S prim.
  - (004 050) MAIN: Active power P prim.
  - (004 052) MAIN: Reac. power Q prim.

IEC

Bug fixing:

- The cause of a potential problem with the initialization of communication in case of activated function group SIG_1 was fixed.
- One of the possible transmission values of *AddCause* was altered.

DTOC, IDMT

In case of a short-time triggering of the inrush stabilization the DTOC/IDMT timers are no longer reset.

MAIN, DEVxx	The following new configuration parameters allow for defining monitoring timers for the switchgear units: (210 007) DEV01: StartCmdTime superv. (210 057) DEV02: StartCmdTime superv. (210 107) DEV03: StartCmdTime superv. (settable in the range 0.1 s ... 10.0 s, default: *blocked*) After sending an Open / Close command, the corresponding timer starts. If the switchgear unit has not reached its intermediate position after this time has elapsed then the command is deactivated. In case of a switchgear unit for which it is (almost) impossible to detect the intermediate position it is recommended to switch off this monitoring by setting the parameter to *blocked*. If the monitoring is active then an exceeded timer is flagged by the new logic state signal (221 112) MAIN: Startcmdtime exceed..

A6.1.1.44 **P139 -311 -417/418/419 -634**

Release: 2012–01–04

Hardware

The P139 is now fitted with an improved power supply module.

Note that the voltage range has changed for DC input:

- For the DC / AC variant, the range is
  - now 60 … 250 VDC / 100 ... 230 VAC
  - (previously 48 … 250 VDC / 100 ... 230 VAC).
- For the DC-only variant, the range is
  - now 24 … 60 VDC
  - (previously 24 VDC).

Diagram

No changes (compared to P139 -310 -634).

Software

No changes (compared to P139 -310 -634).

A6.1.1.45 **P139 -308 -414/415/416 -616-733**

Release: 2012–01–27

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- During the process of connection with clients that use the “IntegrityPeriod” option, sporadically the MMS communication of the Ethernet communication module would crash without an internal monitoring response to re-establish the functionality. (GOOSE messaging and other communication tasks were not affected.)

A6.1.1.46 **P139 -308 -414/415/416 -618-734**

Release: 2012−01−27

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- During the process of connection with clients that use the “IntegrityPeriod” option, sporadically the MMS communication of the Ethernet communication module would crash without an internal monitoring response to re-establish the functionality. (GOOSE messaging and other communication tasks were not affected.)
- Upon receiving a “Cancel” command while a switchgear device is selected, a positive acknowledgement response (“Ack OK”) is sent. Previously, a “Negative ack” was sent.
- If clients did connect to the device immediately after completion of Ethernet communication module startup, this could lead to the temporary erroneous reporting of default values for the external device status (DEVxx) and of the single-pole signals (SIG_1).
- If a close command could not be performed because of a rejection from the sync-check function, the command termination message is now sent with the correct “Block by Synchrocheck” (11) acknowledgement code number. Previously, code (16) “Timeout” was sent instead.
- Reports of events could get lost if too many state changes occurred in a short period of time, especially during secondary injection testing.

GOOSE

The GOOSE Time Allowed to Live (TAL) supervision is enhanced with respect to simultaneous state changes of multiple GOOSE messages.

PC, COMM2

Bug fixing:

- If clients did connect to the device immediately after startup of the Ethernet communication module, the initialization of the second internal communication interface could remain incomplete. As a consequence, access by the operating program via the COMM2 interface or by tunneling was not possible in this case.

A6.1.1.47 P139 -312 -420/421/422 -634

Release: 2012–01–30

Hardware

A new communication module (“REB” = *“Redundant Ethernet Board”*) is now available as an ordering option.

This module can be used for redundant communication via IEC 61850 and may be fitted to slot 2, as an alternative to the other communication modules. The following communication protocols are supported:

- SHP (Self-Healing Protocol).
- RSTP (Rapid Spanning Tree Protocol).
- DHP (Dual-Homing Protocol).

A detailed description of the module and the appropriate network connections is available as a separate document (“Redundant Ethernet Board, Application Guide”).

