INSTALLATION AND OPERATING INSTRUCTION

Automatic transfer switches

TruONE™ ATS, OX_ 30. . .1600_



Receiving, handling and storage



Warning

HAZARD OF EQUIPMENT OVERTURNING

When moving with a fork lift, do not remove the shipping package until the device is in its final location.

Failure to follow this instruction will result in personal injury or equipment damage.

Receiving and handling

Upon receipt, carefully inspect the switch for damage that may have occurred during transit. If damage is evident, or there is visible indication of rough handling, immediately file a damage claim with the transportation company, and notify your local ABB sales office.

Do not remove the shipping package until ready to install the switch.

Storage

If the unit will not be placed into service immediately, store the switch on its original package in a clean, dry location. To prevent condensation, maintain a uniform temperature. Store the unit in a temperature controlled building, allowing adequate air circulation and protection from dirt and moisture. Storing the unit outdoors could cause harmful condensation inside the switch enclosure.

Read these safety instructions carefully before using this product!



Danger

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Wear appropriate personal protective equipment and follow safe electrical work practices.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Disconnect all sources of electrical supply before performing visual inspections, tests, service or maintenance on the equipment. Assume that all circuits are live unless they are completely de-energized, tested, grounded, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding.
- Turn off switch before removing or making load side connections.
- Always use a properly rated voltage sensing device at all line and load to confirm switch is off.

Failure to follow these instructions could result in death or serious injury.



General warning

HI-POT OR DIELECTRIC TEST

- Performing a hi-pot or dielectric test on the power section, REMOVE the mechanism from the switch.
- See details in Service Instruction manual.

CYBER SECURITY

Legal Disclaimer

This product is designed to be connected to and to communicate information and data via a network interface. It is customer's sole responsibility to provide and continuously ensure a secure connection between the product and your network or any other network (as the case may be) and to establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc.) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

ABB and its affiliates are not liable for damages and/or losses related to such security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

Although ABB provides functionality testing on the products and updates that we release, you should institute your own testing program for any product updates or other major system updates (to include but not limited to code changes, configuration file changes, third party software updates or patches, hardware change out, etc.) to ensure that the security measures that you have implemented have not been compromised and system functionality in your environment is as expected.

Defense in Depth in Product

The products similar to TruONE, are susceptible to many security threats due to type of device and resource limitations. TruONE address threats mentioned below by providing security capabilities to counter these threats, as part of product defense in depth strategy to improve security of overall system.

- Improper and invalid input
- Excessive network communication
- Firmware tampering
- Unauthorized modification of product configuration and parameters

Secure communication is critical to maintain the confidentiality, integrity and authenticity of transmitted data. To mitigate the risks with use of unsecure communication protocols ABB recommends customers to follow the product user mitigation strategies.

To enhance the security of TruONE, a session timeout capability is implemented. This capability ensures that user sessions are automatically logged out after a period of inactivity, reducing the risk of unauthorized access.

Secure firmware update ensures that the installed firmware of TruONE is authentic. The firmware is digitally signed by ABB to protect the authenticity and integrity, and the device only installs the firmware when digital signature is verified.

TruONE comes with event logging functionality which creates a log of all the events that concerns the security of the device like configuration changes, etc. The log is accessible in HMI or Ekip Connect tool.

Security hardening recommendations

The commissioning phase is crucial for ensuring that TruONE is set up securely and operates effectively. The customer must implement security measures recommended below to protect the product from unauthorized access and potential threats. Make best use of product security capabilities wherever possible for hardening in addition to the below mentioned points.

- Restrict physical access to the product
- Ensure that only necessary services are running
- Ensure that the latest firmware is installed on the product
- Change all default passwords

The decommissioning phase is essential for securely removing TruONE from active use.

- Perform factory data reset (default settings) by using HMI or Ekip Connect tool

Report Vulnerabilities

To report a cyber security vulnerability, problem or incident in the product, or to get the latest information about cyber security, visit the ABB Cyber Security Portal or send an email.

Website: https://www.abb.com/cybersecurity

Email: cybersecurity@ch.abb.com

Sign-up for security notification emails on the Cyber security alerts and notifications — ABB Group: https://global.abb/group/en/technology/cyber-security/alerts-and-notifications

Installation and operating instruction

Automatic transfer switches, TruONE™ ATS

OPERATING INSTRUCTIONS, TRUONE™ ATS, OX_30...1600

CHAPTERS 1–7

INSTALLATION INSTRUCTIONS, TRUONE™ ATS, OX_30...1600

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Automatic transfer switches, TruONE™ ATS

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1. Introduction

This manual describes the installation and the basic operation of the automatic transfer switches TruONE™ ATS (OX_30…1600_), manufactured by ABB.

Mounting instructions for the switch and for the available accessories, see Part 2, chapters 8 and 9.

Dimension drawings, see Part 2, chapter 10.

1.1 Use of symbols in manual



Hazardous voltage
Warns about a situation where a hazardous voltage may cause physical injury to a person or damage to equipment.



General warning
Warns about a situation where something other than electrical equipment may cause physical injury to a person or damage to equipment.



Caution
Provides important information or warns about a situation that may have a detrimental effect on equipment.



Information
Provides important information about the equipment.

1.2 Explanations of abbreviations and terms

ATS
Automatic transfer switches

Ekip
Electronic accessories / Ekip-modules; communication, signaling and connectivity modules

HMI
Control interface (Human Machine Interface), operating and configuration, available in three different level types

Level 2
HMI with DIP-switches

Level 3
HMI with LCD-screen

Level 4
HMI with touch screen and sensor module

OX_
Automatic transfer switches, type name

OXA_B
Automatic transfer switch, open transition I - II, Source on bottom, type name

OXA_T
Automatic transfer switch, open transition I - II, Source on top, type name

OXB_B
Automatic transfer switch, delayed transition I - O - II, Source on bottom, type name

OXB_T
Automatic transfer switch, delayed transition II - O - I, Source on top, type name

Programming port
Only for Ekip Programming and Ekip Bluetooth -modules (USB port)

Slide switch
Switch for operating mode selection (Hand - Locking - AUTO)

S1
Source 1, power supply

S2
Source 2, power supply

TruONE™ ATS
Automatic transfer switches, product name

2. Product overview

Automatic transfer switches TruONE™ ATS (type OX_), from 30 A up to 1600 A, are designed for use in emergency or standby systems to transfer a load automatically from one source to another. TruONE™ ATS automatic transfer switches can be operated also electrically by DIP, LCD or Touch control interface (HMI) and manually by using the handle. Operating mode can be selected by the slide switch (Hand - Locking - AUTO) on switch front. Configuration is done by HMI. TruONE™ ATS automatic transfer switches are suitable for low voltage automatic transfer switch applications.

The available operation types for automatic transfer switches:

- Automatic transfer switch TruONE™ ATS, type OXA30...1600_: Open transition
  - OXA30...1600_B_: I - II, sources on bottom, load on top
  - OXA30...1600_T_: II - I, sources on top, load on bottom
- Automatic transfer switch TruONE™ ATS, type OXB30...1600_: Delayed transition
  - OXB30...1600_B_: I - O - II, sources on bottom, load on top
  - OXB30...1600_T_: II - O - I , sources on top, load on bottom

2.1 General overview

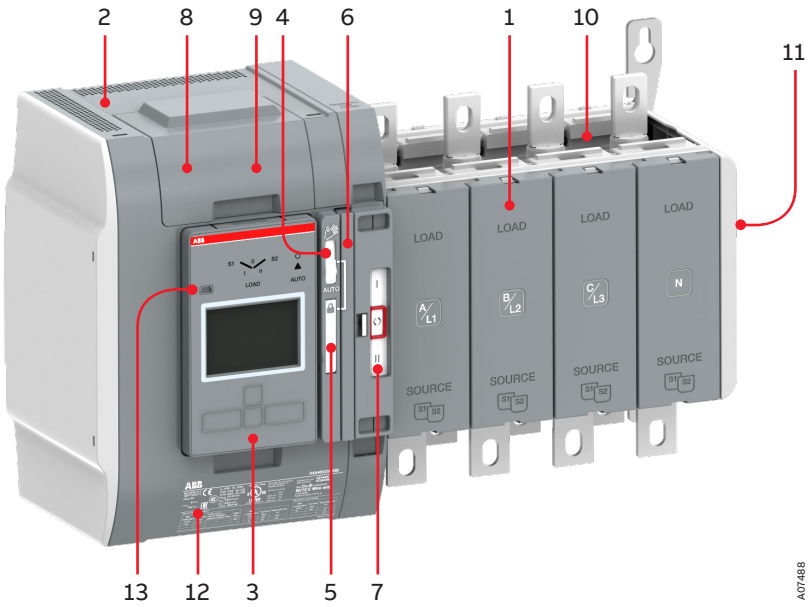


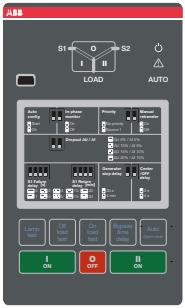
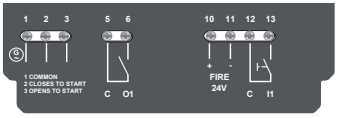
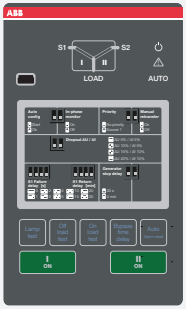
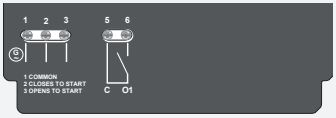
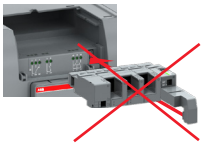
Fig. 2.1 Automatic transfer switch, TruONE™ ATS, type OXB_B

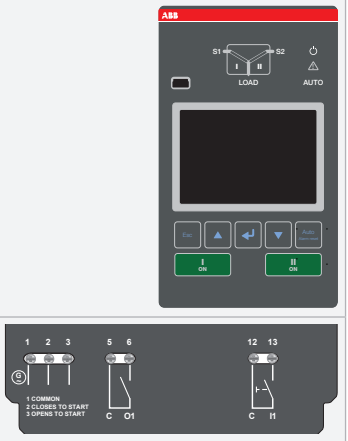
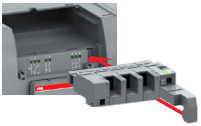
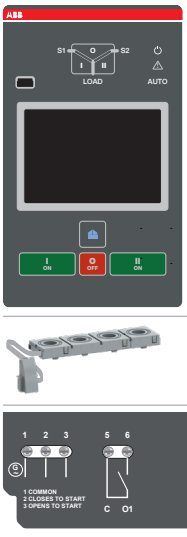
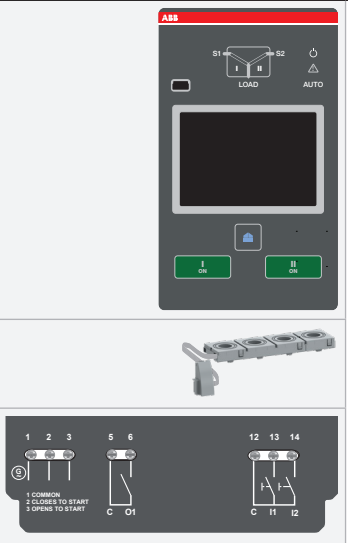
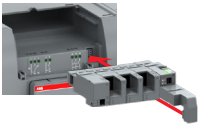
1 Transfer switch
2 Embedded ATS control unit and mechanism
3 Detachable HMI unit, three types of control interfaces Level 2 (DIP), Level 3 (LCD) and Level 4 (touch) for configuration and automatic operation
4 Slide switch (Hand - Locking - AUTO) for selection of the operation mode
5 Padlocking the automatic transfer switch to prevent automatic and manual operation. Note: Slide switch (Hand - Locking - AUTO) has to be in Locking-position
6 Handle for manual operation
7 Position indication
8 Terminals for control circuit connections (behind the cover)
9 Place for connectivity modules (aux power supply, communication and signaling)
10 Place for sensor module (included only with Level 4 products)
11 Place for auxiliary contact blocks
12 Product identification label
13 Programming port, only for Ekip Programming and Ekip Bluetooth-modules

2.1.1 Differences of level types / operation types and suitability of Ekip-modules

In this table you can find the differences of the controller level types 2, 3 and 4 in the automatic transfer switch operation types of open and delayed transition. The differences are on HMI and on number of I/O contacts. For more information on HMIs, see chapter 2.2. For wiring, see chapter 7.

In addition you can find to which controller level types the Ekip connectivity modules mounted with auxiliary power supply module (see chapters 5.4 ...5.6) are suitable.

Operation types, TruONE™ ATS, type OX_30...1600_		**Ekip- modules suitable**
Delayed transition, OXB_	Open transition, OXA_	
S1 I O II S2 Load	S1 I II S2 Load	
Level 2: HMI (with DIP-switches) and connections of control circuit		
 	 	Not suitable 

Operation types, TruONE™ ATS, type OX_30...1600_		Ekip-modules suitable
Delayed transition, OXB_	Open transition, OXA_	
S1 I O II S2 Load	S1 I II S2 Load	
Level 3: HMI (with LCD-screen) and connections of control circuit		
		Suitable 
Level 4: HMI (with touch-screen) and connections of control circuit, sensor unit included		
		Suitable 

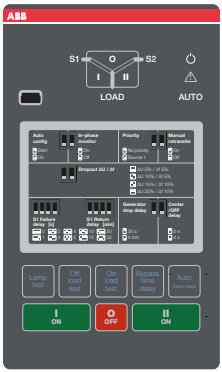
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Table 2.1 The differences of controller level types / operation types and the suitability of Ekip-modules

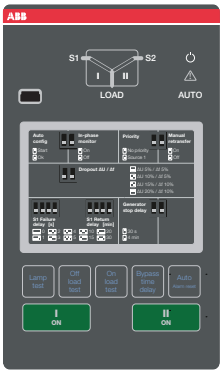
2.2 HMI

HMI is the control interface (Human Machine Interface), available in three different level types. Level 2 contains the HMI with DIP-switches, Level 3 contains the HMI with LCD-screen and level 4 contains the HMI with touch screen. The HMI is used for configuration and operation.

