

YU and YU2: Undervoltage coils

Undervoltage coils YU and YU2 monitor the voltage value of the circuit to which they are connected.

The coils open the circuit-breaker when their energizing voltage drops below a value between 35... 70% U_n .

The circuit-breaker can be re-closed when the coil energizing voltage is between 85...110% U_n .

Undervoltage coils YU and YU2 can also be used for the following purposes:

- trip unit the circuit-breaker remotely using pushbuttons of the normally closed type.
- to activate the lock when the circuit-breaker is closed (the closing of the circuit-breaker is allowed only with the under-voltage coil energized).



CAUTION! under-voltage coils YU and YU2 are emergency releases. Use the opening coil for service operations.



IMPORTANT: The coil power supply must be obtained from the supply side of the circuit-breaker or from an independent source. If an undervoltage coil trips, wait at least 100 ms after it has been reset before activating the closing coil.

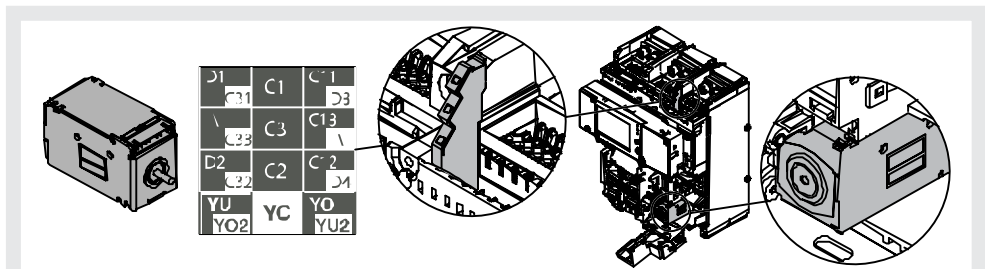


Figure 222 - YU-YU2 for E1.3

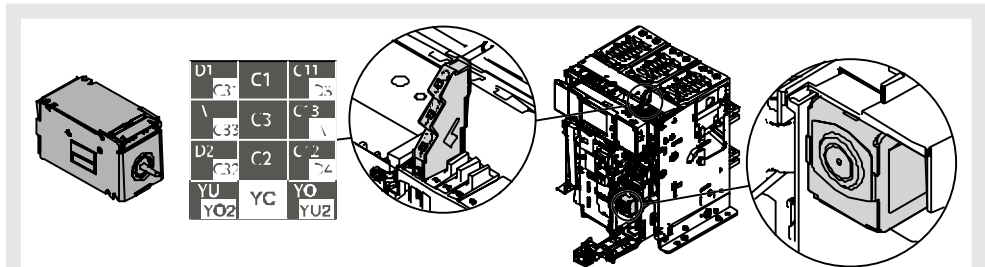


Figure 223 - YU-YU2 for E2.3-E4.3-E6.3

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The tables listing the available voltages and the electrical characteristics are provided below:

Available voltages (Un)	General characteristics	YU
24 V AC/DC	Inrush power (Ps)	300 VA/W
30 V AC/DC	Continuous power (Pc)	3.5 VA/W
48 V AC/DC	Opening time	50 ms
60 V AC/DC		
110...120 V AC/DC		
120...127 V AC/DC		
220...240 V AC/DC		
240...250 V AC/DC		

YU e YU2: Connections

More details are available in the website <https://library.abb.com> which also includes the entire circuit diagram [1SDM000056A1001](#).

Details about assembly are available at <https://library.abb.com>, especially for E1.3 in the kit instruction sheet [1SDH002309A1554](#) and for E2.3-E4.3-E6.3 in the kit sheet [1SDH002310A1554](#).

YR: Remote resetting coil

The remote resetting coil deactivates the lock at the closing of the circuit-breaker, generated by the opening of the circuit-breaker caused by tripping of the Ekip protection trip unit.

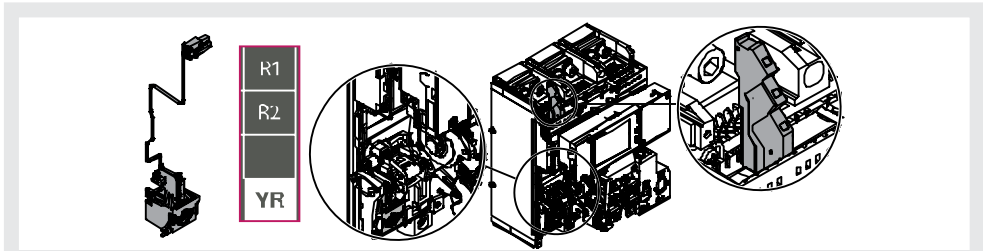


Figure 224 - YR for E1.3

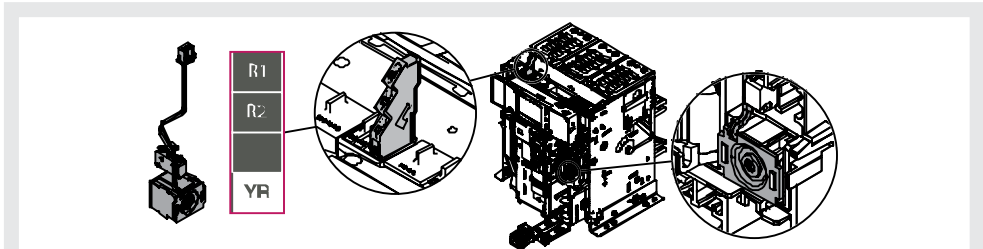


Figure 225 - YR for E2.3-E4.3-E6.3

The tables listing the available voltages and the electrical characteristics are provided below:

Available voltages (Un)		General characteristics
24 V AC ⁽¹⁾	24 V DC ⁽¹⁾	Operating limits
110 V AC ⁽¹⁾	110 V DC ⁽¹⁾⁽²⁾	90...110 %Un
220 V AC ⁽¹⁾	220 V DC ⁽¹⁾⁽²⁾	

⁽¹⁾ The coil must be activated by a pulse lasting at least 20ms.

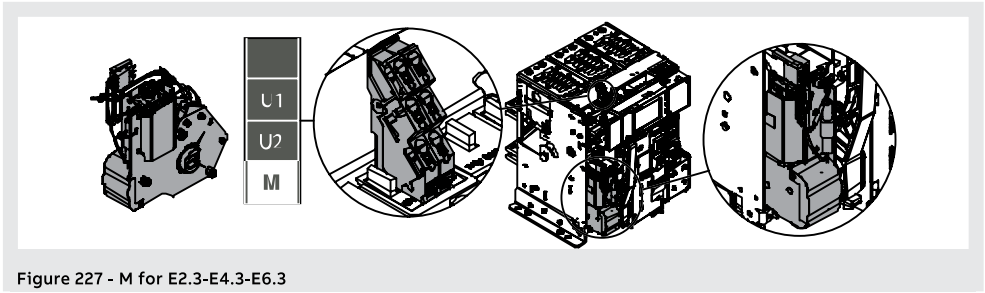
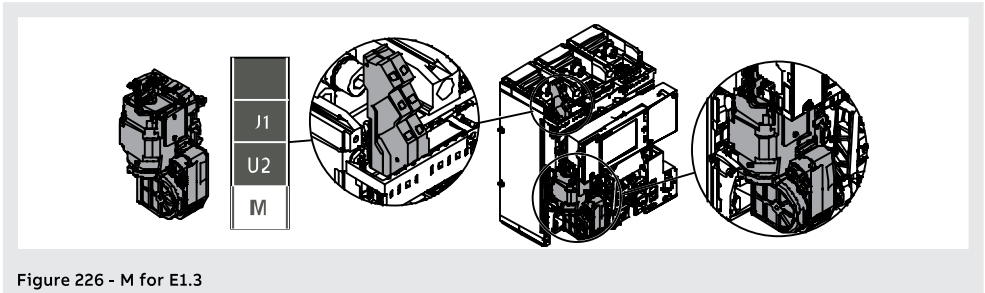
⁽²⁾ The coil must be activated by a pulse lasting max 50ms.

YR: Connections

More details are available in the website <https://library.abb.com> which also includes the entire circuit diagram [1SDM000056A1001](#).

Details about assembly are available at <https://library.abb.com>, especially for E1.3 in the kit instruction sheet [1SDH002309A1606](#) and for E2.3-E4.3-E6.3 in the kit sheet [1SDH002310A1606](#).

M: Motor The motor automatically recharges the closing springs of the circuit-breaker when these are discharged. The motor is equipped with a limit contact S33 M/1 that interrupts the power supply of the motor after charging of the springs is completed. The motor is equipped with a limit contact S33 M/2 that signals the state of the charged springs. Further details are given in the dedicated section. "S33 M/2: springs charged signalling contact".



i **NOTE:** The closing springs can in any case be charged manually through the appropriate front control lever.

The tables listing the available voltages and the electrical characteristics are provided below:

Available voltages (Un)	General characteristics	
24...30 V AC/DC	Operating limits	85...110 %Un
48...60 V AC/DC	Inrush power (Ps)	500 VA/W
100...130 V AC/DC	Power during charge (Pc):	100 VA/W
220...250 V AC/DC	Charging time	Min 5 s, max 10 s
Available voltages (Un) ⁽¹⁾		
380...415 V AC		
Available voltages (Un) ⁽²⁾		
277 V AC/DC		
380...400 V AC		
440...480 V AC		

⁽¹⁾ E1.3
⁽²⁾ E2.3-E4.3-E6.3

M: Connections

More details are available in the website <https://library.abb.com> which also includes the entire circuit diagram [1SDM000056A1001](#).

Details about assembly are available at <https://library.abb.com>, especially for E1.3 in the kit instruction sheet [1SDH002309A1609](#) and for E2.3-E4.3-E6.3 in the kit sheet [1SDH002310A1609](#).

2 - Smart electrical monitoring accessories

YO Sense, YC Sense, YO2 Sense, YC2 Sense: smart opening and closing coils

Smart opening coils (YO Sense and YO2 Sense) and smart closing coils (YC Sense and YC2 Sense⁽¹⁾) enable the circuit-breaker to be remotely monitored, and can also monitor their own operating state.