Diagram

No changes.

Software

No changes (compared to P139 -311 -634).

A6.1.1.48 P139 -312 -420/421/422 -634-732

Release: 2012−02−01

Hardware

No changes (compared to P139 -312 -634).

Diagram

No changes (compared to P139 -312 -634).

Software

IEC

The Originator Category information is now extensively supported for control commands.

Bug fixing:

- During the process of connection with clients that use the “IntegrityPeriod” option, sporadically the MMS communication of the Ethernet communication module would crash without an internal monitoring response to re-establish the functionality. (GOOSE messaging and other communication tasks were not affected.)
- Upon receiving a “Cancel” command while a switchgear device is selected, a positive acknowledgement response (“Ack OK”) is sent. Previously, a “Negative ack” was sent.
- If clients did connect to the device immediately after completion of Ethernet communication module startup, this could lead to the temporary erroneous reporting of default values for the external device status (DEVxx) and of the single-pole signals (SIG_1).
- If a close command could not be performed because of a rejection from the sync-check function, the command termination message is now sent with the correct “Block by Synchrocheck” (11) acknowledgement code number. Previously, code (16) “Timeout” was sent instead.
- Reports of events could get lost if too many state changes occurred in a short period of time, especially during secondary injection testing.
- Events that occured after a communication link had been interrupted and before this interruption had been detected by the server, were not sent as “Buffered reports” after the connection was re-established.

GOOSE

The GOOSE Time Allowed to Live (TAL) supervision is enhanced with respect to simultaneous state changes of multiple GOOSE messages.

PC, COMM2

Bug fixing:

- If clients did connect to the device immediately after startup of the Ethernet communication module, the initialization of the second internal communication interface could remain incomplete. As a consequence, access by the operating program via the COMM2 interface or by tunneling was not possible in this case.

A6.1.1.49 P139 -312 -420/421/422 -634-735

Release: 2012−06−19

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- Modification of sending time tag after change of Data Object Position (*DO Pos.*): The time tag is now modified only after a change of the attribute *Pos.stVal*.
- The P139 stopped randomly to send an *integrity report* at midnight.
- Mirroring of time in report *CSWISTPos$t* sent by the P139 with the time coming from a select-control by an IEC client (*SBOw$T*) is now in line with the standard.

A6.1.1.50 **P139 -312 -420/421/422 -634-736**

Release: 2013–01–21

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- If single-pole signals of function group SIG_1 were active during device startup, this could lead to an aborted initialization of the Ethernet communication module.
- Potential conflict solved when executing ILOCK checks simultaneously because of cyclic updating and control command trigger.
- The order of answers is now inversed in the case of *AddCase=10* (*Blocked by interlocking*).
- BRCB (i.e. Buffered Report Control Blocks) reporting no longer stops after 10 minutes.
- For two-pole state signals, the fault status (00 or 11) report to the HMI is no longer repeated by IEC 61850.

GOOSE

Bug fixing:

- GOOSE Publishing failure for switch gear positions assigned with GOOSE function assignment (*Output xx fct.assig*).

A6.1.1.51 **P139 -312 -420/421/422 -634-737**

Release: 2013–03–22

Hardware

No changes.

Diagram

No changes.

Software

GSSE

Bug fixing:

- GSSE connection was lost within 1 week or after system warm restart.

A6.1.1.52 P139 -313 -420/421/422 -650

Release: 2013–06–17

Hardware

The P139 is now fitted with an improved processor module.

Diagram

No changes.

Software

New MiCOM P30 platform software.

Many parameter labels have been modified so that they harmonize with other MiCOM P30 devices.

MAIN

DTOC and IDMT with settable inrush stabilization per parameter subset: Stabilization selectable per stage (Phase; E/F and I2 stages): MAIN: Funct.Rush restr.PSx (017 093, 017 064, 017 082, 017 083).

Settable maximum timer, for which inrush stabilization should be effective: Blocked (w/o timer) or settable from 0.01 to 10s. (019 001, 019 002, 019 003, 019 004) MAIN: t lift rush rstr.PSx.

