Easergy MiCOM P433

Distance Protection and Control Unit

P433/EN M/R-b5-B

Version P433 -315 -420/421/422/423/424 -661

Technical Manual

Volume 2 of 2

Schneider Electric

A1 Function Groups

ARC	*Auto-reclosing control*
ASC	*Automatic synchronism check*
BUOC	*Backup overcurrent-time protection*
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*
CS	*Cyber Security*
DELTA	*Delta-I protection*
DEV01	*External device*
DEV02	*External device*
DEV03	*External device*
DIST	*Distance protection*
DTOC	*Definite-time overcurrent protection*
DVICE	*Device*
F_KEY	*Configurable function keys*
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*
GFSC	*Ground fault (short-circuit) protection*
GFSIG	*Ground fault protection signaling*
GFTRP	*Ground fault tripping*
GOOSE	*Generic Object Orientated Substation Events*
GSCSG	*Ground fault (short-circuit) protection signaling*

IDMT	*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*
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*
PSB	*Power swing blocking*
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*
TRMON	*Transformer monitoring*
V<>	*Time-voltage protection*
VINP	*Virtual Inputs*

A2 Internal Signals

ARC: CB closed	Vol. 1, Fig. 3-213, (p. 3-272)
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MEASO: Reset meas.val.outp.	Vol. 1, Fig. 3-45, (p. 3-72)
OUTP: Fct.assignment K xxx	Vol. 1, Fig. 3-41, (p. 3-69) Vol. 1, Fig. 3-49, (p. 3-82) Vol. 1, Fig. 3-431, (p. 3-512)
OUTP: Oper. mode K xxx	Vol. 1, Fig. 3-41, (p. 3-69)
P<>: P	Vol. 1, Fig. 3-356, (p. 3-431)
P<>: P-	Vol. 1, Fig. 3-356, (p. 3-431)
P<>: P+	Vol. 1, Fig. 3-356, (p. 3-431)
P<>: Q	Vol. 1, Fig. 3-356, (p. 3-431)

P<>: Q-	Vol. 1, Fig. 3-356, (p. 3-431)
P<>: Q+	Vol. 1, Fig. 3-356, (p. 3-431)
PSB: Asyn. power swing	Vol. 1, Fig. 3-166, (p. 3-218)
PSB: Ready	Vol. 1, Fig. 3-165, (p. 3-217)
PSIG: Frequ. monit. trigg.	Vol. 1, Fig. 3-189, (p. 3-249)
PSIG: Receive weak inf.	Vol. 1, Fig. 3-207, (p. 3-266)
PSIG: Telecom. faulty int.	Vol. 1, Fig. 3-205, (p. 3-264)
PSIG: Timer stage elapsed	Vol. 1, Fig. 3-186, (p. 3-247)
PSIG: Transient blocking	Vol. 1, Fig. 3-190, (p. 3-249)
PSIG: Trip 1	Vol. 1, Fig. 3-197, (p. 3-256) Vol. 1, Fig. 3-201, (p. 3-260)
PSIG: Trip 2	Vol. 1, Fig. 3-206, (p. 3-265)
PSIG: Trip enable	Vol. 1, Fig. 3-197, (p. 3-256) Vol. 1, Fig. 3-201, (p. 3-260) Vol. 1, Fig. 3-203, (p. 3-262) Vol. 1, Fig. 3-205, (p. 3-264)
PSIG: Trip time elapsed	Vol. 1, Fig. 3-186, (p. 3-247)
PSIG: Trip V<	Vol. 1, Fig. 3-207, (p. 3-266)
PSIG: Trip V<, A	Vol. 1, Fig. 3-207, (p. 3-266)
PSIG: Trip V<, B	Vol. 1, Fig. 3-207, (p. 3-266)
PSIG: Trip V<, C	Vol. 1, Fig. 3-207, (p. 3-266)
PSIG: V< triggered	Vol. 1, Fig. 3-207, (p. 3-266)
PSIG: Weak inf. ready	Vol. 1, Fig. 3-208, (p. 3-267)
QV: Bl.Start. QV	Vol. 1, Fig. 3-71, (p. 3-109)
SCDD: Bl.Direct. tIref,N>	Vol. 1, Fig. 3-302, (p. 3-371)
SCDD: Bl.Direct. tIref,P>	Vol. 1, Fig. 3-296, (p. 3-365)
SCDD: Block. direct. tI>	Vol. 1, Fig. 3-296, (p. 3-365)
SCDD: Block. direct. tI>>	Vol. 1, Fig. 3-296, (p. 3-365)
SCDD: Block. Direct. tI>>>	Vol. 1, Fig. 3-296, (p. 3-365)
SCDD: Block. direct. tIN>	Vol. 1, Fig. 3-302, (p. 3-371)
SCDD: Block. direct. tIN>>	Vol. 1, Fig. 3-302, (p. 3-371)
SCDD: Block. Direct. tIN>>>	Vol. 1, Fig. 3-302, (p. 3-371)
SCDD: Block.Direct.tI>>>>	Vol. 1, Fig. 3-296, (p. 3-365)

SCDD: Block.direct.tIN>>>>	Vol. 1, Fig. 3-302, (p. 3-371)
SCDD: Determin. N enabled	Vol. 1, Fig. 3-300, (p. 3-369)
SCDD: Determin. P enabled	Vol. 1, Fig. 3-294, (p. 3-363)
SCDD: Enabled	Vol. 1, Fig. 3-292, (p. 3-361)
SCDD: IN	Vol. 1, Fig. 3-299, (p. 3-368)
SCDD: Phase curr.stage bl.	Vol. 1, Fig. 3-294, (p. 3-363)
SCDD: Resid.curr.stage bl.	Vol. 1, Fig. 3-300, (p. 3-369)
SCDD: VNG	Vol. 1, Fig. 3-298, (p. 3-368)
Signal 1 EXT	Vol. 1, Fig. 3-410, (p. 3-482)
Signal 2 EXT	Vol. 1, Fig. 3-410, (p. 3-482)
SOTF: ARC blocked	Vol. 1, Fig. 3-184, (p. 3-244)
SOTF: Line dead trig. en.	Vol. 1, Fig. 3-182, (p. 3-242)
SOTF: Trip time elapsed	Vol. 1, Fig. 3-184, (p. 3-244)
TGFD: Direction BS	Vol. 1, Fig. 3-322, (p. 3-394)
TGFD: Direction LS	Vol. 1, Fig. 3-322, (p. 3-394)
TGFD: Hardware fault	Vol. 1, Fig. 3-320, (p. 3-392)
TGFD: IN,p triggered	Vol. 1, Fig. 3-322, (p. 3-394)
TGFD: Reset signal	Vol. 1, Fig. 3-324, (p. 3-395)
TGFD: V̲NG	Vol. 1, Fig. 3-321, (p. 3-393)
TGFD: VNG> (f0) triggered	Vol. 1, Fig. 3-322, (p. 3-394)
TGFD: VNG> triggered	Vol. 1, Fig. 3-322, (p. 3-394)
THERM: Block. by CTA error	Vol. 1, Fig. 3-328, (p. 3-400)
THERM: With CTA	Vol. 1, Fig. 3-328, (p. 3-400)
V<>: Starting V< A(-B)	Vol. 1, Fig. 3-337, (p. 3-410)
V<>: Starting V< B(-C)	Vol. 1, Fig. 3-337, (p. 3-410)
V<>: Starting V< C(-A)	Vol. 1, Fig. 3-337, (p. 3-410)
V<>: V< A(-B) ready	Vol. 1, Fig. 3-333, (p. 3-406)
V<>: V< B(-C) ready	Vol. 1, Fig. 3-333, (p. 3-406)
V<>: V< C(-A) ready	Vol. 1, Fig. 3-333, (p. 3-406)
V<>: V< ready	Vol. 1, Fig. 3-333, (p. 3-406)
V<>: V̲neg	Vol. 1, Fig. 3-341, (p. 3-414)

V<>: VNG Vol. 1, Fig. 3-344, (p. 3-417)

V<>: Vpos Vol. 1, Fig. 3-341, (p. 3-414)

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

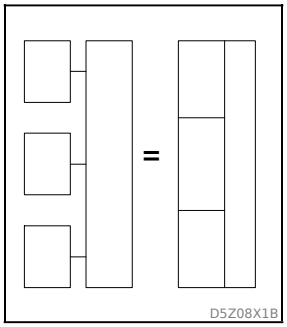
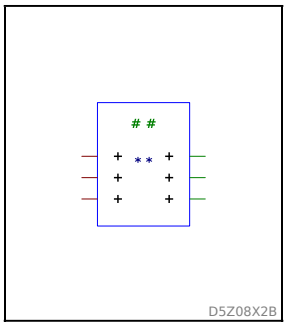
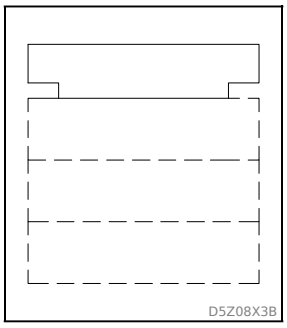
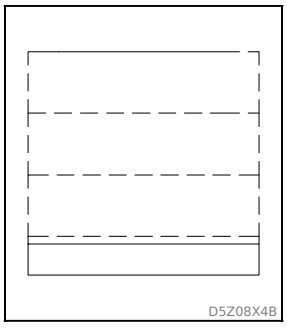
Symbols

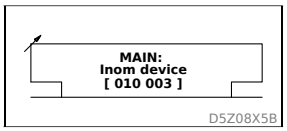
Graphic symbols for block diagrams

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.

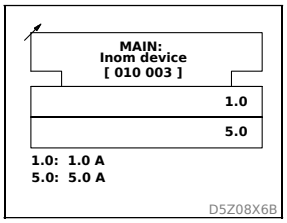
As a rule, direction of the signal flow is from left to right and from top to bottom. Other flow directions are marked by an arrow. Input signals are listed on the left side of the signal flow, output signals on the right side.

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

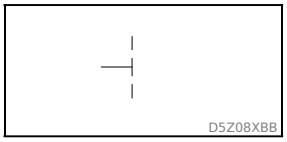
The 6 digits in square brackets represent the address under which the function shown in the text is implemented.



Settable control block with function blocks

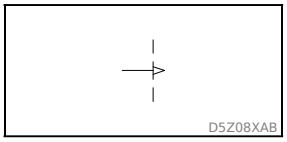
The digits in the function block show the settings that are possible for this function.

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



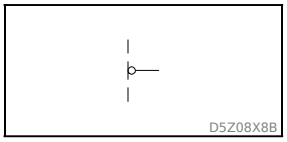
Static input

Only the state of the binary input variable is effective.



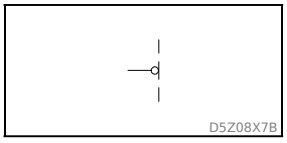
Dynamic input

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



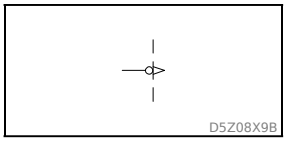
Negation of an output

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



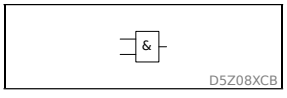
Negation of an input

The input value is negated before the border line.



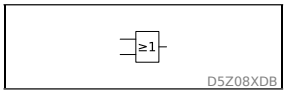
Dynamic input with negation

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



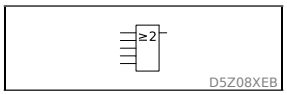
AND element

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



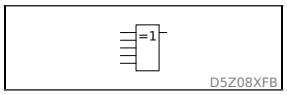
OR element

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



Threshold element

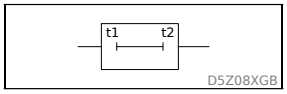
The output variable will be 1 only if at least two input variables are 1. The number in the symbol may be replaced by any other number.



(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.

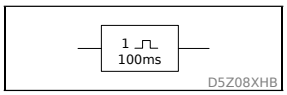


Delay element

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).

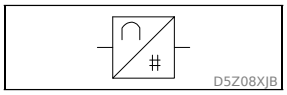


Monostable flip-flop

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).

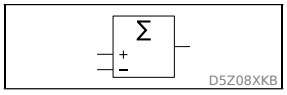
Without a 1 in the function block, the monostable flip-flop is retriggerable.

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



Analog-digital converter

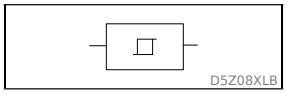
An analog input signal is converted to a binary signal.



Subtractor

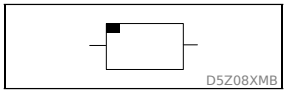
The output variable is the difference between the two input variables.

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



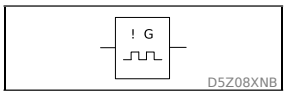
Schmitt Trigger with binary output signal

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.

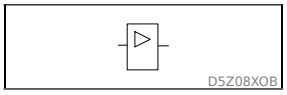


Non-stable flip-flop

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

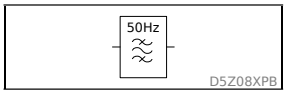
The ! to the left of the G indicates that the pulse sequence starts with the input variable transition (synchronized start).

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).



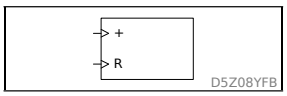
Amplifier

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



Band pass filter

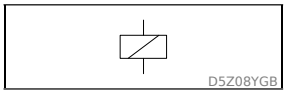
The output only transmits the 50 Hz component of the input signals. All other frequencies (above and below 50 Hz) are attenuated.



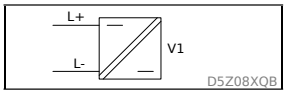
Counter

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.



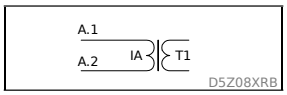
Signal level converter

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:

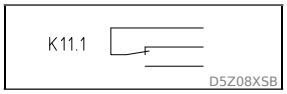
- for A: A1 and A2
- for B: B1 and B2
- for C: C1 and C2
- for N: N1 and N2

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

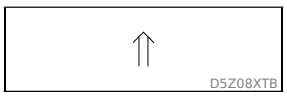
Item identifiers

- 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



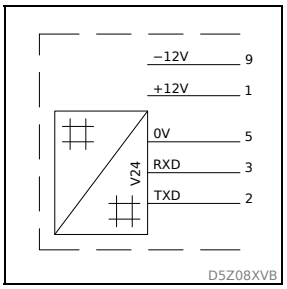
Change-over contact

with item identifier



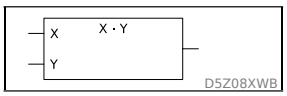
Special symbol

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



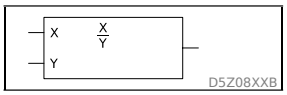
PC interface

with pin connections



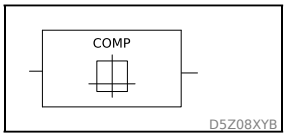
Multiplier

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



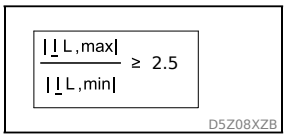
Divider

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 P433.

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	P433 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	P433 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	(037 021) BUOC: Active
[✓]	<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	P433 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	P433 Designations (Address) Description
[✓]	<64>	Start / pick-up A	(036 001) MAIN: Starting A
[✓]	<65>	Start / pick-up B	(036 002) MAIN: Starting B
[✓]	<66>	Start / pick-up C	(036 003) MAIN: Starting C
[✓]	<67>	Start / pick-up N	(036 004) 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)	(036 014) BUOC: Trip signal
[✓]	<73>	Fault location X in ohms	(004 029) FT_DA: Fault react., prim.
[✓]	<74>	Fault forward/line	(036 018) DIST: Fault forward / LS
[✓]	<75>	Fault reverse/busbar	(036 019) DIST: Fault backward / BS
[✓]	<76>	Teleprotection signal transmitted	(036 035) PSIG: Send (signal)
[✓]	<77>	Teleprotection signal received	(037 029) PSIG: Receive (signal)
[✓]	<78>	Zone 1	(036 026) DIST: t1 elapsed
[✓]	<79>	Zone 2	(036 027) DIST: t2 elapsed
[✓]	<80>	Zone 3	(036 028) DIST: t3 elapsed
[✓]	<81>	Zone 4	(036 029) DIST: t4 elapsed
[✓]	<82>	Zone 5	(036 030) DIST: t5 elapsed
[✓]	<83>	Zone 6	(036 031) DIST: t6 elapsed
[✓]	<84>	General starting	(036 000) 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>	
[ ]	<91>	Trip I>>	

	INF	Description	P433 Designations (Address) Description
[ ]	<92>	Trip IN>	
[ ]	<93>	Trip IN>>	

Auto-Reclosure Indications in Monitor Direction

	INF	Description	P433 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	P433 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	P433 Designations (Address) Description
[✓]	<16>	Auto-recloser on/off	(015 064) ARC: Enabled
[✓]	<17>	Teleprotection on/off	(015 008) PSIG: Enabled
[✓]	<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 P433 only if all of the following requirements are fulfilled:

- The selected ID number is known by the P433, i. e. is available as a pre-defined standard bay type.
- 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.
- Bay types with more than 3 switchgear devices are **not** supported by the P433.
- Bay types are generally not supported by the P433 in 24 TE case.
- 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:

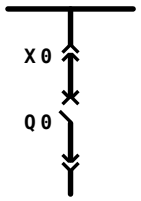
- **/**: Negation
- **0**: Switchgear unit “Open”
- **I** : Switchgear unit “Closed”
- **X**: Switchgear unit in intermediate position
- **FctBl1**: Function block 1, configuration at MAIN: Inp.asg. fct.block.1 (menu branch *Par/Func/Cont*)
- **FctBl2**: Function block 1, configuration at MAIN: Inp.asg.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

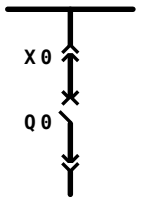
Tab. A5-2: Bay Interlock Equations for Operation without Station Interlocking

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)

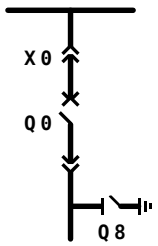
Tab. A5-5: Bay Interlock Equations for Operation without Station Interlocking

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)

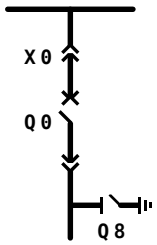
Tab. A5-8: Bay Interlock Equations for Operation without Station Interlocking

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)

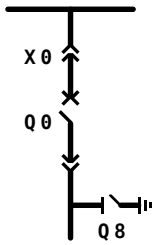
Tab. A5-11: Bay Interlock Equations for Operation without Station Interlocking

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)

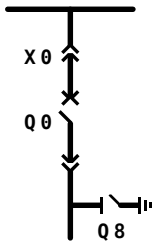
Tab. A5-14: Bay Interlock Equations for Operation without Station Interlocking

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)

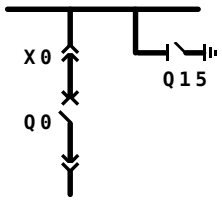
Tab. A5-17: Bay Interlock Equations for Operation without Station Interlocking

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)

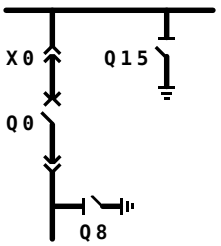
Tab. A5-20: Bay Interlock Equations for Operation without Station Interlocking

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)

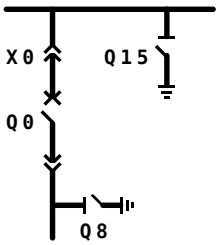
Tab. A5-23: Bay Interlock Equations for Operation without Station Interlocking

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)

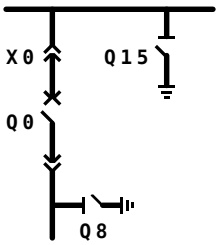
Tab. A5-26: Bay Interlock Equations for Operation without Station Interlocking

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)

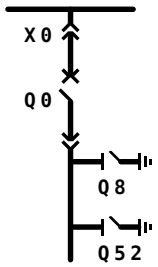
Tab. A5-29: Bay Interlock Equations for Operation without Station Interlocking

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)

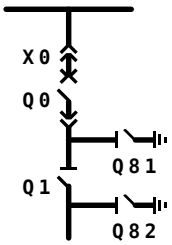
Tab. A5-32: Bay Interlock Equations for Operation without Station Interlocking

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)

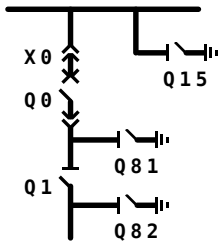
Tab. A5-35: Bay Interlock Equations for Operation without Station Interlocking

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)

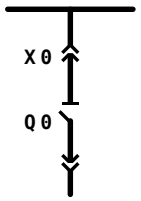
Tab. A5-38: Bay Interlock Equations for Operation without Station Interlocking

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)

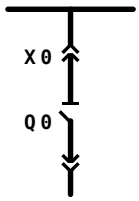
Tab. A5-41: Bay Interlock Equations for Operation without Station Interlocking

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)

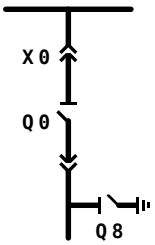
Tab. A5-44: Bay Interlock Equations for Operation without Station Interlocking

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)

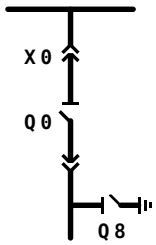
Tab. A5-47: Bay Interlock Equations for Operation without Station Interlocking

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)

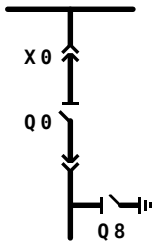
Tab. A5-50: Bay Interlock Equations for Operation without Station Interlocking

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)

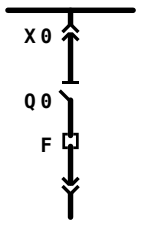
Tab. A5-53: Bay Interlock Equations for Operation without Station Interlocking

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)

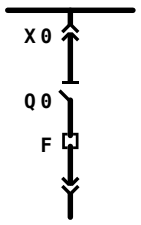
Tab. A5-56: Bay Interlock Equations for Operation without Station Interlocking

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)

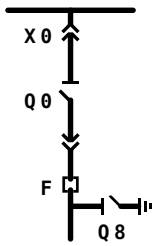
Tab. A5-59: Bay Interlock Equations for Operation without Station Interlocking

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)

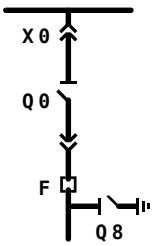
Tab. A5-62: Bay Interlock Equations for Operation without Station Interlocking

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)

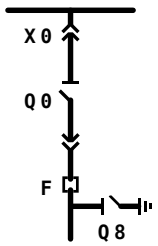
Tab. A5-65: Bay Interlock Equations for Operation without Station Interlocking