To this end, the coils provide Ekip Aware with the following information:

- Coil type and size
- incoming voltage measurement
- make sure that the coil functions correctly
- count of number of operations performed
- percentage measurement of the state of health and remaining life time measurement of the coil

This information is only available in the presence of auxiliary power supply and if the coil has been enabled in the remotely accessible configuration page of the Sense elements of Ekip Aware.

In addition, monitoring of the winding state is only carried out if the incoming voltage is applied to terminals C3, C13, C23, C33.

The circuit-breaker can always be opened when the breaker is closed, while it can only be closed if the circuit-breaker is open and the springs are charged.

The coils can operate in two different modes:

- pulse mode, where the incoming voltage must last at least 100 ms
- with continuous input voltage, only for YO Sense and YO2 Sense opening coils.

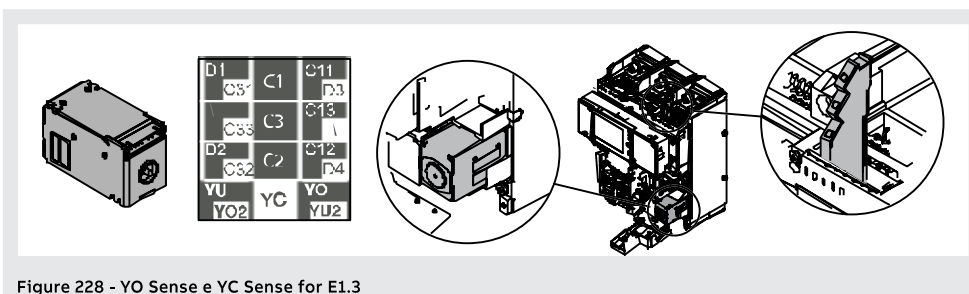


Figure 228 - YO Sense e YC Sense for E1.3

⁽¹⁾ YC2 Sense not available for E1.3

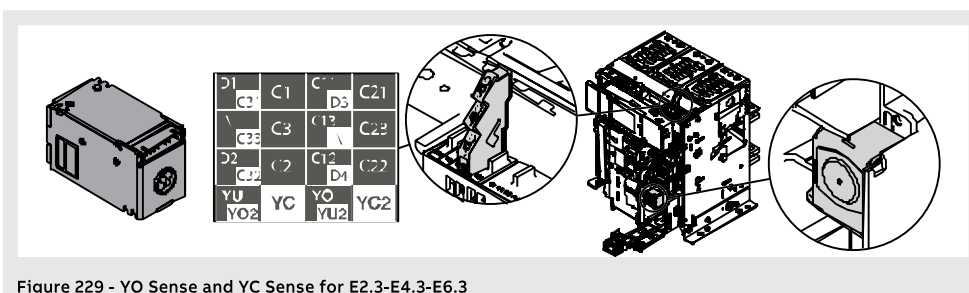


Figure 229 - YO Sense and YC Sense for E2.3-E4.3-E6.3



NOTE: the second YO2 Sense opening coil is alternative to the YU Sense undervoltage coil



IMPORTANT:

- if the closing coils are always energized, it will be possible to re-close the circuit-breaker after an opening coil acts and the circuit-breaker opens. The user must deactivate and then re-activate the closing coil in order to re-close the circuit-breaker.
- if an opening coil trips, wait at least 100 ms after having deactivated the opening coil before operating a closing coil.

Continued on the next page

Available voltages and characteristics

The coils are available in 2 models, corresponding to two U_n size ranges or input voltages:

- 24-60 V AC/DC
- 110-250 V AC/DC

The operating limits are calculated by considering the smaller size (24 V AC/DC or 110 V AC/DC, depending on the model) as lower limit and the larger size (60 V AC/DC or 250 V AC/DC, depending on the model) as upper limit.

The electrical characteristics of the coils are given in the table below:

General characteristics	YO Sense	YC Sense
Operating limits	70...110 % U_n	85...110 % U_n
Inrush power (Ps)	300 VA/W	
Continuous power (Pc)	3.5 VA/W	
Maximum opening time	35 ms	-
Maximum closing time	-	70 ms

Connections

WARNING! strictly comply with the assembly instructions provided for the smart coils; failure to comply with the instructions could cause the circuit-breaker to function in a faulty way.

More details are available in the website <https://library.abb.com> which also includes the entire circuit diagram [1SDM000056A1001](#).

Details about assembly are available at <https://library.abb.com>, especially for E1.3 in the kit instruction sheets:

- [1SDH002309A1552](#) for YO Sense and YO2 Sense coils
- [1SDH002309A1553](#) per coils YC Sense

and for E2.3-E4.3-E6.3 in the kit sheets:

- [1SDH002310A1552](#) for YO Sense and YO2 Sense coils
- [1SDH002310A1553](#) for YC Sense and YC2 Sense coils

YU Sense, YU2 Sense: smart undervoltage coils

Smart undervoltage coils enable the value of the voltage connected at the input to be monitored, while the the operating state of the coils themselves can also be monitored.

To this end, the coils provide Ekip Aware with the following information:

- Coil type and size
- incoming voltage measurement
- periodical inspection of winding state
- count of number of operations performed
- percentage measurement of the state of health and remaining life time measurement of the coil

This information is only available in the presence of auxiliary power supply and if the coil has been enabled in the remotely accessible configuration page of the Sense elements of Ekip Aware.

The coils act by opening the circuit-breaker if the input voltage drops below a limit within the range of 35...70 % U_n . The coils ensure the circuit-breaker closes if the incoming voltage reaches a value within the 85...110 % U_n range.

The coils can also be used with these functions:

- remotely open the circuit-breaker by means of normally closed push-buttons (by temporarily removing the input voltage)
- prevent the circuit-breaker from closing (by not restoring the input voltage)

Continued on the next page

**WARNING!**

- the undervoltage coils are emergency devices; the opening coils must be used for service operations
- if a trip occurs, wait at least 100 ms after having restored the input voltage, before actuating the closing coil



IMPORTANT: the input voltage must be drawn from the supply side of the circuit-breaker or from an independent source

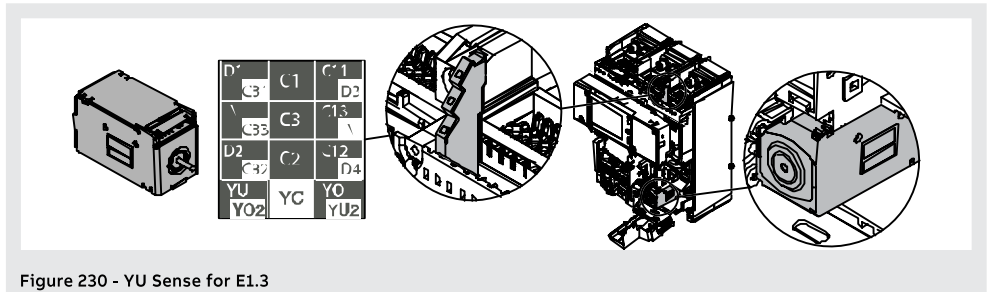


Figure 230 - YU Sense for E1.3

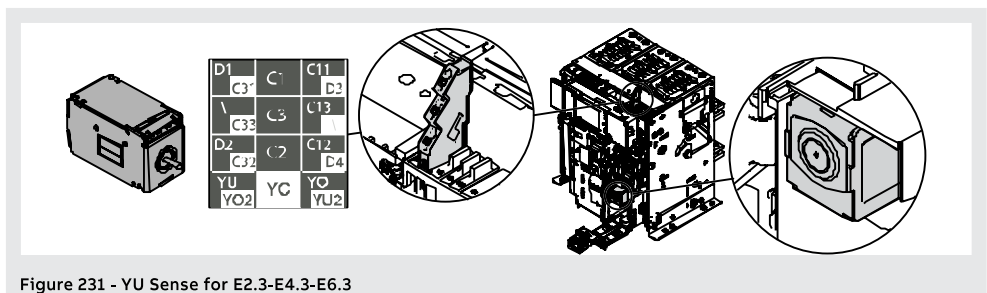


Figure 231 - YU Sense for E2.3-E4.3-E6.3

The available sizes and the electrical characteristics of the coils are given in the table below:

Available voltages (Un)	General characteristics	YU
24 V AC/DC	Inrush power (Ps)	300 VA/W
30 V AC/DC	Continuous power (Pc)	3.5 VA/W
48 V AC/DC	Opening time	50 ms
60 V AC/DC		
110...120 V AC/DC		
120...127 V AC/DC		
220...240 V AC/DC		
240...250 V AC/DC		

Connections

WARNING! strictly comply with the assembly instructions provided for the smart coils; failure to comply with the instructions could cause the circuit-breaker to function in a faulty way.

More details are available in the website <https://library.abb.com> which also includes the entire circuit diagram [1SDM000056A1001](#).

Details about assembly are available at <https://library.abb.com>, especially for E1.3 in the kit instruction sheet [1SDH002309A1554](#) and for E2.3-E4.3-E6.3 in the kit sheet [1SDH002310A1554](#).

Remote configurations: parameters When auxiliary supply is present and the coil is enabled on Ekip Aware, the parameters in table can be configured via USB-C port, via BLE and via system bus.



IMPORTANT: Presence of the accessory must be enabled in the Sense Accessories Configuration page.