Level 2:
HMI with
DIP-switches



I - O - II (or II - O - I)



I - II (or II - I)

Level 3:
HMI with
LCD-screen



I - O - II (or II - O - I)



I - II (or II - I)

Level 4:
HMI with
touch screen



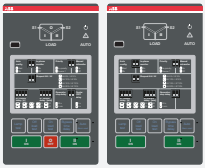
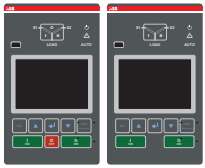
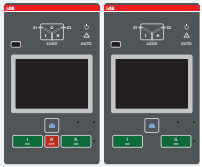
I - O - II (or II - O - I)



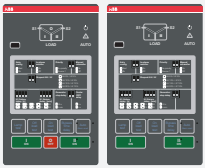
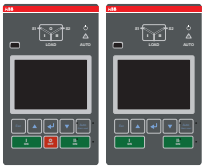
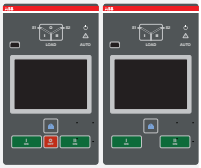
I - II (or II - I)

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Fig. 2.2 HMIs available in three Level types: upper pictures; delayed transition I - O - II (or II - O -I) and lower pictures; open transition I - II (or II - I)

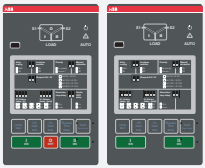
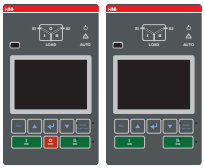
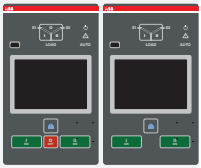
2.3 TruONE™ ATS feature comparison

Feature comparison	Level 2 controls (DIP)	Level 3 controls (LCD)	Level 4 controls (TOUCH)
			
Ampere sizes available	IEC: 160...1600 A	IEC: 160...1600 A	IEC: 160...1600 A
	UL: 30...1200 A	UL: 30...1200 A	UL: 30...1200 A
Rated voltage, three phase	200...480 Vac	200...480 Vac	200...480 Vac
Rated voltage, single phase	200...480 Vac	200...480 Vac	200...480 Vac
Rated frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phase system	Single and Three	Single and Three	Single and Three
Number of poles	2, 3 and 4	2, 3 and 4	3 and 4
Neutral configuration			
Switched	Yes	Yes	Yes
Overlapping	No	Yes	Yes
Product type			
Open transition (I-II or II-I)	Yes	Yes	Yes
Delayed transition (I - O - II or II - O - I)	Yes	Yes	Yes
Voltage and frequency settings			
Pick up Voltage Source 1	Fixed 2% above drop out	71...99%, 101...119%	71...99%, 101...119%
Drop out Voltage Source 1	+/-5, 10, 15, 20%	70...98%, 102...120%	70...98%, 102...120%
Pick up Voltage Source 2	Fixed 2% above drop out	71...99%, 101...119%	71...99%, 101...119%
Drop out Voltage Source 2	+/-5, 10, 15, 20%	70...98%, 102...120%	70...98%, 102...120%
Pick up Frequency Source 1	Fixed 1% above drop out	80,5...99,5%, 100,5...119,5%	80,5...99,5%, 100,5...119,5%
Drop out Frequency Source 1	+/-5, 10%	80...99%, 101...120%	80...99%, 101...120%
Pick up Frequency Source 2	Fixed 1% above drop out	80,5...99,5%, 100,5...119,5%	80,5...99,5%, 100,5...119,5%
Drop out Frequency Source 2	+/-5, 10%	80...99%, 101...120%	80...99%, 101...120%

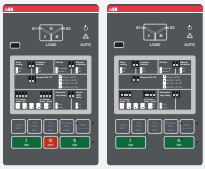
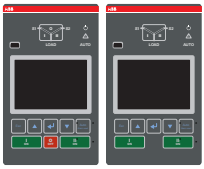
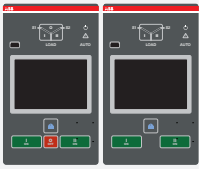
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Feature comparison	Level 2 controls (DIP)	Level 3 controls (LCD)	Level 4 controls (TOUCH)
			
Time delay settings			
Override momentary Source 1 Outage, sec	0, 1, 2, 3, 4, 5, 10, 15, 20, 30	0…60	0…60
Transfer from source 1 to source 2, sec	2 (0…3600 via Ekip Connect)	0…3600	0…3600
Override momentary Source 2 Outage, sec	2 (0…60 via Ekip Connect)	0…60	0…60
Transfer from source 2 to source 1, min	0, 1, 2, 3, 4, 5, 10, 15, 20, 30	0…120	0…120
Generator stop delay, min	30 secs or 4 mins	0…60	0…60
Center-OFF delay, sec	0 or 4	0…300	0…300
Pre-transfer delay S1 to S2, sec	No	0…300	0…300
Post-transfer delay S1 to S2, sec	No	0…300	0…300
Pre-transfer delay S2 to S1, sec	No	0…300	0…300
Post-transfer delay S2 to S1, sec	No	0…300	0…300
Elevator Pre-signal delay S1 to S2, sec	No	0…60	0…60
Elevator Post-signal delay S1 to S2, sec	No	0…60	0…60
Elevator Pre-signal delay S2 to S1, sec	No	0…60	0…60
Elevator Post-signal delay S2 to S1, sec	No	0…60	0…60
Load shed delay, sec	No	0…60	0…60
Source failure detections			
No voltage	Yes	Yes	Yes
Undervoltage	Yes	Yes	Yes
Overvoltage	Yes	Yes	Yes
Phase missing	Yes	Yes	Yes
Voltage unbalance	Yes	Yes	Yes
Invalid frequency	Yes	Yes	Yes
Incorrect phase sequence	Yes	Yes	Yes

Continued on the next page

Feature comparison	Level 2 controls (DIP)	Level 3 controls (LCD)	Level 4 controls (TOUCH)
			
Features			
Controls	DIP + keys	LCD + keys	Touch + keys
LED indications for ATS, S1 and S2 status	Yes	Yes	Yes
Open transition - Standard digital inputs/outputs	0 / 1	1 / 1	2 / 1
Delayed transition - Standard digital inputs/outputs	1 / 1	2 / 1	3 / 1
Programmable digital inputs/ outputs	No	Yes	Yes
Auto config (voltage, frequency, phase system)	Yes	Yes	Yes
Source priority	Source 1, No priority	Source 1/2, No priority	Source 1/2, No priority
Manual retransfer	Yes	Yes	Yes
In-phase monitor (synchro check)	Yes	Yes	Yes
Genset exercising: on-load, off-load	Yes	Yes	Yes
In-built power meter module	No	No	Yes
Load shedding	No	Yes	Yes
Real time clock	Yes	Yes	Yes
Event log	Via Ekip Connect	Yes	Yes
Predictive maintenance	No	No	Yes
Harmonics measuring	No	Voltage	Voltage, current

Continued on the next page

Feature comparison	Level 2 controls (DIP)	Level 3 controls (LCD)	Level 4 controls (TOUCH)
			
Field-mount accessories			
Auxiliary contacts for position indication	Yes	Yes	Yes
Digital input/output modules	No	Yes	Yes
12-24 Vdc aux supply module for controller	No	Yes	Yes
Communication modules	No	Yes	Yes
Connectivity			
Modbus RTU (RS-485) [2]	No	Yes	Yes
Modbus/TCP [2]	No	Yes	Yes
Profibus DP [2]	No	Yes	Yes
ProfiNet [2]	No	Yes	Yes
DeviceNet [2]	No	Yes	Yes
Ethernet IP [2]	No	Yes	Yes
Ekip Com Hub (monitoring via ABB Ability™: EAM)	No	Yes	Yes
For applications			
Mains - Mains	Yes	Yes	Yes
Mains - Generator[1]	Yes	Yes	Yes

[1] Contact ABB for applications with smaller than 20 kVA gensets [2] Includes support for redundant module

—

Table 2.2 ATS feature comparison, main features - but not limited to - in the table above

2.4 Typical applications

TruONE™ automatic transfer switches are used for transferring a load automatically from one source to another.

Possible supply phase scenarions are located on following page. In Chapter 4 / Navigating menu / Parameters: Power distribution systems (Level 3 and Level 4), the considerations for supply phase system design are set forth in. Factory setting: 3 phases with neutral.

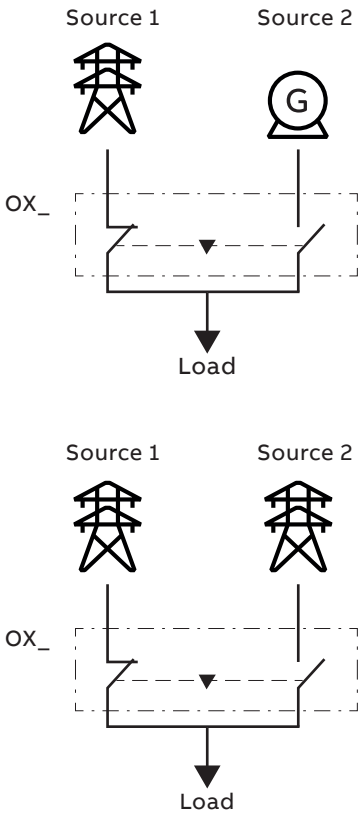
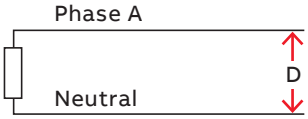
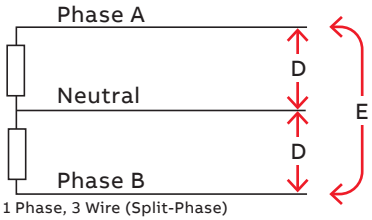


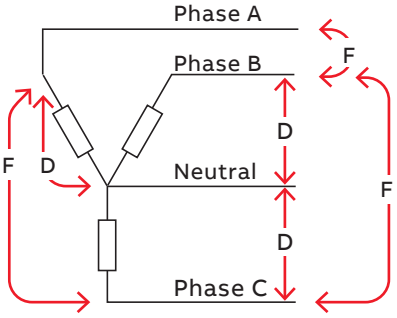
Fig. 2.3 Typical applications of automatic transfer switches



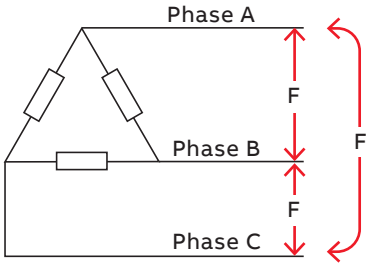
1 Phase, 2 Wire



1 Phase, 3 Wire (Split-Phase)

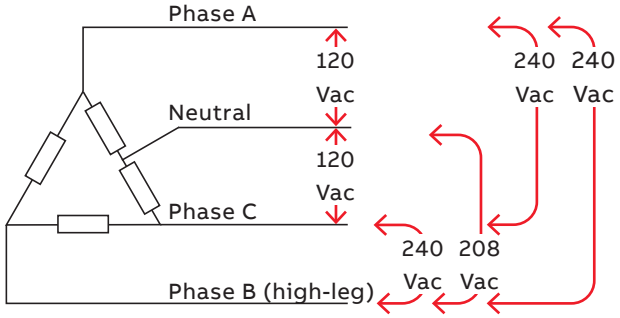


3 Phase 4 Wire, Wye

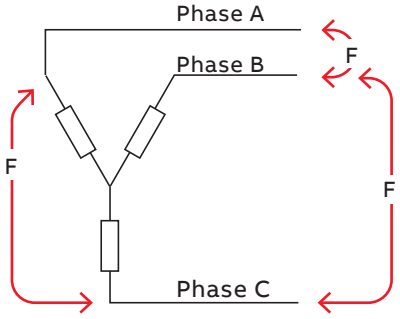


3 Phase 3 Wire, Delta

D	E	F
200...277 Vac L-N	200...480 Vac L-L	200...480 Vac L-L



3 Phase 4 Wire, High-Leg Delta



3 Phase 3 Wire, Wye

—

Fig. 2.4 Possible supply phase scenarios

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2.5 Description of basic functionality

2.5.1 Switching sequence / Automatic

2.5.1.1 Source 1 Priority (Source 2 = Generator)

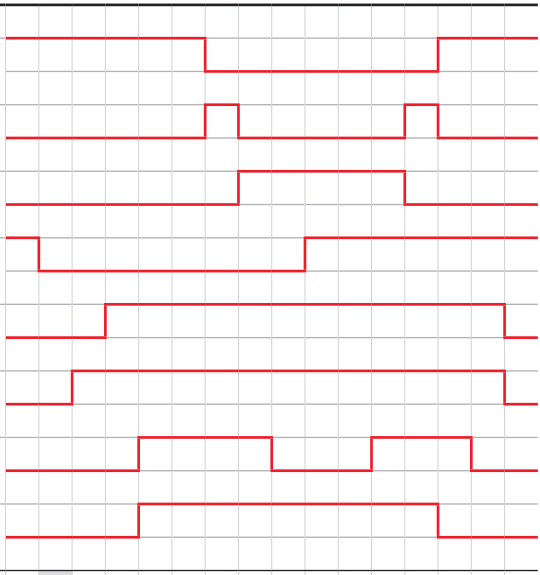
Switching sequence summary:

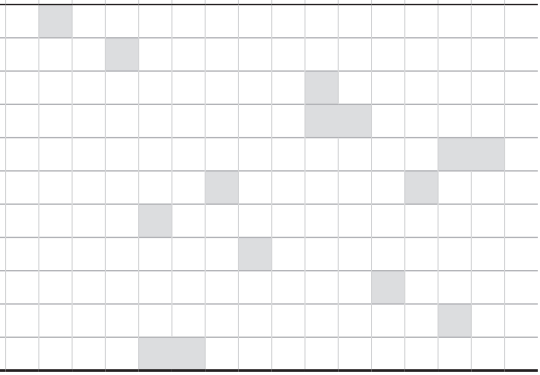
- An anomaly occurs on the source 1
- Override momentary S1 outage delay
- Generator start
- Source 2 OK
- Transfer from S1 to S2 delay
- Pre-transfer signal on
- Load shed signal on
- Pre-transfer S1 to S2 delay
- Load shed delay
- Transfer switch to the position O (only with delayed transition I-O-II type and at least one phase exists in source 1)
- Center-Off delay (only with delayed transition I-O-II type, delay is zero when all phases are missing in source 1)
- Transfer switch to the position II (source 2)
- Post-transfer S1 to S2 delay
- Pre-transfer signal off

Retransfer sequence summary:

- The source 1 is restored
- Transfer from S2 to S1 delay
- Pre-transfer signal on
- Pre-transfer S2 to S1 delay
- Transfer switch to the position O (only with delayed transition I-O-II type)
- Center-off delay (only with Delayed transition I - O - II type)
- Transfer switch to the position I (source 1)
- Load shed signal off
- Generator stop delay
- Post-transfer S2 to S1 delay
- Pre-transfer signal off
- Generator stop
- Source 2 off

Source 1 priority (Source 2 = generator)





Note: The functionality and sequence of ‘Elevator pre- and post-signals’ is equivalent to ‘Pre- and Post-transfer’ features.