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)

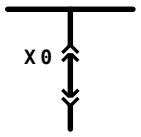
Tab. A5-68: Bay Interlock Equations for Operation without Station Interlocking

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
		—

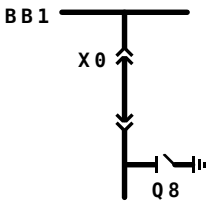
Tab. A5-71: Bay Interlock Equations for Operation without Station Interlocking

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
		—

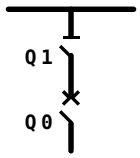
Tab. A5-74: Bay Interlock Equations for Operation without Station Interlocking

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)

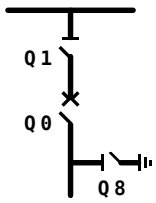
Tab. A5-77: Bay Interlock Equations for Operation without Station Interlocking

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)

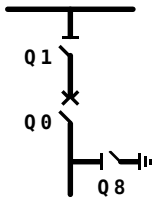
Tab. A5-80: Bay Interlock Equations for Operation without Station Interlocking

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)

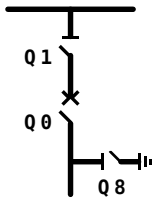
Tab. A5-83: Bay Interlock Equations for Operation without Station Interlocking

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)

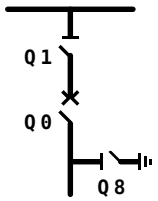
Tab. A5-86: Bay Interlock Equations for Operation without Station Interlocking

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)

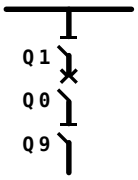
Tab. A5-89: Bay Interlock Equations for Operation without Station Interlocking

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)

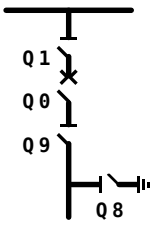
Tab. A5-92: Bay Interlock Equations for Operation without Station Interlocking

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)

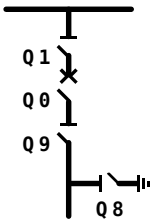
Tab. A5-95: Bay Interlock Equations for Operation without Station Interlocking

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)

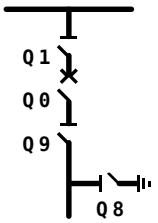
Tab. A5-98: Bay Interlock Equations for Operation without Station Interlocking

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)

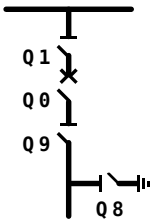
Tab. A5-101: Bay Interlock Equations for Operation without Station Interlocking

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)

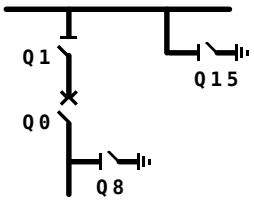
Tab. A5-104: Bay Interlock Equations for Operation without Station Interlocking

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)

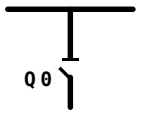
Tab. A5-107: Bay Interlock Equations for Operation without Station Interlocking

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
		—

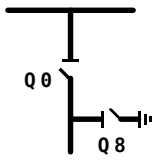
Tab. A5-110: Bay Interlock Equations for Operation without Station Interlocking

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)

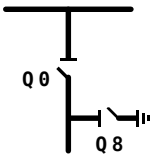
Tab. A5-113: Bay Interlock Equations for Operation without Station Interlocking

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)

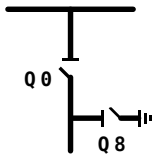
Tab. A5-116: Bay Interlock Equations for Operation without Station Interlocking

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)

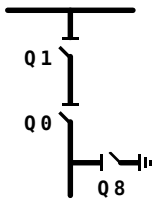
Tab. A5-119: Bay Interlock Equations for Operation without Station Interlocking

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)

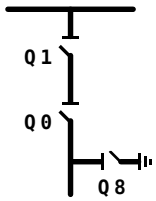
Tab. A5-122: Bay Interlock Equations for Operation without Station Interlocking

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)

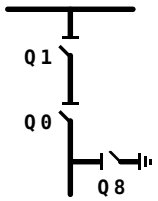
Tab. A5-125: Bay Interlock Equations for Operation without Station Interlocking

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)

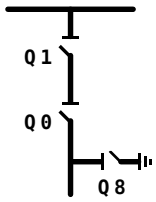
Tab. A5-128: Bay Interlock Equations for Operation without Station Interlocking

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)

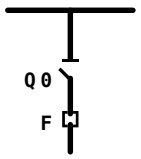
Tab. A5-131: Bay Interlock Equations for Operation without Station Interlocking

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
		—

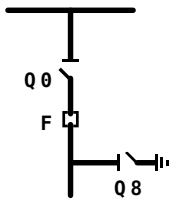
Tab. A5-134: Bay Interlock Equations for Operation without Station Interlocking

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)

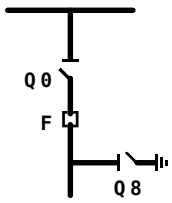
Tab. A5-137: Bay Interlock Equations for Operation without Station Interlocking

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)

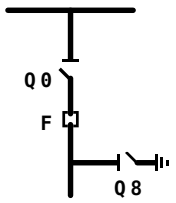
Tab. A5-140: Bay Interlock Equations for Operation without Station Interlocking

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)

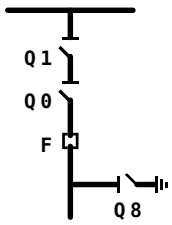
Tab. A5-143: Bay Interlock Equations for Operation without Station Interlocking

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)

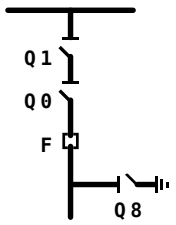
Tab. A5-146: Bay Interlock Equations for Operation without Station Interlocking

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)

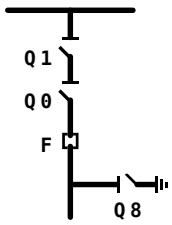
Tab. A5-149: Bay Interlock Equations for Operation without Station Interlocking

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)

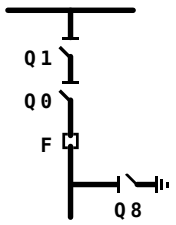
Tab. A5-152: Bay Interlock Equations for Operation without Station Interlocking

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)

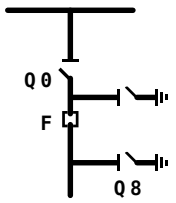
Tab. A5-155: Bay Interlock Equations for Operation without Station Interlocking

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)

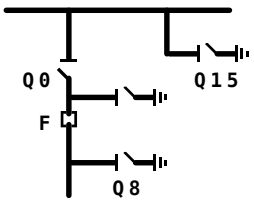
Tab. A5-158: Bay Interlock Equations for Operation without Station Interlocking

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)

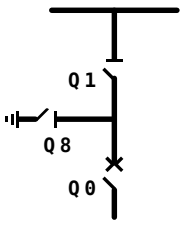
Tab. A5-161: Bay Interlock Equations for Operation without Station Interlocking

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)

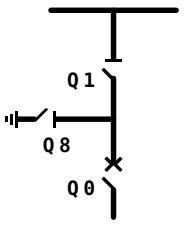
Tab. A5-164: Bay Interlock Equations for Operation without Station Interlocking

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)

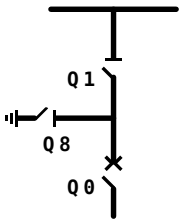
Tab. A5-167: Bay Interlock Equations for Operation without Station Interlocking

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)

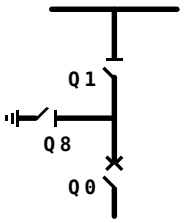
Tab. A5-170: Bay Interlock Equations for Operation without Station Interlocking

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)

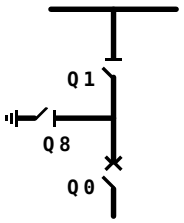
Tab. A5-173: Bay Interlock Equations for Operation without Station Interlocking

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)

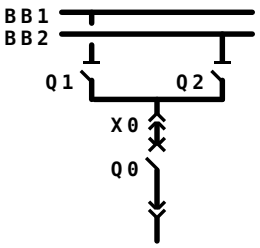
Tab. A5-176: Bay Interlock Equations for Operation without Station Interlocking

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)

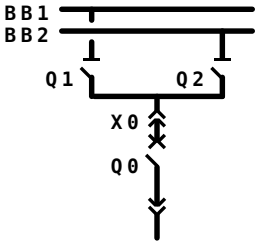
Tab. A5-179: Bay Interlock Equations for Operation without Station Interlocking

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)

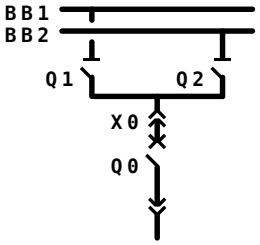
Tab. A5-182: Bay Interlock Equations for Operation without Station Interlocking

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)

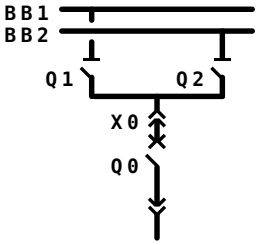
Tab. A5-185: Bay Interlock Equations for Operation without Station Interlocking

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)

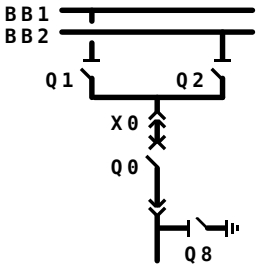
Tab. A5-188: Bay Interlock Equations for Operation without Station Interlocking

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)

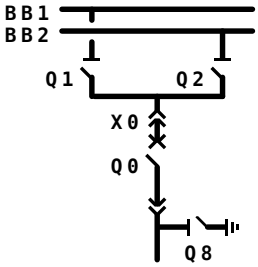
Tab. A5-191: Bay Interlock Equations for Operation without Station Interlocking

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)

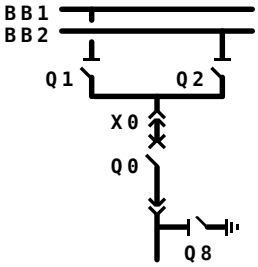
Tab. A5-194: Bay Interlock Equations for Operation without Station Interlocking

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)

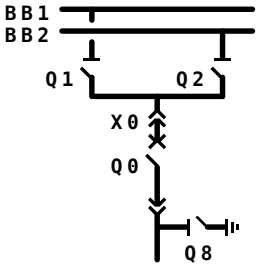
Tab. A5-197: Bay Interlock Equations for Operation without Station Interlocking

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)

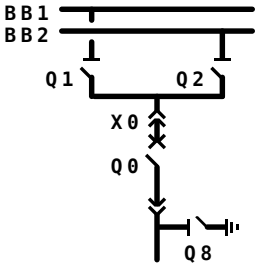
Tab. A5-200: Bay Interlock Equations for Operation without Station Interlocking

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)

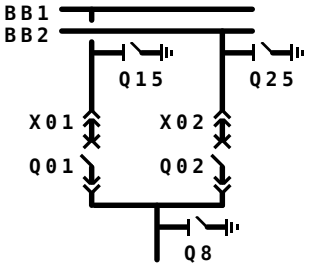
Tab. A5-203: Bay Interlock Equations for Operation without Station Interlocking

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)

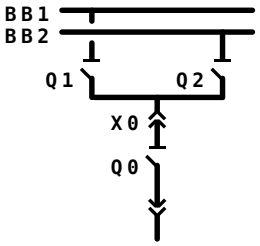
Tab. A5-206: Bay Interlock Equations for Operation without Station Interlocking

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)

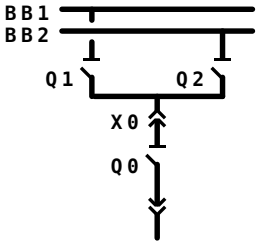
Tab. A5-209: Bay Interlock Equations for Operation without Station Interlocking

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)

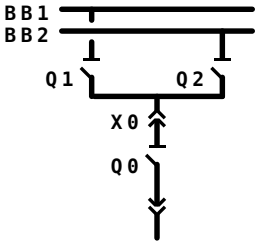
Tab. A5-212: Bay Interlock Equations for Operation without Station Interlocking

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)

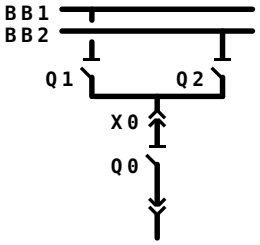
Tab. A5-215: Bay Interlock Equations for Operation without Station Interlocking

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)

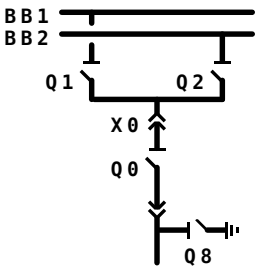
Tab. A5-218: Bay Interlock Equations for Operation without Station Interlocking

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)

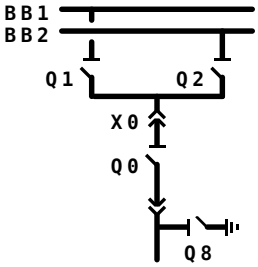
Tab. A5-221: Bay Interlock Equations for Operation without Station Interlocking

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)

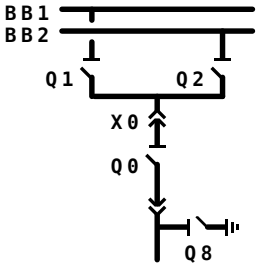
Tab. A5-224: Bay Interlock Equations for Operation without Station Interlocking

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)

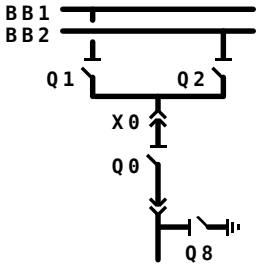
Tab. A5-227: Bay Interlock Equations for Operation without Station Interlocking

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)

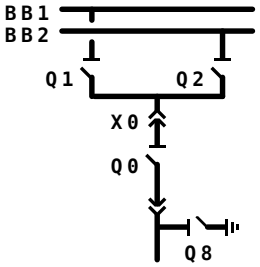
Tab. A5-230: Bay Interlock Equations for Operation without Station Interlocking

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)

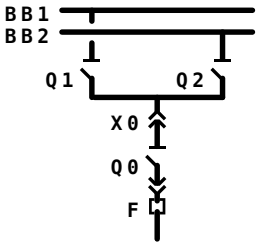
Tab. A5-233: Bay Interlock Equations for Operation without Station Interlocking

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)

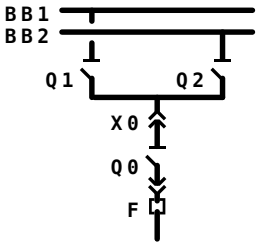
Tab. A5-236: Bay Interlock Equations for Operation without Station Interlocking

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)

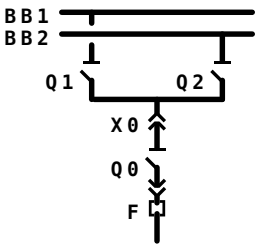
Tab. A5-239: Bay Interlock Equations for Operation without Station Interlocking

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)

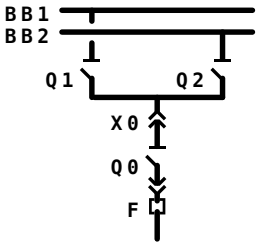
Tab. A5-242: Bay Interlock Equations for Operation without Station Interlocking

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)

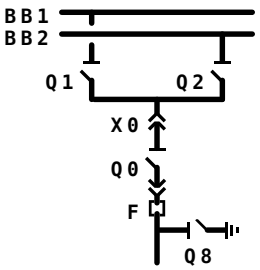
Tab. A5-245: Bay Interlock Equations for Operation without Station Interlocking

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)

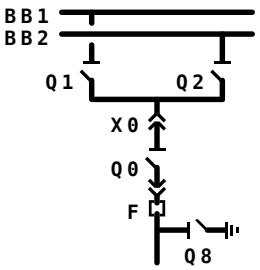
Tab. A5-248: Bay Interlock Equations for Operation without Station Interlocking

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)

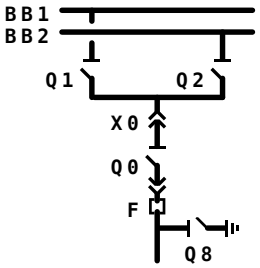
Tab. A5-251: Bay Interlock Equations for Operation without Station Interlocking

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)

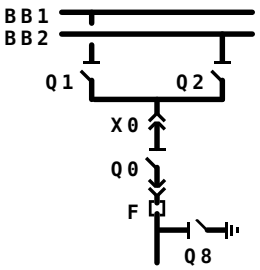
Tab. A5-254: Bay Interlock Equations for Operation without Station Interlocking

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)

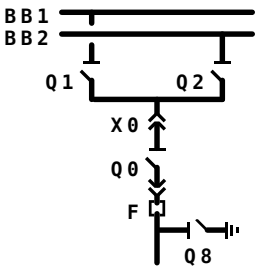
Tab. A5-257: Bay Interlock Equations for Operation without Station Interlocking

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)

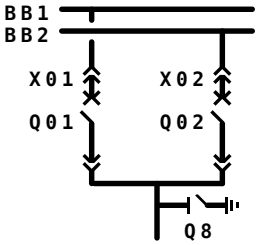
Tab. A5-260: Bay Interlock Equations for Operation without Station Interlocking

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)

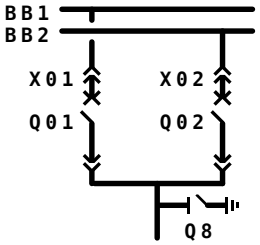
Tab. A5-263: Bay Interlock Equations for Operation without Station Interlocking

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)

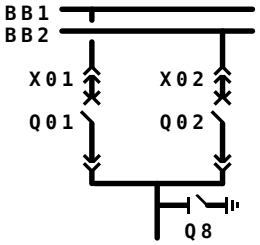
Tab. A5-266: Bay Interlock Equations for Operation without Station Interlocking

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)

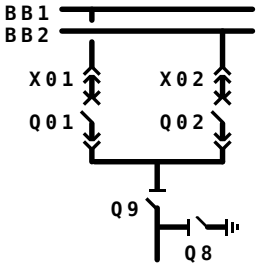
Tab. A5-269: Bay Interlock Equations for Operation without Station Interlocking

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)

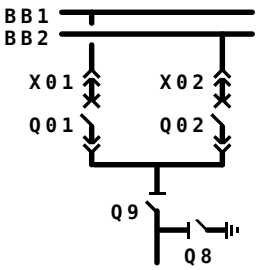
Tab. A5-272: Bay Interlock Equations for Operation without Station Interlocking

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)

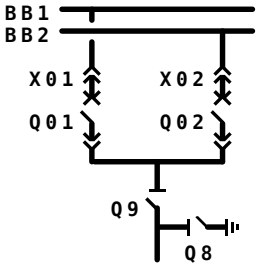
Tab. A5-275: Bay Interlock Equations for Operation without Station Interlocking

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)

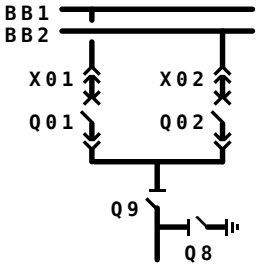
Tab. A5-278: Bay Interlock Equations for Operation without Station Interlocking

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)

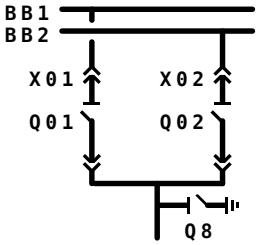
Tab. A5-281: Bay Interlock Equations for Operation without Station Interlocking

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)

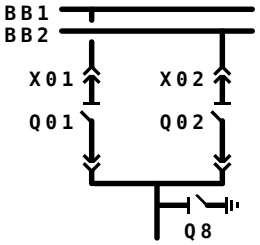
Tab. A5-284: Bay Interlock Equations for Operation without Station Interlocking

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)

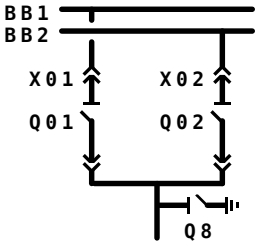
Tab. A5-287: Bay Interlock Equations for Operation without Station Interlocking

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)

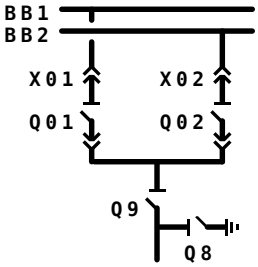
Tab. A5-290: Bay Interlock Equations for Operation without Station Interlocking

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)

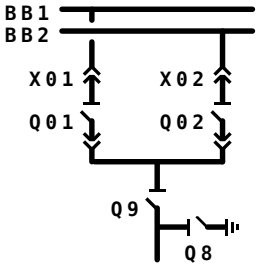
Tab. A5-293: Bay Interlock Equations for Operation without Station Interlocking

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)

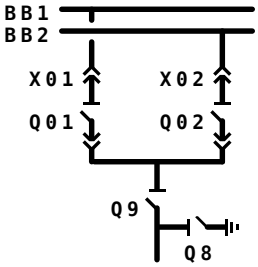
Tab. A5-296: Bay Interlock Equations for Operation without Station Interlocking

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)

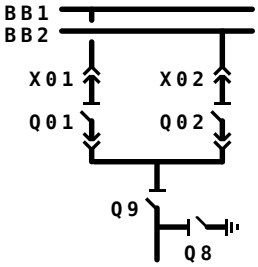
Tab. A5-299: Bay Interlock Equations for Operation without Station Interlocking

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)

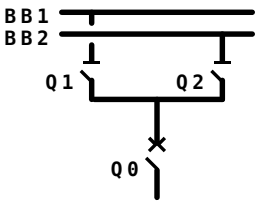
Tab. A5-302: Bay Interlock Equations for Operation without Station Interlocking

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)

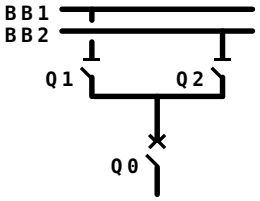
Tab. A5-305: Bay Interlock Equations for Operation without Station Interlocking

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)

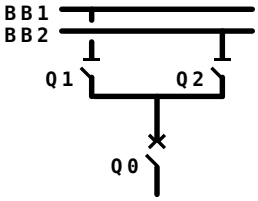
Tab. A5-308: Bay Interlock Equations for Operation without Station Interlocking

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)

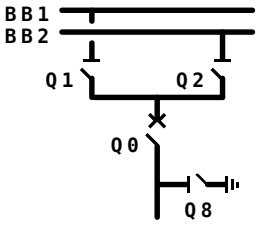
Tab. A5-311: Bay Interlock Equations for Operation without Station Interlocking

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)