Parameter	Description	Default
Supply Voltage Threshold Check Enable	Enables monitoring of the incoming voltage of the coil, especially if the voltage is within a settable range. If the condition is not met, the system activates the "Voltage out of range" signal	Disabled
Min warning threshold (% Un)	Lower limit of coil input voltage monitoring range, given as a percentage with respect to the size of the coil and selectable, in 1 % Un steps, within the ranges: • in the case of opening coils, 65 to 99 % Un • in the case of closing or undervoltage coils, 80 to 99 % Un	• in the case of opening coils: 70 % Un • in the case of closing or undervoltage coils: 85 % Un
Max warning threshold (% Un)	Upper limit of coil input voltage monitoring range, given as a percentage with respect to the size of the coil and selectable, in 1 % Un steps, within the range of 101 to 115 %	110% Un
UVD configuration Enable	Enables the presence of the electric accessory IMPORTANT: correct coil operation depends on enabling	Disabled

Remote information When auxiliary supply is present and the coil is enabled on Ekip Aware, the following information can be accessed via USB-C port, via BLE and via system bus:

Information	Description
Nominal Voltage	Coil size
Sense Coil Type	Type of coil (YO, YO2, YC, YC2, YU or YU2)
SN e Versione	Coil serial number and software version
Coil Status	State of coil, the possible values of which are: • idle: in the absence of input voltage • Pull: identifies the transient coil trip stage • Hold: identifies the coil holding stage • Release: identifies the idle condition of the undervoltage coil
Winding Status	State of the winding, the possible values of which are ⁽¹⁾ : • Unknown: information about the state of the winding is not available, e.g. because coil voltage is not present • Normal: the value of the coil winding is within the correct operating range • Low impedance: the value of the coil winding is lower than that required for correct operation • High impedance: the value of the coil winding is higher than that required for correct operation
Number of operations	Indicates the number of operations performed
Health index	Indicates the state of health of the coil in percentage form, where value 100 means that the coil is new and value 0 means that the coil has reached end of life.
YU test running	Signalling activated if verification of undervoltage coil operation is in progress; verification can be activated using the command described in the "Commands" paragraph

⁽¹⁾ In the case of opening or closing coils, the information is only available in the case of input voltage connected to terminals C3 C13 C23 and C33, if coils YO and YC are not permanently energized..

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Information	Description
Voltage Out of Range	Only when Supply Voltage Threshold Check Enable is enabled, signalling of coil input voltage off limits
Thermal Memory active	Signalling activated in the case of several operations close to each other, with inhibition of the ability to perform further operations.
Net frequency	Network voltage frequency set on Ekip Aware
Number Of Datalogger Available	Number of dataloggers stored, up to 4 maximum.
Total number of operations	Total number of actuations
Number of operations in Self Supply	Total number of actuations in Self Supply
Estimated lifetime	Indicates the remaining lifetime of the coil, given in years
Pull time TimeStamp	Date and time of last actuation
Date time TimeStamp	Date and time of commissioning
Pull Time Valid	TimeStamp of Ekip Aware and coil aligned or not

Remote configurations: commands When auxiliary supply is present and the coil is enabled on Ekip Aware, the following commands are available via USB-C port, via BLE and via system bus:

Command	Description
RELEASE AND RE-PULL (Test)	Only applicable to undervoltage coils, energizes and de-energizes the coil winding to enable its operation to be checked



NOTE: execution of the test for verification of the release of YU Sense and YU2 Sense coils can be commanded from Ekip Connect.

Information in menu

When auxiliary power supply is present and the coil is enabled in Ekip Aware, if Ekip Aware detects the module correctly, the percentage of the state of health of the coil will appear on the display in the Diagnostic/Health Index/Sense pages.

These indicators, which are present in the “Smart Sense Accessories 1” section for coils YO, YC and YU, and in the “Sense Accessories 2” section for coils YO2, YC2 and YU2, correspond to the Health index available remotely.

2 - Electrical signalling accessories

Aux 4Q: auxiliary open-closed contacts

The AUX 4Q contacts signal the open/closed state of the circuit-breaker.

These are "switching" contacts and are available in three types:

- four standard contacts
- four digital signals (low power)
- two standard contacts (Q1-Q2) + two digital signals (Q3-Q4)



NOTE: The standard AUX 4Q contacts are always included in the circuit-breakers

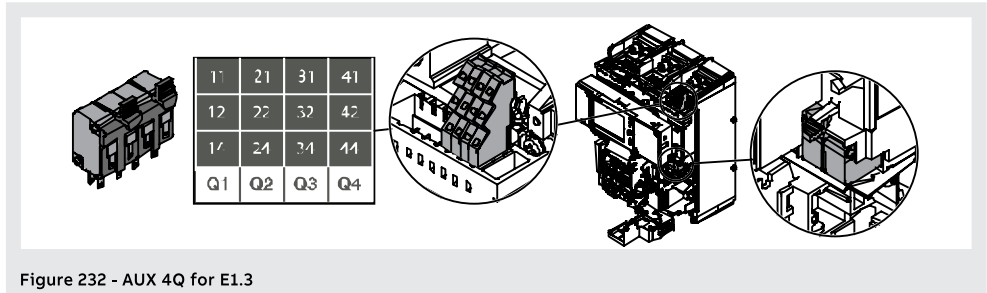


Figure 232 - AUX 4Q for E1.3

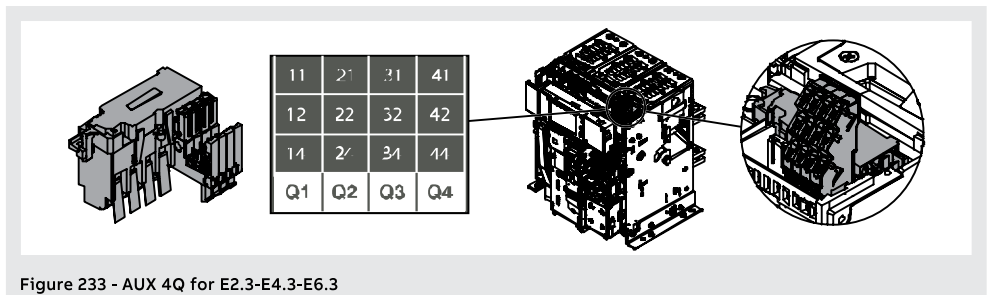


Figure 233 - AUX 4Q for E2.3-E4.3-E6.3

The following table provides information on the electrical characteristics:

Characteristics			Standard	Digital signals
Breaking capacity	DC	24V	-	0.1 A
		125V	0.5A @ 0ms / 0.3A @ 10ms	-
		250V	0.3A @ 0ms / 0.15A @ 10ms	-
	AC	250V	3A cosφ 0,3	-
			5A cosφ 0,7	-
			5A cosφ 1	-
		400V	3A cosφ 1	-
			2A cosφ 0,7	-
			1A cosφ 0,3	-
Minimum load			100mA @ 24V	1mA @ 5V

AUX 4Q: Connections

More details are available in the website <https://library.abb.com> which also includes the entire circuit diagram [1SDM000056A1001](#).

Details about assembly are available at <https://library.abb.com>, especially for E1.3 in the kit instruction sheet [1SDH002309A1601](#) and for E2.3-E4.3-E6.3 in the kit sheet [1SDH002310A1613](#).

AUX 6Q: Additional open/closed auxiliary contacts

The additional AUX 6Q contacts signal the open/closed state of the circuit-breaker. These are "switching" contacts and are available in three types:

- six standard contacts
- six digital signals (low power)
- three standard contacts (Q1-Q2-Q3) + three digital signals (Q4-Q5-Q6)

i **NOTE:** AUX 6Q not available for per E1.3

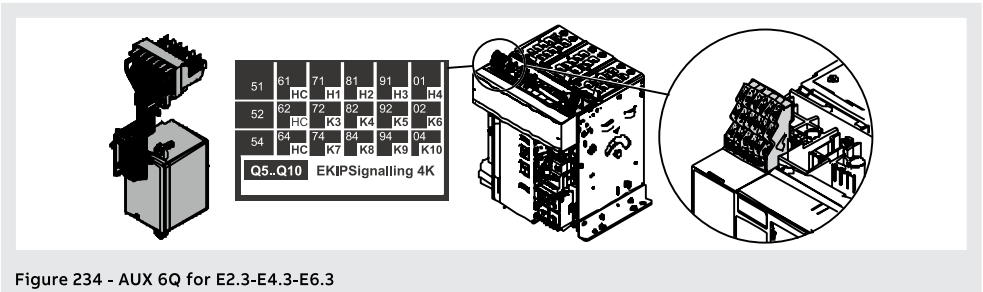


Figure 234 - AUX 6Q for E2.3-E4.3-E6.3

i **NOTE:** AUX 6 Q contacts can only be ordered if the circuit-breaker does not include the Ekip Signalling 4K module in the protection release.

The following table provides information on the electrical characteristics:

Characteristics			Standard	Digital signals
Breaking capacity	DC	24V	-	0.1 A
		125V	0.5A @ 0ms / 0.3A @ 10ms	-
		250V	0.3A @ 0ms / 0.15A @ 10ms	-
	AC	250V	3A cosφ 0,3	-
			5A cosφ 0,7	-
			5A cosφ 1	-
		400V	3A cosφ 1	-
			2A cosφ 0,7	-
			1A cosφ 0,3	-
Minimum load			100mA @ 24V	1mA @ 5V

AUX 6Q: Connections

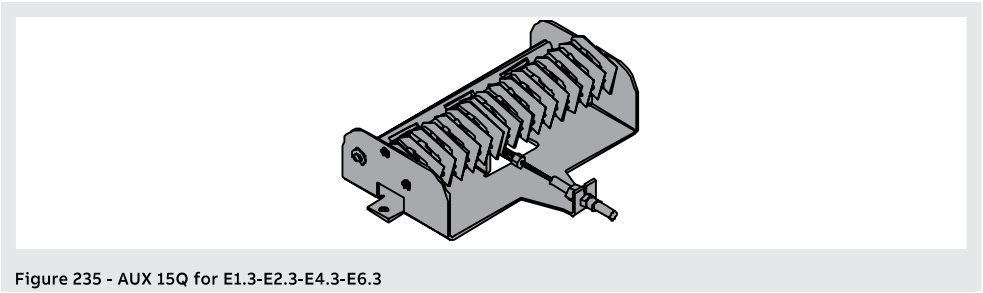
More details are available in the website <https://library.abb.com> which also includes the entire circuit diagram [1SDM000056A1001](#).

Information on the assembly is available on the website <https://library.abb.com> in particular in the kit sheet [1SDH002310A1601](#) for withdrawable circuit-breakers and [1SDH002310A1616](#) for fixed circuit-breakers.