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Table 2.3 Automatic Switching Sequences, Source 1 Priority (Source 2 = Generator)

2.5.1.2 Source 2 Priority (No generator)

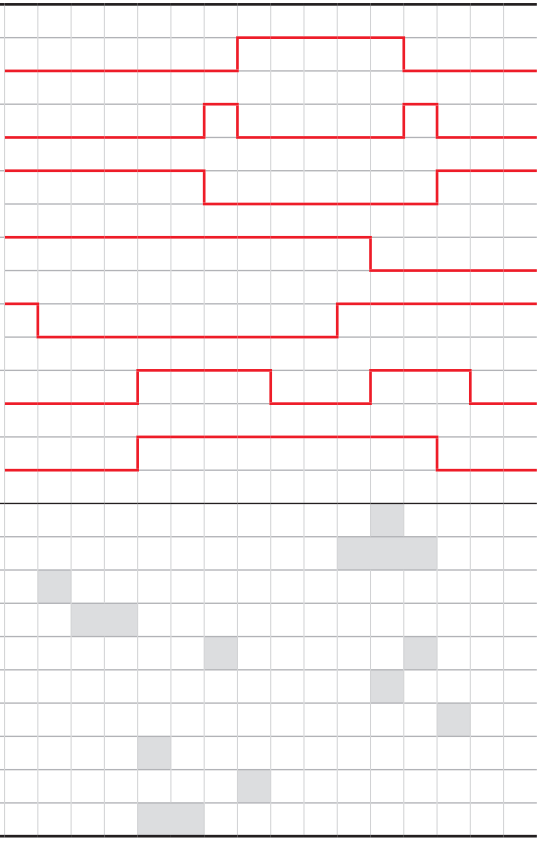
Switching sequence summary:

- An anomaly occurs on the source 2
- Override momentary S2 outage delay
- Transfer from S2 to S1 delay
- Pre-transfer signal on
- Load shed signal on
- Pre-transfer S2 to S1 delay
- Load shed delay
- Transfer switch to the position O (only with delayed transition I-O-II type and at least one phase exists in source 2)
- Center-Off delay (only with delayed transition I-O-II type, delay is zero when all phases are missing in source 2)
- Transfer switch to the position I (source 1)
- Post-transfer S2 to S1 delay
- Pre-transfer signal off

Retransfer sequence summary:

- The source 2 is restored
- Transfer from S1 to S2 delay
- Pre-transfer signal on
- Pre-transfer S1 to S2 delay
- Transfer switch to the position O (only with delayed transition I-O-II type)
- Center-off delay (only with Delayed transition I - O - II type)
- Transfer switch to the position II (source 2)
- Load shed signal off
- Post-transfer S1 to S2 delay
- Pre-transfer signal off

Source 2 priority (no generator)



Note: The functionality and sequence of ‘Elevator pre- and post-signals’ is equivalent to ‘Pre- and Post-transfer’ features.

—

Table 2.4 Automatic Switching Sequences, Source 2 Priority (No generator)

2.5.1.3 No source Priority (Generator and load shed usage disabled)

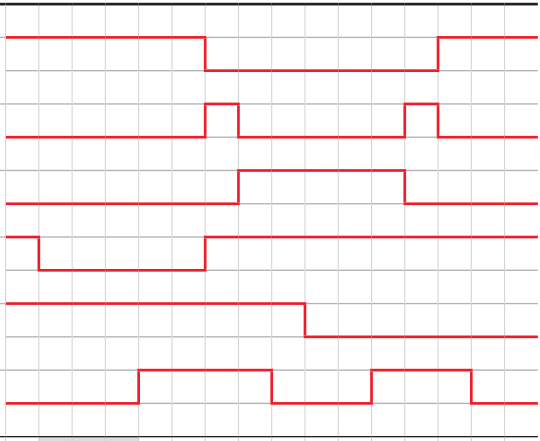
Switching to available source:

- An anomaly occurs on the source 1
- Override momentary S1 outage delay
- Pre-transfer signal on
- Pre-transfer S1 to S2 delay
- Transfer switch to the position O (only with delayed transition I-O-II type and at least one phase exists in source 1)
- Center-Off delay (only with delayed transition I-O-II type, delay is zero when all phases are missing in source 1)
- Transfer switch to the position II (source 2)
- Post-transfer S1 to S2 delay
- Pre-transfer signal off

Retransfer steps following anomaly in the source functioning:

- The source 1 is restored
- An anomaly occurs on the source 2
- Pre-transfer signal on
- Pre-transfer S2 to S1 delay
- Transfer switch to the position O (only with delayed transition I-O-II type and at least one phase exists in source 2)
- Center-Off delay (only with delayed transition I-O-II type, delay is zero when all phases are missing in source 2)
- Transfer switch to the position I (source 1)
- Post-transfer S2 to S1 delay
- Pre-transfer signal off

No Source priority (generator and load shed usage disabled)



Override momentary S1 outage delay	
Override momentary S2 outage delay	
Center-off delay, I - O - II	
Pre-transfer S1 to S2 delay	
Post-transfer S1 to S2 delay	
Pre-transfer S2 to S1 delay	
Post-transfer S2 to S1 delay	

Note: The functionality and sequence of 'Elevator pre- and post-signals' is equivalent to 'Pre- and Post-transfer' features.

—

Table 2.5 Automatic Switching Sequences, No Source Priority (Generator and load shed usage disabled)

2.5.2 Automatic configuration

Automatic configuration sequence can be initiated by an HMI command. This function is able to detect basic system parameters:

- Rated voltage
- Rated frequency
- Source 1 power distribution system
- Source 2 power distribution system
- Neutral Pole Location
- Phase rotation

It is enough to have one source powered. Power distribution system is considered to be the same for both sources in this case.

In 3-pole switches with three phases supplied the system will be configured as 3 Phase 3 Wire, Delta. 3 Phase 3 Wire, Wye system can not be detected automatically, it must be configured manually.

User must finish the sequence manually with DIP HMI when fast blinking AUTO LED indicates that parameter detection is ready. Sequence ends automatically with other types.

2.5.3 In-phase monitor

In-phase monitor can be set On/Off by using HMI (controller levels 2, 3 and 4) or Ekip Connect tool (levels 3 and 4).

Function calculates the phase difference of voltage sources and enables the automatic transfer sequence I -> II or II -> I only when sources are synchronized. Frequency difference of the sources must be less than 3 Hz. Otherwise in-phase monitor activates the 'Frequency Difference' alarm and disables transfer operations.

2.5.4 Powering supply scenarios

Device can be powered:

- Direct from source 1 or source 2: Whole device is powered and ATS can be operated electrically.
- Auxiliary power supply module, OXEA1: Powering the whole device (including HMI), but load transfer cannot be performed.
- Programming port on HMI (USB port): Powering only the main board. Allows software update to main device and connection of Ekip Connect commissioning tool.

3. Operating

3.1 Position indication

Contact movement and position indication is indicated in the figure below:

- Left side: Open transition I - II (or II - I)
- Right side: Delayed transition I - O - II (or II - O - I)

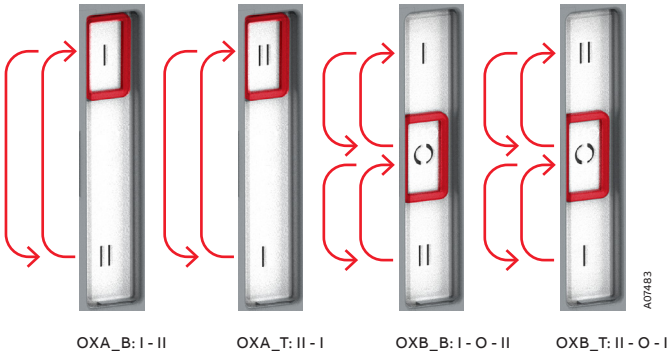


Fig. 3.1 Contact movement / position indication: OXA_, Open transition; OXB_, Delayed transition, _B, bottom entry versions; _T, top entry versions

3.2 Operating and locking

The operation mode is selected by using the slide switch (Hand - Locking - AUTO) located on the front of the automatic transfer switch (ATS).

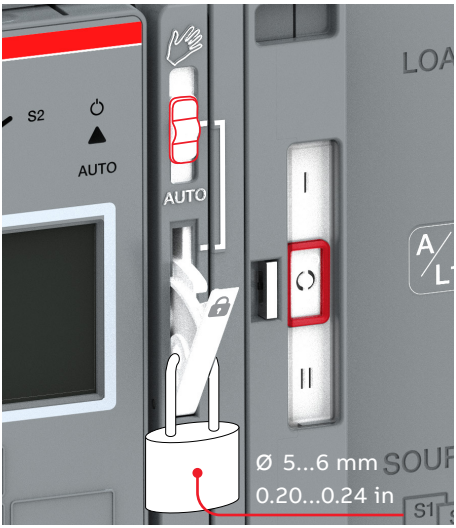
- **Hand**-position = **Manual mode**, enabling emergency manual operation using the handle. ATS functionality is disabled when in Hand position. If the device is powered from either voltage source during the firmware update sequence the operation mode selector must be in manual mode position.
- **Lock**-position = **Locking mode**, padlocking the automatic transfer switch in a specific position to prevent automatic and manual operation. Note! After the handle is set back to its place (standby slot), the slide switch will automatically move to the Locking mode and the switch is allowed to be padlocked. To set the operating handle back to its place, see the left picture in Fig. 3.6.
- **AUTO**-position = **Automatic or HMI operated switch control is enabled**. When the slide switch is moved to the AUTO position, automatic control mode is activated after a three second delay.
- **AUTO-Lock-AUTO** = **Alarm reset**



Manual mode



Automatic mode



Locking mode

Fig. 3.2 Above the selection of the operation modes (Manual or Automatic) by the slide switch. Below padlocking the automatic transfer switch; After the handle is set back to its place (standby slot), the slide switch will automatically move to the Locking mode and the switch is allowed to be padlocked.

3.3 Manual mode, operating by the handle

General warning
Verify the condition of power source prior to manually transferring. Manual operation may result in out-of-phase transfer when both sources are energized.

Mount the handle; turn the slide switch to the Manual mode (Hand), locate and remove the handle from inside the ATS; Insert as shown in the bottom figure.

For more information, see video: Manual and automatic operation - TruONE™ ATS (https://youtu.be/bosvSPVi2sM).

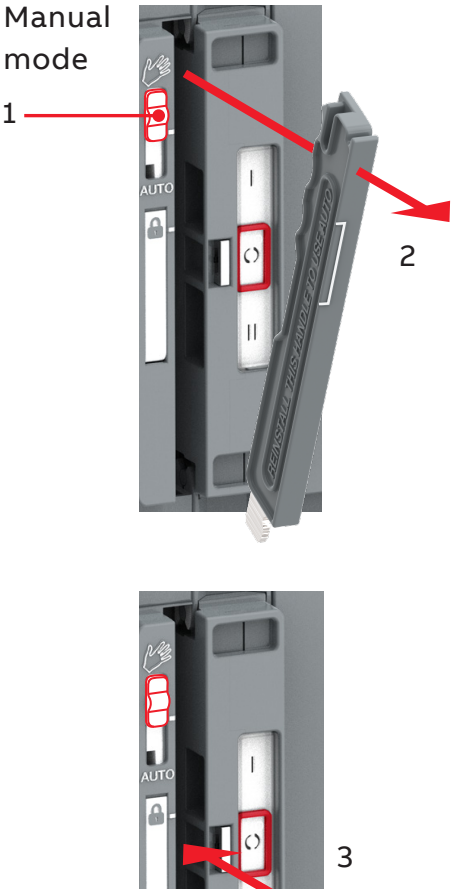
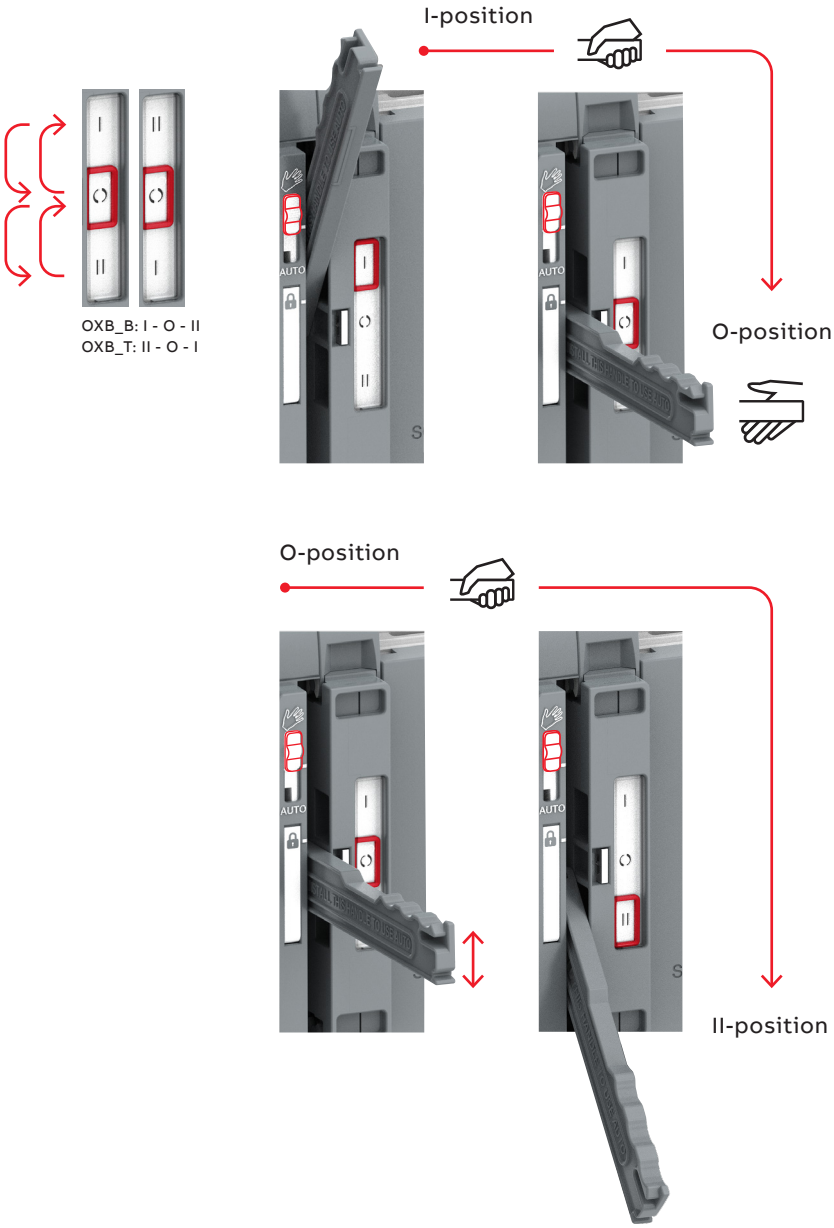


Fig. 3.3 Manual mode: installing handle



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Fig. 3.4 Manual mode, operating by handle, delayed transition I - O - II or II - O - I. To move from position I to II (or II to I), move handle to O position and release hand from handle.