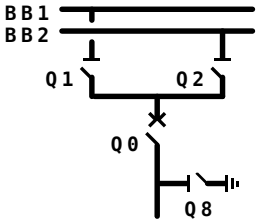
Tab. A5-314: Bay Interlock Equations for Operation without Station Interlocking

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)

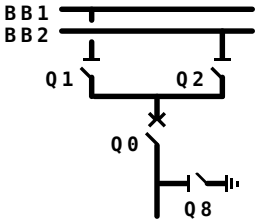
Tab. A5-317: Bay Interlock Equations for Operation without Station Interlocking

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)

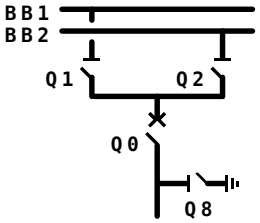
Tab. A5-320: Bay Interlock Equations for Operation without Station Interlocking

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)

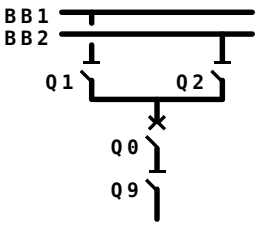
Tab. A5-323: Bay Interlock Equations for Operation without Station Interlocking

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)

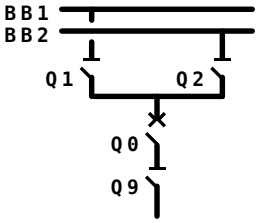
Tab. A5-326: Bay Interlock Equations for Operation without Station Interlocking

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)

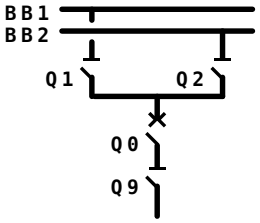
Tab. A5-329: Bay Interlock Equations for Operation without Station Interlocking

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)

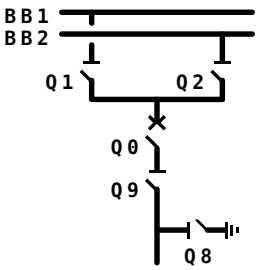
Tab. A5-332: Bay Interlock Equations for Operation without Station Interlocking

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)

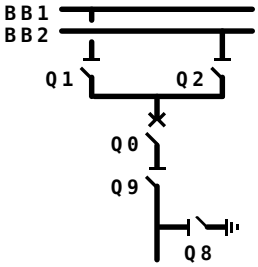
Tab. A5-335: Bay Interlock Equations for Operation without Station Interlocking

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)

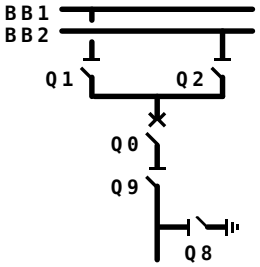
Tab. A5-338: Bay Interlock Equations for Operation without Station Interlocking

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)

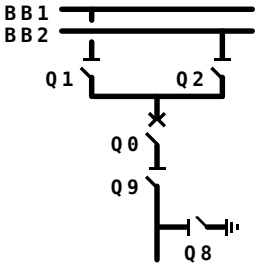
Tab. A5-341: Bay Interlock Equations for Operation without Station Interlocking

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)

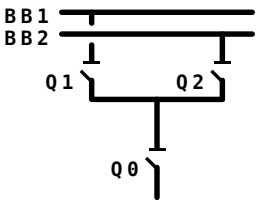
Tab. A5-344: Bay Interlock Equations for Operation without Station Interlocking

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)

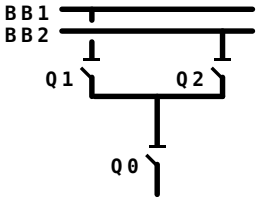
Tab. A5-347: Bay Interlock Equations for Operation without Station Interlocking

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)

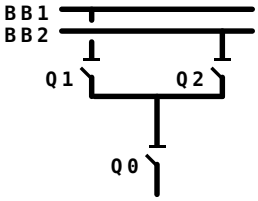
Tab. A5-350: Bay Interlock Equations for Operation without Station Interlocking

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)

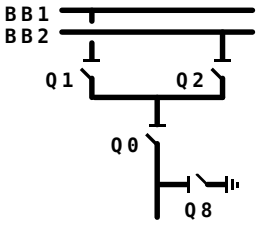
Tab. A5-353: Bay Interlock Equations for Operation without Station Interlocking

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)

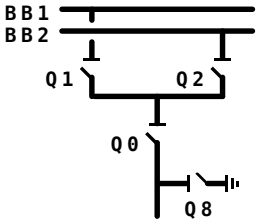
Tab. A5-356: Bay Interlock Equations for Operation without Station Interlocking

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)

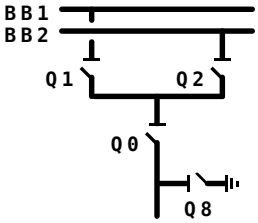
Tab. A5-359: Bay Interlock Equations for Operation without Station Interlocking

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)

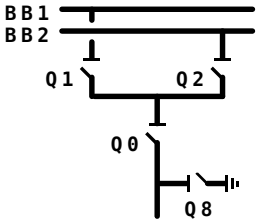
Tab. A5-362: Bay Interlock Equations for Operation without Station Interlocking

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)

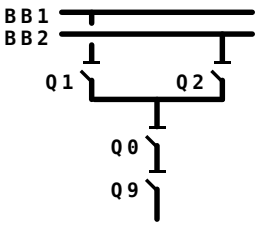
Tab. A5-365: Bay Interlock Equations for Operation without Station Interlocking

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)

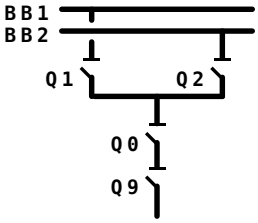
Tab. A5-368: Bay Interlock Equations for Operation without Station Interlocking

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)

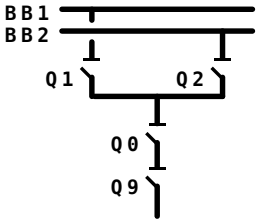
Tab. A5-371: Bay Interlock Equations for Operation without Station Interlocking

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)

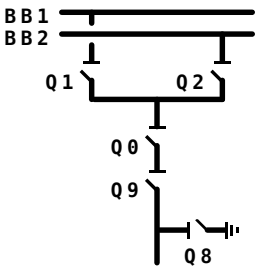
Tab. A5-374: Bay Interlock Equations for Operation without Station Interlocking

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)

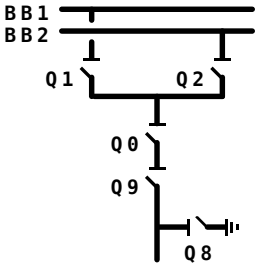
Tab. A5-377: Bay Interlock Equations for Operation without Station Interlocking

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)

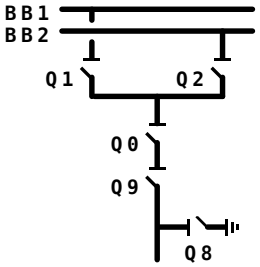
Tab. A5-380: Bay Interlock Equations for Operation without Station Interlocking

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)

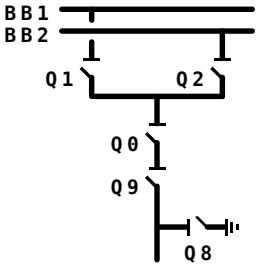
Tab. A5-383: Bay Interlock Equations for Operation without Station Interlocking

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)

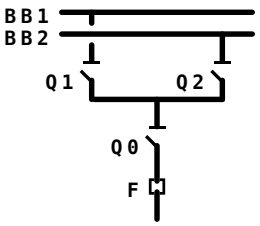
Tab. A5-386: Bay Interlock Equations for Operation without Station Interlocking

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)

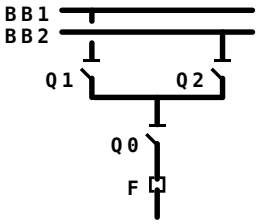
Tab. A5-389: Bay Interlock Equations for Operation without Station Interlocking

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)

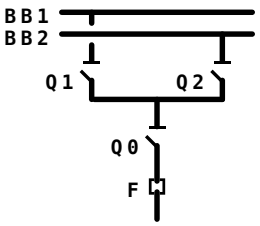
Tab. A5-392: Bay Interlock Equations for Operation without Station Interlocking

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)

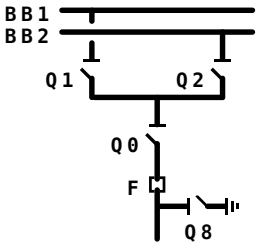
Tab. A5-395: Bay Interlock Equations for Operation without Station Interlocking

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)

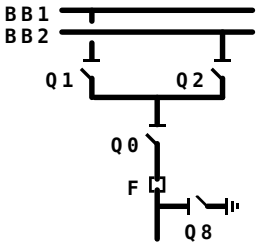
Tab. A5-398: Bay Interlock Equations for Operation without Station Interlocking

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)

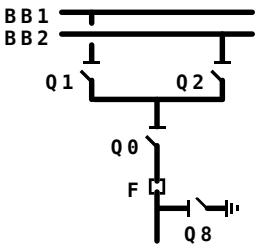
Tab. A5-401: Bay Interlock Equations for Operation without Station Interlocking

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)

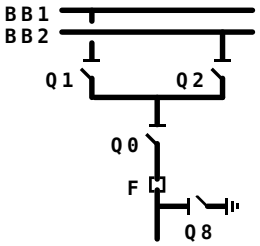
Tab. A5-404: Bay Interlock Equations for Operation without Station Interlocking

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)

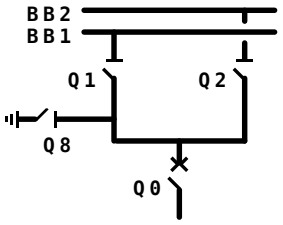
Tab. A5-407: Bay Interlock Equations for Operation without Station Interlocking

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)

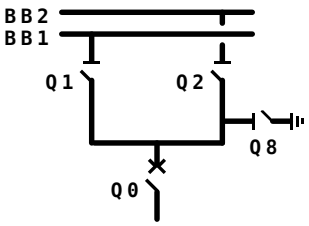
Tab. A5-410: Bay Interlock Equations for Operation without Station Interlocking

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)

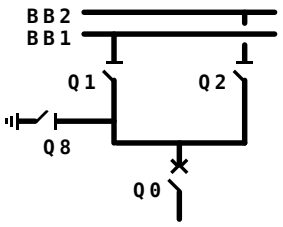
Tab. A5-413: Bay Interlock Equations for Operation without Station Interlocking

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)

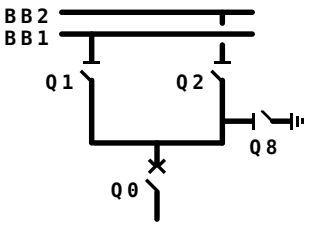
Tab. A5-416: Bay Interlock Equations for Operation without Station Interlocking

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)

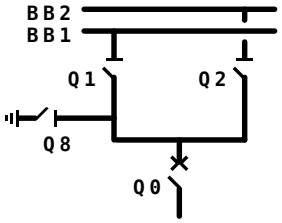
Tab. A5-419: Bay Interlock Equations for Operation without Station Interlocking

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)

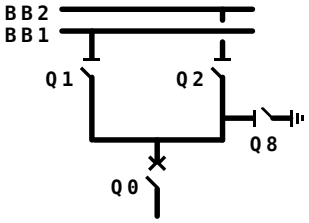
Tab. A5-422: Bay Interlock Equations for Operation without Station Interlocking

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)

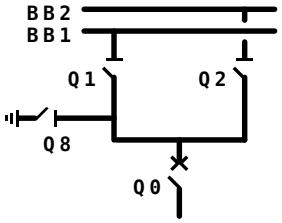
Tab. A5-425: Bay Interlock Equations for Operation without Station Interlocking

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)

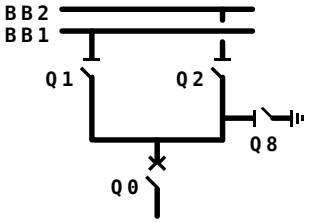
Tab. A5-428: Bay Interlock Equations for Operation without Station Interlocking

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)

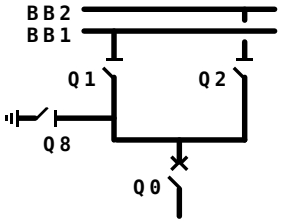
Tab. A5-431: Bay Interlock Equations for Operation without Station Interlocking

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)

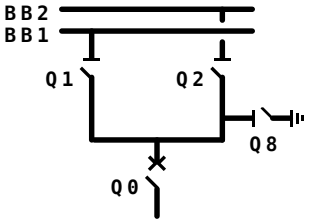
Tab. A5-434: Bay Interlock Equations for Operation without Station Interlocking

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)

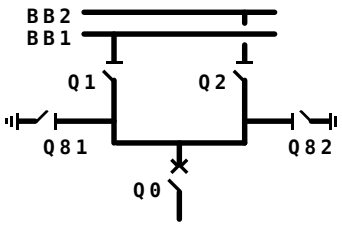
Tab. A5-437: Bay Interlock Equations for Operation without Station Interlocking

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)

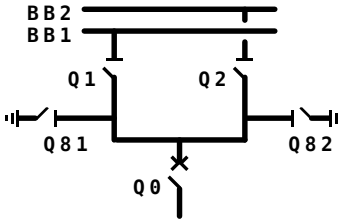
Tab. A5-440: Bay Interlock Equations for Operation without Station Interlocking

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

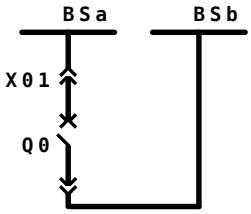
Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q81*=0) & (*Q82*=0)
	Close(d)	/(*Q1*=X) & /(*Q2*=X) & (*Q81*=0) & (*Q82*=0) & /(FctBl1=I) & /(FctBl2=I)
Q1	Close(d)	(*Q81*=0) & (*Q82*=0)
Q2	Close(d)	(*Q81*=0) & (*Q82*=0)
Q81	Open	(*Q0*=I) & (*Q1*=0) & (*Q2*=0)
	Close(d)	(*Q0*=0) & (*Q1*=0) & (*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)

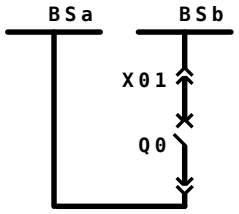
Tab. A5-446: Bay Interlock Equations for Operation without Station Interlocking

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)

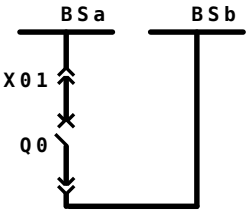
Tab. A5-449: Bay Interlock Equations for Operation without Station Interlocking

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)

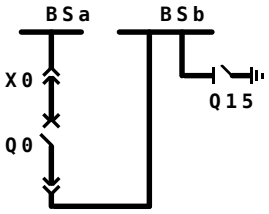
Tab. A5-452: Bay Interlock Equations for Operation without Station Interlocking

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)

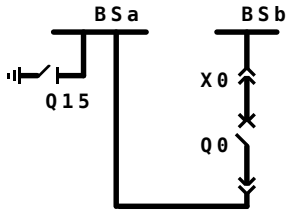
Tab. A5-455: Bay Interlock Equations for Operation without Station Interlocking

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)

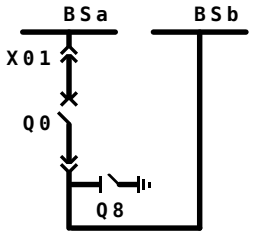
Tab. A5-458: Bay Interlock Equations for Operation without Station Interlocking

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)

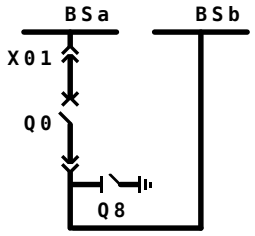
Tab. A5-461: Bay Interlock Equations for Operation without Station Interlocking

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)

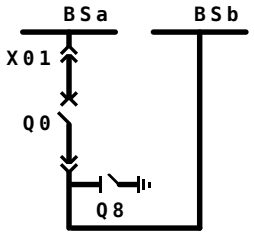
Tab. A5-464: Bay Interlock Equations for Operation without Station Interlocking

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)

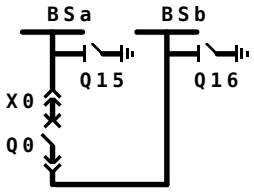
Tab. A5-467: Bay Interlock Equations for Operation without Station Interlocking

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)

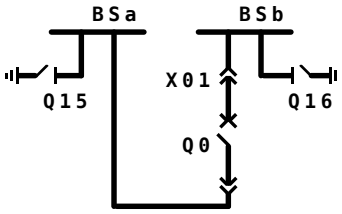
Tab. A5-470: Bay Interlock Equations for Operation without Station Interlocking

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)

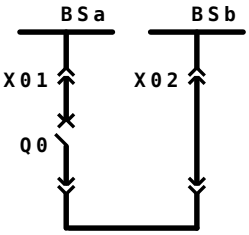
Tab. A5-473: Bay Interlock Equations for Operation without Station Interlocking

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)

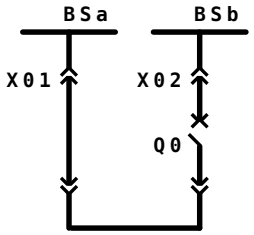
Tab. A5-476: Bay Interlock Equations for Operation without Station Interlocking

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)

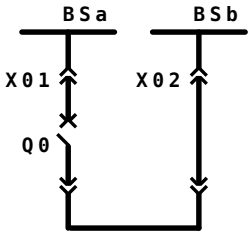
Tab. A5-479: Bay Interlock Equations for Operation without Station Interlocking

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)

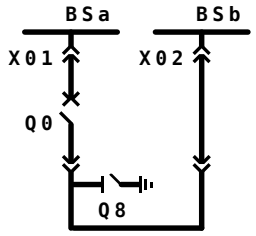
Tab. A5-482: Bay Interlock Equations for Operation without Station Interlocking

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)

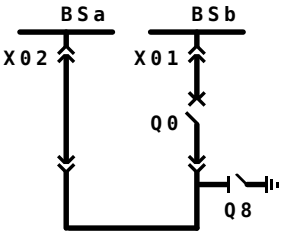
Tab. A5-485: Bay Interlock Equations for Operation without Station Interlocking

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)

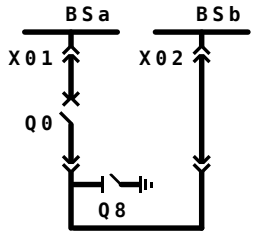
Tab. A5-488: Bay Interlock Equations for Operation without Station Interlocking

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)

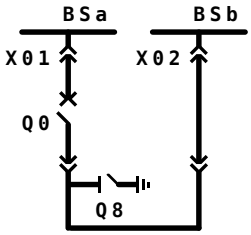
Tab. A5-491: Bay Interlock Equations for Operation without Station Interlocking

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)

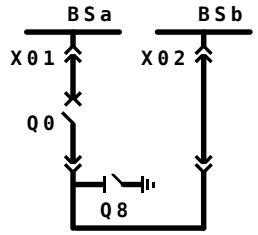
Tab. A5-494: Bay Interlock Equations for Operation without Station Interlocking

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)

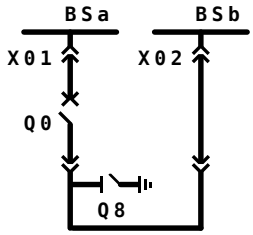
Tab. A5-497: Bay Interlock Equations for Operation without Station Interlocking

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)

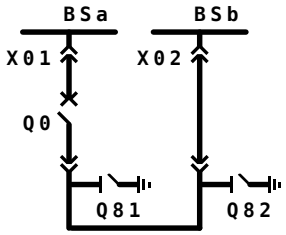
Tab. A5-500: Bay Interlock Equations for Operation without Station Interlocking

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)

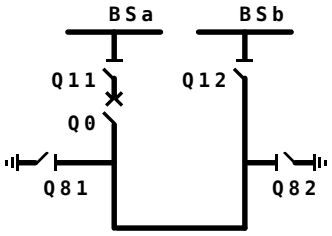
Tab. A5-503: Bay Interlock Equations for Operation without Station Interlocking

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)

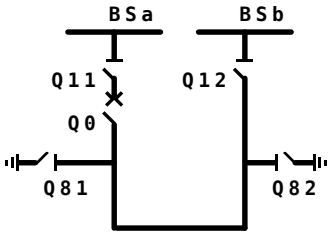
Tab. A5-506: Bay Interlock Equations for Operation without Station Interlocking

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)

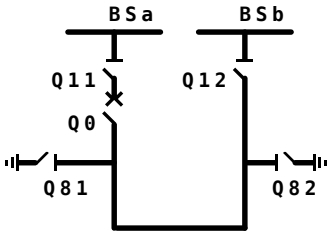
Tab. A5-509: Bay Interlock Equations for Operation without Station Interlocking

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)

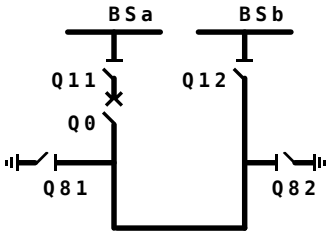
Tab. A5-512: Bay Interlock Equations for Operation without Station Interlocking

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)

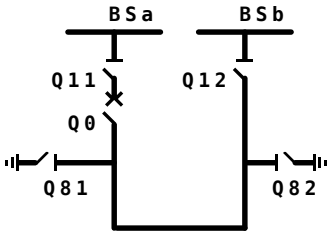
Tab. A5-515: Bay Interlock Equations for Operation without Station Interlocking

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)

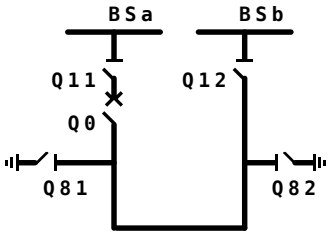
Tab. A5-518: Bay Interlock Equations for Operation without Station Interlocking

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)

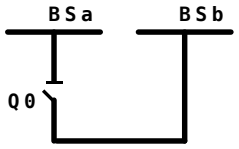
Tab. A5-521: Bay Interlock Equations for Operation without Station Interlocking

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
		—

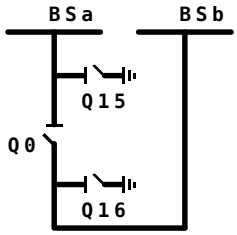
Tab. A5-524: Bay Interlock Equations for Operation without Station Interlocking

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)