The previously available parameters (003 039) MAIN: Warm restart und (000 085) MAIN: Cold restart have been relabeled MAIN: Soft Warm restart and MAIN: Soft Cold restart, respectively. They still trigger a restart of the device, but now the hardware tests are not carried out anymore during the startup phase. (This way the restart needs less time.)

For a restart including hardware tests, the following new parameters can now be used:

- (010 166) MAIN: Warm restart
- (009 254) MAIN: Cold restart

A setting for the release time of the enable for the manual close command is now available:

- (003 088) MAIN: Rel.t. enab. man.cmd

The manual trip command is enabled by:

- (003 105) MAIN: En.man.clos.cmd.USER

The enabling is signaled by the following new signal:

- (039 113) MAIN: Man. cl. cmd.enabl.

There is a pole-selective monitoring of the CB status signals available now (in addition to the previously existing 3p monitoring).

New input signals:

- (031 029) MAIN: CB closed A EXT
- (031 030) MAIN: CB closed B EXT
- (031 031) MAIN: CB closed C EXT

New logic state signals:

- (031 032) MAIN: CB open A
- (031 033) MAIN: CB open B
- (031 034) MAIN: CB open C
- (031 035) MAIN: CB closed A
- (031 036) MAIN: CB closed B
- (031 037) MAIN: CB closed C

Note: The plausibility check operates with pole-selective monitoring only.

There is a phase-selective current flow monitoring available now, identical to but independent of that in function group CBF.

- (010 223) MAIN: Current flow A
- (010 224) MAIN: Current flow B
- (010 225) MAIN: Current flow C

The setting for the neutral-point treatment of the system, MAIN: Neutr.pt. treat. PSx, is only used with the ASC, so that it is now visible only if the function group ASC is configured. Moreover, the set of select options has been restricted to those which are relevant for the application.

DVICE

Instead of one parameter for the software version (previously: (002 120) DVICE: Software version) the version numbers -6XX and -7XX are now separately stored in two new parameters:

- (010 167) DVICE: Software version 6XX
- (010 168) DVICE: Software version 7XX

PC, DVICE

It is now possible to upload new firmware into the device via the TCP/IP protocol. For this purpose there are several new network settings that are not identical to the ones already existing within function group IEC:

- (111 004) PC: IP address
  - (111 005) PC: IP address 1
  - (111 006) PC: IP address 2
  - (111 006) PC: IP address 3
- (111 008) PC: Subnet mask
  - (111 009) PC: Subnet mask 1
  - (111 010) PC: Subnet mask 2
  - (111 011) PC: Subnet mask 3
- (111 016) PC: IP address mode
- (111 017) PC: IP Enable config.

For testing purposes, information parameters store the updated network settings for this firmware uploading network.

- (111 000) DVICE: IP address
- (111 001) DVICE: Subnet mask
- (111 003) DVICE: MAC address

IEC

The number of clients for a report has been increased: An unbuffered report (urcbA ... urcbP) can be allocated to max. 8 clients (previously: 1), and a buffered report (brcbA ... brcbH) can be allocated to max. 4 clients (previously: 1).

FT_DA

The following measured fault data values have been introduced:

- (010 198) FT_DA: Fault type
- (010 217) FT_DA: Flt.volt. PG/PP prim
- (010 199) FT_DA: Fault current P prim
- (010 216) FT_DA: Fault curr. N prim.

The parameters for the load data have been removed:

- (004 037) FT_DA: Load imped.post-flt.
- (004 038) FT_DA: Load angle post-flt.
- (004 039) FT_DA: Resid.curr. post-flt

The fault location may now be determined, based solely on a ground starting condition (without a general starting). For this the P139 determines all three phase-to-ground loop impedances and then provides the fault location based on the reactance of the measurement loop with the lowest impedance value.