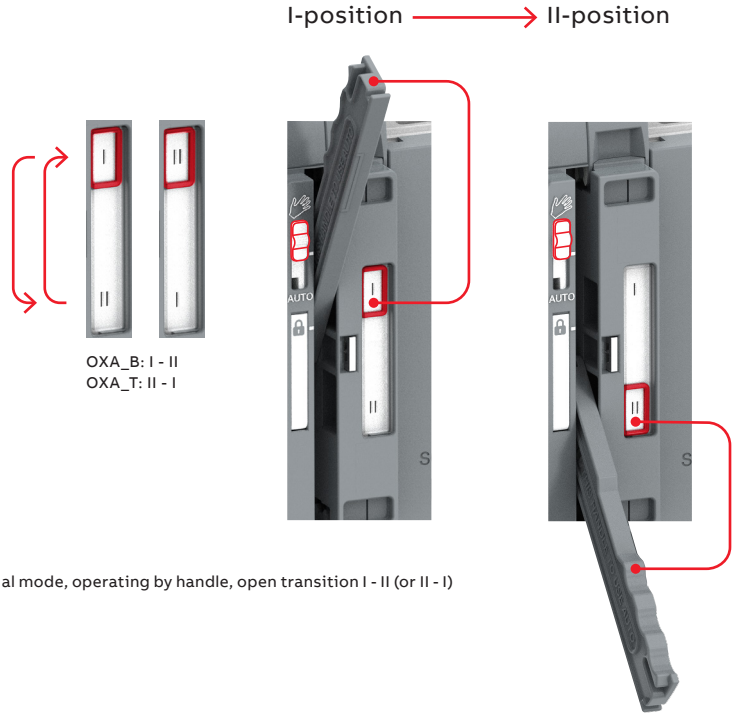


Fig. 3.5 Manual mode, operating by handle, open transition I - II (or II - I)

3.4 Automatic mode, operating by HMI

When operating the automatic transfer switch by HMI, turn the slide switch to Automatic mode (AUTO). Note! The handle must be in the standby slot (not in use) before turning to automatic mode.

Information
When the slide switch is moved to the AUTO position, the automatic control mode is activated after a three second delay.

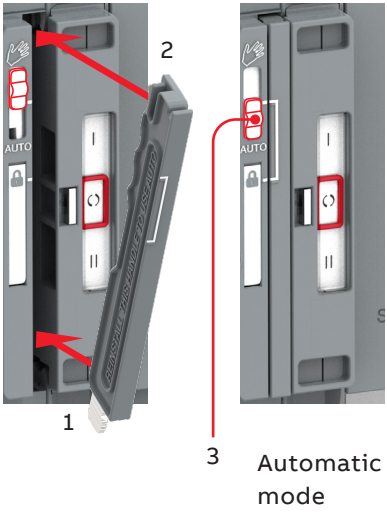
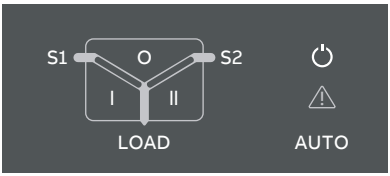


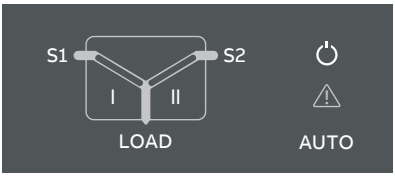
Fig. 3.6 The operating handle must set back to standby slot before moving to the automatic mode

3.5 LED functionality in HMI

LED functionality is common to every HMI-type.

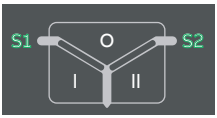


I - O - II



I - II

Fig. 3.7 On left: LEDs in OXB_, delayed transition, I - O - II. On right: LEDs in OXA_, open transition I - II.

LED	Indication	Description
Power led		
	ON, fixed light	Power supply and communication present
	2 quick flashes/1 s	Power supply present, communication absent between switch and the HMI
	OFF	No power available for HMI.
S1 and S2 leds		
	ON, fixed light	S1 or / and S2 is present and within user defined limits
	2 quick flashes/1 s	Undervoltage
	Flash/1 s, 90 %/10 %	Invalid frequency
	Flash/1 s, 10 %/90 %	Unbalance
	5 flashes/1 s, 50 %/50 %	Overvoltage
	Flash/2 s, 50 %/50%	Incorrect phase sequence
	Flash/4 s, 50 %/50 %	Phase missing
	Flash/1 s, 50 %/50 %	Generator stop delay ongoing
	OFF	No voltage

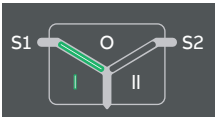
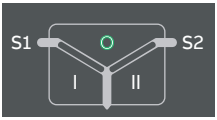
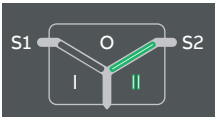
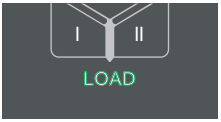
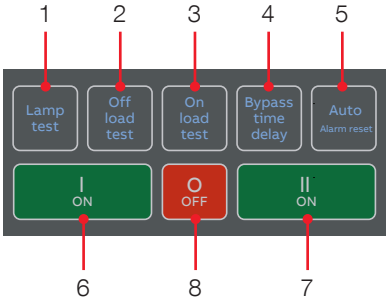
I, II and 0 leds		
	ON, fixed light	Switch position is indicated with fixed light in I, O or II led. Only one can be illuminated
	Flash/1 s, 50 %/50 %	Indicating running time delay
		
Load led		
	ON	Supply ok and connected to load
	OFF	Connected supply to load not ok or load disconnected (switch in O position)
Auto led		
	ON, fixed light	Switch is in automatic mode
	Flash/1 s, 50 %/50 %	Test on load
	Flash/1 s, 90 %/10 %	Test off load
	Flash/1 s, 10 %/90 %	If blinks simultaneously with Alarm led then 'Remote control to S1','Remote control to S2', 'Remote control to OFF' or 'Inhibit transfer' digital input is activated.
	5 flashes/1 s, 50 %/50 %	Autoconfig completed
Alarm led		
	OFF	No alarms
	ON, fixed light	Handle attached, locked, other alarm
	2 quick flashes/1 s	Control Alarm
	5 flashes/1 s, 50 %/50 %	Auto configuration ongoing
	Flash/1 s, 50 %/50 %	Control Retry
	Flash/1 s, 10 %/90 %	Auto mode off
	Flash/1 s, 10 %/90 %	If blinks simultaneously with Auto led then 'Remote control to S1', 'Remote control to S2', 'Remote control to OFF' or 'Inhibit transfer' digital input is activated. If Auto led is fixed light then manual retransfer is required.

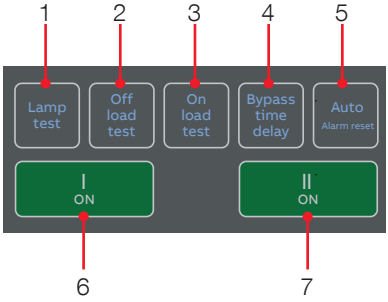
Table 3.1 LED functionality, common to every HMI-type

3.6 Using Level 2 (DIP) control interface HMI

3.6.1 Keypad



OXB_, delayed transition, I - O - II



OXA_, open transition, I - II

Fig. 3.8 Keypad in Level 2 HMI with DIP-switches

1 **Lamp test:** Turns on all LEDs simultaneously to confirm all LEDs are operational

2 **Off load test:** Initiates off load test (Starts generator but does not transfer the load to the generator)

1+2 **Lamp test + Off load test:** Hold for 3 seconds to automatically program a repeating off load weekly test at current time, 20 minutes run time

3 **On load test:** Initiates on load test (Starts the generator and transfers the load to the generator)

1+3 **Lamp test + On load test:** Hold for 3 seconds to automatically program a repeating on load weekly test at current time, 20 minutes run time

4 **Bypass time delay:** Bypass any currently running time delay

5 **Auto (Alarm reset):** In the event of active switch control alarm (open I failure, close I failure, open II failure, close II failure), resets to no alarm state. If no active alarms, toggle between Automatic operation mode and Momentary manual operation mode. If the Manual Retransfer DIP-switch is set to "On", toggle between Manual retransfer and Momentary manual operation modes.
Note: When automatic mode is switched by this button, there is 3 second delay before entering automatic mode.

6 **I ON:** Operate switch to I position

7 **II ON:** Operate switch to II position

8 **O OFF:** Operate switch to O position and disable automatic control mode (only in delayed transition I-O-II type)

3.6.2 Configuration by DIP-switches

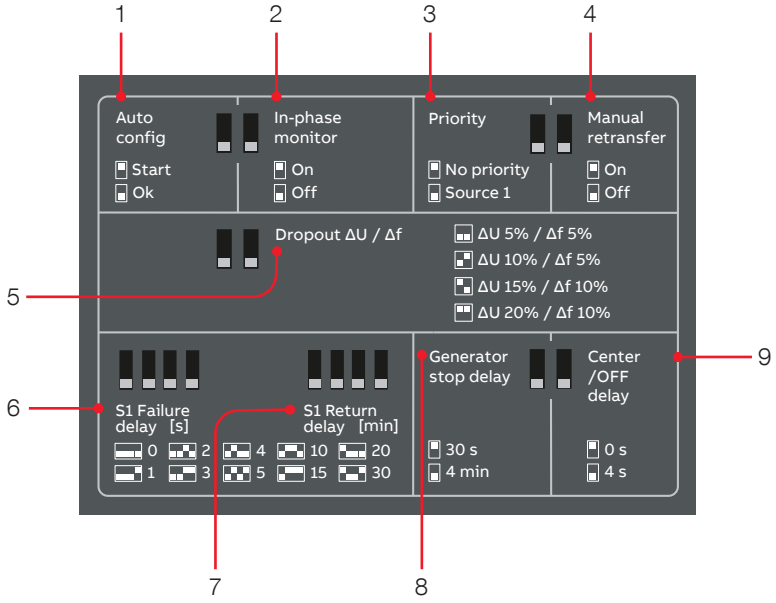


Fig. 3.9 DIP-switches for configuration in Level 2 HMI

1 **Auto config:** Automatically detecting Source 1 and Source 2 parameters. Automatic configuration sequence is started by setting DIP to 'Start' position. Parameter detection is ready when AUTO LED flashes at 5 Hz. After this the DIP must be set to 'Ok' position to resume normal operation. Check power supply of the voltage source in case the Alarm LED keeps flashing instead of AUTO LED. This indicates that system parameters cannot be detected from the supplied voltage.

2 **In-phase monitor:**
On: Enable in-phase monitor
Off: Disable in-phase monitor

3 **Priority:**
No priority: Application 'Two Transformers / No Priority' selected
Source 1: Application 'S1-Transformer / S2-Generator' selected.

4 **Manual retransfer:**
On: Manual retransfer to priority source enabled (automatic retransfer disabled)
Off: Manual retransfer to priority source disabled (automatic retransfer enabled)

5 **Dropout △U / △F:**
Dropout voltage/frequency limit.
For example 5 % / 5 %:
Voltage source is considered acceptable when measured voltage is in range 0.95 * Un ... 1.05 * Un and measured frequency is in range 0.95 * fn ... 1.05 * fn.

6 **S1 Failure delay:** The time (0/1/2/3/4/5/10/15/20/30 s) device waits after priority source failure before starting automatic transfer sequence from priority source to non-priority source.

7 **S1 Return delay:** The time (0/1/2/3/4/5/10/15/20/30 min) device waits after priority source return before starting automatic retransfer sequence from non-priority source to priority source.

8 **Generator stop delay:** The time (30 s or 4 min) device waits after transferring back to priority source before stopping the generator.

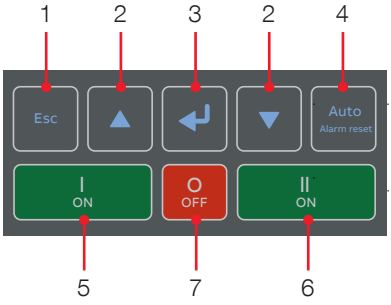
9 **Center-Off delay:** The time (0 s or 4 s) device waits in O position during automatic transfer sequence I -> II or II -> I (only delayed transition I-O-II type). This delay is always 0 s in case all phases are missing in the original source.

Only features in active use should be enabled

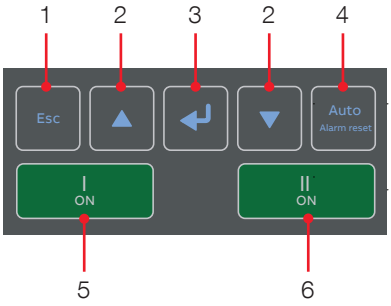
3.7 Using Level 3 (LCD) control interface HMI

3.7.1 Keypad

1 **Esc:** Go back in menu. When pressed in root page, the alarm list is shown.
2 **Up, Down:** Move in menu or choose parameter values.
3 **Enter:** Opens menu in root page. Enter a new menu page and accept function.
4 **Auto (Alarm reset):** In the event of active switch control alarm (open I failure, close I failure, open II failure, close II failure), resets to no alarm state. If no active alarms, toggle between momentary manual mode and the original operation mode. Note: When automatic mode is switched by this button there is 3 second delay before entering automatic mode.
6 **II ON:** Operate switch to II position.
7 **O OFF:** Operate switch to O position and disable automatic control mode (only in delayed transition I-O-II type).



OXB_, delayed transition, I - O - II



OXA_, open transition, I - II

Fig. 3.10 Keypad in Level 3 HMI with LCD screen

3.7.2 Navigating in menu

See the menu tree in Chapter 4.

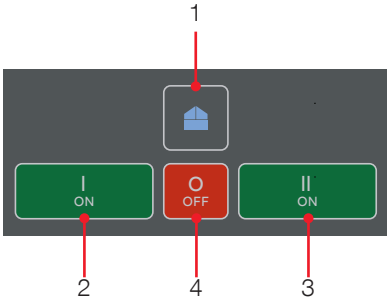
3.8 Using Level 4 (touch) control interface HMI

3.8.1 Keypad

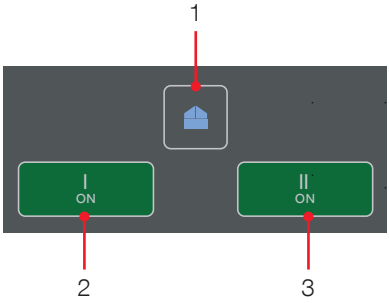
1 **Home Button:** Opens up the root menu or brings user to the homepage if defined. While viewing a specific page, it can be defined as the home page by pressing the home button for 3 seconds. All pages, except for the menus, can be set as home page. Home page is automatically shown after inactivity.
2 **I ON:** Operate switch to I position.
3 **II ON:** Operate switch to II position.
4 **O OFF:** Operate switch to O position and disable automatic control mode (only in delayed transition I-O-II type).