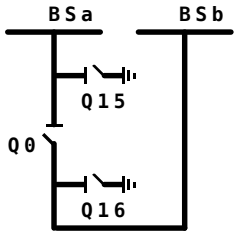
Tab. A5-527: Bay Interlock Equations for Operation without Station Interlocking

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)

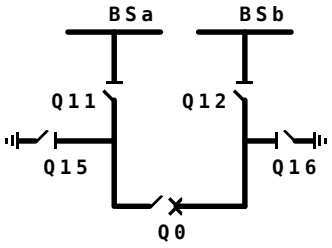
Tab. A5-530: Bay Interlock Equations for Operation without Station Interlocking

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)

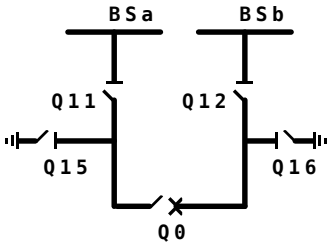
Tab. A5-533: Bay Interlock Equations for Operation without Station Interlocking

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)

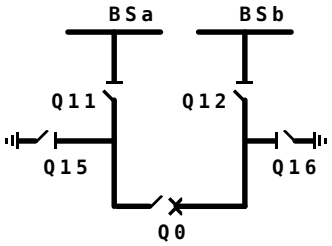
Tab. A5-536: Bay Interlock Equations for Operation without Station Interlocking

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)

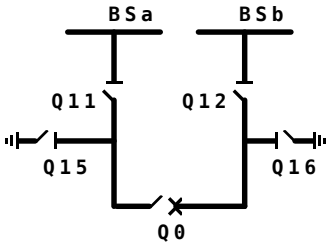
Tab. A5-539: Bay Interlock Equations for Operation without Station Interlocking

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)

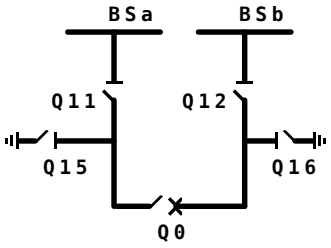
Tab. A5-542: Bay Interlock Equations for Operation without Station Interlocking

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)

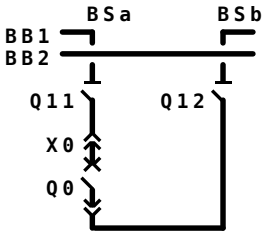
Tab. A5-545: Bay Interlock Equations for Operation without Station Interlocking

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)

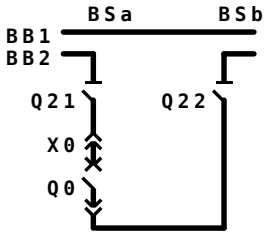
Tab. A5-548: Bay Interlock Equations for Operation without Station Interlocking

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)

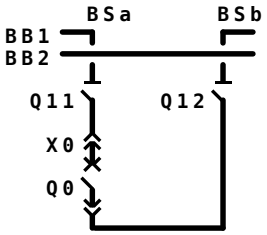
Tab. A5-551: Bay Interlock Equations for Operation without Station Interlocking

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)

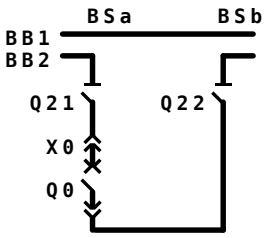
Tab. A5-554: Bay Interlock Equations for Operation without Station Interlocking

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)

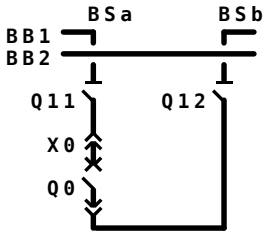
Tab. A5-557: Bay Interlock Equations for Operation without Station Interlocking

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)

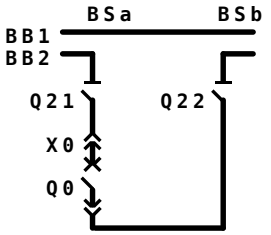
Tab. A5-560: Bay Interlock Equations for Operation without Station Interlocking

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)

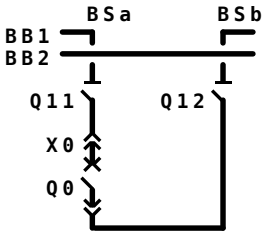
Tab. A5-563: Bay Interlock Equations for Operation without Station Interlocking

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)

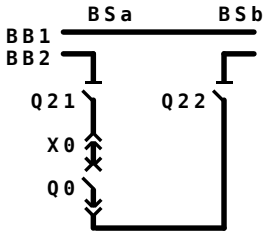
Tab. A5-566: Bay Interlock Equations for Operation without Station Interlocking

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)

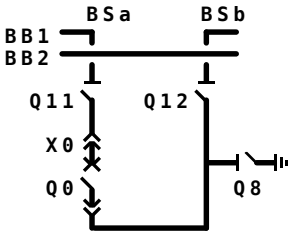
Tab. A5-569: Bay Interlock Equations for Operation without Station Interlocking

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)

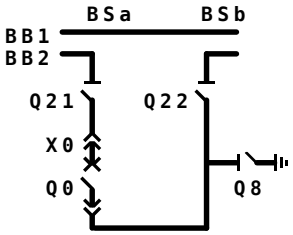
Tab. A5-572: Bay Interlock Equations for Operation without Station Interlocking

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)

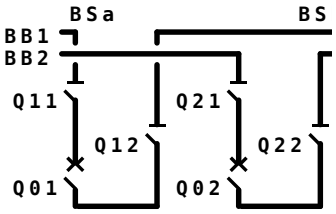
Tab. A5-575: Bay Interlock Equations for Operation without Station Interlocking

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)

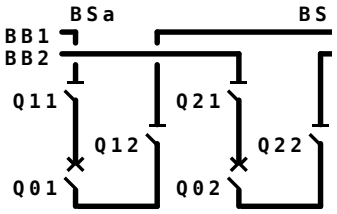
Tab. A5-578: Bay Interlock Equations for Operation without Station Interlocking

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)

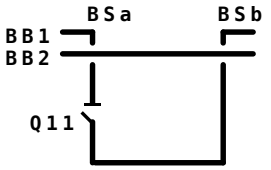
Tab. A5-581: Bay Interlock Equations for Operation without Station Interlocking

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
		—

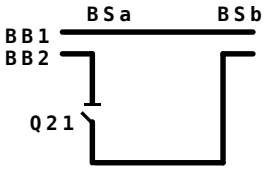
Tab. A5-584: Bay Interlock Equations for Operation without Station Interlocking

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
		—

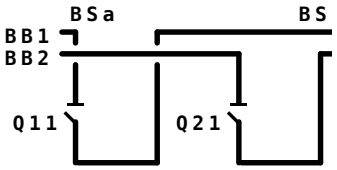
Tab. A5-587: Bay Interlock Equations for Operation without Station Interlocking

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)

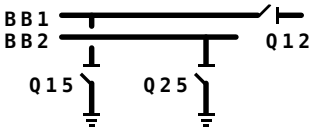
Tab. A5-590: Bay Interlock Equations for Operation without Station Interlocking

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)

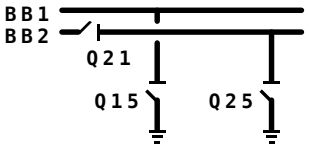
Tab. A5-593: Bay Interlock Equations for Operation without Station Interlocking

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)

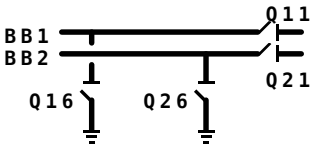
Tab. A5-596: Bay Interlock Equations for Operation without Station Interlocking

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)

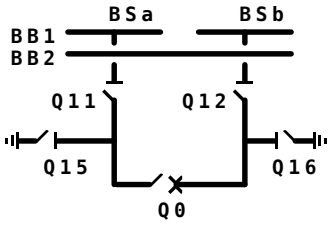
Tab. A5-599: Bay Interlock Equations for Operation without Station Interlocking

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)

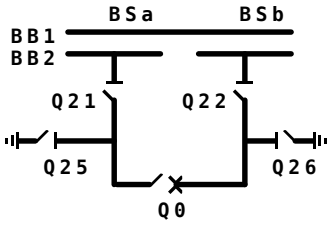
Tab. A5-602: Bay Interlock Equations for Operation without Station Interlocking

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)

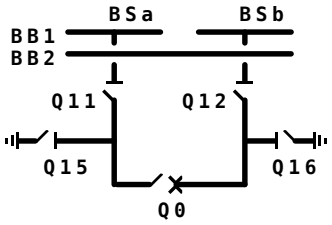
Tab. A5-605: Bay Interlock Equations for Operation without Station Interlocking

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)

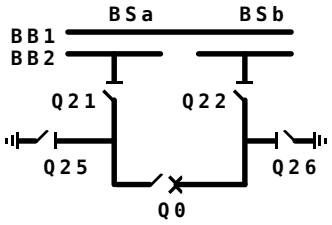
Tab. A5-608: Bay Interlock Equations for Operation without Station Interlocking

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)

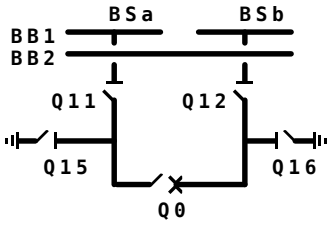
Tab. A5-611: Bay Interlock Equations for Operation without Station Interlocking

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)

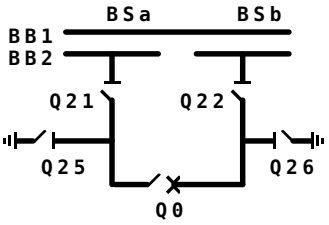
Tab. A5-614: Bay Interlock Equations for Operation without Station Interlocking

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)

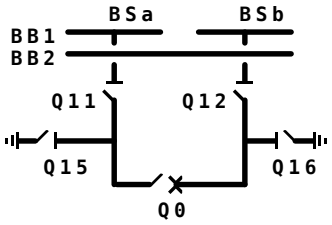
Tab. A5-617: Bay Interlock Equations for Operation without Station Interlocking

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)

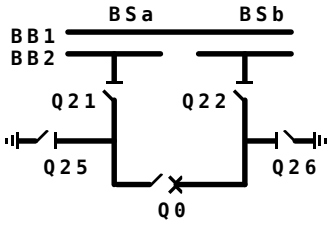
Tab. A5-620: Bay Interlock Equations for Operation without Station Interlocking

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)

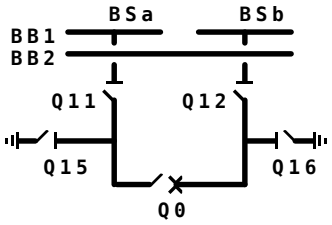
Tab. A5-623: Bay Interlock Equations for Operation without Station Interlocking

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)

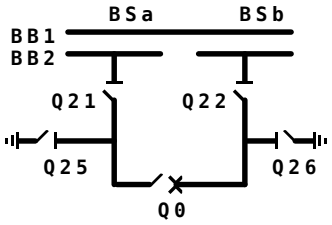
Tab. A5-626: Bay Interlock Equations for Operation without Station Interlocking

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

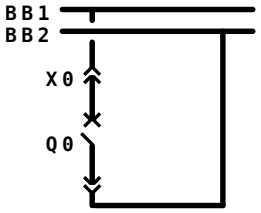
Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q25*=0) & (*Q26*=0)
	Close(d)	/(*Q21*=X) & /(*Q22*=X) & (*Q25*=0) & (*Q26*=0) & /(FctBl1=I) & /(FctBl2=I)
Q21	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q25*=0)
Q22	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q26*=0)
Q25	Open	(*Q0*=I) & (*Q22*=I)
	Close(d)	(*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)

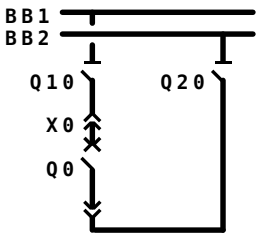
Tab. A5-632: Bay Interlock Equations for Operation without Station Interlocking

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)

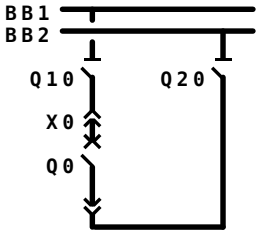
Tab. A5-635: Bay Interlock Equations for Operation without Station Interlocking

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)

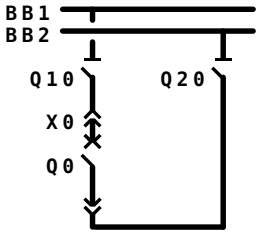
Tab. A5-638: Bay Interlock Equations for Operation without Station Interlocking

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)

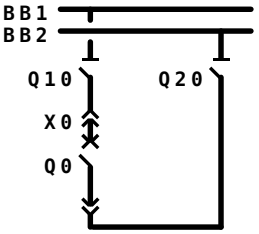
Tab. A5-641: Bay Interlock Equations for Operation without Station Interlocking

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)

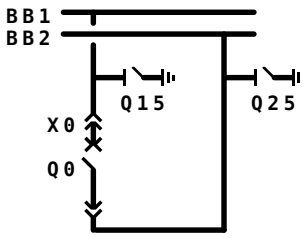
Tab. A5-644: Bay Interlock Equations for Operation without Station Interlocking

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)

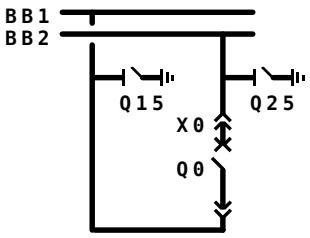
Tab. A5-647: Bay Interlock Equations for Operation without Station Interlocking

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)

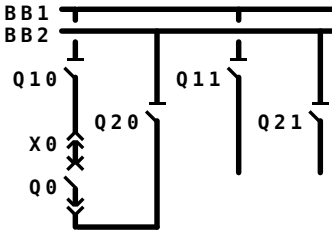
Tab. A5-650: Bay Interlock Equations for Operation without Station Interlocking

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)

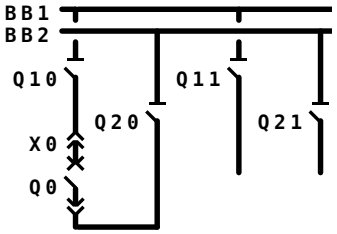
Tab. A5-653: Bay Interlock Equations for Operation without Station Interlocking

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)

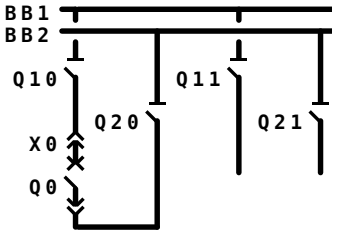
Tab. A5-656: Bay Interlock Equations for Operation without Station Interlocking

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)

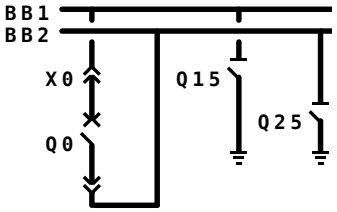
Tab. A5-659: Bay Interlock Equations for Operation without Station Interlocking

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)

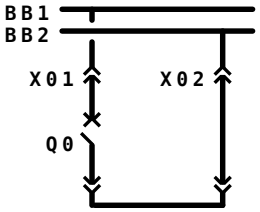
Tab. A5-662: Bay Interlock Equations for Operation without Station Interlocking

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)

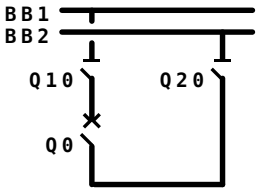
Tab. A5-665: Bay Interlock Equations for Operation without Station Interlocking

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)

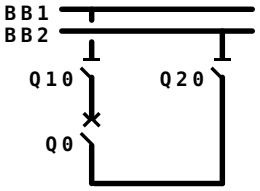
Tab. A5-668: Bay Interlock Equations for Operation without Station Interlocking

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)

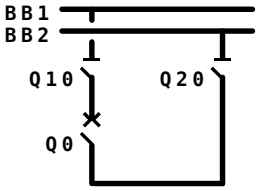
Tab. A5-671: Bay Interlock Equations for Operation without Station Interlocking

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)

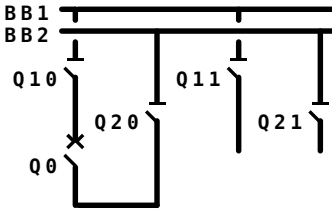
Tab. A5-674: Bay Interlock Equations for Operation without Station Interlocking

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)

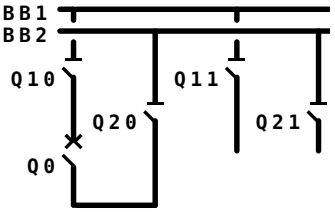
Tab. A5-677: Bay Interlock Equations for Operation without Station Interlocking

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)

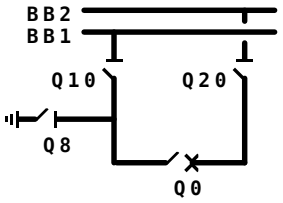
Tab. A5-680: Bay Interlock Equations for Operation without Station Interlocking

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)

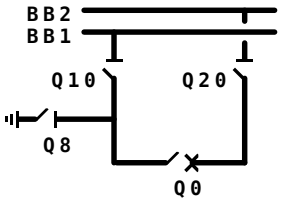
Tab. A5-683: Bay Interlock Equations for Operation without Station Interlocking

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)

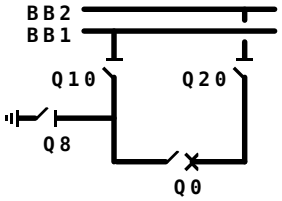
Tab. A5-686: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q8*=0) & /(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)
Q8	Open	(*Q0*=I) & (*Q20*=I)
	Close(d)	(*Q0*=0) & (*Q10*=0) & (*Q20*=I) & /(FctBI1=I) & /(FctBI2=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)

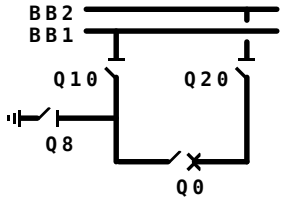
Tab. A5-689: Bay Interlock Equations for Operation without Station Interlocking

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)

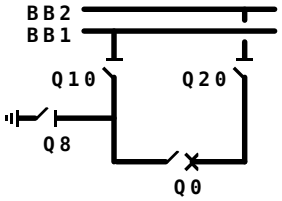
Tab. A5-692: Bay Interlock Equations for Operation without Station Interlocking

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)

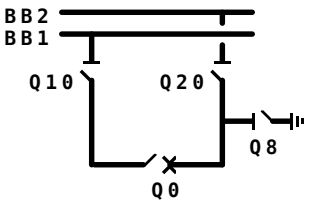
Tab. A5-695: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q8*=0) & /(FctBI1=I) & /(FctBI2=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) & /(FctBI1=I) & /(FctBI2=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)

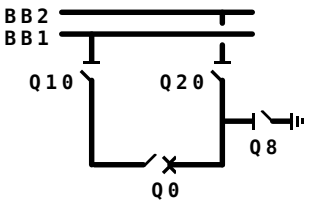
Tab. A5-698: Bay Interlock Equations for Operation without Station Interlocking

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)

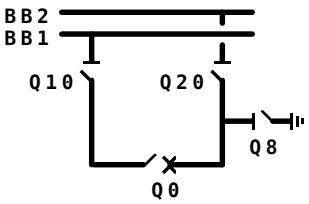
Tab. A5-701: Bay Interlock Equations for Operation without Station Interlocking

Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q8*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q8*=0) & /(FctBI1=I) & /(FctBI2=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) & /(FctBI1=I) & /(FctBI2=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)

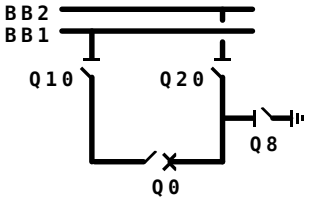
Tab. A5-704: Bay Interlock Equations for Operation without Station Interlocking

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)

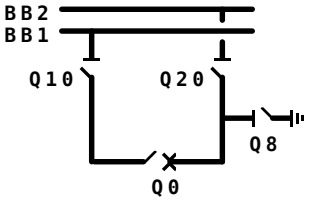
Tab. A5-707: Bay Interlock Equations for Operation without Station Interlocking

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)

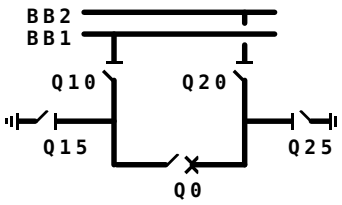
Tab. A5-710: Bay Interlock Equations for Operation without Station Interlocking

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)

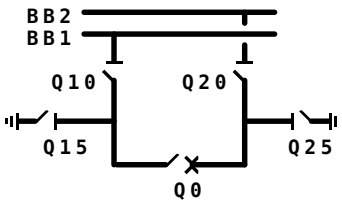
Tab. A5-713: Bay Interlock Equations for Operation without Station Interlocking

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)

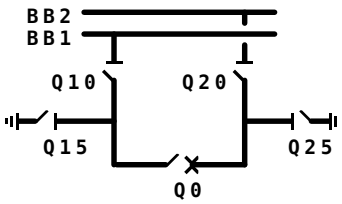
Tab. A5-716: Bay Interlock Equations for Operation without Station Interlocking

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)

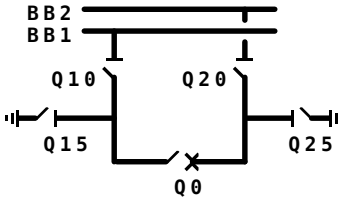
Tab. A5-719: Bay Interlock Equations for Operation without Station Interlocking

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)

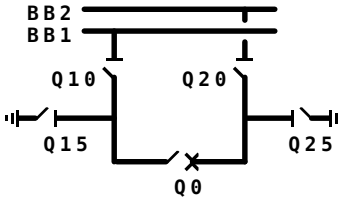
Tab. A5-722: Bay Interlock Equations for Operation without Station Interlocking

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

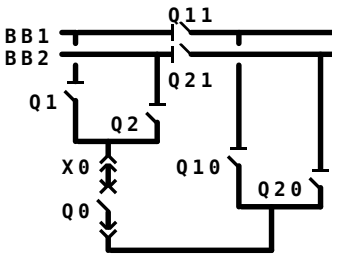
Switchgear unit	Control O/C	Interlock equation
Q0	Open	(*Q15*=0) & (*Q25*=0)
	Close(d)	/(*Q10*=X) & /(*Q20*=X) & (*Q15*=0) & (*Q25*=0) & /(FctBl1=I) & /(FctBl2=I)
Q10	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q15*=0)
Q15	Open	(*Q0*=I) & (*Q20*=I)
	Close(d)	(*Q0*=0) & (*Q10*=0) & (*Q20*=I) & /(FctBl1=I) & /(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)