ASC	There are separate parameters now for the manual close command and the auto-reclose control. The previously available parameters for the close enable conditions have been relabeled such that the letters “AR” (for *auto-reclose control*) are now part of the label, and there is a corresponding set of new “MC” (for *manual close command*) parameters.
MP	With the new parameter MP: Retain replica PSx (009 046, 009 250, 009 251, 009 252) it can now be configured whether the thermal replica is retained in the non-volatile section of the device’s memory so that it will still be available after an interruption of the supply voltage.
THERM	With the new parameter THERM: Retain replica PSx (009 019, 009 030, 009 032, 009 039) it can now be configured whether the thermal replica is retained in the non-volatile section of the device’s memory so that it will still be available after an interruption of the supply voltage.
V<>	Stages $V_{>>>}$, $V_{<<<}$, $V_{ref>>>}$ and $V_{ref<<<}$ have been added, including a separate timer for each of these new stages. For all three phase stages the 3p logic OR and AND results are signaled.
CBF	It is now possible to also use the residual current (measured or calculated) as an additional criterion for “circuit breaker open”. The following setting parameters are new: ● (022 184) CBF: Evaluation IN ● (022 180) CBF: IN< The signal (038 235) CBF: Current flow N = *Yes* flags that the residual current I_E is greater than the setting CBF: IN<.
ILOCK	The new parameter (250 102) ILOCK: Function group ILOCK allows for cancelling (or configuring) the function group ILOCK. (Previously, this function group was always enabled.)
LOG_2	There is a new function group LOG_2 (Programmable Logic 2). It is identical to the previously available function group LOGIC, but it offers only four logical equations. These, however, have long-term timers, settable from 0 to 60000 s (= 16 hours, 40 minutes).
COUNT	The number of binary counters has been increased to 4. The setting values of the cycle time for the count transmission – (217 007) COUNT: Cycle t.count transm – has been modified: Previously, this was a numerical parameter, the setting values could be in the range 0 to 60 [minutes]. Now there is an option table assigned to this parameter, which offers a variety of time values.

A6.1.1.53 P139 -313 -420/421/422 -651

Release: 2013–06–17

Hardware

No changes.

Diagram

No changes.

Software

COUNT	The 4 counters have been equipped with individual debounce timers and limit monitoring. Settable limit thresholds and related alarm signals for counter values have been implemented: ● Setting parameters: COUNT: Limit counter 1 (217 221) ... COUNT: Limit counter 4 (217 224) ● Alarm signals: COUNT: Warning count 1 (217 191) ... COUNT: Warning count 4 (217 194)
DVICE	A “Select before operate (SBO)” operating mode interface has been implemented as further alternative for local control via HMI (LOC), in addition to the previously existing “Direct Mode”. Two new options are available with different graphic visualization. Setting parameter: LOC: Operation mode (011 240) Setting options: *LOC Direct*, *LOC SBO option 1*, *LOC SBO option 2*
LED	There is a new operating mode *ES Alarmunit*: If this is set, the LED starts flashing with the first signal edge of the assigned signal. If this is acknowledged (i.e. the LED is reset), although the assigned signal is still active, then the LED changes to continuous light, and if the signal disappears later on, then the LED goes off. If the flashing LED is acknowledged (i.e. the LED is reset) and the assigned signal is no longer present, the LED immediately goes off.
MAIN	A signal for the indication of chatter suppression start has been implemented: MAIN: Chatt.suppr. started (221 121)

DTOC

Under voltage controlled Phase Over-Current protection has been implemented. Each of the three phase over-current stages can be applied now with a settable V< (I>) release stage.

Setting parameters:

- DTOC: V< (I>) PSx (011 244)
- DTOC: V< (I>>) PSx (011 248)
- DTOC: V< (I>>>) PSx (011 252)

The default value of each of these parameters is *blocked*, which turns off the voltage control.

MP

The parameter MP: Pre-close time left shows the remaining time until the next start-up procedure will be released. This parameter is supported by the DNP 3.0 protocol, too.

Control (DEVxx, MAIN)

There is a new alarm signal for “switchgear operating time exceeded”: MAIN: DEV op.time exceeded

This signal is issued if the switching command is not successfully reset within the set operation time by switchgear position indication or an external run-back signal.