AUX 15Q: External additional open/closed auxiliary contacts

The additional AUX 6Q contacts signal the open/closed state of the circuit-breaker. These are "switching" contacts and are available in two types:

- 15 standard contacts
- 15 digital signals (low power)



The following table provides information on the electrical characteristics:

Characteristics			Standard	Digital signals
Breaking capacity	DC	24V	-	0.1 A
		125V	0.5A @ 0ms / 0.3A @ 10ms	-
		250V	0.3A @ 0ms / 0.15A @ 10ms	-
	AC	250V	3A cosϕ 0,3	-
			5A cosϕ 0,7	-
			5A cosϕ 1	-
		400V	3A cosϕ 1	-
			2A cosϕ 0,7	-
			1A cosϕ 0,3	-
Minimum load			100mA @ 24V	1mA @ 5V

AUX 15Q Connections

More details are available in the website <https://library.abb.com> which also includes the entire circuit diagram [1SDM000056A1001](#).

Details about assembly are available at <https://library.abb.com>, especially for E1.3 in the kit instruction sheet [1SDH002309A1607](#) and for E2.3-E4.3-E6.3 in the kit sheet [1SDH002310A1607](#).

AUP: auxiliary position contacts

The AUP contacts are intended for circuit-breakers in withdrawable version.

They electrically signal the position of a moving part (inserted/test/withdrawn) in relation to the fixed part in which they are inserted.

These are "switching" contacts and are available in the following configurations:

Up to a maximum of six contacts for E1.3:

- six standard contacts
- six digital signals

Up to a maximum of ten contacts for E2.3-E4.3-E6.3:

- five standard contacts
- five digital signals
- five additional standard contacts
- five additional digital signals

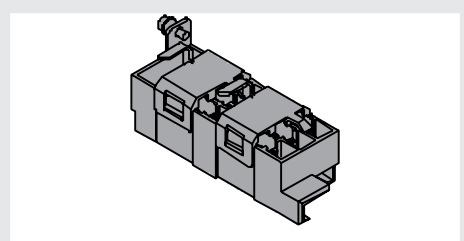


Figure 236 - AUP for E1.3

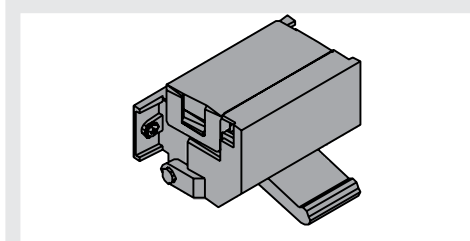


Figure 237 - AUP for E2.3-E4.3-E6.3

The following table provides information on the electrical characteristics:

Characteristics			Standard	Digital signals
Breaking capacity	DC	24V	-	0.1 A
		125V	0.5A @ 0ms / 0.3A @ 10ms	-
		250V	0.3A @ 0ms / 0.15A @ 10ms	-
	AC	250V	3A cosϕ 0,3	-
			5A cosϕ 0,7	-
			5A cosϕ 1	-
		400V	3A cosϕ 1	-
			2A cosϕ 0,7	-
			1A cosϕ 0,3	-
Minimum load			100mA @ 24V	1mA @ 5V

AUP: Connections

More details are available in the website <https://library.abb.com> which also includes the entire circuit diagram [1SDM000056A1001](#).

Details about assembly are available at <https://library.abb.com>, especially for E1.3 in the kit instruction sheet [1SDH002309A1603](#) and for E2.3-E4.3-E6.3 in the kit sheet [1SDH002310A1603](#).

RTC: ready to close signalling contact

The RTC contact indicates that the circuit-breaker is ready to receive a closing command.

The conditions necessary to allow the closing of the circuit-breaker are:

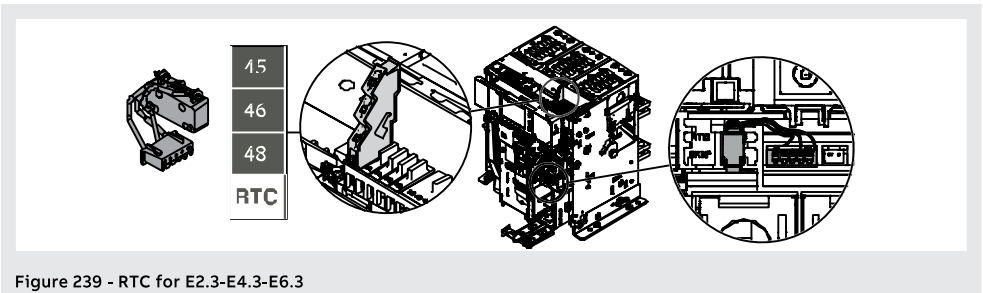
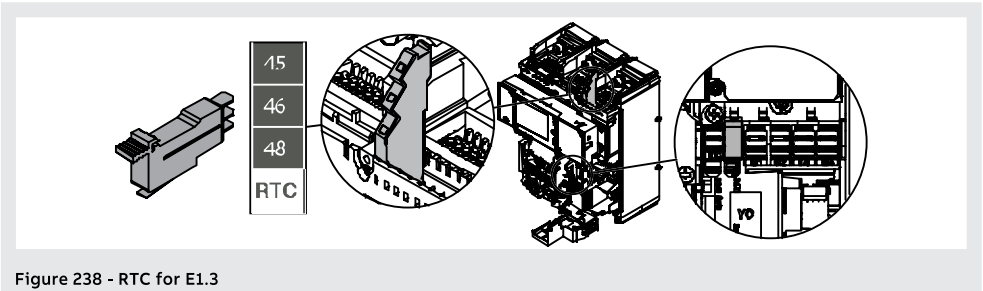
- circuit-breaker open
- springs charged (the state of the springs can be checked via USB-C port, via BLE and via system bus).
- absence of an opening command or of a lock in opening



NOTE: Proceed as described below to close the circuit-breaker after the Ekip protection release has tripped:

- Press the TU Reset button on the front to reset the circuit-breaker Reset signal
- Close the circuit breaker

The RTC is a "switching" contact type and is available in the standard version or in the versions for digital signals.



The following table provides information on the electrical characteristics:

Characteristics			Standard	Digital signals
Breaking capacity	DC	24V	-	0.1 A
		125V	0.3A @ 0ms	-
			0.15A @ 10ms	-
		250V	0.3A @ 0ms	-
	0.15A @ 10ms		-	
	AC	125V - 250V	1A cosφ 0,3	-
			2A cosφ 0,7	-
			3A cosφ 1	-
Minimum load			100mA @ 24V	1mA @ 5V

RTC: Connections

More details are available in the website <https://library.abb.com> which also includes the entire circuit diagram [1SDM000056A1001](#).

Details about assembly are available at <https://library.abb.com>, especially for E1.3 in the kit instruction sheet [1SDH002309A1604](#) and for E2.3-E4.3-E6.3 in the kit sheet [1SDH002310A1604](#).

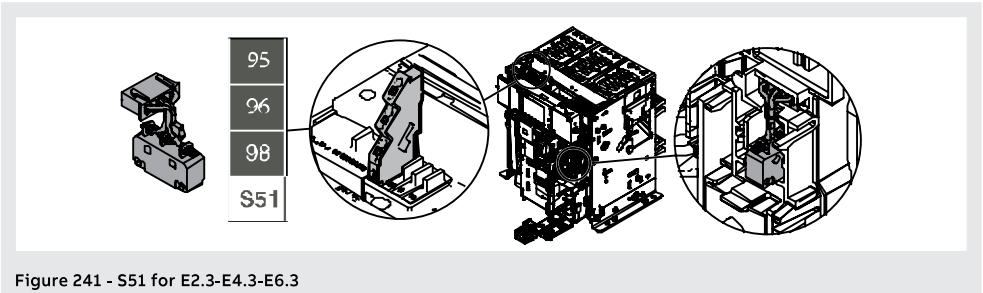
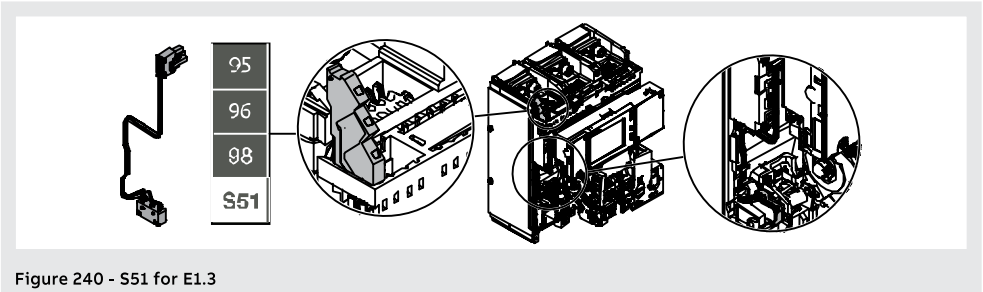
**S51: trip unit tripping
signalling contact**

The S51 contact signals the opening of the circuit-breaker due to tripping of the Ekip protection trip unit. It is available in two different types:

- standard contact
- contact for digital signals



NOTE: The standard S51 contact is always included in automatic circuit-breakers, and is associated with the TU Reset mechanical signalling.



The following table provides information on the electrical characteristics:

Characteristics			Standard	Digital signals
Breaking capacity	DC	24V	-	0.1 A
		125V	0.3A @ 0ms	-
			0.15A @ 10ms	-
		250V	0.3A @ 0ms	-
	0.15A @ 10ms		-	
	AC	125V - 250V	1,5A cosφ 0,3	-
			3A cosφ 0,7	-
			5A cosφ 1	-
Minimum load			100mA @ 24V	1mA @ 5V

S51: Connections

More details are available in the website <https://library.abb.com> which also includes the entire circuit diagram [1SDM000056A1001](#).

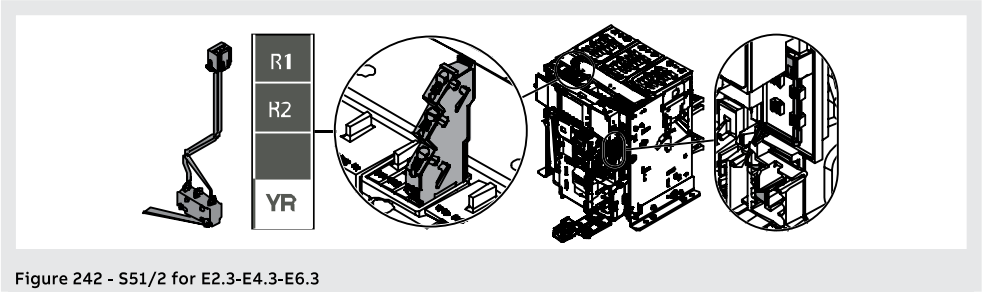
Details about assembly are available at <https://library.abb.com>, especially for E1.3 in the kit instruction sheet [1SDH002309A1605](#) and for E2.3-E4.3-E6.3 in the kit sheet [1SDH002310A1605](#).