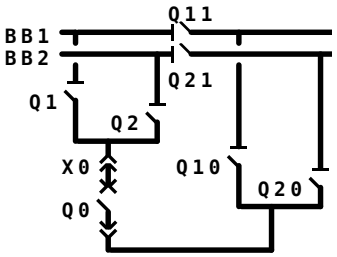
Tab. A5-728: Bay Interlock Equations for Operation without Station Interlocking

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

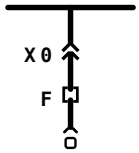
Switchgear unit	Control O/C	Interlock equation
Q0	Close(d)	/(*Q1*=X) & /(*Q2*=X) & /(*X0*=X) & /(*Q10*=X) & /(*Q20*=X) & /(FctBl1=I) & /(FctBl2=I)
Q1	Open	(*Q0*=0)
	Close(d)	(*Q0*=0) & (*Q2*=0)
Q11	Open	(*Q0*=I) & (*Q1*=I) & (*Q10*=I) & (*X0*=I)
	Close(d)	(*Q0*=I) & (*Q1*=I) & (*Q10*=I) & (*X0*=I)
Q2	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
		—

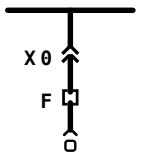
Tab. A5-734: Bay Interlock Equations for Operation without Station Interlocking

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
		—

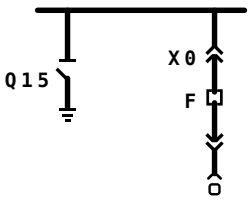
Tab. A5-737: Bay Interlock Equations for Operation without Station Interlocking

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)

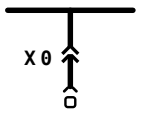
Tab. A5-740: Bay Interlock Equations for Operation without Station Interlocking

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
		—

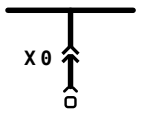
Tab. A5-743: Bay Interlock Equations for Operation without Station Interlocking

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
		—

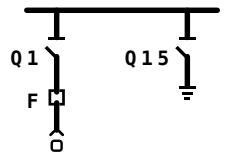
Tab. A5-746: Bay Interlock Equations for Operation without Station Interlocking

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)

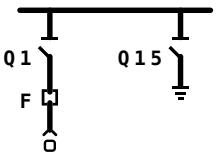
Tab. A5-749: Bay Interlock Equations for Operation without Station Interlocking

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
		—

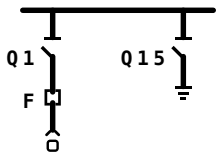
Tab. A5-752: Bay Interlock Equations for Operation without Station Interlocking

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)

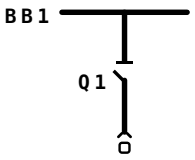
Tab. A5-755: Bay Interlock Equations for Operation without Station Interlocking

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
		—

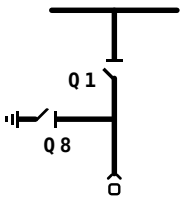
Tab. A5-758: Bay Interlock Equations for Operation without Station Interlocking

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)

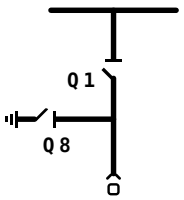
Tab. A5-761: Bay Interlock Equations for Operation without Station Interlocking

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)

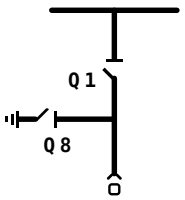
Tab. A5-764: Bay Interlock Equations for Operation without Station Interlocking

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)

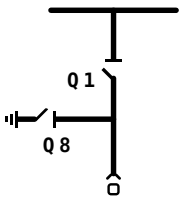
Tab. A5-767: Bay Interlock Equations for Operation without Station Interlocking

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)

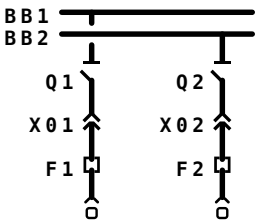
Tab. A5-770: Bay Interlock Equations for Operation without Station Interlocking

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
		—

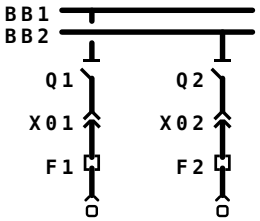
Tab. A5-773: Bay Interlock Equations for Operation without Station Interlocking

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)

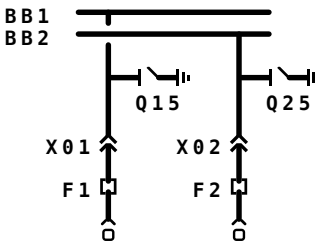
Tab. A5-776: Bay Interlock Equations for Operation without Station Interlocking

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)

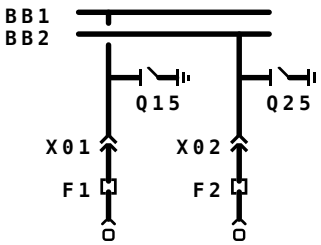
Tab. A5-779: Bay Interlock Equations for Operation without Station Interlocking

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)

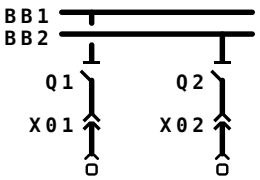
Tab. A5-782: Bay Interlock Equations for Operation without Station Interlocking

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
		—

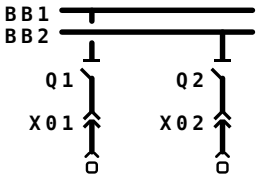
Tab. A5-785: Bay Interlock Equations for Operation without Station Interlocking

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)

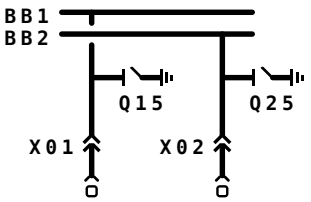
Tab. A5-788: Bay Interlock Equations for Operation without Station Interlocking

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)

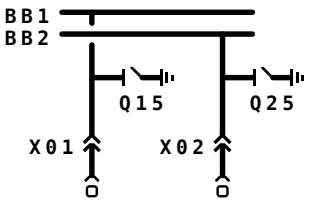
Tab. A5-791: Bay Interlock Equations for Operation without Station Interlocking

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)

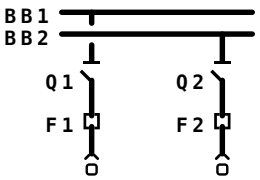
Tab. A5-794: Bay Interlock Equations for Operation without Station Interlocking

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
		—

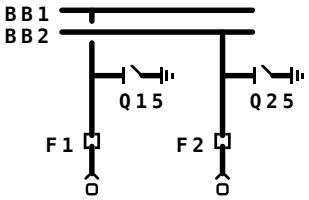
Tab. A5-797: Bay Interlock Equations for Operation without Station Interlocking

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)

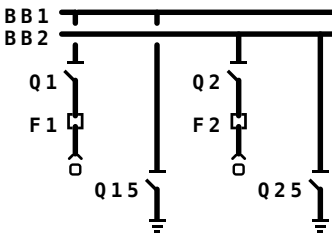
Tab. A5-800: Bay Interlock Equations for Operation without Station Interlocking

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)

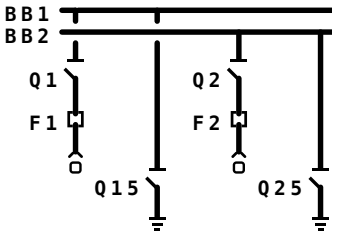
Tab. A5-803: Bay Interlock Equations for Operation without Station Interlocking

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
		—

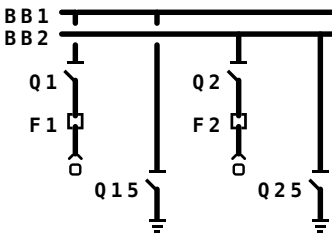
Tab. A5-806: Bay Interlock Equations for Operation without Station Interlocking

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)

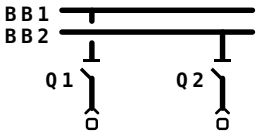
Tab. A5-809: Bay Interlock Equations for Operation without Station Interlocking

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
		—

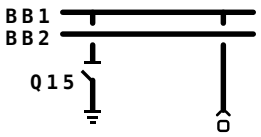
Tab. A5-812: Bay Interlock Equations for Operation without Station Interlocking

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
		—

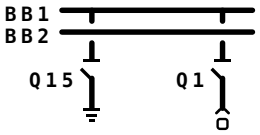
Tab. A5-815: Bay Interlock Equations for Operation without Station Interlocking

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
		—

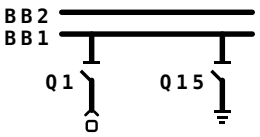
Tab. A5-818: Bay Interlock Equations for Operation without Station Interlocking

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)

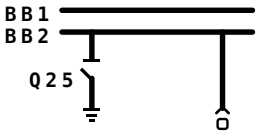
Tab. A5-821: Bay Interlock Equations for Operation without Station Interlocking

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
		—

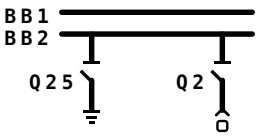
Tab. A5-824: Bay Interlock Equations for Operation without Station Interlocking

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
		—

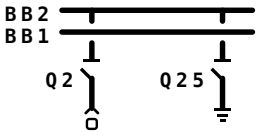
Tab. A5-827: Bay Interlock Equations for Operation without Station Interlocking

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)

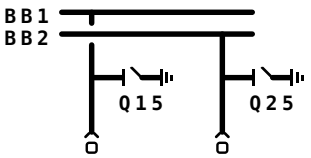
Tab. A5-830: Bay Interlock Equations for Operation without Station Interlocking

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)

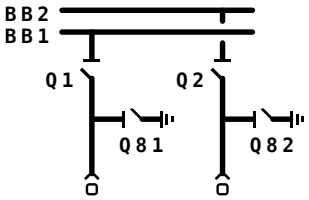
Tab. A5-833: Bay Interlock Equations for Operation without Station Interlocking

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)

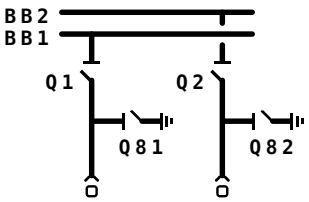
Tab. A5-836: Bay Interlock Equations for Operation without Station Interlocking

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)

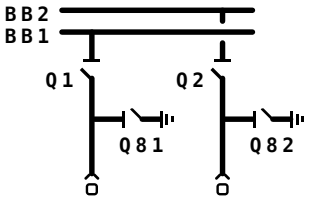
Tab. A5-839: Bay Interlock Equations for Operation without Station Interlocking

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)

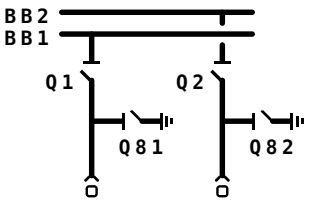
Tab. A5-842: Bay Interlock Equations for Operation without Station Interlocking

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

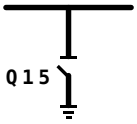
Switchgear unit	Control O/C	Interlock equation
Q1	Close(d)	(*Q81*=0)
Q2	Close(d)	(*Q82*=0)
Q81	Close(d)	(*Q1*=0)
Q82	Close(d)	(*Q2*=0)

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)

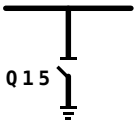
Tab. A5-848: Bay Interlock Equations for Operation without Station Interlocking

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)

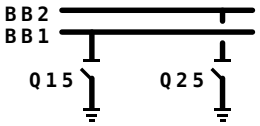
Tab. A5-851: Bay Interlock Equations for Operation without Station Interlocking

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)

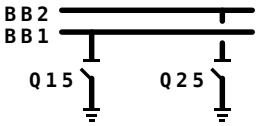
Tab. A5-854: Bay Interlock Equations for Operation without Station Interlocking

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

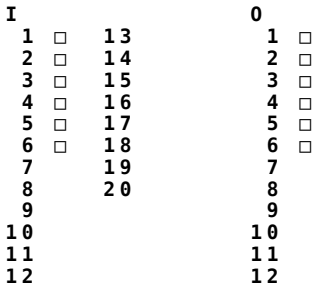
Switchgear unit	Control O/C	Interlock equation
		—

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

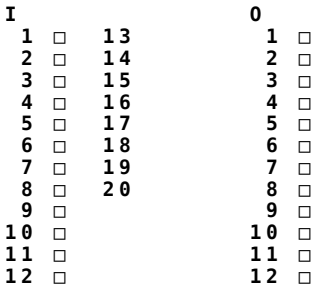
Switchgear unit	Control O/C	Interlock equation
		—

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

A6 Version History

A6.1 Version History – MiCOM P30

A6.1.1 P433 -301 -40x -601 … -313 -4xx -653-701

A6.1.1.1 P433 -301 -401 -601

Release: 2001–02–05

Initial product release.

A6.1.1.2 P433 -301 -401 -602

Release: 2001–06–26

This version has no release!

A6.1.1.3 P433 -301 -402/403 -602-701

Release: 2001–07–18

Hardware

No changes.

Diagram

No changes.

Software

COMM2	There is a second communication interface available.
THERM	The thermal overload protection function has been enhanced by adding coolant temperature monitoring.
OL_DA	The overload data acquisition function has been enhanced.

A6.1.1.4 P433 -302 -402/403 -603

Release: 2002–02–13

Hardware

No changes.

Diagram

No changes.

Software

FT_RC	The reference voltage is recorded.
PSB	The power swing blocking function has been added: Detection of power swing to either block distance protection (= Power Swing Blocking) or to deliberately trip (= Out-of-Step Tripping).
MCMON	“Fuse Failure” monitoring has been added.
ARC	If required ARC can now operate together with the automatic synchronism check (ASC).
ASC	The automatic synchronism check function has been added.
MAIN	The procedure to determine the energy value was changed. The measured reference voltage value has been added.
SFMON	The configuration table of the user defined alarm condition has been extended by the instantaneous and timed outputs 30…32(t) of the programmable LOGIC: ● (098 053) SFMON: Output 30 ~ (042 090) LOGIC: Output 30 ● (098 054) SFMON: Output 30 (t) ~ (042 091) LOGIC: Output 30 (t) ● (098 055) SFMON: Output 31 ~ (042 092) LOGIC: Output 31 ● (098 056) SFMON: Output 31 (t) ~ (042 093) LOGIC: Output 31 (t) ● (098 057) SFMON: Output 32 ~ (042 094) LOGIC: Output 32 ● (098 058) SFMON: Output 32 (t) ~ (042 095) LOGIC: Output 32 (t) These logic outputs are included in the warning signals by setting SFMON: Fct. assign. warning and they are also recorded in the monitoring signal memory. These signals can be used to create an alarm signal under complex application conditions. This signaling has no influence on the device's operation (i.e. no warm restart or blocking).
DIST	Minimum starting time is now reduced to less than 10 ms. The distance zones may now be blocked individually via appropriately configured binary signal inputs. Distance zones may also be blocked individually from the newly enhanced power swing blocking function.

A6.1.1.5 **P433 -302 -402/403 -603-702**

Release: 2002–09–12

Hardware

No changes.

Diagram

No changes.

Software

PSIG

Bug fixing:

- Weak Infeed Logic operates now correctly.

A6.1.1.6 P433 -303 -404/405 -604

Release: 2003–03–21

Hardware

A new communication module A, providing the InterMiCOM protective interface COMM3, now can be fitted on slot 3, instead of the transient ground fault detection module N.

The new hardware variants now offer, per ordering option, additional operating thresholds for the binary signal inputs:

- >18 V (standard variant) (no order ext. No.)
- >90 V (60...70% of VA,nom = 125...150 V) (Order ext. No. 461)
- >155 V (60...70% of VA,nom = 220..0.250 V) (Order ext. No. 462)

Installation of the standard variant is generally recommended if the application does not specifically require such binary signal inputs with higher operating thresholds.

Diagram

The new terminal connection diagrams include the COMM3 interfaces:

- P433 -404 (for 40TE case, pin-terminal connection)
- P433 -405 (for 84TE case, ring-terminal connection)

Software

IDMT	Accuracy of tripping time is improved. Particularly the characteristic “IEC extremely inverse” is now within the claimed tolerance range. The direction characteristic for short circuit direction measurement based on negative-sequence current and voltage is now corrected.
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.
MAIN	New input signals allow direct transfer tripping without use of protective signaling scheme logic (function group PSIG). The BUOC-trip signal now forms part of the configuration list for the general trip commands. (Please note, that this trip signal forms a fixed part of general trip command 1 and may only assigned to general trip command 2.) 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. **Bug fixing:** ● In the selection table for MAIN: Fct. assign. fault (021 031) output relays K14x, K16x and K18x were missing.

FT_DA

The output of the primary short-circuit reactance is now made in the same way as the fault location.

The measuring window for fault data acquisition is determined by the distance element for fault durations shorter than 55 ms.

Bug fixing:

- **Bug fixing:**

  The fault location output is now correctly given according to the setting (010 032) FT_DA: Outp. flt.locat. PSx.
- Fault locations of numerical values >655.35% were falsely displayed as small values.

DIST

The directional element was further improved in order to cope with transient errors seen with synthetic test signals for faults close to the directional line.

MCMON

Bug fixing:

- The m.c.b. trip signal was stored without the 300 ms pick-up delay in the monitoring signal memory. This caused false entries in case of switching-off of the auxiliary supply, if at the same time the auxiliary voltage of the binary signal input was also switched-off (input operated as “active low”).
- **Bug fixing:**

  The V_{neg} comparator for monitoring the voltage measuring circuits was not initialized if the operating mode at MCMON: Op. mode volt. mon. was set to *Vneg with curr. enab* as long as the load current was below 5% I_{nom}.

DTOC

DTOC ground fault protection is now able to operate in directional mode.

TGFD

The setting range for the parameter at TGFD: IN,p> (016 042) has been extended to 0.03 I_{nom}.

The pick-up delay of the measuring circuit monitoring signal at SFMON: TGFD mon. triggered (093 094) is now increased from 5 s to 65 s.

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*.

Bug fixing:

- 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.

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,...).

A6.1.1.7 **P433 -303 -404/405 -604-703**

Release: 2003–05–20

Hardware

No changes.

Diagram

No changes.

Software

INP

Bug fixing:

- Binary I/O modules with higher operating thresholds are now correctly managed by the devices.

A6.1.1.8 P433 -304 -404/405 -605

Release: 2005–01–31

Hardware

The new hardware variants now offer, per ordering option, additional operating thresholds for the binary signal inputs:

- >73 V (67% of VA,nom = 110 V) (Order ext. No. 463)
- >146 V (67% of VA,nom = 220 V) (Order ext. No. 464)

Installation of the standard variant is generally recommended if the application does not specifically require such binary signal inputs with higher operating thresholds.

Diagram

No changes.

Software

MAIN

The BUOC-trip signal now forms part of the configuration list for the general trip commands. (Please note, that this trip signal forms a fixed part of general trip command 1 and may only assigned to general trip command 2.)

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

Parameters, which could previously only be set in the “General Functions” branch of the menu tree, have been transferred to the parameter subsets.

- MAIN: Neutr.pt. treat. PSx
- MAIN: Phase prio. 2pG PSx
- MAIN: Transfer for 1p PSx
- MAIN: Op. mode rush r. PSx
- MAIN: I> lift rush r. PSx
- MAIN: Rush I2fn/Ifn PSx

With this improvement it is now possible to consider operational changes in the system's neutral grounding by selecting the appropriate parameter subset.

The general trip command is now available as a multiple signal made up by the two trip commands 1 and 2: (035 071) MAIN: Gen. trip command

The CB close time (e.g. time from close command to closing of CB contacts) can now be set at MAIN: tCB,close (000 032). This time duration may be applied in the function ASC for the new functionality „switch on at point of synchronism“.

Bug discovered after release:

- The setting parameter (010 023) MAIN: IN,nom,par device of the parallel line neutral current input, used for mutual compensation, is visible in the data model but has no function. The parameter becomes invisible – which is correct – after reading-out the setting from the device, as the necessary CT is not available with the P433.

Bug fixing:

- All energy counters were reset by a general starting (GS).

COMM1

Bug fixing:

- IEC 60870-5-101: Support of the 7-byte time tag length has been corrected: (003 198) COMM1: Time tag length = *7 Byte*
- IEC 60870-5-101: Transmission of negative cyclic measured values has been corrected.
- IEC 60870-5-101: Acknowledgment of the general scan command has been corrected.
- IEC 60870-5-101: Signals in the general scan are now transmitted correctly without a time tag.
- IEC 60870-5-101: Command rejections issued internally by the protection device (between the processor module and communication module) are no longer signaled by the communication interface.
- IEC 60870-5-101: Commands are now transmitted correctly, even when the ASDU address length is 2 byte: (003 193) COMM1: Address length ASDU = *2 byte*

FT_RC

The recording duration for binary tracks is now limited to 1 minute in order to prevent recording of endless events.

MEASI

Open-circuit monitoring of the 20 mA input has been improved.

The maximum temperature value since the last reset is now displayed by the new measured operating value at (004 233) MEASI: Temperature Tmax.

This measured operating value is reset by the new triggering parameter (003 045) MEASI: Reset temperat. Tmax.

DIST

Bug fixing:

- Frequency compensation at 60 Hz nominal frequency is now correct.
- **Bug fixing:**

  When an inclined reactance characteristic ($\sigma \neq 0°$) was set, the set angle with an opposite sign was used in determining the zone decision (e.g. setting a negative angle $\sigma < 0°$ would lead to a larger characteristic).
- Undervoltage starting could tend to overreact when switching on to an idle feeder with line side VT. The joint action with the function SOTF, set to operating mode “trip with starting”, would lead to unwanted tripping.

PSB

Extension of the power swing detection function by the operating mode ΔZ. Here the rate of change of the resistance component of positive-sequence impedance, when entering the power swing polygon, is interpreted.

PSIG

The blocking condition for the weak-infeed logic was extended.

ARC

This function now also operates with a direct transfer trip from the remote end MAIN: Transfer trip. EXT (120 046).

ASC

New functionality “Switch on at point of synchronism”: In slightly asynchronous networks the reclose command can be controlled in such a way that it will be issued at the exact point of synchronism.

The close command conditions can now be set individually for ARC and manual closing.

The reference voltage V_{ref} and the voltage from the corresponding measuring loop are stored as event data.

GFDSS

“Admittance processing” was added to the function 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.

Bug fixing:

- As of version -604 the setting range for the current stage TGFD: IN,p> PSx (016 042) has been extended to 0.03·Inom. Such a sensitive setting of the current stage at TGFD: IN,p> PSx could lead to triggering of the self-monitoring function which would then issue the SFMON: Module N DAC faulty (093 095) warning signal.
- As of version –602 there was a bug, where it was not checked that necessary TGFD hardware was present when a setting file, with the TGFD configured, was downloaded to the device. This check was only carried out after a warm restart of the device and therefore lead to an entry to the monitoring signal memory, which could not be acknowledged.

f<>

The length of the evaluation window is now limited internally to 5 cycles.