There is a new setting parameter, MAIN: ext.cmd.term. w/o PI (221 115), to configure whether an “external termination” of the switching command is also done based on position indication, or if only an external termination signal is accepted.

DEVxx

In addition to the direct motor control principle based on fixed logic (K200), three configurable setting parameters have been implemented:

- (202 004) CMD_1: CMD_DC1 config. — with impulse characteristic

  CMD_1: CMD_DC1 config. is for direct control of command starting sequence only; additional original high precision contacts are used for command reset and for disconnecting the power circuit of the motor drive.
- (202 009) CMD_1: CMD_DC2 config. — without check back signal
- (202 014) CMD_1: CMD_DC3 config. — with check back signal

An operating counter and a settable limit threshold with related alarm signal has been implemented for each DEVxx:

- (210 043) DEV01: Operation counter ... (211 243) DEV10: Operation counter
- (218 211) DEV01: Oper.count.limit ... (218 220) DEV10: Oper.count.limit
- (219 081) DEV01: Warning op.count. ... (219 090) DEV10: Warning op.count.

There are two new setting parameters available for each device, which can be used for blocking any open / close operation of the switchgear unit. These parameters are not affected by interlocking conditions.

- (218 120) DEV01: Block cmd open ... (218 129) DEV10: Block cmd open
- (218 160) DEV01: Block cmd close ... (218 169) DEV10: Block cmd close

TPD1 … TPD4	Four virtual devices have been implemented, for the configuration of Three Position Switchgear devices (TPD) using one common motor drive for Disconnector and Earthing Switch. There is a fixed logic to prevent wrong operation commands and to handle different switchgear positions during clockwise or anti-clockwise operation. An operating counter, settable limit thresholds and related alarm signals have been implemented for the TPDx.
SIG_1	The number of SIG_1 input signals has been extended to 64. However, this requires that two hardware modules of type X(24I) are fitted.
ILOCK	With the ILOCK function assignments there are now also voltage and current thresholds of the function group LIMIT selectable.

A6.1.1.54 **P139 -308 -414/415/416 -618-739**

Release: 2013–07–03

Hardware

No changes.

Diagram

No changes.

Software

COMM1

Bug fixing:

- After activation and subsequent deactivation of the signal and measurement blocking (COMM1: Sig./meas. block EXT) it was no longer possible to control switchgear units via IEC 60870-5-103 (master) protocol.

A6.1.1.55 **P139 -312 -420/421/422 -634-738**

Release: 2013–07–09

Hardware

No changes.

Diagram

No changes.

Software

COMM1

Bug fixing:

- After activation and subsequent deactivation of the signal and measurement blocking (COMM1: Sig./meas. block EXT) it was no longer possible to control switchgear units via IEC 60870-5-103 (master) protocol.

IEC

Bug fixing:

- The fault impedance was not properly transmitted via the IEC 61850 protocol if I_{nom} = 5 A.

A6.1.1.56 **P139 -313 -420/421/422 -650-701**

Release: 2013–07–18

Hardware

No changes.

Diagram

No changes.

Software

Remark: This software version replaces (and corrects) software version -650.
The bugs fixed with this version did not appear in any software version other than -650.

DVICE

Bug fixing:

- The MAC address could not be set, and the download of the firmware via Ethernet was not possible.
- It could happen that no configuration could be loaded via the operating program.

IEC

Bug fixing:

- Counter values were not transmitted via IEC 61850 protocol.

A6.1.1.57 **P139 -313 -420/421/422 -651-701**

Release: 2013–10–09

Hardware

No changes.

Diagram

No changes.

Software

OUTP

Bug fixing:

- Output relay K608 did not operate correctly.

A6.1.1.58 P139 -313 -420/421/422 -652

Release: 2014–03–19

Hardware

No changes.

Diagram

No changes.