3.8.2 Navigating in menu

See the menu tree in Chapter 4.



OXB_, delayed transition, I - O - II



OXA_, open transition, I - II

Fig. 3.11 Keypad in Level 4 HMI with touch screen

4. Navigating menu

4.1 Level 3 (LCD) control interface, menu tree

The default password is 00001, enter the password when prompted (see Fig. 4.1). The default password is highly recommended to be changed.

The keypad is described In Chapter 3.7, see Fig. 3.10. By pressing the Enter-key (3) you can:

- open the menu in root page
- enter a new menu page
- accept the function

By pressing Up and Down -keys (2) you can:

- move in the menu
- choose the parameter value

By pressing Esc-key (1) you can:

- go back in the menu

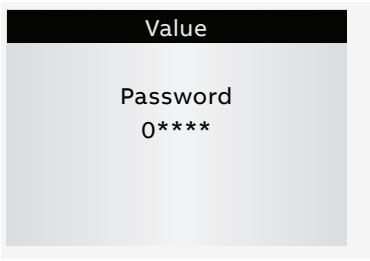


Fig. 4.1 Enter the password when asked, choose the right number by Up and Down -keys (2) and confirm by Enter-key (3), go forward setting number after number

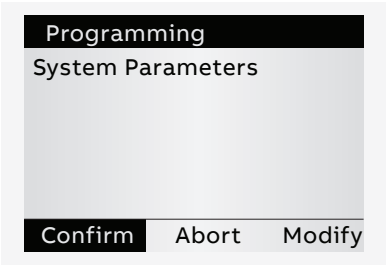


Fig. 4.2 After you have changed the parameter, always go back in the menu by pressing Esc-key and when prompted confirm changes with Enter-key

Description of the icons

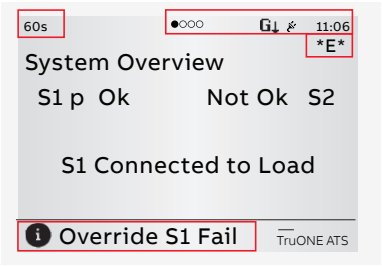


Fig. 4.3 Location of the small icons and the alarms

The small icons in System Overview -pages are:

On upper right corner

●○○○○ Indicates the amount of pages and the page where you are at the moment

Auxiliary voltage connected

11:06 Time

Application set up as Transformer-Generator. Generator start-up signal deactivated

Application set up as Transformer-Generator. Generator start-up signal activated

Alarm List

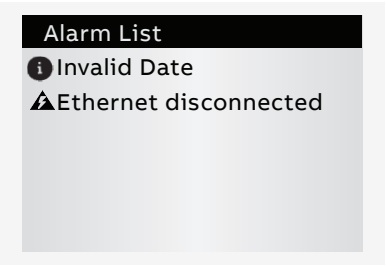


Fig. 4.4 When pressed Esc-key (1) in System Overview -pages, the alarm list is shown.

On upper left corner

60s Time delay, in Alarm list you can see the name of delay at the same time, e.g. Override S1 Fail

E Indicates that generator exerciser is programmed

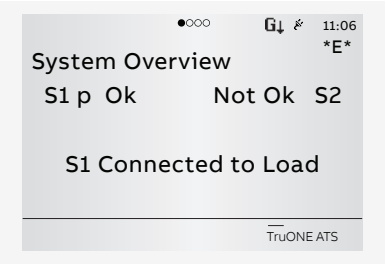
On middle

S1 p Letter "p" after S1 indicates that S1 is a priority source

On the lower edge of the screen you can see the Alarms. When pressed Esc-key (1) in System Overview -pages, the alarm list is shown

Information
The default values are marked in the menu tree by *-marking.

4.1.1 Start screens



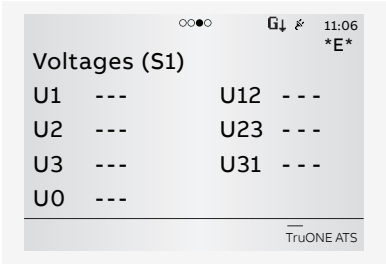


Fig. 4.5 From System Overview screen you will find Switch status and Supply info views, and by pressing Up and Down -keys (2), you can go forward to see Voltages and Synchronization view, see the table below.

Start screens
System Overview (Switch status)
Shows voltages and frequencies of both supplies and the switch position.
Supply info view
Shows Phase to Phase voltages of both supplies and the frequencies.
Voltages (S1)
S1 phase voltages
S1 line voltage
Voltages (S2)
S2 phase voltages
S2 line voltage
Synchronization view
Enabled only when In-phase monitor is on.
Show the time to next sync, sync period
Current view
Enabled only when current measurement module is connected.
Phase currents
Neutral current
Residual current

Start screens, continues
Active Power view
Enabled only when current measurement module is connected.
Active power by phase
Total active power
Reactive Power view
Enabled only when current measurement module is connected.
Reactive power by phase
Total reactive power
Apparent Power view
Enabled only when current measurement module is connected.
Apparent power by phase
Total apparent power
Energy Counters view
Enabled only when current measurement module is connected.
Active energy by source
Reactive energy by source
Apparent energy by phase
Total active energy
Total reactive energy
Total apparent energy

4.1.2 Enter key, main menu

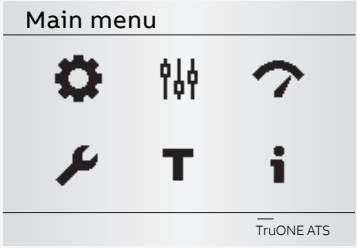


Fig. 4.6
By pressing Enter-key (3) you will move to the main menu page of Operation, Parameters, Measurements, Settings, Test and About, see the table below for the selections. You can move in menu or choose parameter values by Up and Down -keys (2) and by Enter-key (3) you can accept function and enter a new menu page. By Esc-key (1) you can go back in menu.

Information
When you have changed the parameter, always go back in the menu by pressing Esc-key and when prompted confirm changes with Enter-key.

Operation			*Default
	Bypass Time Delay		
		Bypass any currently running time delay.	
	HMI Control Keys [1]		
		Enabled*	
		Disabled	
	HMI OFF Key		
		Enabled*	
		Disabled	
	Energy Counters	Reset	
	Operation mode		
		AUTO*	Automatic switch control mode. [2]
		MAN momentary	Manual operation mode but warning that device is in manual mode will be shown by HMI. ATS will automatically send the generator start signal in case of a total power outage but user intervention is required to initiate transfer and retransfer.
		MAN permanent	Manual operation mode but warning that device is in manual mode will not be shown by HMI. ATS will automatically send and remove the generator start signal but user intervention is required to initiate transfer and retransfer.
		MAN retransfer	Same as AUTO but automatic retransfer sequence is disabled. Load will be kept on non-priority source until operator manually (by HMI or manual handle) or remotely operates the load back to priority source.

[1] Note: Disables also 0-key in OXB models!

[2] Note: When automatic mode parameter is confirmed there is 3 second delay before entering it.

Parameters			***Default**
	System parameters		
	Start Automatic Configuration		
	Power distribution systems (see Fig. 2.4)		
		Source 1	1 Phase, 2 Wire
			1 Phase, 3 Wire (Split-Phase)
			3 Phase 3 Wire, Delta
			3 Phase 4 Wire, Wye
			3 Phase 4 Wire, High-Leg Delta
			3 Phase 3 Wire, Wye
		Source 2	1 Phase, 2 Wire
			1 Phase, 3 Wire (Split-Phase)
			3 Phase 3 Wire, Delta
			3 Phase 4 Wire, Wye
			3 Phase 4 Wire, High-Leg Delta
			3 Phase 3 Wire, Wye
	Rated Voltage		
		200 V (3ph) / 208 V (3ph) / 220 V (3ph) / 230 V (3ph) / 240 V (3ph) / 277 V (3ph) / 347 V (3ph) / 380 V (3ph) / 400 V (3ph)* / 415 V (3ph) / 440 V (3ph) / 460 V (3ph) 480 V (3ph) / 200 V (1ph) / 220 V (1ph) / 230 V (1ph) / 240 V (1ph) / 254 V (1ph) / 265 V (1ph) / 277 V (1ph) / 318 V (1ph) / 333 V (1ph) / 347 V (1ph) / 380 V (1ph) / 400 V (1ph) / 415 V (1ph) / 440 V (1ph) / 460 V (1ph) / 480 V (1 ph)	
	Rated Frequency		
		50 Hz*	
		60 Hz	
	Neutral Pole Location		
		Pole 4* [1)]	
		Pole 1	
	Phase Sequence		
		ABC*	
		ACB	
		Not Enabled	

[1)] Overlapping neutral always on Pole 4, this cannot be changed.

Continued on the next page

Parameters (continued)			***Default**
Device Parameters			
In-phase Monitor			
	Enable	Off*	
		On	
	Synchronization Window	±1...10° (±1*°)	A phase angle difference limits to restrict live to live source transfers unless both sources are within this certain window of electrical degrees.
Time Delays			
	Override S1 Failure	0...60 s (2* s)	S1 priority: How long the device is waiting S1 recovery before starting transfer sequence to S2. S2 priority: How long the device is keeping the load on failed S1 although S2 is already available.
		0...10 min	0...10 min range enabled only when auxiliary power supply is connected.
	Transfer from S1 to S2	0...60 min (2* s)	S1 priority: How long the device is keeping the load on failed S1 after S2 becomes available. S2 priority: How long the device waits before transfer sequence back to available S2 begins. This delay is bypassed by 'Override S1 Failure' in case of S1 failure.
	Pre-transfer signal 1 / 2 / 3 / 4		
	Pre-transfer S1 to S2 Post-transfer S1 to S2 Pre-transfer S2 to S1 Post-transfer S2 to S1	0*...300 s	Enabled only when any digital outputs is configured as 'Pre-transfer Signal'. Pre-transfer: How long the device is keeping pre-transfer signal activated before transferring from S1 to S2 or S2 to S1. Post-transfer: How long the device is keeping pre-transfer signal activated after transferring from S1 to S2 or S2 to S1.
	Center-off	0*...300 s	Only delayed transition I-O-II type. How long the switch is stopped at position O while transferring from S1 to S2 or from S2 to S1 and the original source is not completely down. Center-OFF delay is bypassed in case all phases are missing from the original source which we are leaving.

Continued on the next page

Parameters (continued)			***Default**
Device Parameters (continued)			
Time Delays (continued)			
	Override S2 Failure	0…60 s (2* s)	S1 priority: How long the device is keeping the load on failed S1 after S2 becomes available. S2 priority: How long the device waits before transfer sequence back to available S2 begins. This delay is bypassed by 'Override S1 Failure' in case of S1 failure
	Transfer from S2 to S1	0*...120 min (2* s)	S1 priority: How long the device is keeping the load on failed S1 after S2 becomes available. S2 priority: How long the device waits before transfer sequence back to available S2 begins. This delay is bypassed by 'Override S1 Failure' in case of S1 failure.
	Elevator Pre-transfer signal	1 / 2 / 3 / 4	
	Elevator Pre-signal S1-S2 Elevator Post-signal S1-S2 Elevator Pre-signal S2-S1 Elevator Post-signal S2-S1	0*...60 s	Enabled only when any digital output is configured as 'Elevator pre-signal'. Pre-transfer: How long the device is keeping pre-signal activated before transferring from S1 to S2 or from S2 to S1. Post-transfer: How long the device is keeping pre-signal activated after transferring from S1 to S2 or from S2 to S1.
	Generator Stop	0...60 min (5* min)	Enabled only when generator is in use. Generator cooling time, how long the device is keeping the generator running without load after returning to priority source.
	Load Shed	0*...60 s	Enabled only when any digital output is configured as 'Load Shed'. How long before the transfer from priority to non-priority source the device activates load shed signal.

Continued on the next page

Parameters (continued)				***Default**
Device Parameters (continued)				
	Voltage & Frequency Setpoints	Defines the voltage and frequency limits for source being acceptable. Source has an anomaly when measured voltage/ frequency goes out of range drop-out lower/drop-out Upper. Source becomes acceptable when measured voltage/frequency goes back in range pick-up lower/pick-up higher.		
	S1 Setpoints			
		S1 Drop-out Voltage	Upper Threshold	102...120 % Un (115* % Un)
			Lower Threshold	70...98 % Un (85* % Un)
		S1 Pick-up Voltage	Upper Threshold	101...119 % Un (114* % Un)
			Lower Threshold	71...99 % Un (90* % Un)
		S1 Drop-out Frequency	Upper Threshold	101...120 % fn (115* % fn)
			Lower Threshold	80...99 % fn (85* % fn)
		S1 Pick-up Frequency	Upper Threshold	100.5...119.5 % fn (114* % fn)
			Lower Threshold	80.5...99.5 % fn (86* % fn)
	S2 Setpoints			
		S2 Drop-out Voltage	Upper Threshold	102...120 % Un (115* % Un)
			Lower Threshold	70...98 % Un (85* % Un)
		S2 Pick-up Voltage	Upper Threshold	101...119 % Un (114* % Un)
			Lower Threshold	71...99 % Un (90* % Un)
		S2 Drop-out Frequency	Upper Threshold	101...120 % fn (115* % fn)
			Lower Threshold	80...99 % fn (85* % fn)
		S2 Pick-up Frequency	Upper Threshold	100.5...119.5 % fn (114* % fn)
			Lower Threshold	80.5...99.5 % fn (86* % fn)
	Voltage Unbalance Setpoints	Options to change voltage unbalance measurement limits or disable unbalance measurement completely.		
		Unbalance Drop-Out		±5...30 % Un (±10* % Un)
		Unbalance Pick-Up		±3...28 % Un (±8* % Un)
		Unbalance Measuring		Off*
				On

Continued on the next page

Parameters (continued)			***Default**
Device Parameters (continued)			
Generator Exercisers			Switch and generator functioning can be tested automatically and also periodically by using four independent exerciser events. Test on load function starts the generator and transfers the load to it. Test off load function only starts the generator for the duration of the event. Overlapping events are prioritized, event 1 has the highest priority.
	Exerciser 1 / 2 / 3 / 4		
		Status	Disabled*
			Non-periodic
			Daily
			Weekly
			Bi-weekly
			Monthly
			Yearly
		Function	No Function*
			Test on Load
			Test off Load
		Duration (hh:mm:ss)	00:00:00...24:00:59 (00:01:00*)
		Time (hh:mm)	Starting time of the event: 00:00*...23:59
		Date (Month, day, year)	Starting date of the event Jan 01, 2020... (---*)
	Application		
	S1-Transformer/S2-Generator*		
	S2-Transformer/S1-Generator		
	2 Transformers/S1 Priority		
	2 Transformers/S2 Priority		
	2 Transformers/No Priority		
	Commit Transfer		
	Off*		If priority source fails, device cancels the transfer sequence to non-priority source (generator) if priority source returns before non-priority source becomes acceptable.
	On		If priority source fails, device continues transfer sequence to non-priority source (generator) even if priority returns before non-priority source becomes acceptable. Retransfer sequence according to time delays.