S51/2: releases tripped signaling contact

Contact S51/2 signals circuit-breaker opening after the protection release Ekip has tripped.
Only available with circuit-breakers Emax E2.3-E4.3-E6.3
It is available in two different types:

- standard contact
- contact for digital signals

- **NOTE:** Contact S51/2 can be used as an alternative to YR and at the same time as S51.
- **NOTE:** S51/2 not available for per E1.3



The following table provides information on the electrical characteristics:

Characteristics			Standard	Digital signals
Breaking capacity	DC	24V	-	0.1 A
		125V	0.3A @ 0ms	-
			0.15A @ 10ms	-
		250V	0.3A @ 0ms	-
	0.15A @ 10ms		-	
	AC	125V - 250V	1,5A cosφ 0,3	-
			3A cosφ 0,7	-
			5A cosφ 1	-
Minimum load			100mA @ 24V	1mA @ 5V

S51: Connections

More details are available in the website <https://library.abb.com> which also includes the entire circuit diagram [1SDM000056A1001](#).
Information on the assembly is available on the website <https://library.abb.com> in particular in the kit sheet [1SDH002310A1614](#).

S33 M/2: springs charged signalling contact

The S33 M/2 contact signals the state of the closing springs of the circuit-breaker control (charged or discharged).

It is available in two types:

- standard contact
- contact for digital signals



NOTE: Contact S33 M/2 is not available with M Sense Enabler installed. Information about the state of the springs is accessible remotely via USB-C port, BLE or system bus



NOTE: the S33 M/2 contact is always included in the gearmotor for automatic charging of the springs in the standard version. The version for digital signals must be requested with the order for the motor.

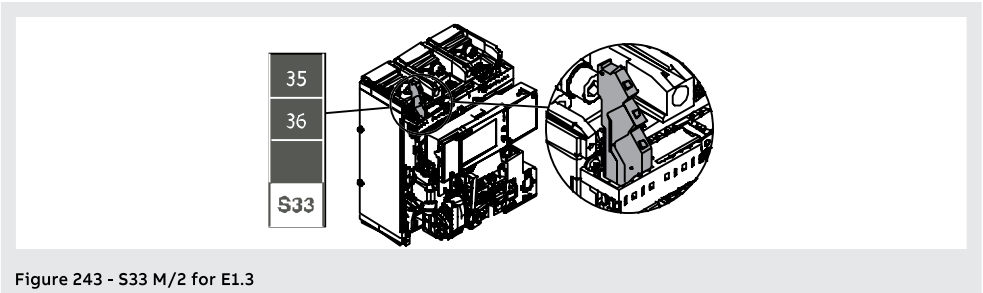


Figure 243 - S33 M/2 for E1.3

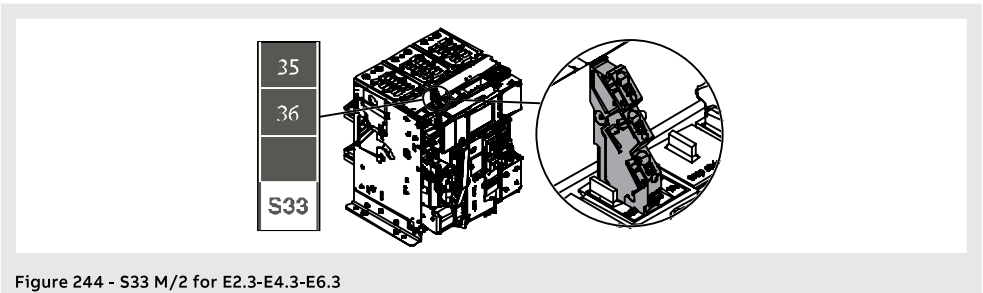


Figure 244 - S33 M/2 for E2.3-E4.3-E6.3

The following table provides information on the electrical characteristics:

Characteristics			Standard	Digital signals
Breaking capacity	DC	24V	-	0.1 A
		125V	0.5A @ 0ms / 0.3A @ 10ms	-
		250V	0.3A @ 0ms / 0.15A @ 10ms	-
	AC	250V	3A cosφ 0,3	-
			5A cosφ 0,7	-
			5A cosφ 1	-
		400V	3A cosφ 1	-
			2A cosφ 0,7	-
			1A cosφ 0,3	-
Minimum load			100mA @ 24V	1mA @ 5V

S33/M2: Connections

More details are available in the website <https://library.abb.com> which also includes the entire circuit diagram [1SDM000056A1001](#).

Details about assembly are available at <https://library.abb.com>, especially for E1.3 in the kit instruction sheet [1SDH002309A1609](#) and for E2.3-E4.3-E6.3 in the kit sheet [1SDH002310A1609](#).

Internal electronic accessories

1 - Digital Rating Plug

Description The current protections and measurement ranges use rated current I_n defined by the Digital Rating Plug as a reference.
When ordering the CB, the customer chooses the value to be configured in the device.
On Ekip Aware, rated current I_n appears on the left of the display and in the *Info - Circuit-breaker* (Rat. Curr.field) menu.

Modify I_n The CB is supplied by ABB with fixed I_n rated current, which cannot be changed.
The Digital Flexible Rating Plug digital upgrade, available on the aftermarket, enables the I_n value to be made editable, see page 171.



IMPORTANT:

- with $I_u \leq 400$ A size circuit-breakers, you can configure 100 A rated current I_n to the I_u size of the CB
- with $I_u > 400$ A size circuit-breakers, you can configure 400 A rated current I_n to the I_u size of the CB



IMPORTANT:

- the value of rated current I_n must be changed with the CB in OPEN position, in the absence of primary voltages and currents
- The user must replace the sticker on the left of the display when the rated current is changed, so as to adapt it to the new value. The stickers are supplied in the dedicated software package

2 - Ekip Busbars Supply

Presentation The Ekip Busbars Supply module enables the protection release to be supplied directly by the voltage sockets to which the CB is connected.
The module also enables Ekip Signalling 4K to be energized, if present.

Configurations available The module can be set up in different connection configurations:

- connection to internal terminals or in an external terminal box
- connection to the upper or lower terminals of the poles on the basis of the expected power flow
- with normal or reverse pole order

For full details about ordering and the connections, consult technical catalog [1SDC200023D0906](#) and the wiring diagrams [1SDM000056A1001](#).

Electrical characteristics The *Ekip Busbars Supply* module functions correctly in the electrical conditions described on page 57.
Installations with up to 1200 VAC line-to-line voltage can be connected and configured in the presence of connections to external sockets and an isolation transformer.

Isolation transformer The isolation transformer must conform to standard IEC 60255-27 and possess the following characteristics:

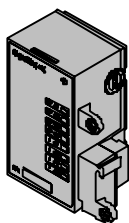
Characteristics	Description
Electrical	• Accuracy class: $\leq 0,2$ • Performance: ≥ 10 VA • Overload: 20 % permanent • Insulations: 4 kV between inputs and outputs, 4 kV between shield and outputs, 4 kV between shield and inputs • Frequency: $F_n \pm 10\%$ • Primary voltage: 100 to 1150 V (nominal, to be configured via menu) • Secondary voltage: 100 to 230 V (nominal, to be configured via menu)

Test Disconnect the *Ekip Busbars Supply* module from Ekip Aware (as in the procedure described on the front label) and the external sockets from the terminal box in the following cases:

Test	Module Measurement Enabler with voltage sockets
Dielectric test	x
Isolation between phases	x

Replacement The *Ekip Busbars Supply* module installed in Ekip Aware can be replaced.
Details are available in document [1SDH001000R0528](#).

3 - Ekip Signalling 4K



Ekip Signalling 4K is an accessory signalling module allowing programmable inputs/outputs to be managed.

The module is provided with:

- four digital outputs and relevant state LED: O 01, O 02, O 03, O 04
- four digital inputs and relevant state LED: I 01, I 02, I 03, I 04
- a Power LED indicative of the startup status of the module



NOTE: The module can be installed on circuit-breakers in which AUX 6Q contacts are not present

Connections

The module must be connected directly to the Ekip Aware in the dedicated slot on the left-hand side of the display; the outputs and inputs of the module can be accessed via the upper terminal box of the circuit-breaker.

To connect the module to Ekip Aware, please consult document [1SDH002310A1516](#).

For references about the connection and terminals, please consult document [1SDM000056A1001](#).

Power supply

The module functions with Ekip Aware via auxiliary power supply, either direct or provided by the *Ekip Supply* module (Lite or Evo Modus TCP).

Description of the outputs

Each output consists of a contact, isolated by Ekip Aware and other outputs, which can be open or closed and possesses the following electrical characteristics:

Characteristics	Maximum limit ⁽¹⁾
Maximum switchable voltage	150 V DC / 250 V AC
Breaking capacity	2 A @ 30 V DC, 0,8 A @ 50 V DC, 0,2 A @ 150 V DC, 4A @ 250 V AC
Dielectric strength between open contacts	1000 V AC (1 minute @ 50 Hz).
Dielectric strength between each contact and coil	1000 V AC (1 minute @ 50 Hz).

⁽¹⁾ data relating to a resistive load

The outputs are independent of each other and each output can be programmed so that it activates when one or more events occur.



NOTE: when the module is off, the output contacts are always open

Description of the inputs

The state of each input can be closed or open and is determined by connection (or non-connection) of the input to the common reference of the inputs.

The corresponding ON or OFF logic state detected by Ekip Aware depends on the configuration of the input.

State of the input	Electrical condition with respect to the common reference	Configuration of input	Logic state detected by Ekip Aware
Open	Circuit open ⁽¹⁾	Active open	ON
		Active closed	OFF
Closed	Short-circuit ⁽²⁾	Active open	OFF
		Active closed	ON

(1) $R > 100 \text{ k}\Omega$

(2) $R \text{ (wiring + short circuit contact)} < 25 \Omega$

The inputs are independent of each other and Ekip Aware can be programmed so that actions or signals correspond to the state of each input.