P<>

The underpower stages P</<< und Q</<< were added to the function. Further starting signals were added which will only trigger when power values have been determined *and* the power direction is detected to correspond with the setting.

LOGIC

Bug fixing:

- The LOGIC timer stages are no longer reset with a parameter subset selection.
- The function “Minimum duration” was corrected.
- The function LOGIC can now be correctly inactivated (e.g. all outputs are set to the logic state “low”), when the protection is set off-line (either by setting the relevant parameter or as a reaction to a triggering of the self-monitoring function).

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.

A6.1.1.9 P433 -305 -406/407 -610

Release: 2006–02–20

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.

- P433 -405 (for 40TE case, pin-terminal connection)
- P433 -405 (for 84TE case, ring-terminal connection)

The designation texts of the binary signal inputs and output relays have been replaced by the standard Px3x texts, i.e. the designation comprises the board location number (1 or 2 digits) followed by a consecutive number (2 digits).

Example: K2001 replaces K201 (= first relay in slot 20).

Software

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.

GOOSE

For the exchange of binary information in an Ethernet network section the IEC 61850 communication procedure (IEC-GOOSE) has been implemented.

ASC

Bug fixing:

- The internal timer clock was corrupted during the ASC operative time. This led to implausible time tags added to binary signals, which in turn made fault records difficult to interpret. Protection functions were in no way affected.
- The offset angle ASC: Phi offset PSx) was taken into account but by a factor of 10 less than required (for instance when set to 90° an internal value of only 9° was taken into account).

A6.1.1.10 **P433 -305 -406/407 -610-705**

Release: 2006–08–30

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.

A6.1.1.11 **P433 -305 -406/407 -610-706**

Release: 2006–09–29

Hardware

No changes.

Diagram

No changes.

Software

COMM1

The upgraded communications software 3.18 is now implemented. Various small bugs have been fixed in communication protocols per IEC 60870-5-101 and MODBUS.

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 P433.

A6.1.1.12 **P433 -305 -406/407 -610-707**

Release: 2007–02–13

Hardware

No changes.

Diagram

No changes.

Software

IEC — Improved VxWorks version implemented.

A6.1.1.13 **P433 -306 -408/409 -611-708**

Release: 2007–11–15

Hardware

No changes.

Diagram

No changes.

Software

IEC — Enhancement of IEC 61850 protocol:

- Enhanced ICD according KEMA requirements.
- New Logical Node RBRF2 as used with P132, P139 and P439.
- New Logical Node MmuPriMMXN2 to cover I_N primary value.

CBF

Bug fixing:

- The signal (036 017) CBF: CB failure was not supported in previous version.

A6.1.1.14 **P433 -306 -408/409 -611-709**

Release: 2009–02–13

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- When being server to multiple clients, Px3x devices blocked communications on simultaneous access to the disturbance record file transmission.

GOOSE

Bug fixing:

- The implemented Time Allowed to Live (TAL) value was not appropriate to identify the loss of a single GOOSE message.

MAIN

The operation of the internal clock with no external time synchronisation (via IRIG-B, COMM1 or IEC) has been improved.

A6.1.1.15 P433 -306/-307 -408/409 -611

Release: 2007−04−19

Hardware

As an ordering option for the 40TE and 84TE model versions there is now a variant available with a detachable HMI. The detachable HMI is always supplied with a case width of 40TE.

The following new functions are available independently of the ordering option for the control panel type (e.g. detachable HMI or permanently mounted LOC):

- In version -307:
  - Six freely configurable LEDs (H18 to H23) are situated next to six freely configurable function keys.
  - All of the freely configurable LEDs (H4 to H16 and H18 to H23) are provided as multi-color type LEDs.
- In version -306, the HMI is equipped with function keys and multicolored LED indicators only for the order option “with detachable HMI (DHMI)”, otherwise the standard HMI without function keys and with monochrome LED indicators is supplied.

Diagram

The updated connection diagrams now include the interfaces to connect the detachable HMI.

- P433 -408 (for 40TE case, pin-terminal connection)
- P433 -409 (for 84TE case, ring-terminal connection)

Software

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)

CBF

The complete revision of the circuit breaker failure protection function now includes a current breaking-off criterion.

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

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 and H18 bis H23 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”.

LOC, MAIN

Respective binary signal inputs (if previously unavailable) are assigned to all default reset functions. These binary input functions are now available in the configuration list for the two newly implemented group resetting functions as well as the extended functional assignment for the CLEAR key ('C'):

- (005 248) MAIN: Fct.assign. reset 1
- (005 249) MAIN: Fct.assign. reset 2
- (005 251) LOC: Assignment reset key

Two menu jump lists may now be configured. These menu jump lists make it possible to select individual menu points (i.e. set values, counters, triggering functions, event logs) in a freely definable sequence.

- (030 238) LOC: Fct. menu jmp list 1
- (030 239) LOC: Fct. menu jmp list 2

IEC

Implementation of the communication protocol has been extended:

- A second SNTP server is supported.
- *VLAN priority* can be set.

The implementation of this version of the IEC 61850 protocol of the P433 has been certified by the KEMA.

OUTP, MAIN, LOGIC

Bug fixing:

- In the selection list for the configuration of the output relays, for the function assignment of the Boolean equations and in the configuration of the trip commands these two signals were missing:
  - LOGIC: Output 32 (042 094)
  - LOGIC: Output 32 (t) (042 095)

SFMON

Bug notice: Programmable signals SFMON: Output 30 (098 053) to SFMON: Output 32 (t) (098 058) will not issue a warning signal, even if they have been selected at SFMON: Fct. assign. warning (021 030).

F_KEY

The new control panel (HMI) is fitted with 6 freely configurable function keys which may be used either as switches or keys, and are password protected.

Because of this the function group F_KEY “Configurable Function Keys” has been added.

FT_DA

Bug fixing:

- When the primary short circuit impedance was calculated, the set secondary nominal voltage was not taken into account (the calculation was always carried out with the value for Vnom = 100 V).

FT_RC

The PSB: Z within polygon (036 024) signal is now entered into the fault recording.

MAIN

If the system star point is low-impedance grounded the ground fault starting condition for distance protection has been made settable: (001 249) MAIN: Ground starting PSx = *IN> OR VNG>* or *IN> AND VNG>*.

Here the MAIN setting value *IN> OR VNG>* corresponds to the previous operation.

The selection table for the function assignment of the blocking functions, for example (021 021) MAIN: Fct.assign. block. 1, has been extended.

Bug fixing:

- **Bug fixing:**

  The (060 060) MAIN: Min-pulse clock EXT state signal is now displayed correctly with the “read only” attribute by the MiCOM S1/ S&R-103 support software.

PSB

Settable counters for stable and instable power swings have been added to the function. An additional signal is issued when set counter values are reached, and such a signal may also be used for tripping.

Bug fixing:

- The measurement of Delta Z was not always carried out correctly when the positive-sequence impedance moved into the power swing polygon “from left to right”.
- The maximum blocking time is now re-started again with each entry into the power swing polygon.
- The display text for the dimension of the setting value at (014 058) PSB: IP> has been corrected.

MCMON

A copy of the current version of “Fuse Failure” monitoring from the P437-611 has been implemented. This includes the following functional changes:

- The default setting for (031 056) MCMON: Vneg>, FF has been increased to *0.16 Vnom*. This value is generally recommended.

  Note: Such modifications must be carried out manually when converting existing setting files.
- There is no voltage monitoring while the ARC dead time is running and with an open circuit breaker (acquisition from the CB’s auxiliary contacts).

The “Fuse Failure” monitoring function can be blocked by a binary input function at MCMON: Blocking FF,V EXT (002 182). Further blocking conditions can be flexibly defined by applying this signal, e.g. with the help of the LOGIC function.

BUOC

The setting range for the overcurrent stages has been extended:

- (010 058) BUOC: I> PSx = 0.10 ... 1.00 ... 20.00 Inom
- (010 064) BUOC: IN> PSx = 0.10 ... 0.20 ... 20.00 Inom

PSIG

Bug fixing:

- When the parameter (015 003) PSIG: Echo on receive PSx was set to *On receive & V<* an echo signal was issued only if a voltage drop was detected before the receive signal was attained.

ARC

When the parameter (015 088) ARC: Zone ext.dur. RC PSx = *Following HSR* or *Always* the ARC function now permits distance tripping by the overreach zone, with reclosing having failed, regardless of whether PSIG is ready or not. The overreach zone is enabled for the duration of the set reclose command time even when the command is terminated together with the CB closed position signal.

ASC

An additional operating mode was implemented with the voltage checking function which makes reclosing possible only if one of the two ends is already carrying voltage (the respective other end must be de-energized) such as:

- (018 029) ASC: AR Op.mode v-chk.PSx = *N V&Vref or V&n Vref*

The meaning of abbreviation "*N V&Vref or V&n Vref*" is "[(NOT V) AND Vref] OR [V AND (NOT Vref)]".

When the operating mode is set to *Vref & Z1 but not V* the significance of "Z1" is extended so that with a trip from distance zone 1 OR a PSIG trip the condition is met. This then makes reclosing possible if the primary fault was on the protected line.

The default values for which the voltage thresholds determine that "*voltage is present*" (V>) or "*voltage is not present*" (V<) have been set to more realistic values:

- (026 017) ASC: AR V> volt.check PSx = *0.80 Vnom(/√3)*
- (018 017) ASC: AR V< volt.check PSx = *0.20 Vnom(/√3)*

DTOC

The intermittent ground fault protection function was added to the residual overcurrent timer stages (hold-time stage, pulse extension and separately set accumulated tripping time).

IDMT

The residual current stage has been enhanced by functionalities available with the P437 -610:

- Extended (sensitive) setting range for the reference current at the measured value for the residual current.
- Minimum current value to be exceeded before time measurement will start.
- Minimum trip time
- Compensation reactance value to be set with the protection of series compensated lines.

A6.1.1.16 P433 -308 -410/411 -612

Release: 2008–07–19

Hardware

Additional binary input/output modules are now available:

- X (24I) fitted with 24 binary signal inputs,
- X (6I 6O) to control up to 3 switchgear units,
- X (6I 3O) fitted with 6 binary signal inputs and 3 output relays,
- X (4H) fitted with 4 heavy duty contacts.

Diagram

The updated terminal connection diagrams include the terminal connection diagrams for the new binary I/O modules:

- P433 -410 (for 40TE pin-terminal connection)
- P433 -411 (for 84TE ring-terminal connection)

Software

LIMIT	Reference voltage monitoring was added to the Limit Value Monitoring function.

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

Various operating modes can be set atIEC: DEV control model (221 081) to control external devices from the clients.

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).
- A comma in the channel designation text would lead to an error message in Eview and has therefore been replaced by a decimal point.
- A faulty Comtrade file name could have been generated in specific situations.
- The automatically generated data file names are now correct with fault numbers exceeding 999. Data file names are issued according to this format:

  yyyymmdd_HHMMSS_xxx_rNNNN.eee

  With: yyyy = year

  mm = month

  dd = day

  HH = hour

  MM = minute

  SS = second

  xxx = millisecond

  r = permanent single character

  NNNN = fault number

  eee = file extension

  In previous versions the dot (.) was overwritten for fault numbers exceeding 999.

INP	The setting INP: Filter (010 220) is now available for conformity with standard IEC 60255-22-7, class A. Further reset commands were added to the function assignment of binary signal inputs: ● (006 054) COMM3: Reset No.tlg.err.EXT ● (006 076) MEASI: Reset Tmax EXT ● (006 074) ASC: Reset counters EXT ● (006 075) f<>: Reset meas.val. EXT
CBF	The following parameters are available now with the P433: ● (038 230) CBF: Current flow A ● (038 231) CBF: Current flow B ● (038 232) CBF: Current flow C ● (038 227) CBF: CBsync.superv A open ● (038 228) CBF: CBsync.superv B open ● (038 229) CBF: CBsync.superv C open The parameter designation for (022 160) CBF: I> was changed to (022 160) CBF: I<.
DVICE	Up to 3 switchgear units may now be controlled but this requires that the device be fitted with module X(6I 6O) (see “Hardware” above) as well as with a communications module (COMM1+COMM2 or Ethernet+COMM2). Parameter DVICE: AFS Order No. (001 000) is to be used instead of (000 001) DVICE: Order No.. This new device identification parameter may be edited so that details on hardware additions can be registered with the device on site.
DEV01 to DEV03	The new “External device xx” (xx: 01, 02, 03) function groups are now available because control functions have been implemented.
ILOCK	The new “Interlocking logic” function group is now available because control functions have been implemented.
CMD_1	The new “Single-pole commands” function group is now available because control functions have been implemented.
SIG_1	The new “Single-pole signals” function group is now available because control functions have been implemented.
GOOSE	Several GOOSE signals have been added because of the newly-implemented control functionality. For details, see section “Configuration Parameters” in Chapter “Settings” and section “Logic State Signals” in Chapter “Information and Control Functions”.

COMMx	Data points COMM1: -103 prot. variant (003 178) and COMM1: Address mode (003 168) are now also available with the setting for the communications protocol per IEC 60870-5-103. **Bug fixing:** ● An error in the handling of time tags has been corrected.
F_KEY	Data points F_KEY: Fct.assignm. Fx (x = 1 to 6) have been renamed to F_KEY: Function assignm. Fx.
LED	By default (unchanged) the H4 LED indicator is assigned to MAIN: Gen. trip signal (036 251), but its operating mode is now set at (085 008) LED: Operating mode H 4 to *ES reset (fault)* by default.

MAIN

The designation text of the following data point has been changed:

(003 030) MAIN: Device on-line (was previously: MAIN: Protection enabled)

In order to assign control functions to function keys the following parameters are now available and may be assigned to four of the six function keys:

- MAIN: Device selection key (006 001)
- MAIN: Device OPEN key (006 002)
- MAIN: Device CLOSE key (006 003)
- MAIN: Local/Remote key (006 004)

Also available is the acquisition of binary signals with the debouncing feature to use with the control function and the parameter MAIN: Time tag (221 098).

Because of the control functionality these data parameters are now provided:

- MAIN: Type of bay (220 001)
- MAIN: Customized bay type (221 062)

The MAIN: Meas. direction P,Q (006 096) setting now allows sign inversion for the display of the following measured operating values:

- MAIN: Active power P prim. (004 050)
- MAIN: Reac. power Q prim. (004 052)
- MAIN: Active power P p.u. (004 051)
- MAIN: Reac. power Q p.u. (004 053)

This parameter setting does not influence the remaining measured operating values. It must be noted that by inverting the sign only the display of measured operating values is effected, but all of the protection functions continue to use non-inverted measured operating values.

The following logic state signals are issued depending on the respective control point position:

- MAIN: Cmd. fr. comm.interf (221 101)
- MAIN: Command from HMI (221 102)
- MAIN: Cmd. fr. electr.ctrl (221 103)

New measured operating values:

- MAIN: Load angle phi A p.u (005 073)
- MAIN: Load angle phi B p.u (005 074)
- MAIN: Load angle phi C p.u (005 075)
- MAIN: Angle phi N p.u. (005 076)
- MAIN: Angle ΣVPG/IN p.u. (005 072)
- MAIN: Frequency f p.u. (004 070)
- 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)

SFMON

The (093 094) SFMON: TGFD mon. triggered signal can now be selected at (021 030) SFMON: Fct. assign. warning but it does not automatically issue an alarm signal on its own.

Bug fixing:

- Programmable signals (098 053) SFMON: Output 30 etc. did not issue their respective alarm signals when they had been selected at (021 030) SFMON: Fct. assign. warning.

DIST

The monitoring speed and accuracy of the tripping time in isolated neutral and resonant grounding systems has been improved.

MCMON

The following new signals are now available:

- (007 213) MCMON: M.circ. Vref flty.
- (007 214) MCMON: M.circ. VNG flty.

This permits blocking of only the associated voltage timer stages in V<>, without blocking the entire V<> function group.

PSIG

The former parameter (036 048) PSIG: Receive EXT is now featured as two signals:

- (036 048) PSIG: Receive (A) EXT
- (006 037) PSIG: Receive (B) EXT

By setting PSIG: 3ended line prot PSx it is determined whether both signals are linked in an “AND” or an “OR” gate to form the (006 036) PSIG: Receive combined signal.

ARC

When ARC: Mon. PSIG recv. PSx is set to *Yes* then the signals received between the operative time and the dead time are counted, and when the result in the counter is not 1 then the device switches to the tPmax mode.

Operative time 2 (ARC: Operative time 2 PSx) is now featured by the P433.

Bug fixing:

- Up to now the “kze” factor was always applied with the HSR (i.e. this also applied to a TDR).

ASC

The cycle time at which the measured values from the automatic synchronism check are transmitted may be set at ASC: Transm.cycle,meas.v. (101 212).

The meaning of “Z1” for the *Vref & Z1 but not V* operating mode has been enhanced, so that the close request is also enabled if a PSIG based Z1e trip occurs (because in this case, too, a fault on the line is detected).

DTOC

Bug fixing:

- Up to now blocking of the tIN timer stage (by setting (072 027) DTOC: tIN> PSx to *Blocked*) also resulted in the blocking of the direction determination by the residual current stages tIN>>, tIN>>> and tIN>>>.

V<>

There are now time voltage protection stages available for V_{ref}.

P<>

Bug fixing:

- In certain situations an overflow could occur with very large values for $P_<$, $Q_<$.

CBM

These new data points signal the sum of trip currents:

- (009 071) CBM: ΣItrip A
- (009 073) CBM: ΣItrip B
- (009 076) CBM: ΣItrip C

A6.1.1.17 **P433 -308 -410/411 -612-710**

Release: 2009–02–26

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- Reports from SIG1 to SIG40 were lost when events changed in just a few milliseconds.
- A communications fault occurred when fast successive command signals were received (SPC’s system / SPCOx).
- The correct number of binary channels is now entered in the COMTRADE configuration file (*.cfg). In the previous version the number of binary channels was given as n*16+1 when, because of the function configuration, n*16 binary information signals were recorded. Therefore values stored in the *.cfg file and the *.dat file did not match.
- It is now guaranteed that no communication error will occur when several clients simultaneously request fault files.
- After approximately 15000 switching commands an internal memory fault would cause the rejection of further commands. Furthermore no GOOSE messages could be sent in that faulty memory state.

COMM1

Bug fixing:

- Communications protocol DNP3: Contact positions were transmitted twice.

MAIN

Bug fixing:

- Without external clock synchronization (IRIG-B or via communication protocol) there were leaps (typ. 7 hours) in the system time.

DVICE

Bug fixing:

- If the device was fitted with the communication module that operates with just one interface supporting the IEC 60870-5-103 protocol, then it was blocked when the control function was used.
- The hardware self-identification has been enhanced by the addition of a feature that checks at startup whether the binary I/O module X(6I 6O) is fitted; in such a case the control function is enabled only when either no communication module is fitted or a communication module with two interfaces is fitted (furthermore order extension numbers for communication modules do not contain the digits "-91x").

GOOSE

The TAL (time allowed to live) for GOOSE messages has been increased so that during normal operation the loss of one single message would have no consequences.

LOC

Bug fixing:

- With version -612 the following display settings were without function:
  (221 070) LOC: Display L/R = *Without*
  (221 071) LOC: Displ. interl. stat. = *Without*

DIST

Bug fixing:

- **Bug fixing:**
  As of version -610 zero-sequence starting only (IE> AND VNE>) could no longer be determined when neutral point treatment was set to isolated/ compensated (setting at MAIN: Neutr.pt. treat. PSx = *Isol./res.w/o st. PG*).

A6.1.1.18 P433 -308 -410/411 -614

Release: 2010–02–01

Hardware

No changes.

Diagram

No changes.

Software

F_KEY	With the default setting a password is no longer required when a function key is to be pressed. If required a password may be set, as previously, from the local control panel.
MAIN	It is now possible to set the reset time of the manual close command enable using this parameter: ● (003 088) MAIN: Rel.t. enab. man.cmd
DIST	The calculation of the short circuit impedance angle is now always carried out using the filtered fundamental fault voltage value.
PSIG	With triple-ended applications the fault signals of both communication channels are now available for separate use. ● (004 064) PSIG: Telecom. faulty EXT ● (008 094) PSIG: Telec.faulty (B) EXT The signal (004 064) represents the fault signal for communication channel A, so that in the next version, the text will be modified accordingly to: (004 064) PSIG: Telec.faulty (A) EXT
P<>	The minimum operate values for the active and reactive power thresholds, with the maximum dynamic range being used, have been extended to 1%·Snom so that the setting ranges required to set the Q/V protection functions are now available.

A6.1.1.19 **P433 -308 -410/411 -614-711**

Release: 2010–07–29

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- In version –614, the IEC 61850 communication protocol was not usable.
- At high loads it could happen that further *select* commands were rejected with the signal *“command already in execution”*.

GOOSE

The protocol's internal parameter *Time Allowed to Live* was increased from 4000 ms to 4100 ms.

Bug fixing:

- The internal counters “sqNum” and “stNum” were not initialized correctly (after GOOSE activation).

A6.1.1.20 P433 -308 -410/411 -615

Release: 2011–01–07

Hardware

No changes.

Diagram

No changes.

Software

LIMIT

Bug fixing:

- The overvoltage stages Vref> and Vref>> for the reference voltage did not operate when the data point ASC: Measurement loop PSx was set to *Loop yG* (y = A, B, C).

IEC

In order to guarantee full compatibility with PACiS the neutral-point displacement voltage (calculated and measured) as well as the residual current (calculated and measured) were assigned to the node MMXU so that the node MSQI would then include only the positive-sequence and negative-sequence values.

F_KEY

The default setting of passwords for function keys has been changed.
A password is now no longer required when pressing a function key.

However, a password may still be configured individually for each function key.

INP

Bug fixing:

- Inputs provided by the binary (I/O) module X (6I 3O) could not be used.

PSIG

Bug fixing:

- The receive signal was not updated.

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.

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.

A6.1.1.21 **P433 -308 -410/411 -615-713**

Release: 2012–02–01

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.
- 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.

A6.1.1.22 P433 -308 -410/411 -630

Release: 2010–09–17

Hardware

No changes.

Diagram

No changes.

Software

IEC

Bug fixing:

- After some 15000 close/open commands, the client aborted communication.
- 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.
- 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.
- When transmitted via the IEC 61850 protocol, valid voltage measured values could be labeled as *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.