Continued on the next page

Parameters (continued)			***Default**
Device Parameters (continued)			
	High current alarm		
		Status	
			Enabled	If measured current is higher than ten times the nominal value device will prevent all operations and show high current alarm on-screen. After high current status is over, device will start operating normally.
			Disabled*	
		Alarm reset required	
			Yes	User confirmation is required before re-entering normal operation after high current status.
			No*	Normal operation is started automatically after high current status.
	Transfer to Dead Source		
			On*	User can transfer to an unavailable source by using HMI keys I/II or by a remote command.
			Off	Transfer to an unavailable source is disabled.
	Source Loss Center-Off Delay		
			On*	User can select whether to always run the 'center-off' timer or skip it if there is no voltage on any of the phases on the source from where the ATS is transferring from.
			Off	
	Source Loss Pre-Signal Delay		
			On*	User can select whether to always run the pre-signal delays 'elevator pre-signal S1-S2', 'elevator pre-signal S2-S1', 'pre-transfer S1 to S2', 'pre-transfer S2 to S1' timers or skip these if there is no voltage on any of the phases on the source from where the ATS is transferring from.
			Off	
	Gen Start in Manual Mode		User may choose if device sends generator start signal when slide switch is not in AUTO mode.
			On*	Send the generator start signal regardless of slide switch position.
			Off	If slide switch is in lock or MAN mode device won't send the generator start signal.
	MAN Retransfer w/ Override		Affects only MAN retransfer mode. Select whether to stay in failed non-priority or transfer automatically back to priority if it is healthy.
			Off*	Stay at failed non-priority.
			On	Transfer to priority if non-priority is not ok.

Measurements

Switch Diagnostics			
	Total operations		I-O-II switches: Total number of transfers I-O, O-II, II-O and O-I. I-II switches: Total number of transfers I-II and II-I.
	Manual operations		Total transfers operated by the handle.
	Number of load transfers		Total number of transfers I-II and II-I.
	Transfer time		Time it took to transfer the load between sources (ms).
	Source fail transfers		Total number of automatic transfers due to source failures.
	Days energized		
	Total time on S1		Hours
	Total time on S2		Hours
	Time S1 available		Minutes
	Time S2 available		Minutes
	Last generator start		MM, DD, YYYY hh:mm:ss
	Generator starting time		How long it took for the generator to become acceptable after latest start (s).
	In-phase time		How long it took for the in-phase monitor to achieve synchronized transfer (s).
Event Log			
	View Log		250 time stamped events, latest first.
	Clear Log		Delete all log entries.
Harmonics			Harmonic components up to 15th are calculated for the selected phase.
	Measured Phase	Disabled*	
		Phase 1	
		Phase 2	
		Phase 3	
	Voltage	Total distortion	THD for each phase of both voltage sources.
		S1 Components	Each harmonic component of the selected S1 phase.
		S2 Components	Each harmonic component of the selected S2 phase.
Power Factor			Enabled only when current measurement module is connected.

Settings			*Default
Standard I/O Settings			
I 01 / I 02 / I 03			
	Function	No function	Input disabled.
		Emergency Stop* (default in I 01)	Transfers to O position in delayed transition I-O-II type switches. Disables automatic control mode in both delayed and open transition types.
		Remote Test On Load* (default in I 02)	Start/stop test on load sequence in rising (NO) or falling (NC) edge of the input signal.
		Remote Test Off Load* (default in I 03)	Start/stop test off load sequence in rising (NO) or falling (NC) edge of the input signal.
		Inhibit ATS	Prevent switch control operations, configuration, test sequences and generator start in case of priority source failure.
		Manual Retransfer	Disables automatic transfer back to priority source.
		Source Priority S1	Sets priority for source 1 in transformer-transformer application.
		Source Priority S2	Sets priority for source 2 in transformer-transformer application.
		Inhibit Transfer	Disables automatic transfer from priority source to non-priority source. When input is activated, transfer to non-priority can be initiated by pressing HMI control button and entering the device password.
		Bypass Running Time Delays	Bypass any currently running time delay.
		Remote Control to S1	Transfer to S1 when active. Overridden by activated 'Remote Control to OFF' signal.
		Remote Control to OFF	Transfer to O position when active.
		Remote Control to S2	Transfer to S2 when active. Overridden by activated 'Remote Control to OFF' or 'Remote Control to S1' signals.
		Reset Alarm	Reset any active switch control alarms (open I failure, close I failure, open II failure, close II failure).
		Inhibit Transfer w/ Override	Prevents ATS to transfer away from acceptable power source. If connected power source fails ATS can transfer to another source if it is OK.
		Load Shed Input Signal	Allows generator to signal to ATS to transfer away from the generator source to prevent overload. Input works differently with OXA_ and OXB_ switch types. OXA_ models: ATS transfers to priority source and stays there while the input is activated. OXB_ models: Transfers switch to O-position. If priority source restores while the input is activated ATS will transfer to it.
		Manual-Auto Mode	Toggle automatic/HMI control mode, input is active only in rising/falling edge according to contact type
		Peak Shaving Input	ATS will transfer to generator and stay on generator regardless of primary source condition. If generator fails and primary source is available ATS will automatically transfer to primary source.

Continued on the next page

Settings				***Default**
Standard I/O Settings (continued)				
	I 01 / I 02 / I 03 (continued)			
		Contact type	NC	Active open.
			NO*	Active closed.
	O 01			
		Function	No Function	Output disabled.
			Alarm / Product availability*	Signal is activated if any condition (both intentional and unintentional) prevents automatic operation
			ATS in Position S1	Switch in position I.
			ATS in Position OFF	Switch in position O.
			ATS in Position S2	Switch in position II.
			Pre-transfer Signal 1	Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.
			Pre-transfer Signal 2	Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.
			Pre-transfer Signal 3	Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.
			Pre-transfer Signal 4	Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.
			Source 1 Available	No anomalies in S1 voltage supply.
			Source 2 Available	No anomalies in S2 voltage supply.
			Load Shed Output Signal	Used for shedding non-essential loads before transferring to non-priority source. Signal is activated before transferring to non-priority source according to load shed delay and kept activated until load is transferred back to priority source.
			Elevator pre-transfer Signal 1	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
			Elevator pre-transfer Signal 2	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
			Elevator pre-transfer Signal 3	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
			Elevator pre-transfer Signal 4	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.

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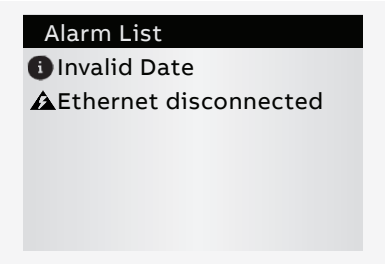
Settings			*Default
Standard I/O Settings (continued)			
O 01 (continued)			
	Function	ATS in AUTO mode	Automatic control mode active
		ATS in MAN retransfer mode	Manual retransfer control mode active
		Ready for MAN retransfer	Manual retransfer control mode active, ATS is on non-priority source and priority source is available.
		Product Malfunction	Signal is activated if product malfunction prevents automatic operation
	Contact type	NC	Active open.
		NO*	Active closed.
Modules (See Chapter 5, Electronic accessories)			
System			
	RESET to Factory Setting		Restore default parameter values.
	Date [1)]		Month, day, year
	Time [1)]		Hours:Minutes
	Language	English*	
		Italian	
		French	
		German	
		Spanish	
		Russian	
		Chinese	
	New Password		Five digits
	Temperature Unit	Celsius*	
		Fahrenheit	
	Clock Format	24 h*	
		12 h	
	Display Contrast	10...100 % (30 %*)	
	Installation Date		Month, day, year

[1)] Clock capacitor must be charged before inserting Date/Time. Clock capacitor is charged from source voltage (not AUX) and takes about 10 minutes. Clock capacitor keeps the date/time saved for 48 h in case of no source voltage available.

Test			*Default
T	On-Load Test Settings		
	Bypass Local Test	Bypass if Generator fails.*	
		Stay on Generator.	
	Bypass Remote Test	Bypass if Generator fails.*	
		Stay on Generator.	
	Bypass Generator Exerciser	Bypass if Generator fails.*	
		Stay on Generator.	
	Test On Load	Test generator with transferring the load. Test with switch transfer.	
	Test Off Load	Test generator without transferring the load. Test without switch transfer.	
	HMI Test	Initiate display test screen and turn all LEDs on. This function is not available when time delay is ongoing.	
	Optional modules (See Chapter 5, Electronic accessories)		

About		
i	HMI	HMI serial number
		Software version
		Software subversion
		HMI Type code
	Controller Unit	Time
		Date
		Serial number
		Normative
		Controller software version
		Controller software subversion
	Automatic Transfer Switch	TAG name
		ATS Type Code
		ATS serial number
		Rated current
		Number of poles
		ATS Type
	Modules (See Chapter 5, Electronic accessories)	

4.1.3 Esc key



—
Fig. 4.7
By pressing Esc-key (1) in System Overview -pages, the alarm list is shown.

Alarm list
More information, see chapter 6, Troubleshooting

4.2 Level 4 (touch) control interface, menu tree

Password

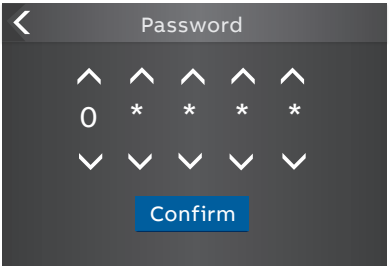


Fig. 4.8 Enter the password when asked, choose the right number by arrowheads and confirm, go forward entering number after number

The default password is 00001, enter the password when prompted (see Fig. 4.8). The default password is highly recommended to be changed.

Description of the icons

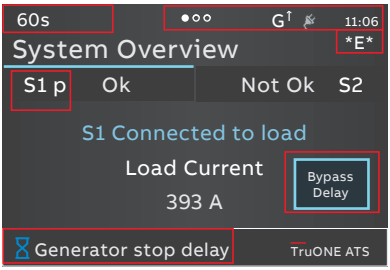


Fig. 4.9 The location of the small icons and the alarms

The small icons in System Overview -pages are:

On upper right corner

●○○ Indicates the amount of pages and the page where you are at the moment

Auxiliary voltage connected

11:06 Time

G↓ Application set up as Transformer-Generator. Generator start-up signal deactivated

G↑ Application set up as Transformer-Generator. Generator start-up signal activated

E Indicates that generator exerciser is programmed

On upper left corner

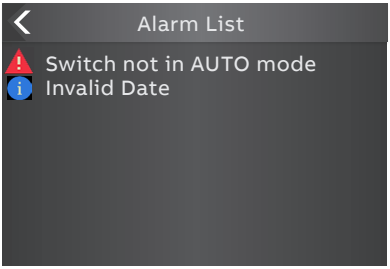
60s Time delay, in Alarm list you can see the name of delay at the same time, e.g. Generator stop delay

On middle area

S1 p Letter "p" after S1 indicates that S1 is a priority source

Bypass Delay Software button which allows skipping ongoing time delay. Visible when any skippable delay is ongoing

Alarm List

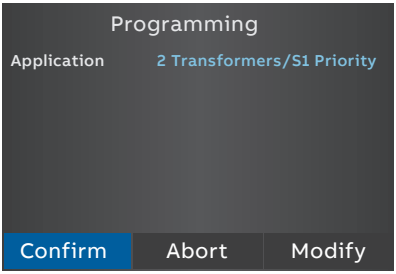


—

Fig. 4.10 By touching on the alarm indication on the lower edge of the screen you will get the Alarm List

On the lower edge of the screen you can see the Alarms. Touching the alarm name in bottom bar will open alarm list. It lists all active informations, warnings and alarms.

To confirm the change



—

Fig. 4.11 After you have changed the parameter, go back in the menu by pressing the " < " on the top left corner or Home key and when prompted confirm changes by "Confirm" option

To define the home page

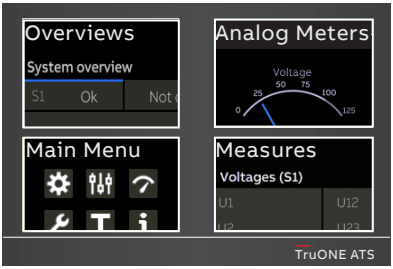


—

Fig. 4.12 Home page definition, acceptance of the function

While viewing a specific page, it can be defined as the home page by pressing the home button for 3 seconds. All pages, except for the menus, can be set as home page. Home page is automatically shown after inactivity.

4.2.1 Start Menu

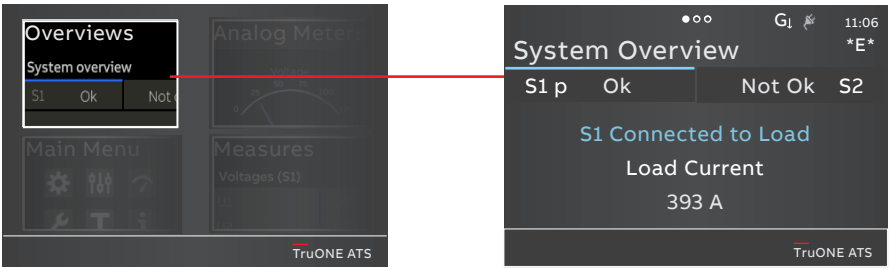


—
Fig. 4.13

—
Fig. 4.13 By touching on one of Start Menu choices, you can choose the Overviews -pages (upper left corner), Main Menu -pages (lower left corner), Analog Meters -pages (upper right corner) or Measures -pages (lower right corner)

—
Fig. 4.14 By touching on Start Menu upper left corner -image you can move to the Overviews -pages, where you will find Switch status and Supply info views, see the table below

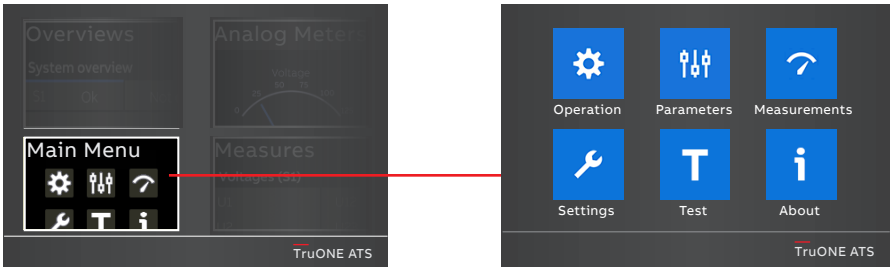
4.2.1.1 Overviews



—
Fig. 4.14

System Overview (Switch status)
Shows voltages and frequencies of both supplies and the switch position.
Supply info view
Shows voltages and frequencies of both supplies.
Temperature view
Shows the HMI, device and pole temperatures.
HMI temperature indicates ambient temperature where the ATS power panel is installed, when HMI is mounted to door. Device temperature indicates the temperature inside the ATS power panel. Pole temperature indicates the temperature on the load side terminals.
Synchronization view (Enabled only when In-phase monitor is on)
Show the time to next sync, sync period.
Contact Wear
Shows current contact wear information, End of life prediction date and bar graph of the contact wear to show when replace is needed.