NOTE: when the module is off the state of the inputs detected is not valid

Interface The module has 9 signaling leds:

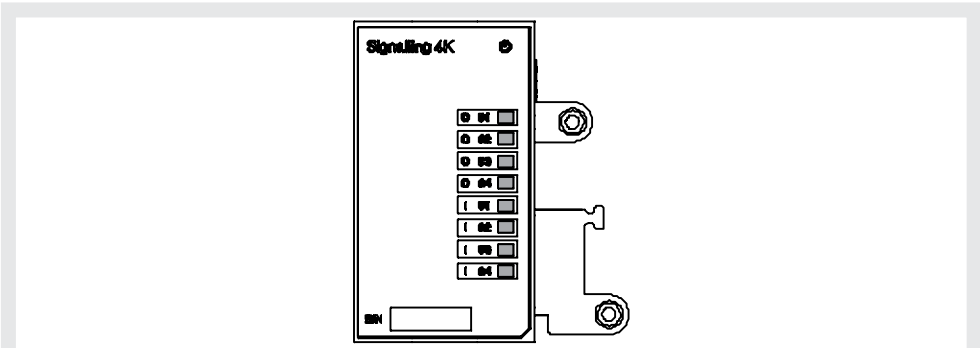


Figure 245

LED	Description
Power	Indicates the state of the module (on or off)
O 01, O 02, O 03, O 04	A LED for each output indicates the state of the output contact: • off, open state of the contact; • on, closed state of the contact
I 01, I 02, I 03, I 04	The state of the input is indicated by a LED for each input: • off, open state (non-connection to the common reference of the inputs); • on, closed state (-connection to the common reference of the inputs)

Configuration of the outputs All the available outputs enable the following parameters to be configured:

Parameter	Description	Default
Signal Source	Condition that activates the output and switches the contact from the idle state to the activated state. The user can configure the activation condition by selecting an event from a pre-defined list or by selecting the Custom mode, which enables several events to be combined.	None
Delay	Minimum duration of the activation condition before the output is activated; this delay is given in seconds and can be set within a range between 0 s and 100 s, in 0.01 s steps. IMPORTANT: • the output will not be activated if the activation condition disappears before this time has elapsed • if delay = 0 s, the activation condition must persist for more than 300 ms	0 s
Contact Type	Defines the rest state of the contact with activation condition absent: Normally Open or Normally Closed	Normally Open
Latched ⁽¹⁾	Allows the output to remain activated (if ON) or to be deactivated (if OFF) when the activation condition disappears NOTA: regardless of the self-latching condition, the state of the output is reset in the case of reset command, autotest command or if the module shuts down	Off
min Activation Time ⁽²⁾	With self-latching disabled, the output has a minimum duration of the activated state if the duration of the activation condition is less. • if the duration of the activation condition is less than the selected minimum activation time, the output remains activated for at least the minimum activation time • if the duration of the activation condition is the same as the minimum activation time or longer, the output remains activated for the time the activation condition persists. The available options are 0 ms, 100 ms and 200 ms	0 ms

Continued on the next page

⁽¹⁾ if the output is used for the Power Controller function, its self-latch must be disabled

⁽²⁾ if the output is used for the Power Controller function, you can select the Power Controller ms option, with which the output is kept activated for a set time of the function itself, regardless of whether the activation condition persists

Configuration of the inputs Each input can be configured via USB-C port, via BLE and via system bus, by means of the following parameters:

Parameter	Description	Default
<i>Polarity</i>	Defines the state of the input (circuit closed or open) that activates the logic state ON detected by Ekip Aware	Active Closed
<i>Delay</i>	Minimum duration of the input state before change of state is recognized; this delay is given in seconds and can be set within a range between 0 s and 100 s, in 0.01 s steps.  IMPORTANT: - the change of state is not recognized if the input deactivates or reactivates before this time has elapsed - if delay = 0 s, the state of the input must persist for more than 300 ms	0.1 s

State The logic state of the inputs (OFF or ON) and the state of the output contacts (Open or Closed) are available via USB-C port, via BLE and via system bus.

Commands The following commands are available via USB-C port, via BLE and via system bus:

- Sign Reset which, with self-latching enabled and in the absence of the activation condition, switches any activated output contacts to the rest state
- Sign Autotest, which executes the automatic test sequence of the outputs

The Sign Autotest command is also available on the display, in the *Test/Ekip CI/Ekip Signalling 4K* menu.

4 - M-Sense Enabler

M-Sense Enabler is an accessory module which can be installed on all Emax 3 circuit-breakers equipped with Ekip Aware, for the purpose of monitoring the spring charging motor.

To this end, the module:

- measures the supply voltage of the motor and its current consumption during operation
- communicates with Ekip Aware and provides information about the state of the motor
- in circuit-breakers E2.3, E4.3 and E6.3, it has a LED which indicates the “on” state of the module and the state of communication with Ekip Aware



NOTE: the information given above about the motor and possible module configurations is only available if the module has been enabled in the remotely accessible configuration page of the Sense accessories of Ekip Aware



NOTE: in Emax 3 E1.3 circuit-breakers, the M Sense Enabler module is installed as an alternative to the MID Sx module. in Emax 3 E2.3-E4.3-E6.3 circuit-breakers, the M Sense Enabler module is installed as an alternative to the Ekip Signalling 4K module

Connections Instructions on how to connect the module to Ekip Aware are available in documents:

- for Emax 3 E1.3 circuit-breakers: [1SDH002309A1611](#)
- for Emax 3 E2.3-E4.3-E6.3 circuit-breakers: [1SDH002310A1611](#)

For references about the connection and terminals, please consult document [1SDM000056A1001](#).

Power supply The module functions with Ekip Aware supplied by auxiliary power either directly or by the Ekip Supply module (Lite or Evo Modus TCP).

Interface In Emax 3 E2.3, E4.3 e E6.3 circuit-breakers, the module has a signalling LED which indicates the “on” state of the module.

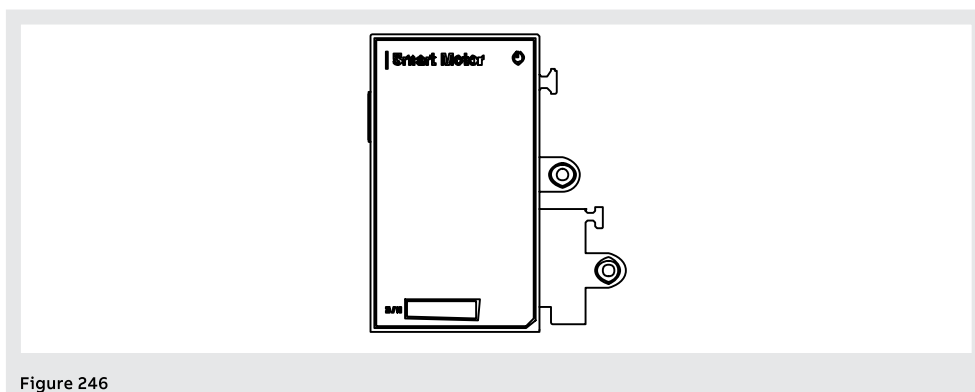


Figure 246

Information in menu If the module is detected correctly by Ekip Aware, the percentage indicator of the state of health of the motor, corresponding to the remotely available Health Index indicator, will appear on the display in the *Diagnostic/Health Index/Sense Accessories 1* page.

Remote configuration

Each input can be configured via USB-C port, via BLE and via system bus, by means of the following parameters:



IMPORTANT: the size of the motor to be paired must be indicated in the Nominal Voltage parameter. Failing this, the diagnostics will not provide the correct information.

Parameter	Description	Default
Nominal Voltage	Select motor size IMPORTANT: <i>enabling is required for correct operation of the diagnostics.</i>	24 V - 30 V or 220 V - 250 V
Supply Voltage Threshold Check Enable	Enables monitoring of the incoming voltage of the coil, especially if the voltage is within a settable range. If the condition is not met, the system activates the "Voltage out of range" signal	Disabled
Min warning threshold (% Un)	Lower limit of motor supply voltage monitoring range, given as a percentage compared to the rated voltage of the circuit-breaker and selectable within the range of 80 to 99% Un in 1 % Un steps	85% Un
Max warning threshold (% Un)	Upper limit of motor supply voltage monitoring range, given as a percentage compared to the rated voltage of the circuit-breaker and selectable within the range of 101 to 115 % Un in 1 % Un steps	110 % Un
Time Charge Control Enable	Enables motor charge time monitoring, especially if less than the Max time of charge; if more, the Motor Charge Time Warning signal is activated and further motor operations are inhibited	Disabled
Max time of charge	When Charge Control Enable is enabled, limit applied to the motor charge time given in seconds and selectable within the range of 1 to 16 s in 1 s steps	10 s

About The following information can be accessed via USB-C port, via BLE and via system bus:

Information	Description
SN e Versione	Serial number and software version of module
Motor Voltage	Motor supply voltage measured by module in real time
M-Sense Enabler Error	Signalling of generic error of motor
Voltage out of range	Only when Supply Voltage Threshold Check Enable is enabled, signalling of Motor supply voltage off limits
Motor Charge Time Warning	Only when Time Charge Control Enable is enabled, signalling of Motor charge time off limits
S33 Status	Indicates the state of the motor springs (charged or not)
Number of operations	Indicates the number of operations performed by the motor since being put into service
Health index	Indicates the state of health of the motor in percentage form, where value 100 means that the motor is new and value 0 means that the motor has reached end of life
Estimated end of life	Indicates the remaining lifetime of the motor, given in years
Max current 1s, Min current 1s, Average current 1s, Max voltage 1s, Min voltage 1s, Average voltage 1s	Module measurements relating to the initial stage of the last operation performed, overwritten upon each new operation
Max current, Min current, Average current, Max voltage, Min voltage, Average voltage	Module measurements relating to charge completion
Time of charge	Module measurements relating to the charge time of the last operation performed, overwritten upon each new operation
Last Charge TimeStamp	Date and time of the last operation performed, overwritten upon each new operation



NOTE: With reference to the measurements of the module, a further section with a copy of the measurements relating to an executed operation you want to save is also available; this copy is maintained at each new operation, unless a new save command is transmitted

Commands The following commands are available via USB-C port, via BLE and via system bus:

- SAVE REFERENCE MOTOR OPERATION, enabling the module measurements relating to the last operation performed to be saved
- RESET TIME MOTOR TIME ALARM, enabling the Motor Charge Time Warning signal to be removed and the capability of performing further operations to be unlocked

External electronic accessories

1 - Introduction

Modules The electronic accessories described in the next chapters form the terminal box modules to be assembled on the circuit-breaker (in the fixed version) or on the fixed part of the circuit-breaker (in the withdrawable version).