Software

GOOSE	The number of GOOSE inputs has been extended to 128: Extension of available GOOSE inputs from 32x 1-pole/32x 2-pole to 128 GOOSE inputs configurable in the IED Configurator tool. Max. 128x 1-pole binary signals freely configurable in the device or alternatively up to max. 128x 2-pole switchgear position indications for using the Control/Interlocking conditions.
GSSE	The function group GSSE has been removed from the data model, because its functionality has been replaced by the extended GOOSE input option.
COMM1	Signal and Command Blocking integrated in the General Interrogation for protocols IEC 60870-5-101 and -103.
TGFD	Minimum value for the VNG> release threshold extended down to 0.05 Vnom/ √3.
OUTP	Bug fixing: ● States of output relays are now stored after power off/on cycle.
LED	Bug fixing: ● LED states are now stored after power off/on cycle.
MAIN	Bug fixing: ● Measured energy values are now stored after power off/on cycle.
CBM	Bug fixing: ● CBM measured values are now stored after power off/on cycle.
IEC	Bug fixing: ● Upon cold restart the MCL configuration of the Ethernet board is now deleted.
ASC	Bug fixing: ● ASC now generates close command after triggering ASC: MC Close request EXT (037 062) via binary input.

LOGIC	The number of logic outputs (equations) has been extended to 128.
BTC	The Bay Type Configurator (BTC) tool has been enhanced with new features for the creation of customized bay types: ● Integration of new Binary I/O module options available on slot 9/10 for 40TE (or slot 18/20 for 84TE): X(4H), X(6O), X(3I 6O). ● Integration of new module option 2nd X(24I) available on slot 3. ● Extension to 64 binary signals in Function Group SIG_1. ● New command type for direct control using the High Break Contacts of module X(4H).

A6.1.1.59 **P139 -313 -420/421/422 -652-701**

Release: 2014–06–18

Hardware

No changes.

Diagram

No changes.

Software

COMM3

Bug fixing:

- The InterMiCOM test signal now works when executing (120 053) COMM3: Send signal, test.

Device

Bug fixing:

- If MAIN: Funct.Rush restr.PSx was used and PSS: Param.subs.sel. USER was transferred to the P139 (or selected via local control panel) a wrong calculation of the checksum of the NVRAM was performed, which led to a storage area violation and therefore to a cold restart.

  This affected all software versions as of P139 -650.

A6.1.1.60 **P139 -312 -420/421/422 -634-741**

Release: 2014–08–25

Hardware

No changes.

Diagram

No changes.

Software

Device

Bug fixing:

- With the binary module X(6I 6H) being fitted on slot 7 the P139 -634 did not accept the RTD board (analog module with 9 temperature sensors).

A6.1.1.61 P139 -314 -420/421/422 -653

Release: 2015–01–22

Hardware

The Redundancy Ethernet Board (REB) can now be ordered with an additional redundancy protocol: PRP (Parallel Redundancy Protocol) is available now as an alternative to RSTP, SHP or DHP.

Diagram

No changes.

Software

V_LOG	The new timer (221 123) ILOCK: Rset ILOCK violation can be (optionally) used to activate an automatic reset of the signal (221 018) MAIN: Interlock equ. viol..
DEVxx	Bug fixing: ● With the binary module X(6I 8O) being fitted the transmission of a close command via IEC 60870-5-103 was blocked.
DTOC, IDMTx	New setting parameters allow to select for each overcurrent stage of the phase and the residual currents whether the starting decision shall be based on the fundamental or on the r.m.s. value. Remark: For the negative-sequence stages, the starting decision is always based on the fundamental. The following settings are new: ● (060 002) DTOC: Meas.value I/IE> PSx ● (060 006) DTOC: Meas.val. I/IE>> PSx ● (060 010) DTOC: Meas.val.I/IE>>> PSx ● (060 014) DTOC: Meas.v. I/IE>>>> PSx ● (060 018) IDMT1: Meas.value I/IE PSx ● (060 022) IDMT2: Meas.value I/IE PSx

A6.1.1.62 P139 -315 -423/424/425 -654

Release: 2015–02–27

Hardware

Optionally, a binary module of type X(6I/8O) can now be fitted in slot 8 (40 TE case) or slot 16 (84 TE case), respectively.