4.2.1.2 Main Menu



—
Fig. 4.15 By touching on Start Menu lower left corner -image you can move to the Main Menu page of Operation, Parameters, Measurements, Settings, Test and About, see the table below for the selections

Information
When you have changed the parameter, go always back in the menu and confirm the change always when asked.

Information
The default values are marked in the menu tree by *-marking.

Operation			*Default
	Alarm Reset	Reset any active switch control alarms (open I failure, close I failure, open II failure, close II failure)	
	Bypass Time Delay		
		Bypass any currently running time delay	
	HMI Control Keys [1]		
		Enabled*	
		Disabled	
	HMI OFF Key		
		Enabled*	
		Disabled	
	Energy Counters	Reset energy values	
	Operation mode		
		AUTO*	Automatic switch control mode. [2]
		MAN momentary	Manual operation mode but warning that device is in manual mode will be shown by HMI. ATS will automatically send the generator start signal in case of a total power outage but user intervention is required to initiate transfer and retransfer.
		MAN permanent	Manual operation mode but warning that device is in manual mode will not be shown by HMI. ATS will automatically send and remove the generator start signal but user intervention is required to initiate transfer and retransfer.
		MAN retransfer	Same as AUTO but automatic retransfer sequence is disabled. Load will be kept on non-priority source until operator manually (by HMI or manual handle) or remotely operates the load back to priority source.

[1] Note: Disables also 0-key in OXB models!

[2] Note: When automatic mode parameter is confirmed there is 3 second delay before entering it.

Parameters			*Default
System parameters			
	Start Automatic Configuration		
	Power distribution systems (see Fig. 2.4)		
		Source 1	1 Phase, 2 Wire
			1 Phase, 3 Wire (Split-Phase)
			3 Phases 3 Wire, Delta
			3 Phase 4 Wire, Wye
			3 Phase 4 Wire, High-Leg Delta
			3 Phase 3 Wire, Wye
		Source 2	1 Phase, 2 Wire
			1 Phase, 3 Wire (Split-Phase)
			3 Phases 3 Wire, Delta
			3 Phase 4 Wire, Wye
			3 Phase 4 Wire, High-Leg Delta
			3 Phase 3 Wire, Wye
	Rated Voltage		
		200 V (3ph) / 208 V (3ph) / 220 V (3ph) / 230 V (3ph) / 240 V (3ph) / 277 V (3ph) / 347 V (3ph) / 380 V (3ph) / 400 V (3ph)* / 415 V (3ph) / 440 V (3ph) / 460 V (3ph) 480 V (3ph) / 200 V (1ph) / 220 V (1ph) / 230 V (1ph) / 240 V (1ph) / 254 V (1ph) / 265 V (1ph) / 277 V (1ph) / 318 V (1ph) / 333 V (1ph) / 347 V (1ph) / 380 V (1ph) / 400 V (1ph) / 415 V (1ph) / 440 V (1ph) / 460 V (1ph) / 480 V (1 ph)	
	Rated Frequency		
		50 Hz*	
		60 Hz	
	Neutral Pole Location		
		Pole 4* [1)]	
		Pole 1	
	Phase Sequence		
		ABC*	
		ACB	
		Not Enabled	

[1)] Overlapping neutral always on Pole 4, this cannot be changed.

Continued on the next page

Parameters (continued)			***Default**
Device Parameters			
	In-phase Monitor		
		Enable	Off*
			On
		Synchronization Window	±1...10 ° (±1*°)	A phase angle difference limits to restrict live to live source transfers unless both sources are within this certain window of electrical degrees.
	Time Delays		
		Override S1 Failure	0...60 s (2* s)	S1 priority: How long the device is waiting S1 recovery before starting transfer sequence to S2. S2 priority: How long the device is keeping the load on failed S1 although S2 is already available.
			0...10 min	0...10 min range enabled only when auxiliary power supply is connected.
		Transfer from S1 to S2	0...60 min (2* s)	S1 priority: How long the device is keeping the load on failed S1 after S2 becomes available. S2 priority: How long the device waits before transfer sequence back to available S2 begins. This delay is bypassed by 'Override S1 Failure' in case of S1 failure.
		Pre-transfer signal 1 / 2 / 3 / 4		
		Pre-transfer S1 to S2 Post-transfer S1 to S2 Pre-transfer S2 to S1 Post-transfer S2 to S1	0*...300 s	Enabled only when any digital outputs is configured as 'Pre-transfer Signal'. Pre-transfer: How long the device is keeping pre-transfer signal activated before transferring from S1 to S2 or S2 to S1. Post-transfer: How long the device is keeping pre-transfer signal activated after transferring from S1 to S2 or S2 to S1.
		Center-Off	0*...300 s	Only delayed transition I-O-II type. How long the switch is stopped at position O while transferring from S1 to S2 or from S2 to S1 and the original source is not completely down. Center-OFF delay is bypassed in case all phases are missing from the original source which we are leaving.

Continued on the next page

Parameters (continued)		***Default**
Device Parameters (continued)		
Time Delays (continued)		
Override S2 Failure	0...60 s (2* s)	S1 priority: How long the device is keeping the load on failed S2 although S1 is already available. S2 priority: How long the device is waiting S2 recovery before starting transfer sequence to S1.
Transfer from S2 to S1	0...120 min (2* s)	S1 priority: How long the device waits before transfer sequence back to available S1 begins. This delay is overridden by 'Override S2 Failure' in case of S2 failure. S2 priority: How long the device is keeping the load on failed S2 although S1 is already available.
Elevator Pre-transfer signal	1 / 2 / 3 / 4	
Elevator Pre-signal S1-S2 Elevator Post-signal S1-S2 Elevator Pre-signal S2-S1 Elevator Post-signal S2-S1	0*...60 s	Enabled only when any digital output is configured as 'Elevator pre-signal'. Pre-transfer: How long the device is keeping pre-signal activated before transferring from S1 to S2 or from S2 to S1. Post-transfer: How long the device is keeping pre-signal activated after transferring from S1 to S2 or from S2 to S1.
Generator Stop	0...60 min (5* min)	Enabled only when generator is in use. Generator cooling time, how long the device is keeping the generator running without load after returning to priority source.
Load Shed	0*...60 s	Enabled only when any digital output is configured as 'Load Shed'. How long before the transfer from priority to non-priority source the device activates load shed signal.

Continued on the next page

Parameters (continued)					***Default**
Device Parameters (continued)					
	Voltage & Frequency Setpoints	Defines the voltage and frequency limits for source being acceptable. Source has an anomaly when measured voltage/ frequency goes out of range drop-out lower/drop-out Upper. Source becomes acceptable when measured voltage/ frequency goes back in range pick-up lower/pick-up higher.			
		S1 Setpoints			
			S1 Drop-out Voltage	Upper Threshold	102...120 % Un (115* % Un)
				Lower Threshold	70...98 % Un (85* % Un)
			S1 Pick-up Voltage	Upper Threshold	101...119 % Un (114* % Un)
				Lower Threshold	71...99 % Un (90* % Un)
			S1 Drop-out Frequency	Upper Threshold	101...120 % fn (115* % fn)
				Lower Threshold	80...99 % fn (85* % fn)
			S1 Pick-up Frequency	Upper Threshold	100.5...119.5 % fn (114* % fn)
				Lower Threshold	80.5...99.5 % fn (86* % fn)
		S2 Setpoints			
			S2 Drop-out Voltage	Upper Threshold	102...120 % Un (115* % Un)
				Lower Threshold	70...98 % Un (85* % Un)
			S2 Pick-up Voltage	Upper Threshold	101...119 % Un (114* % Un)
				Lower Threshold	71...99 % Un (90* % Un)
			S2 Drop-out Frequency	Upper Threshold	101...120 % fn (115* % fn)
				Lower Threshold	80...99 % fn (85* % fn)
			S2 Pick-up Frequency	Upper Threshold	100.5...119.5 % fn (114* % fn)
				Lower Threshold	80.5...99.5 % fn (86* % fn)
	Voltage Unbalance Setpoints	Options to change voltage unbalance measurement limits or disable unbalance measurement completely.			
			Unbalance Drop-Out		±5...30 % Un (±10* % Un)
			Unbalance Pick-Up		±3...28 % Un (±8* % Un)
			Unbalance Measuring		Off*
					On

Continued on the next page

Parameters (continued)			***Default**
Device Parameters (continued)			
Generator Exercisers	Switch and generator functioning can be tested automatically and also periodically by using four independent exerciser events. Test on load function starts the generator and transfers the load to it. Test off load function only starts the generator for the duration of the event. Overlapping events are prioritized, event 1 has the highest priority.		
	Exerciser 1 / 2 / 3 / 4		
		Status	Disabled*
			Non-periodic
			Daily
			Weekly
			Bi-weekly
			Monthly
			Yearly
		Function	No Function*
			Test on Load
			Test off load
		Duration (hh:mm:ss)	00:00:00...24:00:59 (00:01:00*)
		Time (hh:mm)	Starting time of the event. 00:00*...23:59
		Date (Month, day, year)	Starting date of the event Jan 01, 2020... (---*)
	Application		
	S1-Transformer/S2-Generator*		
	S2-Transformer/S1-Generator		
	2 Transformers/S1 Priority		
	2 Transformers/S2 Priority		
	2 Transformers/No Priority		
	Commit Transfer		
	Off*	If priority source fails, device cancels the transfer sequence to non-priority source (generator) if priority source returns before non-priority source becomes acceptable.	
	On	If priority source fails, device countinues transfer sequence to non-priority source (generator) even if priority returns before non-priority souce becomes acceptable. Retransfer sequence according to time delays.	

Continued on the next page

Parameters (continued)			***Default**
Device Parameters (continued)			
	High current alarm		
		Status	
			Enabled	If measured current is higher than ten times the nominal value device will prevent all operations and show high current alarm on-screen. After high current status is over, device will start operating normally.
			Disabled*	
		Alarm reset required	
			Yes	User confirmation is required before re-entering normal operation after high current status.
			No*	Normal operation is started automatically after high current status.
	Transfer to Dead Source		
			On*	User can transfer to an unavailable source by using HMI keys I/II or by a remote command.
			Off	Transfer to an unavailable source is disabled.
	Source Loss Center-Off Delay		
			On*	User can select whether to always run the 'center-off' timer or skip it if there is no voltage on any of the phases on the source from where the ATS is transferring from.
			Off	
	Source Loss Pre-Signal Delay		
			On*	User can select whether to always run the pre-signal delays 'elevator pre-signal S1-S2', 'elevator pre-signal S2-S1', 'pre-transfer S1 to S2', 'pre-transfer S2 to S1' timers or skip these if there is no voltage on any of the phases on the source from where the ATS is transferring from.
			Off	
	Gen Start in Manual Mode		User may choose if device sends generator start signal when slide switch is not in AUTO mode.
			On*	Send the generator start signal regardless of slide switch position.
			Off	If slide switch is in lock or MAN mode device won't send the generator start signal.
	MAN Retransfer w/ Override		Affects only MAN retransfer mode. Select whether to stay in failed non-priority or transfer automatically back to priority if it is healthy.
			Off*	Stay at failed non-priority.
			On	Transfer to priority if non-priority is not ok.

Measurements			
Switch Diagnostic			
	Total operations		I-O-II switches: Total number of transfers I-O, O-II, II-O and O-I. I-II switches: Total number of transfers I-II and II-I
	Manual operations		Total transfers operated by the handle.
	Number of load transfers		Total number of transfers I-II and II-I
	Transfer time		Time it took to transfer the load between sources (ms)
	Source fail transfers		Total number of automatic transfers due to source failures.
	Days energized		
	Total time on S1		Hours
	Total time on S2		Hours
	Time S1 available		Minutes
	Time S2 available		Minutes
	Last generator start		MM, DD, YYYY hh:mm:ss
	Generator starting time		How long it took for the generator to become acceptable after latest start (s).
	In-phase time		How long it took for the in-phase monitor to achieve synchronized transfer (s).
Event Log			
	View Log		250 time stamped events, latest first.
	Clear Log		Delete all log entries.
Harmonics			Harmonic components up to 15th are calculated for the selected phase.
	Measured Phase	Disabled*	
		Phase 1	
		Phase 2	
		Phase 3	
	Voltage	Total distortion	THD for each phase of both voltage sources.
		S1 Components	Each harmonic component of the selected S1 phase.
		S2 Components	Each harmonic component of the selected S2 phase.
	Current	Total distortion	THD for each phase
		Current Components	Each harmonic component of the selected phase
	Harmonic Component Filter	Off*	Harmonics included in current
		On	Harmonics filtered from current
Power Factor			Enabled only when current measurement module is connected.
Metering Pages			Allows to show/hide current, power and energy related analog meters and measurement pages.
		Enabled*	
		Disabled	

Settings				*Default
Standard I/O settings				
	I 01 / I 02 / I 03			
		Function	No function	Input disabled.
			Emergency Stop* (default in I 01)	Transfers to O position in delayed transition I-O-II type switches. Disables automatic control mode in both delayed and open transition types.
			Remote Test On Load* (default in I 02)	Start/stop test on load sequence in rising (NO) or falling (NC) edge of the input signal.
			Remote Test Off Load* (default in I 03)	Start/stop test off load sequence in rising (NO) or falling (NC) edge of the input signal.
			Inhibit ATS	Prevent switch control operations, configuration, test sequences and generator start in case of priority source failure.
			Manual Retransfer	Disables automatic retransfer back to priority source.
			Source Priority S1	Sets priority for source 1 in transformer-transformer application.
			Source Priority S2	Sets priority for source 2 in transformer-transformer application.
			Inhibit Transfer	Disables automatic transfer from priority source to non-priority source. When input is activated, transfer to non-priority can be initiated by pressing HMI control button and entering the device password.
			Bypass Running Time Delays	Bypass any currently running time delay.
			Remote Control to S1	Transfer to S1 when active. Overridden by activated 'Remote Control to OFF' signal.
			Remote Control to OFF	Transfer to O position when active.
			Remote Control to S2	Transfer to S2 when active. Overridden by activated 'Remote Control to OFF' or 'Remote Control to S1' signals.
			Reset Alarm	Reset any active switch control alarms (open I failure, close I failure, open II failure, close II failure).
			Inhibit Transfer w/ Override	Prevents ATS to transfer away from acceptable power source. If connected power source fails ATS can transfer to another source if it is OK.
			Load Shed Input Signal	Allows generator to signal to ATS to transfer away from the generator source to prevent overload. Input works differently with OXA_ and OXB_ switch types. OXA_ models: ATS transfers to priority source and stays there while the input is activated. OXB_ models: Transfers switch to O-position. If priority source restores while the input is activated ATS will transfer to it.