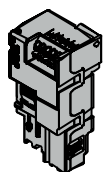
This modules can be of two different types:

- supply modules, to be installed in the first slot of the terminal box of the circuit-breaker
- function modules (e.g.: signalling modules, communication modules, etc.)

With the exclusion of the Ekip Supply Lite supply module (which has no communication function), these modules need the Local Bus to be enabled in order to be detected by Ekip Aware and operate correctly; the Local Bus can be enabled via display in the *Settings/Connectivity/Local Bus* menu or remotely.

If Ekip Aware has detected the module correctly, you can access the information and configuration parameters of the module via USB-C port, via BLE and via system bus; details are given in the relevant chapter; in addition, for each module, correct detection by Ekip Aware enables access via display, in the *Info/Modules* menu, to a page giving part of this information (such as the serial number and software version).

2 - Ekip Supply Lite



Ekip Supply Lite is an accessory supply module able to manage a range of both AC and DC incoming voltages:

- supplies auxiliary power to Ekip Aware
- allows the terminal box modules to be supplied and connected to Ekip Aware

The module has a Power led to signal the presence of incoming power supply:

- off: power supply absent
- on (steady): power supply present

Electrical characteristics

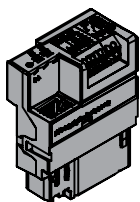
Characteristic	Values
Power supply voltages	21,5 ÷ 265 VDC
Frequency	45 - 66 Hz
Maximum power consumption without modules	3 W / VA
Maximum power consumption with maximum number of modules connected	10 W / VA
Maximum inrush current	2 A for 20 ms



IMPORTANT: the Supply module is suitable for applications up to overvoltage level 2 (OVC II) and there is no provision for direct connection to the main distribution line; an external surge suppressor must be used for applications requiring an overvoltage category higher than 2.

Connections For references about the connection and terminals, please consult document [1SDM000056A1001](#); use AWG 22-16 cables with 1.4 mm maximum outer diameter for the external cabling.
To connect the module to Ekip Aware, please consult document [1SDH002310A1511](#).

3 - Ekip Supply Evo Modbus TCP



Ekip Supply Evo Modbus TCP is an accessory supply and communication module which allows Ekip Aware to be energized and, in its basic version, Ekip Aware to be integrated into an Ethernet network with Modbus TCP communication protocol, with remote monitoring function.

As supply module:

- supplies Ekip Aware and the terminal box modules by means of auxiliary voltage
- connects Ekip Aware to the terminal box modules via Local Bus
- makes connections to the Local Bus available to ABB external DIN rail devices such as Ekip Cartridge



NOTE: up to three modules can be connected to Ekip Supply Evo Modbus TCP.

As Modbus TCP communication module, in its basic version, the module is configured as master and enables the following operations to be executed remotely:

- read Ekip Aware measurements and information
- manage certain controls, including opening and closing the circuit-breaker
- configure parameters, including those not available on the display
- If connected to a withdrawable version of the circuit-breaker, the allows the racked-in/racked-out status to be detected



IMPORTANT: the remote open and close commands of the circuit-breaker can only be executed if Ekip Aware is in the Remote configuration mode and the circuit-breaker is equipped with YO Sense and YC Sense coils (page 265).

The module is always supplied with Ekip AUP and Ekip RTC contacts (page 273, 274).

The System Interface document is available for mapping the module in its Modbus TCP communication network. All the required communication and command details are listed in the document (page 237).

In addition, the following digital upgrades can be enabled if the module is present:

- Modbus TCP Security Protocol, which implements a protected channel for Modbus TCP communication
- Ekip Link, with which the module enables integration of Ekip Aware into an internal Ethernet network using ABB proprietary protocol (Link Bus), implementation of the logic Zone Selectivity function and expansion of the Custom Logic and Power Controller functionalities (if the respective packages for the protection release are purchased)
- Advanced MDGF, which integrates all the functions of the Ekip Link package with the addition of the Advanced MDGF function

Depending on the parameter settings, described in the next pages, the ports used by the module are:

Port	Service	Notes
502/tcp	Modbus TCP	With basic version of module
319/udp	IEEE 1588	With IEEE 1588 protocol enabled
320/udp		
802/tcp	Modbus TCP Security Protocol	With Modbus TCP Security Protocol digital package enabled
18/udp	ABB proprietary	With Ekip Link digital package enabled, for fast data exchange among ABB devices
68/udp	DHCP client	Client DHCP protocol enabled, as an alternative to Static IP Address = On

Electrical characteristics

Model	Ekip Supply 24-240 VDC
Power supply voltages	21,5 ÷ 265 VDC
Frequency	45 - 66 Hz
Maximum power consumption without modules	3 W/VA
Maximum power consumption with maximum number of modules connected	10 W/VA
Maximum inrush current	2 A for 20 ms

**IMPORTANT:**

- Consult chapter Cybersecurity guidelines on page 80
- The module cannot be connected directly to the Internet. Only connect to dedicated Ethernet networks with Modbus TCP communication protocol

Bus Ethernet

An Ethernet bus on connector RJ45 (marked W9) and two 100BASE-T1 buses on the same number of connectors (marked 100M in and 100M out) are made available on the module in order to implement Modbus TCP communication (Standard or Secure) and the functions that can be actuated using the Ekip Link package.

By default:

- Modbus TCP communication can only be implemented via connector RJ45
- the Ekip Link functions can only be implemented via the 100BASE-T1 lines

The default configurations can be altered by setting the dedicated parameters described in Remote configurations on page 290.

The devices connect in the daisy chain mode exclusively for communication via Link bus. The devices only use the daisy chain mode for Modbus TCP when the Extend Modbus traffic 100M Port parameter is enabled.

The modules connect by using both buses, but must avoid creating a loop. For example, they connect in the daisy chain mode to the 100M ports and to the same switch with RJ45 when Link bus is enabled on both 100Base T1 and on RJ45.

Direct point-to-point connection between two modules by means of connector RJ45 is obtained by using one of the following, mutually exclusive, modes:

- using a crossover-type Ethernet cable
- by setting the complementary MDI mode in the two modules (one set in MDI and the other in MDI-X, using the Ethernet MDI Mode parameter



NOTE: the parameter is for exclusive use in the configuration of the connection between two modules; it is neither used nor considered in other configurations.

Connections

Use AWG 22-16 cables with 1.4 mm maximum outer diameter to connect the external supply.

Cable of the Class 6 type with S/FTP double screening must be used for communication connected to the RJ45 connector.

Use a suitable 2-wire cable for the Ethernet connection, e.g. a T1 SPE cable with double shielding type HARTING T1 SPE/SF/TP 1x2xAWG26/7, up to 15 m in length.

Use the twisted cable supplied with Ekip Cartridge for communication between the W3-W4 lines. If a longer cable is required, use BELDEN 3105A shielded cable or equivalent, not more than 15 m in length. The shield must be earthed from both sides.

To connect the module to Ekip Aware, please consult document [1SDH002310A1511](#).

Ekip Link function To implement the Ekip Link functions, such as Programmable Logic, Power Controller, logic Zone Selectivity and Advanced MDGF, excluding the Ekip Signalling 10K Link modules, the units involved must all have an Ekip Supply Evo Modbus TCP with the function enabled. The IP addresses of all the remaining modules connected in each of the modules involved must be entered.

The modules must be connected to a dedicated network. The network must include solely Ekip modules, such as Supply Evo Modbus TCP or Ekip Signalling 10K Link, and Ethernet switches that declare support to the level L2 multicast in the datasheet. If the network also includes routers, multicast must be enabled and configured in all the level L3 VLAN interfaces. Each device is defined an actor in the Ekip Link network. Each Ekip Supply Evo Modbus TCP can interface with up to 15 actors, of which up to 12 for the Logic Zone Selectivity function and 8 for the Advanced MDGF function.

Programmable Logic The Programmable Logic function is activated when the Ekip Link digital package is present. This function can be used to program activation up to 4 bits of the module, each as a function of any combination of the state bits of one of the actors paired to the module (if this actor is represented by a compatible protection release).

These four bits of the module are called Remote Programmable Status A-B C and D and their value is transmitted to the Ekip Aware to which the module is connected.

In addition, the Ekip Link package:

- provides up to four Word, or registers into which the content of a register (which can be selected from a list) of an actor (if the actor is represented by a compatible Trip Unit) can be copied.
- enables one of three possible Ekip Signalling 10K Link modules (which can be connected to the Link Bus) to be paired to an actor

Power Controller Using the Power Controller function, each actor can:

- Acquire the status and control the loads
- Act as master and collect the energy measurements of actors entered as Energy Meters
- Supply energy measurements to actors entered as masters

The state of the loads can be acquired by checking the state of the inputs of the signalling modules connected to the actors, while load control can be performed by programming the outputs.

Remote acquisition of the state of the loads and monitoring of the loads can also be implemented with Ekip Signalling 10K Link modules connected to the network.

Further information on the potential of the function is available in the White Paper [1SDC007410G0201](#) "Load management with Ekip Power Controller for SACE Emax 2".

Logic Zone Selectivity With the logic Zone Selectivity function:

- the actors perform the role of interlock with respect to the circuit-breaker to which the module is connected
- for each interlock entered, the protections for which logic selectivity must be actuated must be selected, by setting a mask
- If both hardware and logic selectivity have been selected (instead of just hardware), the consequently selected protections will add to those of hardware selectivity
- You can enable diagnostics for each interlock, in order to check for inconsistencies between the hardware and logic selectivity settings
- a mask can be set (solely applicable to logic selectivity information) for the purpose of identifying those protections to which the received selectivity information must be re-transmitted, regardless of whether the actor is in the alarm state or not.