Freely selectable designations may now be assigned to the busbar. The designation wanted may be defined as open text at:

- (218 191) LOC: Busbar1 Name by User

Bug fixing:

- The Detachable HMI could freeze in case of a warm restart with activated LED reset.
- The signals LED: State H18 red, and LED: State H18 green, assigned to LEDs located to the right of the function keys were not always updated, i.e. did not always match the actual state.
- Process cycle times were often extended to approximately 100 to 150 ms when the device was operated without a local control panel (HMI) being attached.
- When LED indicators were reset externally, some characters on the LC display could be shown incorrectly or not at all.

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.*

MAIN

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.

New logic state signals for clock synchronization:

The parameter: MAIN: Time synchronized (009 109) shows whether an external clock synchronization had been carried out. This signal is reset after 10 minutes.

DEV01 ... DEV03

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

(218 103) DEV03: DEV-Name User

CBF

The parameter (011 067) CBF: tCBF has been removed. This time-delay is no longer required by the new circuit breaker failure function which includes the undercurrent criterion.

Bug fixing:

- The associated signal CBF: Current flow Phx would sometimes jitter during an open command.

GOOSE

The protocol's internal parameter *Time Allowed to Live* was increased from 4000 ms to 4100 ms.

Bug fixing:

- The internal counters “sqNum” and “stNum” were not initialized correctly (after GOOSE activation).
- Some GOOSE records could be partially transmitted.
- Measured operating values were not updated in GOOSE messages.

DVICE

The new data point (008 233) DVICE: SW vers.Chin.DHMI DM is a purely internal version number (for the order option “Chinese display”).

IEC, GOOSE

Phase 2 of the IEC 61850 communications protocol has been implemented.

PSIG

Bug fixing:

- When the PSIG function is not ready, control of the extended zone 1 is transferred to the ARC function. This did not work correctly in the “DC loop” and this problem has now been fixed.

CMD_1, SIG_1

Bug fixing:

- Function groups CMD_1 and SIG_1 were enabled after a restart, even if they had been manually disabled.

ILOCK

As the interlock conditions are also transmitted together with reporting in the newly implemented phase 2 of the IEC 61850 communication protocol (see above), it is now a requirement that these interlock conditions are cyclically checked and not, as before, only with the request for a switching operation. Therefore this new parameter has been introduced:

- (221 104) ILOCK: Cycle t interl.check

The cycle time (range from 100 ms to 10 s) is set here, after which a check of the interlock conditions is carried out. As additional processor capacity must be provided for each of these checks it must be ensured that a favorable compromise is found for the cycle time setting value. On the one hand it is desirable to select a cycle time value which is as short as possible so that changes in the interlock conditions are updated without any notable delays, but on the other hand this cycle time value should not be so short that the P433 system will be under too much strain. As the P433 CPU load is dependent on the total number of function groups having been configured it is not possible to suggest a generally acceptable cycle time value.

LIMIT

Bug fixing:

- When switching the ASC measurement between phase-to-phase and phase-to-earth loops, the limit values for reference voltage monitoring were not updated until the P433 was restarted. This applies to the following parameters:

  (042 144) LIMIT: Vref>

  (042 145) LIMIT: Vref>>

  (042 146) LIMIT: Vref<

  (042 147) LIMIT: Vref<<

DEVxx

Device identifiers can now be edited. In the “Designat. ext. dev.” parameters the ‘Device Name User’ setting should be selected. Then the text for the device’s name, entered by the user at each of the “DEV-Name User” parameters, will be used as the device’s designation. The maximum number of 4 characters was not changed from the previous permanent default setting.

Parameters:

- DEV01: DEV-Name User (218 101)
- DEV02: DEV-Name User (218 102)
- DEV03: DEV-Name User (218 103)

A6.1.1.23 P433 -308 -410/411 -631

Release: 2011–01–07

Hardware

New Schneider Electric design for the local control panel (HMI).

Diagram

No changes.

Software

IEC

In order to guarantee full compatibility with PACiS the neutral-point displacement voltage (calculated and measured) as well as the residual current (calculated and measured) were assigned to the node MMXU so that the node MSQI would then include only the positive-sequence and negative-sequence values.

F_KEY

The default setting of passwords for function keys has been changed.
A password is now no longer required when pressing a function key.
However, a password may still be configured individually for each function key.

INP

Bug fixing:

- Inputs provided by the binary (I/O) module X (6I 3O) could not be used.

MAIN

The internal range for the primary measured power values was extended from 1000 MW, 1000 MVAr and 1300 MVA to 3200 MW, 3200 MVAr and 3200 MVA, respectively. This applies to the following data points:

- (005 025) MAIN: Appar. power S prim..
- (004 050) MAIN: Active power P prim.
- (004 052) MAIN: Reac. power Q prim.

The designation text for signal (036 051) has been changed from MAIN: CB closed sig. EXT to MAIN: CB closed 3p EXT without changes in its functionality.

DTOC

The setting range of the characteristic angle DTOC: Angle phiG PSx (004 092, 004 247, 004 248, 004 249) has been extended to −90°...+90° so that capacitive ground fault currents in systems with current-limited grounding and in isolated systems may now be taken into account.

PSIG

Bug fixing:

- The receive signal was not updated.

DEVxx

Bug fixing:

- The feature, introduced with version -630, where the designation for devices could be defined in free text was not applicable, as the data model did not support the associated selection option *DEV-Name User*.

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.
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.

A6.1.1.24 P433 -308 -410/411 -631-712

Release: 2012–2–1

Hardware

The P433 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.

Software

ARC

The function is now also available when DIST is blocked by a fault in the voltage-measuring circuit (MCMON) and BUOC is not configured (external backup protection), but it is without rapid reclosure (RRC).

IEC

Bug notice: It is not possible to read the IEC configuration back from the P433, if the dataset size(s) exceed(s) the GOOSE size limit significantly.

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.
- 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.

A6.1.1.25 P433 -309 -412/413 -631-712

Release: 2012−02−01

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

The diagrams now include the new “REB” module.

- P433 -412: case 40 TE, pin-terminal connection
- P433 -413: case 84 TE, ring-terminal connection

Software

ARC	The function is now also available when DIST is blocked by a fault in the voltage-measuring circuit (MCMON) and BUOC is not configured (external backup protection), but it is without rapid reclosure (RRC).

IEC

Bug notice: It is not possible to read the IEC configuration back from the P433, if the dataset size(s) exceed(s) the GOOSE size limit significantly.

The Originator Category information is now extensively supported for control commands.

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.
- 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.

SFMON

The device module check has been enhanced to accept the new redundant Ethernet module only with the new power supply module („PSU2“). If a wrong PSU is fitted, one of the following monitoring signals is recorded:

- case 40 TE: SFMON: Defect.module slot 9 (097 008)
- case 84 TE: SFMON: Defect.module slot20 (097 019)

A6.1.1.26 **P433 -309 -412/413 -632**

Release: 2012−03−22

Hardware

The P433 is now fitted with an improved communication module for the InterMiCOM protocol.

Note: This new module is not supported by previous firmware due to differences in uploading the firmware to the controller from the main processor during service bootup.

Diagram

No changes.

Software

IEC

Bug fixing:

- **Bug fixing:**

  In the previous software version (P433-631-712) device control via IEC commands was not possible in every configuration.
- After a connection has been re-established, it could happen that not all *Buffered Reports* were re-sent.

COMM1

Bug fixing:

- A change of the setting of parameter (003 161) COMM1: Name of manufacturer became effective only after a warm restart.

COMM1, COMM2, PC

Bug fixing:

- When the IEC 60870-5-103 protocol was used, the following signals were not transmitted spontaneously:

  (040 025) CBF: Not ready

  (038 016) CBF: Starting trig. EXT

  (040 026) CBF: Trip signal

  (009 041) GFDSS: Starting backward/BS

  (040 168) LIMIT: tVNG> elapsed

  (040 169) LIMIT: tVNG>> elapsed

  (031 042) MAIN: CB closed 3p

  (041 023) MAIN: Man.cl.cmd.enabl.EXT

OUTP

Bug fixing:

- The output relays of the binary module X(6I 3O) (i.e. K1001,...,K1003 for the 40TE case and K1801,...,K1803 for the 84TE case) could not be used (i.e. they were not operated according to the assigned state signal).

PSB

Bug fixing:

- In the operating mode ΔS the threshold value could be exceeded in case of low values of the apparent power.

  This was caused by natural fluctuations of the measured value during normal operation and resulted in spurious signaling of (036 058) PSB: Enable delay runn..

  To cope with this problem the apparent power is now measured only after it has entered the power swing polygon.

ASC

The test triggering functionality has been enhanced to allow an operation test with RC settings.

Therefore existing parameters were renamed so that the description texts contain “MC” (“manual close”), and “AR” parameters (“auto reclose”) were added.

In menu branch *Control and testing*:

- (018 004) ASC: MC close requ. USER

  (Values: *don't execute* / *execute*, the setting is password-protected.)
- (008 238) ASC: AR close requ. USER

  (Values: *don't execute* / *execute*)
- (018 005) ASC: Test MC close r.USER

  (Values: *don't execute* / *execute*)
- (008 237) ASC: Test AR close r.USER

  (Values: *don't execute* / *execute*)

In menu branch *Log. state signals*:

- (037 064) ASC: Test MC close r. EXT
- (000 106) ASC: Test AR close r. EXT
- (037 062) ASC: MC close request EXT
- (008 236) ASC: AR close request EXT
- (034 018) ASC: Close request MC
- (008 239) ASC: Close request AR
- (034 019) ASC: Test MC close requ.
- (008 240) ASC: Test AR close requ.

V<>

The blocking of the neutral displacement overvoltage stages VNG> and VNG>> (in case of m.c.b. operation) is now dependent on the setting V<>: Evaluation VNG PSx (076 002).

If VNG is calculated, then the overvoltage stages are blocked if (004 061) MAIN: M.c.b. trip V EXT = *Yes*.

If VNG is measured, then the overvoltage stages are blocked if (002 183) MAIN: M.c.b. trip VNG EXT = *Yes*.

PC, COMM1, COMM2

For the configuration of the parameters

- (003 185) PC: Cycl. data ILS tel.,
- (003 175) COMM1: Cycl. data ILS tel. and
- (103 175) COMM2: Cycl. data ILS tel.,

the following measured variables are available now (in addition to those available in previous software versions):

- (004 054) MAIN: Active power factor
- (005 026) MAIN: Appar. power S p.u.
- (005 056) MAIN: Current IP,min p.u.
- (004 191) GFDSS: Admitt. Y(N) p.u.
- (004 192) GFDSS: Conduct. G(N) p.u.
- (004 193) GFDSS: Suscept. B(N) p.u.

A6.1.1.27 P433 -311 -414/415 -650

Release: 2013–03–01

Hardware

The P433 is now fitted with an improved processor module.

Diagram

The updated terminal connection diagrams include the optional additional I/O module interfaces:

- P433 -414 (for 40TE pin-terminal connection)
- P433 -415 (for 84TE ring-terminal connection)

Software

New MiCOM P30 platform software.

Many parameter labels have been modified so that they harmonize with other MiCOM P30 devices.

CBM	Function group circuit breaker monitoring (CBM) has been added.
	Function circuit breaker monitoring (CBM) has been added.

MAIN

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*.

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

DTOC, IDMT and DIST 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 value range of (015 067) MAIN: Close cmd.pulse time has been increased to *0.100 ... 10.000 s*.

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

The previous selection of sensitive or maximum dynamic range for current measurements has been removed (address (031 082) MAIN: Dynamic range I). The P433 now continuously measures currents in both ranges and functions use adaptively the appropriate sampled values. Where previously 2 separate parameters were used to provide appropriate setting ranges, the sensitive range setting parameter is now removed and the high range setting parameter provides the overall setting range.

Old:

- (010 068) DIST: I> (Ibl) high r. PS1
- (010 119) DIST: I> (Ibl) sens. r.PS1

New:

- (010 068) DIST: I> (Ibl) PSx

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.

COMM1/IEC	Control for one device (CB) available for all supported communication protocols on COMM1 and IEC 61850 by default, independent of hardware configuration.
DEV01	Function group DEV01 activated and visible by default.
ILOCK	Function group ILOCK activated and visible by default.
CMD_1	Function group CMD_1 with 12 configurable single pole commands activated and visible by default.
SIG_1	Function group SIG_1 with 12 configurable single-pole signals activated and visible by default.
OP_RC	The operating data recording buffer size has been enlarged. It now can store up to 1000 events.
PC	The default value of (003 081) PC: Baud rate has been changed to *115.2 kBaud*.

FT_RC

The maximum value of (003 079) FT_RC: Post-fault time and (003 075) FT_RC: Max. recording time has been increased to *750 periods*.

Fault recording is now providing its own independent current trigger:

- (017 065) FT_RC: I>

A further analog channel is available, which can be used to record the calculated frequency:

- (035 169) FT_RC: Rec. analog chann.10

Note: This setting shares a common selection table with P437, where “Current IN,par” could be selected. As this current is not available with P43x, such setting has the same effect as “Without”.

Note: Inadvertently, recording channel 9 can no longer be set to “Without”, but is fixed to “Vref” (if such VT input is available, otherwise this setting is invisible).

MCMON

The minimum current thresholds that enable negative sequence current and voltage monitoring functions are now settable:

- (010 183) MCMON: Imin curr. monitor.
  (previously fix preset to 0.125 I_{nom})
- (010 184) MCMON: Imin Vneg monitoring
  (previously fix preset to 0.050 I_{nom})

Pick-up thresholds and the time delay setting of fuse failure monitoring have been made invisible, hence can no longer be changed by user.

Note: When converting an old setting file, these settings are retained in the new settings file, but are not visible. It is recommended to set them to default values prior to conversion.

BUOC

A dedicated signal is now available for indicating that IN> element has started:

- (010 185) BUOC: Zero-sequ. starting

SOTF

The parameters (011 060) SOTF: Man. close timer PSx and (011 061) SOTF: Operating mode PSx have been moved to the parameter sets.

The “switch on to fault” function (SOTF) has been completely updated. This mainly includes the dead line monitoring feature with permanent activation of the function while the line is not energized, and dedicated overcurrent stages.

In operating mode *Trip with overreach*, SOTF provides now the trip time for extended zone 1:

- (010 218) SOTF: Tripping time PSx

GFSC

The value range of (018 062) GFSC: VNG> has been changed to *0.010 ... 0.500 Vnom*.

The German label of parameter (018 071) GFSC: Criteria tS active has been retexted.

The sensitive directional ground fault protection function (GFSC) has been added.

DIST

Reactance reach of polygonal zones is now separately settable for phase-phase and phase-ground loops. This could be used to compensate mutual/ zero-sequence coupling effects. E.g. for zone 1:

- (012 001) DIST: X1,PG (polygon) PSx
- (002 076) DIST: X1,PP (polygon) PSx

Note: When converting setting files, Xn,PP is set to default values and must be adjusted manually.

Zone 1 extension can now be applied to either ‘R and X’ or to ‘X’ reach only.

- (010 186) DIST: kze (polygon) PSx

Signaling is accomplished by “any overcurrent start”:

- (011 139) DIST: Starting I>>

The sensitive range has been combined with the high range.

PSB

The Power Swing Blocking function has been revised. In particular, the ΔS operating mode has been removed, and PSB blocking has been enhanced.

The following additional features are now available:

- By setting, not only distance zones but also undervoltage stages can be blocked by PSB.
- An overall timer is implemented, which starts when apparent impedance enters the detection polygon for the first time. The overall timer gets reset, if the apparent impedance does not re-enter the detection polygon within the set hold time. If the overall timer elapses, PSB gets blocked for a settable time.
  - (010 179) PSB: Max. blocking time
  - (011 142) PSB: Hold time
  - (011 143) PSB: Blocking time int.
- The description text of the following address has been changed to be more self-explaining:
  - Old: (014 055) PSB: Max. blocking time
    New: (014 055) PSB: Max. PS cycle dur.

CMD_1, SIG_1

The default values of (249 252) CMD_1: Function group CMD_1 and (249 250) SIG_1: Function group SIG_1 have been changed to *With*, so that the function groups CMD_1 and SIG_1 are active by default.

COUNT

Function group COUNT has become available. Four binary counters can be used to count the positive pulse edges of a binary signal present at an appropriately configured binary signal input.

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

Minor version index 7xx is now starting from 700 with each new major version 6xx.

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

COMM1

In the communication protocol per IEC 60870-5-103 positive command acknowledgement can now be set to use either single-character E5 (as previous versions) or a short message FT 1.5.

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 P433 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.

PSIG

The PSIG trip signal is now also raised in case of reverse interlocking application (trip condition: fault impedance in extended zone 1, no blocking signal received and tripping time elapsed).

ARC

The autoreclosing cycle now could also get started from a set LOGIC condition, e.g. in case of a ground fault forward condition in isolated/compensated power systems.

- (015 033) ARC: Fct.assgn. tLOGIC

GSCSG

The sensitive directional ground fault protection signaling function (GSCSG) has been added.

IDMT

The inverse definite minimum overcurrent protection function has been completely updated, most addresses for settings and signals are changed. Moreover, the directional operation of the function has been dropped.

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.

P<>

Directional power protection now operates based on sensitive current measurements. As a consequence, only one threshold setting is needed per stage.

Setting ranges have been harmonized:

- P,Q </>>: 0.01 ... 1.50 S_{nom}
- P,Q </<<: 0.01 ... 0.50 S_{nom}

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<.

LIMIT

The following group signals have been added:

- (221 232) LIMIT: tIPxx triggered
- (221 233) LIMIT: tVPGxx triggered
- (221 234) LIMIT: tVPPxx triggered
- (221 235) LIMIT: tVNGxx triggered
- (221 237) LIMIT: tVrefxx triggered

LOGIC

The number of logic binary inputs has been extended to 40.

Control (DEVxx, MAIN)	Function to control one switchgear device (DEV01) is now always available, independent from the hardware configuration. It is possible to download multiple customized bay types without cold restart. Selection parameter has been changed in that way, that any of the downloaded baytypes could be selected through its ID number: ● (220 000) MAIN: Type of bay Direct motor control feature has been enhanced. A new alarm signal for switchgear operating time exceeded is implemented: ● (221 110) MAIN: DEV op.time exceeded This signal will be raised if the command does not reset successfully by switchgear position indication or external run-back signal within set operating time. 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.
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).

A6.1.1.28 **P433 -311 -414/415 -650-701**

Release: 2013–06–21

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.

A6.1.1.29 **P433 -311 -414/415 -650-702**

Release: 2013–10–10

Hardware

No changes.

Diagram

No changes.

Software

OUTP

Bug fixing:

- Output relay K608 did not operate correctly.

A6.1.1.30 **P433 -311 -414/415 -651**

Release: 2014–01–14

Hardware

No changes.

Diagram

No changes.

Software

COUNT	The 4 counters have been equipped with individual debounce timers and limit monitoring.
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) The MAIN: Fct.assig.trip cmd.1 (021 001) is now provided with a dedicated reduced selection table. This prevents the configuration of signals that are already linked in fixed logic such as *DIST: Trip signal*. This in turn avoids jeopardizing fixed logic and thereby avoids an unwanted 3-pole trip or non-selective trip of extended zone 1. Operation of chatter suppression is now signaled: ● (221 121) MAIN: Chatt.suppr. started
Control (DEVxx, MAIN)	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), a new setting parameter has been implemented:

- (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 ... (210 143) DEV03: Operation counter
- (218 211) DEV01: Oper.count.limit ... (218 213) DEV03: Oper.count.limit
- (219 081) DEV01: Warning op.count. ... (219 083) DEV03: Warning op.count.

Two new setting parameters per external device can be used for blocking any open / close commands to the switchgear unit. These parameters are not affected by interlocking conditions.

- (218 120) DEV01: Block cmd open ... (218 122) DEV03: Block cmd open
- (218 160) DEV01: Block cmd close ... (218 162) DEV03: Block cmd close

SFMON

Bug fixing:

- Monitoring signals resulting from GFSC (measurement monitoring) and GSCSG (mismatch of operation mode when using a common channel with PSIG) were missing in the previous P433 data model and have now been added:
  - (098 013) SFMON: Meas. circuits GFSC
  - (098 019) SFMON: Op.mode PSIG inval.

PSIG

The condition for signaling transmission channel failure can now be set to match the application requirements:

- PSIG: Blk.f.telcom.flt PSx (012 246)

  = *Ch. (A)OR(B) faulty* for 2- or 3-ended line protection

  = *Ch. (A)AND(B) faulty* for 2-ended line protection with redundant channels

The send signal PSIG: Send (signal) (036 035) is now raised even in 3-channel applications along with any of the phase selective send signals, because it is transmitted in the protocol according to IEC -103 as compatible spontaneous message.

For unambiguous signaling an additional send signal is implemented which is used along with a 1-channel transmission:

- PSIG: Send (012 243)

MAIN, CMD_1, SIG_1	The direct motor control of switchgear devices has been enhanced. Instead of using an external contactor (K200) internal high-break output can now be used. It requires adjustments to the switching and monitoring timings, for which a dedicated single command and a single signal are provided. Settings: ● (202 014) CMD_1: CMD_DC3 config. ● (202 010) CMD_1: Design. CMD_DC3 ● (233 007) SIG_1: SIG_DC3 config. ● (233 000) SIG_1: Designat. SIG_DC3 ● (221 240) MAIN: DC op. delay t1 ● (221 242) MAIN: DC2/3 release delay ● (221 115) MAIN: Ext.cmd.term. w/o PI Signals: ● (202 011) CMD_1: CMD_DC3 ● (233 004) SIG_1: SIG_DC3 EXT ● (233 005) SIG_1: Logic SIG_DC3
LOGIC	The number of logic outputs (equations) has been extended to 128.

A6.1.1.31 **P433 -311 -414/415 -651-701**

Release: 2014–03–19

Hardware

No changes.

Diagram

No changes.

Software

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.
- Modelling of XSWI SwTyp EnumTyp has been aligned to IEC 61850-7-4 standard.

A6.1.1.32 **P433 -311 -414/415 -651-702**

Release: 2014–04–15

Hardware

No changes.