Diagram

The updated diagrams now include the additional binary module.

- P139 -423 (for 40 TE case, with pin-terminal connection)
- P139 -424 (for 40 TE case, transformer module: with ring-terminal connection; other modules: with pin-terminal connection)
- P139 -425 (for 84 TE case, with ring-terminal connection)

Software

DTOC, IDMT1, IDMT2

I0 elimination has now been introduced for the overcurrent protection.

DTOC: The following addresses are new:

- DTOC: I0 Elimin. I> PSx (013 150, 013 151, 013 152, 013 153)
- DTOC: I0 Elimin. I>> PSx (013 154, 013 155, 013 156, 013 157)
- DTOC: I0 Elimin. I>>> PSx (013 158, 013 159, 013 160, 013 161)

  with the settings:
  - *without*
  - *with I0 calculated*
  - *with I0 measured*

IDMTx: The following addresses are new:

- IDMT1: I0 Elimin. I> PSx (013 166, 013 167, 013 168, 013 169)
- IDMT2: I0 Elimin. I> PSx (013 170, 013 171, 013 172, 013 173)

  with the settings:
  - *without*
  - *with I0 calculated*
  - *with I0 measured*

A new setting *Calc with I0 elim.* has been introduced for the following addresses:

- DTOC: Eval. IN> PSx (072 128, 073 128, 074 128, 075 128)
- DTOC: Eval. IN>> PSx (007 239, 007 240, 007 241, 007 242)
- DTOC: Eval. IN>>> PSx (007 243, 007 244, 007 245, 007 246)
- IDMT1: Evaluation IN PSx (072 075, 073 075, 074 075, 075 075)
- IDMT2: Evaluation IN PSx (071 040, 071 041, 071 042, 071 043)

For an explanation of these addresses and settings, see the “Settings” chapter.

THERM

The thermal overload protection can now also be applied to the earth current.

The following settings are new:

- THERM: Select current PSx (013 139, 013 140, 013 141, 013 142)
  - *Max. phase current*
  - *IN calculated*
  - *IN measured*

f<>	A 5th frequency stage (f5) has now been introduced for over-/underfrequency protection.

A6.1.1.63 P139 -315 -423/424/425 -655

Release: 2015–09–14

Hardware

No changes.

Diagram

No changes.

Software

Control	Bug fixing: ● After some time, it could happen that all controls (time synchronization, LED reset, operation of switchgear devices, etc.) were delayed by approx. 20 seconds, which could then be fixed only by a (warm or cold) restart. This problem existed since software version -650 and has been resolved now.
DTOC	A 4th stage has now been introduced for phase current stages and negative-sequence current stages. New setting is available: DTOC: Start w. Direct. Starting only if measured direction is equal set direction.
IDMT	Time correction has been added.
ARC	4 ARC counters for successful HSR, unsuccessful HSR, successful TDR and unsuccessful TDR cycle have been added. New setting is available: ARC: Fct.assig.start ARC.
GFDSS	A new operating mode “Power+Admitt.” has been added.
Pf<	A new function group “Underfrequency Load Shedding” (Pf<) is available.
QV	A new function group “QV Protection” (QV) is available.
TIMER	A new function group “Timer” is available.

A6.1.1.64 **P139 -315 -423/424/425 -655 -701**

Release: 2015–09–14

Hardware

No changes.

Diagram

No changes.

Software

COMM1, IEC	Bug fixing: ● Protocol IEC 60870-103: Test of sending spontaneous signals with “start” information was not executed. ● Protocol Modbus: There was no response to a single pole command.
TIMER	Bug fixing: ● A memory problem has been fixed.

A6.2 Version History – Easergy MiCOM 30

A6.2.1 P139 -315 -4xx -656 *ff*

A6.2.1.1 P139 -315 -423/424/425 -656

Release: 2015–03–07

Hardware

No changes.

Diagram

No changes.