Further details about the logic Selectivity function are available on page 119.

Advanced MDGF Advanced MDGF protection enables earth fault selectivity to be implemented beginning from the measurements of the earth current of the actors, synchronized by means of the IEEE 1588 protocol or master clock and transmitted via Link Bus.

Further details about the Advanced MDGF function are available on page 108.

Interface The module has five signalling LEDs:

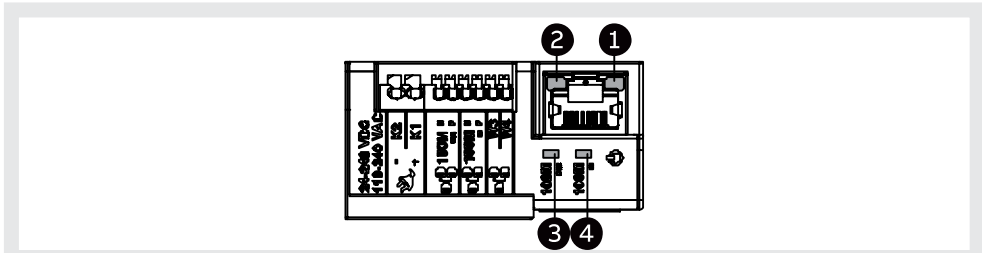


Figure 247

LED	Description
Power	Signals the on status and correct communication with Ekip Aware: - Off: module off - on and steady or with flashing synchronized with Power LED of Ekip Aware: module on and communication with protection release present - flashing not synchronized with Power LED of Ekip Aware (two fast flashes per second): module on and communication with protection release absent
Activity (1)	Indicates the communication state on connector RJ45: - off: no activity on the line - flashing (activity on line present receiving and/or transmitting)
Link (2)	Indicates the communication state on connector RJ45: - Off: incorrect connection, signal absent - on fixed: correct connection
100M in (3)	Indicates the state of the physical connection of the 100M in lines: - Off: incorrect connection, signal absent - on: connection correct
100M out (4)	Indicates the state of the physical connection of the 100M out lines: - Off: incorrect connection, signal absent - on: connection correct

Remote configurations Additional parameters can be accessed via USB-C port, via BLE and via system bus:

Parameter	Description	Default
Force Static IP Address	Defines whether the module has the dynamic (OFF) or static (ON) IP address If = ON, all the associated parameters are enabled	OFF
Static IP Address	Enables the static IP to be selected	0.0.0.0
Static Network Mask	Enables the subnet mask to be selected	0.0.0.0
Static Gateway Address	When there are several subnets, enables the IP address of the node to which the module is connected to be selected	0.0.0.0
Enable IEEE 1588	Allows the IEEE 1588 protocol for distribution of the clock and synchronization signal to be enabled.	OFF
IEEE 1588 master	Enables the module to be set up as a master in the the network segment to which it belongs (synchronization clock)	OFF
IEEE 1588 delay mechanism	Allows the data exchange mode between module and master, either Peer-to-Peer or End-to-End, to be selected.	End-to-End
Time zone	Defines the time zone to be used for synchronism	+00:00
Daylight Saving Time	Used to select whether daylight saving time is present (ON) or not (OFF) in the country to which the synchronization time refers	OFF

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Parameter	Description	Default
<i>Gratuitous ARP</i>	Enables periodic generation of a Gratuitous ARP message, used by Ekip Connect to rapidly find the modules via Ethernet scan without knowing the IP address beforehand	ARP Enabled
<i>IEEE 1588 Boundary clock</i>	Parameter useful if an IEEE 1588 GrandMaster clock is not available: • if enabled (ON), the module is considered to be the IEEE1588 master clock by all the slaves/devices in the same local network, even if the source of external synchronism is different from IEEE 1588 (SNTP for example) • if disabled (OFF), the module benefits from the synchronism of the master in its own network	OFF
<i>Ethernet 100Base-TX MDI Mode</i>	Enables either MDI or MDI-X to be set as the type of connection of the Ethernet cable on the 100Base-TX port of the module. This is useful for direct point-to-point connection between two Ekip Supply Evo Modbus TCP modules when a straight-through cable is used. Alternatively, a crossover cable can be used.	MDI
<i>Extend Modbus traffic 100M Port</i>	Enables the capability of extending Modbus TCP communication (Standard or Secure) to the 100BASE-T1 lines by connecting them to the Modbus TCP bus; in fact, by default, Modbus TCP communication can only be implemented via the RJ45 connector of the module	OFF
<i>ICMP traffic enable</i>	Enables the capability of conducting a ping test of the module	OFF

Remote information

The following information can be accessed via USB-C port, via BLE and via system bus:

Information	Description
<i>SN and Version</i>	Serial number and software version of module
<i>IP Address</i>	Address of the module, assigned to the module by a DHCP server at the time of connection to the network in the case of configuration with a dynamic IP or settable in the case of a static IP.  NOTE: without a DHCP server, the module automatically adopts a random IP address within the 169.254.xxx.xxx range
<i>Network Mask</i>	Subnet mask; identifies the method for recognizing the subnet to which the modules belong and enables modules to be searched for within a defined set of recipients.
<i>Gateway Address</i>	IP address of the node to which the module is connected, in the presence of several subnets
<i>Connected client 1, 2, 3</i>	IP addresses of the client devices connected to the module (in the Server mode)
<i>MAC address</i>	Address assigned by ABB, with OUI (Organizationally Unique Identifier) equal to ac:d3:64, which uniquely identifies the manufacturer of an Ethernet device
<i>100M In Port 100M Out Port</i>	Signals errors in connection to the port
<i>100Base-TX (ETH)</i>	Signals errors in connection to the port

Link Configuration

New parameters for enabling and configuring the function are available if the Ekip Link package is present. For the sake of convenience, the following descriptions refer to paths and menus via Ekip Connect, on the “Ekip Supply Evo Modbus TCP - General” and “Ekip Supply Evo Modbus TCP-Link configuration” pages.

Parameter	Description	Default
Enable Link Bus	If the Ekip Link digital package is present, enables the capability of implementing functions that can be actuated via Link bus.	OFF
Extend Link Bus on ETH Port	Enables extension of the communication for the purpose of implementing the Ekip Link functions via RJ45 connector, by connecting it to the Link bus. By default, the functions are implemented solely via the 100BASE-T1 lines of the module	OFF
IP Address	Enables the IP address of the actor to be entered for each of the 15 potential actors	0.0.0.0
Configuration parameters	If a different IP Address from default has been entered, the ability to set the following parameters is enabled for each actor of the module: - Enables the role of slave (if False) or master (if True) to be selected in the case of Power Controller, Power Controller Master functions - If the function is Power Controller and the role of slave has been selected for the actor, Power Controller Energy Meter allows the capability of using the energy measurements of the actor to be enabled (the setting has no effect if the role of master has been selected for the actor) - If True, Selectivity Actor enables the actor to be selected as interlock unit in the Logic Zone Selectivity function and the relevant configuration parameters to be enabled - If True, MDGF Actor enables the actor to be selected as unit in the Advanced MDGF function and the relevant configuration parameters to be enabled	False False False False
Remote Programmable Status (A ÷ D)	With reference to the Programmable Logic function, for each of the four programmable bits of the module: - Actor Selector allows you to select the actor (from 1 to 15) to which the bit is paired - Program OpCodes allows you to program the combination of events of the selected actor, to which the active state (if the condition is met) or non-active state (if the condition is not met) of the bit must correspond	Actor 1 None
Remote Status Word (A ÷ D)	For each of the four Word of the module: - Actor Selector allows you to select the actor (from 1 to 15) to which the Word is paired - Status Word Selector allows you to select, from a list, the register of the selected actor, the content of which must be copied into the Word of the module	None Global
Ekip Signalling 10K Link (1 to 3)	If there are Ekip Signalling 10K Link modules connected to the Link Bus, for each of the three possible Ekip Signalling 10K Link modules enables one of the 15 possible actors (and the relevant IP address) to be paired to the module itself	None

Link informations With reference to the Ekip Link functions, the following state information is available via USB-C port, via BLE and via system bus:

Information	Description
Communication Error	Signals a communication error (for example, absence on the Link Bus of a device with IP Address entered) for each of the 15 possible actors of the module for which a different IP Address from default has been entered
Remote Programmable Status (A ÷ D)	With reference to the Programmable Logic function, signals the state of the bit (True if active or False if non-active) of each of the four programmable bits of the module
Remote Status Word (A ÷ D)	Gives the content of the Word of each of the four Word of the module
Ekip Signalling 10K Link (1 to 3)	Signals an error in the connection to the Ekip Signalling 10K Link module or that it is not an Ekip Signalling 10K Link module
Input I (01 ÷ 10)	If there are Ekip Signalling 10K Link modules connected to the Link Bus, the function enables one of the 15 possible actors, including the relevant IP address, to be paired to each of the three Ekip Signalling 10K Link modules

Modbus TCP Security Protocol - Configurations, information and procedures

New parameters for enabling and configuring are available if the Modbus TCP Security Protocol package is present.

For the sake of convenience, the following descriptions refer to paths and menus via Ekip Connect, on the “Ekip Supply Evo Modbus TCP - General” page.

Configurations

Parameter	Description	Default
Enable Secure Modbus	Allows you to select the non-protected Modbus TCP (Standard Modbus (port 502)) or protected (Secure Modbus (port 802)) communication channel	Standard Modbus (port 502)
Enable Intermediate CA	Enables an intermediate CA to be inserted in the client and server certificate validation chain. If the option is disabled, the client and server certificates are validated directly with respect to the Root CA.  NOTE: the parameter is available if the “Secure Modbus (port 802)” channel has been selected	Disabled

About

Information about the function is active and available if the “Secure Modbus (port 802)” has been selected:

Information	Description
Server certificate	Signals an error in the certificate or in the server key
Root CA	Signals a Root CA verification error
Enable Intermediate CA	Signals an Intermediate CA verification error  NOTE: the parameter is available and valid if the “Enable Intermediate CA” has been enabled

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