Diagram

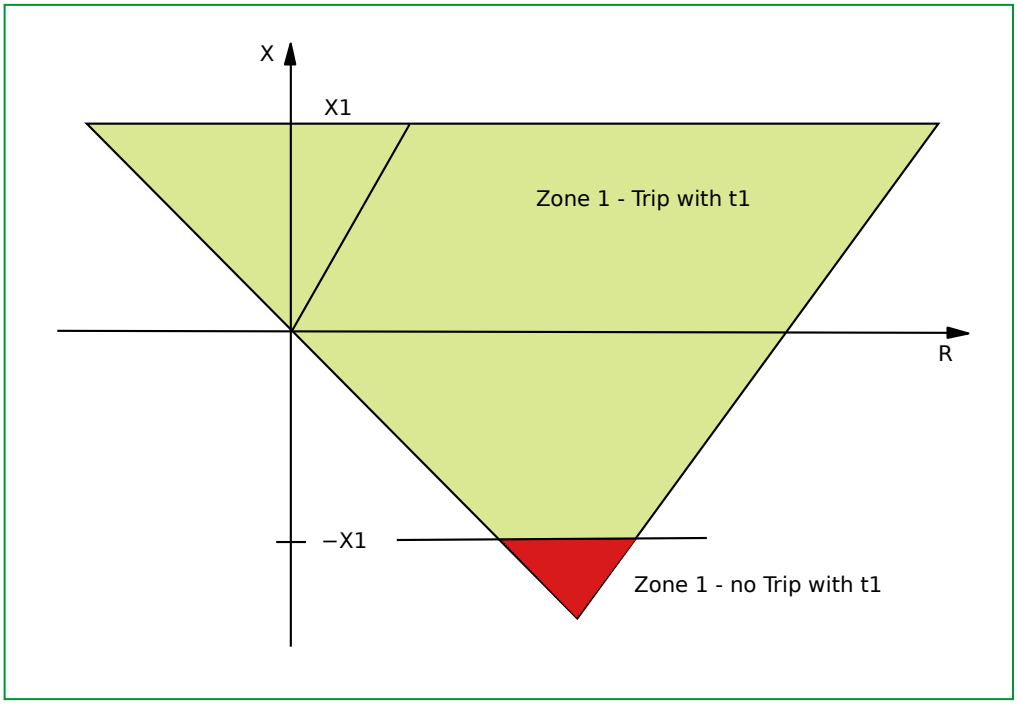
No changes.

Software

DIST

Bug fixing:

- With (010 048) MAIN: Neutr.pt. treat. PSx set to *Isol./res.w.start.PG* or *Isol./res.w/o st. PG*, the reach of the underimpedance fault detection in the C-A measuring loop was limited to only a quarter of the set value. This has now been corrected.
- As of software version -650, the tripping characteristic had been erroneously limited to the reactance range ±|X|. Using a zone 1 in forward direction with a reach of X1 as an example, then no tripping occured for impedances in the 4th quadrant with X < −X1 (shaded area in the following sketch). This has now been corrected.



INP

Bug notice: The visibility of the operating mode settings for the U1002 or U1003 binary signal inputs at INP: Oper. mode U 1002 (152 167) or INP: Oper. mode U 1003 (152 170) depends on whether the output relays K1002 or K1003 are fitted or not. Therefore, these settings are visible even if only the X(6O) module is fitted in slot 10 (40 TE case).

This does not impact the device function.

A6.1.1.33 P433 -312 -414/415/416 -651-703

Release: 2014–06–11

Hardware

An additional 40 TE case variant with a combination of pin- and ring-terminal connection can now be ordered (transformer module: for ring-terminal connection; other modules: for pin-terminal connection).

Diagram

The additional terminal connection diagram describes the new case variants:

- P433 -414 (for 40TE pin-terminal connection)
- P433 -415 (for 84TE ring-terminal connection)
- P433 -416 (for 40 TE case, transformer module: with ring-terminal connection; other modules: with pin-terminal connection)

Software

PSIG

Bug fixing:

- The PSIG test function (i.e. executing (015 009) PSIG: Test telecom. USER) now also works with operating mode PSIG: Operating mode PSx = *DC loop operat. mode*.

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 P433 (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 P433 -650.

A6.1.1.34 P433 -313 -417/418/419 -652

Release: 2015–05–12

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.

As an additional order option, a binary module of type X(6I/8O) can now be fitted in slot 8 (40TE case) or slot 16 (84TE case), respectively.

Diagram

The updated terminal connection diagrams include the optional additional I/O module interfaces:

- P433 -417 (for 40TE pin-terminal connection)
- P433 -418 (for 84TE ring-terminal connection)
- P433 -419 (for 40 TE case, transformer module: with ring-terminal connection; other modules: with pin-terminal connection)

Software

f<> A 5th frequency stage (f5) has now been introduced for over-/underfrequency protection.

IEC

Bug fixing:

- Disabling the protection via binary input ((003 026) MAIN: Disable protect. EXT = *Yes*) could have interrupted the IEC 61850 communication permanently. This has now been corrected.

DTOC, IDMT

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)
- IDMT: Mode timer start PSx
  - (007 226, 007 227, 007 228, 007 229)

New settings permit the selection for each overcurrent stage whether the fundamental or on the r.m.s. value of the current shall be measured for starting. As further alternative, DTOC measurement can be based upon peak-peak values. This setting is common for the phase and the neutral current stages.

Remark: For the negative-sequence stages, the starting decision is always based on the fundamental.

The following settings are new:

- DTOC: Meas.value I/IN> PSx
  - (060 002, 060 003, 060 004, 060 005)
- IDMT: Meas.value I/IN PSx
  - (060 018, 060 019, 060 020, 060 021)

All phase and the residual overcurrent stages of DTOC and IDMT can now be set directional:

- (017 071) DTOC: Direction tI> PSx (etc.)
- (072 032) DTOC: Direction tIN> PSx (etc.)
- (017 066) IDMT: Direct. tIref,P> PSx
- (017 067) IDMT: Direct. tIref,N> PSx

The fault direction information is commonly evaluated from the new function group SCDD (Short-Circuit Direction Determination).

Accordingly additional trip signals have been implemented, which get issued if the DTOC or IDMT trip time elapses and the actual fault direction is equal to the set direction, e.g.:

- (013 123) DTOC: Trip signal tI> = (040 010) DTOC: tI> elapsed
  AND (040 039) SCDD: Fault P or G forwd.
  AND (017 071) DTOC: Trip signal tI> = *Forward directional*

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

Function group GSSE has been removed from the Data Model. Replaced by the extended GOOSE input option.

COMM1

Bug fixing:

- Bug fixing concerning the IEC 60870-5-103 protocol:

  Test of sending spontaneous signals with “start” information was not executed.

  The status information (036 102) PSS: Control via user was not spontaneously transmitted (Typ 82h, Inf 08h).

OUTP

Bug fixing:

- Output relay test failed for K1002. It was not possible to trigger K1002 neither from HMI nor from MiCOM S1 Studio. Instead relay K1001 got operated. This has now been corrected.

  Execution of (005 255) MAIN: General reset EXT did not reset latched outputs.

MAIN

The DTOC and IDMT starting signals can now get linked into the MAIN starting signaling by setting (013 072) MAIN: Gen. start w. OC PSx. If MAIN: Gen. start w. OC PSx is set to *Yes*, upon DTOC/IDMT starting also MAIN General starting and (if applicable) phase-selective starting signals are issued.

Neutral and negative-sequence OC elements can be included or excluded from general starting (017 027 - MAIN: Gen. start. mode PSx), depending on the neutral starpoint treatment and operation philosophy.

Along with this new signaling the following group signals have been implemented:

- (040 000) MAIN: OC General starting

  = starting of any DTOC or IDMT phase stage

  or (neutral or negative-sequence starting if MAIN: Gen. start. mode PSx is set to *With start. IN, Ineg*)
- (040 005) MAIN: OC Starting A

  = starting of any DTOC or IDMT phase A

  (equivalent signals for starting in phases B and C)
- (040 008) MAIN: OC Starting GF

  = starting of any DTOC or IDMT neutral stage
- (040 105) MAIN: OC General starting

  = starting of any DTOC or IDMT negative-sequence stage

Note:

SOTF in operating mode still does operate upon DIST and BUOC starting only, irrespective of setting to include DTOC/IDMT starting in general starting. In order to accomplish OC trip the SOTF OC stages have to be used.

Bug fixing:

- Neutral starting (036 004 - MAIN: Starting GF) was not signaled if back-up overcurrent neutral element started (010 185 - BUOC: Zero-sequ. starting). This has now been corrected.

DIST

The zone reach settings have been extended to the following maximum values (at Inom = 1A):

- (010 101) DIST: Zfw,PG PSx
  (010 105) DIST: Zfw,PP PSx up to 300.00 Ω
- (010 050) DIST: Xfw PSx
  (010 051) DIST: Rfw,PG PSx
  (010 052) DIST: Rfw,PP PSx up to 400.00 Ω
- (012 001) DIST: X1,PG (polygon) PSx
  (002 076) DIST: X1,PP (polygon) PSx
  (012 005) DIST: R1,PG (polygon) PSx
  (012 006) DIST: R1,PP (polygon) PSx up to 400.00 Ω

(etc. for zones 2 ... 6, and parameter sets PS2 ... PS4)

MCMON

Bug fixing:

- The release threshold for current monitoring (010 183 - MCMON: Imin curr. monitor.) now operates correctly. Previous implementation in -650ff operated at half of the set threshold.

SOTF

Please consider the note on SOTF in operating mode in above section “MAIN”.

DTOC

By setting, any of the DTOC elements can be selected to trigger an autoreclosing cycle:

- (013 127) DTOC: Funct. start ARC PSx

This selection has the following consequences:

- Starting of any of the set DTOC elements triggers the ARC operative timer(s). An ARC dead time is started, if the general trip signal 1 ends within the operative timer(s).
- The trip signal of the selected DTOC elements is automatically triggering the general trip signal 1 with no need to configure it by setting (021 001) MAIN: Fct.assig.trip cmd.1. This assignment to the general trip command 1 remains active, even if ARC is not ready.

There are no tripping time settings provided as with P13x to facilitate instantaneous tripping if ARC is ready. The selected DTOC elements will operate with their set tripping time. If a dedicated tripping time is needed (e.g. instantaneous trip, if ARC is ready), then this requires a separate DTOC stage.

The settings for neutral directional operation ((010 045) SCDD: VNG> PSx und (004 092) SCDD: Charact. angle G PSx) have been moved to the new function group SCDD (Short-Circuit Direction Determination).

As with neutral OC stages, phase OC stages can be set in non-directional mode by binary input signals:

- (013 119) DTOC: Block. dir. tI> EXT

  ...

  (013 122) DTOC: Block.dir.tI>>>> EXT

Setting ranges of all 4 phase OC stages have been extended to a maximum setting of 30.00 Inom:

- (072 007) DTOC: I> PSx

  ...

  (072 010) DTOC: I>>>> PSx

IDMT

A time setting (013 143 - IDMT: Time Correction PSx) has been implemented to provide compensation of the function starting time and thus harmonizing operation time with other installed devices. A negative setting will reduce the tripping time, a positive setting will prolong the tripping time accordingly. This feature is only needed in applications with potentially very short tripping times (i.e. extremely inverse characteristics, small time dial factors, high I/Iref ratio).

SCDD

Function group SCDD (Short-Circuit Direction Determination) is implemented to provide directional information to DTOC and IDMT protection functions. It provides the same functionality as known from P13x, with just 2 annotations:

- The directional voltage memory is shared from DIST. Nevertheless, its only setting (010 109 - DIST: Oper.val.Vmemory PSx) remains in DIST function group for user convenience.

  Note: Even if DIST is disabled or de-configured by setting, the voltage memory is still available for SCDD.

- There is no biasing of the neutral directional element, and accordingly no setting to block it (as with P13x: (017 078) SCDD: Block. bias G PSx)

For the neutral directional element either calculated or measured neutral current IN and neutral displacement voltage VNG can be selected by settings:

- (008 105) SCDD: Evaluation IN PSx

  (071 056) SCDD: Evaluation VNG PSx

Measured fault direction and information about thevoltage used for direction determination are signaled, e.g.:

- (013 110) SCDD: Fault P forward

  ...

  (013 114) SCDD: Direct. using memory

THERM

The thermal overload protection can now alternatively also be applied to the measured or calculated neutral current:

- (013 139) THERM: Select current PSx

ILOCK

This function group now can be (de-)configured:

- (250 102) ILOCK: Function group ILOCK

The interlock violation signal (221 018) MAIN: Interlock equ. viol. now will be automatically reset after a settable time period:

- (221 123) ILOCK: Rset ILOCK violation

A6.1.1.35 P433 -313 -417/418/419 -653

Release: 2015–07–20

Hardware

No changes.

Diagram

No changes.

Software

The data model has been enhanced to offer more selection values for some “m out of n” parameters.

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.

A6.1.1.36 P433 -313 -417/418/419 -653-701

Release: 2015−12−04

Hardware

No changes.

Diagram

No changes.

Software

COMM1

Bug fixing:

- IEC 60870-5-103 and -101 protocols: Wrong energy measurement values were transmitted (low and high byte were interchanged).
- MODBUS protocol: The execution of the single pole command (CMD_1: C001) did not return a response to the master.
- DNP3.0 protocol: After a warm restart of the P433 Class 0 objects were not available and a permanent time-out on link re-establishing stage was present.

IEC

Bug fixing:

- The reporting of reset of general starting (PTRC1.ST.Str) was missing if the general starting had been triggered by the BUOC protection. (If it had been triggered by the DIST protection the reporting was correct.)
- A wrong command originator was reported (in *rcb*) upon change of control point.

DIST

Bug fixing:

- Distance protection was not blocked from INP or LOGIC via “Blocking Zx EXT” (e. g. (036 034) DIST: Blocking Z1 EXT) if the blocking signal had also been assigned to (012 017) PSB: Fct. assign. block..

IDMT

Bug fixing:

- Directional tripping of IDMT neutral overcurrent stage $t_{Iref,N}$ was not available if all DTOC neutral overcurrent stages ($t_{IN>}$, $t_{IN>>}$,...) were blocked.

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 Version History – Easergy MiCOM 30

A6.2.1 P433 -313 -4xx -654 *ff*

A6.2.1.1 P433 -313 -417/418/419 -654

Release: 2016–03–23

Hardware

No changes.

Diagram

No changes.

Software

COMM1	Bug fixing: ● COMM1 communication was permanently blocked, if COMM1 was assigned to physical channel 2 and the device was rebooted while communication was busy. ● Bug fixing concerning the IEC 60870-5-103 protocol: The signal (090 010) SFMON: Battery failure is now sent spontaneously.
IEC	The data modelling has been accomplished by Logical Nodes for 3p phase over-/undervoltage elements and the new trip commands 3 and 4, as well as for new function groups QV, Pf<.
MAIN	Two further trip commands have been implemented with the same setting options and functionality as trip command 2. These can be used e. g. for transformer back-up protection schemes. CB status inputs can now be used with no check that input signals are configured to opto-couplers. This allows to enter them through LOGIC inputs in case additional pick-up/drop-off delays are required. Bug fixing: ● Visibility of (010 100) MAIN: Vref,nom V.T. prim. and (031 052) MAIN: Vref,nom V.T. sec. did not depend on whether or not the VT for Vref had been fitted.
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).
FT_RC	Bug fixing: ● Disturbance recording didn't log binary signal changes during post-fault time.

DIST

Improvement of starting logic for correct discrimination of 2p faults in solidly grounded power systems, excluding false underimpedance starting on adjacent PP loops.

For function group harmonization, release setting in parameter subsets has been added:

- DIST: Enable PSx (019 009 / 019 015 / 019 030 / 019 039)

Note that for backward compatibility reasons the DIST is enabled by default (i. e. the default setting is *Yes*).

MCMON

Fuse Failure Vref monitoring has been accomplished by a blocking input (002 182) MCMON: Blocking FF, V EXT), that can be required in 1.5 CB applications.

BUOC

Input signals have been accomplished to block starting of overcurrent elements:

- BUOC: Blocking I> EXT (018 217)
- BUOC: Blocking IN> EXT (018 218)

SCDD

For function group harmonization, settings for configuration, general enable and release in parameter subsets have been accomplished.

- SCDD: Function group SCDD (056 021)
- SCDD: General enable USER (017 070)
- SCDD: Enable PSx (076 235 / 077 235 / 078 235 / 079 235)

Note that for backward compatibility reasons the SCDD is by default enabled.

ASC

The operating mode “NOT(V) OR NOT(Vref)” has been changed to permit (re)closure only if one voltage is below the V< threshold and the other voltage is not in “undefined” condition, i.e. in between V< and V>.

As an alternative to the 3-pole voltage the 1-pole T90 voltage input has been made available for ASC function. Selection can be made by setting/command or via binary input signal:

- ASC: Meas.V(T90) USER PSx (016 222 / 016 223 / 016 224 / 016 225)
- ASC: Meas.V(T90) EXT (016 221)

Consequentially ASC blocking in case of VT measurement circuit failure is now depending on the selected VT input(s).

V<>

New settings permit the selection for each neutral displacement overvoltage stage whether the fundamental or the r.m.s. value of the voltage shall be measured for starting:

- V<>: Meas. Value VNG> PSx (018 219 / 018 250 / 018 251 / 018 252)
- V<>: Meas. Value VNG>>PSx (018 253 / 018 254 / 018 255 / 019 005)

Minimum current enabling of undervoltage elements is now phase-selective.

Additional signals are provided to indicate 1-pole undervoltage starting:

- V<>: Starting V< 1-pole (019 006)
- V<>: Starting V<< 1-pole (019 007)
- V<>: Starting V<<< 1-pole (019 008)

Pf<	Implementation of a dedicated function group that provides under frequency load shedding (UFLS) depending on active power flow direction.
QV	Implementation of a dedicated function group that provides 3-pole undervoltage protection depending on reactive power direction, specifically required for connecting wind farms to the power system.
CBF	Bug fixing: ● If pole-selective CB status input signals were configured (031 029) MAIN: CB closed A EXT, etc.), CBF operation had always been falsely dependent on correct CB status signaling. If the CB status signals indicated a closed CB then CBF tripped even after current flow had ended.
CBM	The hysteresis of undercurrent elements used to identify end of current flow has been improved to prevent signal chattering: (044 201) CBM: Curr. flow ended A, etc.
TRMON	Implementation of a dedicated Transformer Monitoring function group that provides inputs for external transformer protection equipment (3 sets of Buchholz alarm and trip, insulation alarm).
TIMER	Implementation of this function group inherited from P132 -655 / P139 -655. It provides 4 groups of timer clocks that operate upon settable times (of a settable set of week-days).

A6.2.1.2 P433 -313 -417/418/419 -655

Release: 2017–02–01

Hardware

No changes.

Diagram

No changes.

Software

COMM1	Bug fixing in protocol IEC 60870-5-101: Date and time information in 7 Byte frame is now correct (bug affected versions from -650).
MEASO	Bug fixing: Measurands with negative values were now correctly scaled as [0…20]mA current output signals.
FT_RC	Bug fixing: When relay date was beyond 19.01.2038, no fault records were available.

PSIG

Bug fixing:

In release scheme (permissive overreaching transfer trip mode) using below send and trip signal conditioning, no trip signal was issued.

- (015 000) PSIG: Operating mode PS1 = Release scheme
- (015 036) PSIG: Oper. mode send PS1 = Dist.-dependent
- (015 107) PSIG: Oper. mode trip PS1 = Direct.-dependent

ARC

Bug notice:

The following addresses of the new adaptive auto-reclosing function of P437 are erroneously also visible in the P433 data model:

Settings:

- (020 144) ARC Sec. arc eval. PS1
- (020 148) ARC Dead time min 1p PS1
- (020 152) ARC Sec. arc V< PS1
- (020 156) ARC Sec. arc d> PS1
- (020 160) ARC Sec. arc delay PS1
- (020 168) ARC Sec. arc tMin PS1

Signals:

- (020 164) ARC Sec. arc d> exceeded
- (020 165) ARC Sec. arc V< or d>
- (020 166) ARC RC block by sec. arc
- (020 167) ARC 3p-HSR by sec. arc

The function of adaptive auto-reclosing is not implemented, so any change of the above settings will have no impact on the function performance, and also none of these signals will get active at any time.

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.

TIMER

Feature enhancement:

When setting end time smaller than start time, the timer runs until reaching the end time on next day.

A6.2.1.3 P433 -315 -420/421/422/423/424 -660

Release: 2017–07–21

Hardware

The P433 is now fitted with Ethernet module (SEB LC/RJ45 or REB LC/RJ45). This module is used for IEC 61850 Edition 1 and Edition 2 and is fitted to slot 2, as an alternative to other communication modules.

HSR/PRP communication protocols are supported.

Release of 24 TE mounting case variant with 10 colored LEDs, without function keys and DHMI option. With limited number of boards and functionality compared to 40 TE or 84 TE mounting case variant.

Diagram

The updated connection diagrams now include the Ethernet module communication interface with SEB and REB.

Adding new terminal connection diagrams for new 24 TE Pin and Hybrid variant.

- P433 -420 (for 40 TE case, with pin-terminal connection)
- P433 -421 (for 40 TE case, with CT/VT ring-, I/O pin-terminal connection)
- P433 -422 (for 84 TE case, with ring-terminal connection)
- P433 -423 (for 24 TE case, with pin-terminal connection)
- P433 -424 (for 24 TE case, with CT/VT ring-, I/O pin-terminal connection)

Software

CS

Implementation of a dedicated function group that provides Cyber Security protection to mitigate the security risks.

The Security Administration Tool is required for RBAC configuration and setting changes.

- (180 031) CS: CyberSecurity Vers.
- (180 002) CS: Number of users
- (180 032) CS: Comms logout
- (180 033) CS: HMI logout
- (180 043) CS: Comms username
- (180 034) CS: HMI username
- (180 013) CS: User access role
- (180 011) CS: Max login attempts
- (180 010) CS: Login attempts left
- (180 015) CS: Blocking time
- (180 012) CS: Blocking time left
- (180 041) CS: Result EPW setting
- (180 003) CS: Change pincode
- (180 044) CS: Config disabled
- (180 014) CS: Recovery Password
- (180 045) CS: Reset RABC

IEC	The protocol of the redundant connection is configurable with IEC: ETH COMM Mode. When Ethernet module (REB or SEB) is used, second Ethernet information is provided. ● (104 080) IEC: ETH COMM Mode ● (104 072) IEC: Gateway address 2 ● (104 070) IEC: IP address 2 ● (104 073) IEC: Block Port A/B ● (104 074) IEC: Block Port C ● (221 125) IEC: Ctrl blocked user ● (104 071) IEC: Subnet mask 2 ● (104 079) IEC: IEC prot. variant

A6.2.1.4 P433 -315 -420/421/422/423/424 -661

Release: 2017–12–19

Hardware

PRP/HSR/RSTP communication protocols are supported.

Diagram

No changes.

Software

IEC	The RSTP protocol is supported and configurable via IEC: ETH COMM Mode. IEC 60870-5-104 protocol has been added. It can be enabled and selected via IEC: IEC60870-5-104enable and IEC: IEC prot. varian. To improve network administration, VLAN and port assignment are supported.
VINP	VINP functional group includes 64 virtual inputs and is intended to process binary information from the Ethernet module running with protocol IEC 60870-5-104. This function group is only visible if IEC: IEC60870-5-104enable is set to Yes.
DIST	The distance protection is extended to 8 zones.
DELTA	The new functionality Delta-I protection is available. It designed to detect faults based on a continuous monitoring for sudden current changes.

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