Software

COMM1	Bug fixing: ● DNP3.0 protocol: After a warm restart of the P139 Class 0 objects were not available and a permanent time-out on link re-establishing stage was present.
IEC	Bug fixing: ● A wrong command originator was reported (in *rcb*) upon change of control point.
ASC	The ASC functionality has been enhanced, so that it is now possible to have the voltage measured at T90 used instead of the “normal” line voltage transformers (T5 / T6 / T7).
V<>	Bug fixing: ● After a cold or warm restart the minimum current threshold (V<>: I enable V< PSx) was not functioning. This could result in inadvertent and chattering operation of undervoltage stages.

A6.2.1.2 P139 -315 -423/424/425 -657

Release: 2016–12–14

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- Selection list of (104 064) IEC SigGGIO1 selection falsely contained few analog values (which must not be selected).

PC

Bug fixing:

- File transfer (to use customized bay types or data models) was not available with previous version -656 together with Easergy Studio.

SFMON

Bug fixing:

- Self monitoring of output relays was not operating on all defects. Also the group signal (041 200) SFMON Relay Kxx faulty was not activated in case of an output relay failure.
- Alarm signaling of internal auxiliary voltage failures was not proper maintained until the failure was cleared (alarm signaling could have been reset while a defect was still present).

MEASO

Bug fixing:

- Measurands with negative values were now correctly scaled as [0…20]mA current output signals.

FT_DA

Bug fixing:

- Fault currents were not acquired when recording was triggered by neutral starting only.

FT_RC

Bug fixing:

- Binary signals are now correctly recorded during the whole post-fault period.
- When relay date was beyond 19.01.2038, no fault records were available.
- Time stamps of some signals that trigger the general trip command were later than the trip commands time stamp.

MAIN

A new group signal has been implemented which indicates that inrush blocking picked up in at least one phase:

- (019 213) MAIN Inrush blk. trigg.

Additionally 8 user configurable group signals have been implemented:

- (019 192) MAIN Group signal 01 to
  (019 199) MAIN Group signal 08

For each of them up to 32 internal signals can be freely combined using Boolean operators NOT, AND, OR. These state signals are continuously updated, but with no latching nor settable pick up/ release delay timers.

The configuration lists of general trip commands have been updated to incorporate the new group signals.

ARC

Separate HSR and TDR trip times for GFDSS power and Admittance trip conditions have been implemented. The already existing settings are now solely assigned to wattmetric trip condition.

- (015 078) ARC: HSR trip t. pow. PS1
- (021 059) ARC: HSR trip t. adm. PS1
- (015 078) ARC: TDR trip t. pow. PS1
- (021 069) ARC: TDR trip t. adm. PS1

GFDSS

Function enhancement to allow ground fault detection by power and Admittance methods, both operating independently in parallel.

For that purpose Admittance method has been accomplished with its dedicated settings, where previously settings had been shared with power method. These are:

- (020 176) GFDSS: Oper. mode admit PS1
- (016 111) GFDSS: G(N)> / B(N)> LS PS1
- (020 184) GFDSS: Op. delay LS adm PS1
- (020 188) GFDSS: Rel delay LS adm PS1
- (020 192) GFDSS: Op. delay BS adm PS1
- (020 200) GFDSS: Rel delay BS adm PS1

Both methods have been accomplished by a settable hold timer which prevents inadvertent reset of starting for short gaps in ground fault current (intermittent ground faults):

- (020 172) GFDSS: Hold time pow. PS1
- (020 222) GFDSS: Hold time adm. PS1

For versatility in application, both methods have been accomplished by dedicated blocking input signals:

- (020 227) GFDSS: GF (pow.) block. EXT
- (020 226) GFDSS: Admittance block EXT

P<>	The new setting (021 074) P<> Start w. Direct. PS1 determines the starting condition for all power stages: ● With setting "Yes" starting takes place only, if the power start threshold operates AND the measured direction is equal to the set direction of the stage. ● With setting "No" starting takes place, if the power start threshold operates.
CBF	Function of external triggering has been made more robust: If only single-pole trigger (038 205 CBF Start 3p EXT) is configured, then this input must be active as long as the CBF timer is running. Otherwise CBF resets as soon as the trigger input signal resets.

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