Continued on the next page

Settings (continued)			***Default**
Standard I/O settings (continued)			
I 01 / I 02 / I 03 (continued)			
Function (continued)			
		Manual-Auto Mode	Toggle automatic/HMI control mode, input is active only in rising/falling edge according to contact type.
		Peak Shaving Input	ATS will transfer to generator and stay on generator regardless of primary source condition. If generator fails and primary source is available ATS will automatically transfer to primary source.
	Contact Type	NC	Active open
		NO*	Active closed
O 01			
	Function	No function	Output disabled.
		Alarm / Product availability*	Signal is activated if any condition (both intentional and unintentional) prevents automatic operation
		ATS in Position S1	Switch in position I.
		ATS in Position OFF	Switch in position O.
		ATS in Position S2	Switch in position II.
		Pre-transfer Signal 1	Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.
		Pre-transfer Signal 2	Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.
		Pre-transfer Signal 3	Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.
		Pre-transfer Signal 4	Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.
		Source 1 available	No anomalies in S1 voltage supply.
		Source 2 available	No anomalies in S2 voltage supply.
		Load Shed Output Signal	Used for shedding non-essential loads before transferring to non-priority source. Signal is activated before transferring to non-priority source according to load shed delay and kept activated until load is transferred back to priority source.
		Transfer Alarm	Activated when ATS has transferred on non-priority source. Silence alarm popup will be shown in HMI after output has activated. It allows user to deactivate the the output.

Continued on the next page

Settings (continued)			***Default**
Standard I/O settings (continued)			
	O 01 (continued)		
	Function (continued)		
		Elevator pre-signal 1	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
		Elevator pre-signal 2	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
		Elevator pre-signal 3	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
		Elevator pre-signal 4	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
		ATS in AUTO mode	Automatic control mode active
		ATS in MAN retransfer mode	Manual retransfer control mode active
		Ready for MAN retransfer	Manual retransfer control mode active, ATS is on non-priority source and priority source is available
		Product Malfunction	Signal is activated if product malfunction prevents automatic operation
	Contact Type	NC	Active open.
		NO*	Active closed.
Modules (See Chapter 5, Electronic accessories)			
System			
	RESET to Factory Setting		Restore default parameter values
	Date [1)]		Month, day, year
	Time [1)]		Hours:Minutes

[1)] Clock capacitor must be charged before inserting Date/Time. Clock capacitor is charged from source voltage (not AUX) and takes about 10 minutes. Clock capacitor keeps the date/time saved for 48 h in case of no source voltage available.

Continued on the next page

Settings (continued)			***Default**
Standard I/O settings (continued)			
0 01 (continued)			
System (continued)			
Language			
	English*		
	Italian		
	French		
	German		
	Spanish		
	Russian		
	Chinese		
New Password		FIve digits	
Temperature Unit	Celcius*		
	Fahrenheit		
Clock Format	24 h*		
	12 h		
Installation Date		Month, day, year	
View			
Ammeter Phase			
	I Max*		
	L1		
	L2		
	L3		
	Ne		
S1 Voltmeter Phase			
	V Max*		
	U12		
	U23		
	U31		
S2 Voltmetter Phase			
	V Max*		
	U12		
	U23		
	U31		

Test			*Default
T	On-Load Test Settings		
	Bypass Local Test		
		Bypass if Generator Fails*	
		Stay on Generator	
	Bypass Remote Test		
		Bypass if Generator Fails*	
		Stay on Generator	
	Bypass Generator Exerciser		
		Bypass if Generator Fails*	
		Stay on Generator	
	Test On Load	Test generator with transferring the load. Test with switch transfer.	
	Test Off Load	Test generator without transferring the load. Test without switch transfer.	
	HMI Test	Initiate display test screen and turn all LED's on. This function is not available when time delay is ongoing.	
	Optional modules (See Chapter 5, Electronic accessories)		

About		
	HMI	HMI serial number
		Software version
		Software subversion
		HMI Type code
	Controller Unit	Time
		Date
		Serial number
		Normative
		Controller software version
		Controller software subversion
	Automatic Transfer Switch	TAG name
		ATS Type Code
		ATS serial number
		Rated current
		Number of Poles
		ATS Type
	Modules (See Chapter 5, Electronic accessories)	

Only features in active use should be enabled.

4.2.1.3 Analog meters

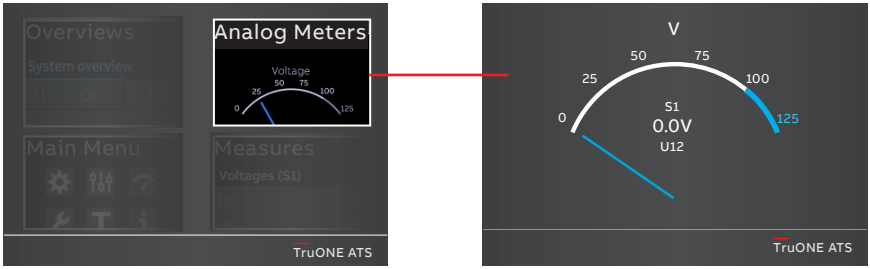
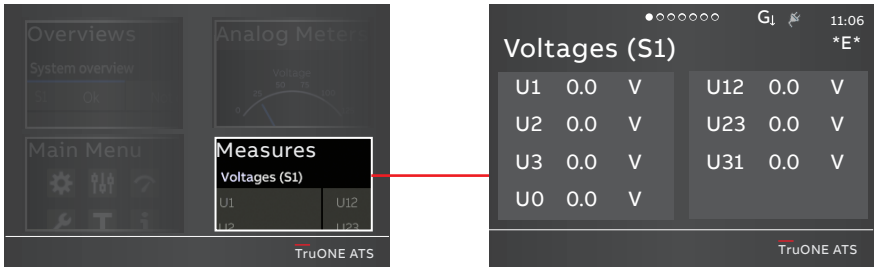


Fig. 4.16 By touching on Start Menu upper right corner -image you can find the analog meters information, see the table below

S1 Voltage meter
S2 Voltage meter
Current meter
Power meter
VAR meter
VA meter

4.2.1.4 Measures



—
Fig. 4.17 By touching on Start Menu lower right corner -image you can find the measured data, see the table below

Voltages (S1)
Voltages (S2)
Current
Active power
Reactive power
Apparent power
Energy counters

5. Electronic accessories

Ekip Connect Sofware and Programming -modules are suitable for all TruONE automatic transfer switches, see chapters 5.1…5.2.

- Ekip Connect -software
- Ekip Programming -module

Ekip Signalling and Com -modules are available for TruONE automatic transfer switches with Level 3 and Level 4 controllers (LCD and touch control interfaces). These modules are mounted with auxiliary power supply module, OXEA1 (see the mounting in section 2, Chapter 9, Mounting of accessories).

Ekip-modules mounted with auxiliary power supply module are (see chapters 5.3…5.6):

- Ekip signalling modules;
  - Ekip signalling 2K-1-OX
  - Ekip signalling 2K-2-OX
  - Ekip signalling 2K-3-OX
  - Ekip Signalling 10K
- Ekip Com modules;
  - Ekip Com Modbus RTU-OX
  - Ekip Com Modbus TCP-OX
  - Ekip Com Profibus DP
  - Ekip Com DeviceNet
  - Ekip Com Profinet
  - Ekip Com EtherNet/IP
  - Ekip Com Hub

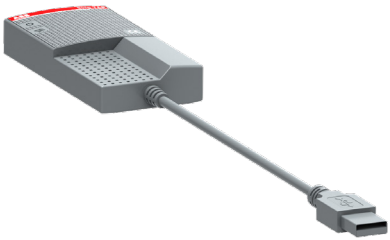


Fig. 5.1 Ekip Programming -module

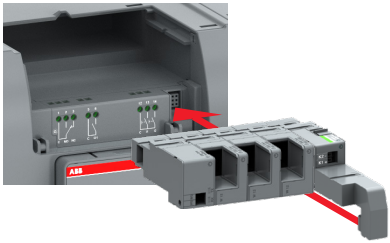


Fig. 5.2 Ekip Signalling and Com -modules are mounted to TruONE automatic transfer switch with a auxiliary power supply module, OXEA1

5.1 Using Ekip Connect -software

Ekip Connect is a free software for communication and testing of TruONE automatic transfer switches. The software is compatible with all TruONE automatic transfer switches. It can be installed on PCs equipped with the Microsoft Windows® operating system. Download it from the web site, see the address below:
http://www.abb.com/abblibrary/DownloadCenter/

With its communication function, it allows you to:

- Monitor the state of the connected automatic transfer switches and record information.
- Configure automatic transfer switches with customized parameters.
- Configure electronic accessories, connected to automatic transfer switch via Local Bus.
- Download information from automatic transfer switches.
- Create communication reports.
- Reset configurations.

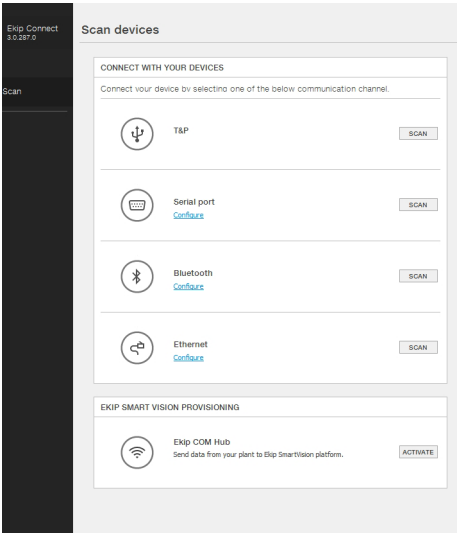


Fig. 5.3 Ekip Connect -software

5.2 Using Ekip Programming -module

Ekip Programming -module is suitable to use with all TruONE™ automatic transfer switches. You can connect the module via the programming port, see Fig. 5.5. The programming port can only be used with Ekip Programming -module.

Ekip Programming -module allows you to:
- With Ekip Connect software update the softwares and load, set and read the parameters
- If the firmware is updated while the device is powered via either voltage source the slide switch must be in MANUAL position.

Ekip Programming -module draws its power from the PC and connects one side directly to the programming port (see Fig. 5.5) and on the other to the USB ports of the PC with the cable supplied.

Note
Ekip Programming only powers the main switch (HMI and modules excluded). Therefore, in order to recognize all connected modules with Ekip Connect, the auxiliary power supply module, type OXEA1, must be used (see chapter 5.3).

5.2.1 Signallings

Ekip Programming -module turns on after connecting to the PC, and is equipped with two LEDs, a green one indicating that the module is on, and a yellow one indicating active communication.

Information
The Ekip Programming module can be used without powering the mains. (Local Bus Accessories, including HMI, are not operative).

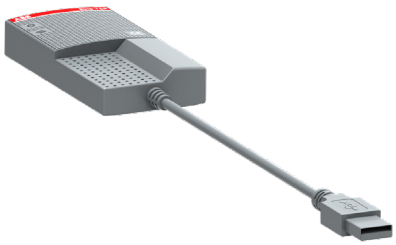


Fig. 5.4 Ekip Programming -module

Information
Programming port (USB port) for service use only.

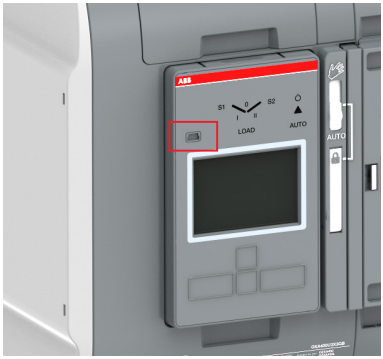


Fig. 5.5 Programming port (USB port) is situated in the front of the HMI, on left side

5.3 Auxiliary power supply module

The auxiliary power supply module, type OXEA1, supplies non-insulated power to the external Ekip-modules, HMI and main control unit. It is supplied by external supply, for example from generator battery or from isolated transformer connected to the main circuit. Powering product only with Auxiliary power supply module limits some operation functions of the main control unit, for example: Operation of Sensor module isn't possible.

Connections are push-in spring terminals, no tool is required. For external wiring cable cross sections:

- K1+ / K2-; AWG 22-16 / 0,5-1,5 mm²
- W3 / W4; AWG 26-20 / flexible, with ferrule; with plastic sleeve 0,25-0,34mm² / without plastic sleeve 0,25-0,5mm²
- For the Local Bus, Belden type 3105A or equivalent cables must be used, that is with a pair of twisted and shielded cables, with a characteristic impedance equal to 120 Ω.
- The maximum recommended length for the connection is 10 m.

5.3.1 Electrical characteristics

The following table lists the electrical characteristics:

Module	OXEA1
Power supply input voltage (K1+, K2-)	12 - 24 V DC ± 10% SELV
Nominal power consumption	5 - 12 W
Inrush current	Maximum 2 A
Local Bus (A Line H)	W3
Local Bus (B Line L)	W4

Table 5.1 Electrical characteristics of auxiliary power supply module OXEA1

5.3.2 Signallings

LED	Indication	Description
Power LED, green	On, fixed	Power is connected to the input of the module.
	Off	Power is not connected.

Table 5.2 Indication / auxiliary power supply module OXEA1

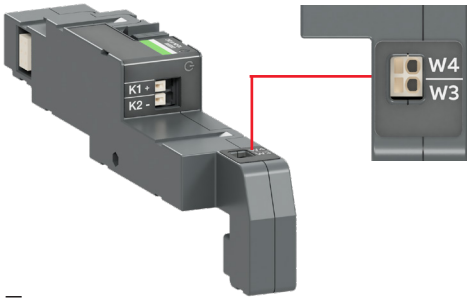


Fig. 5.6 Auxiliary power supply module, type OXEA1, is needed when Ekip Signalling and Com -modules are mounted to TruONE automatic transfer switch1



Fig. 5.7 Signals of auxiliary power supply module OXEA1

5.4 Using Ekip Signalling 2K-_ -module

The Ekip Signalling 2K-_ is a signalling accessory module. It is suitable Level 3 and Level 4 controllers (LCD and touch control interfaces). The module has:

- Two digital inputs, and two contacts for output signals.
- A power status LED, and four signalling LEDs (one LED for every input/output).

Information
On each ATS, a maximum of three Ekip Signalling 2K modules can be installed: one 2K-1, one 2K-2, and one 2K-3. These modules differ by their name and label, and have distinct wiring, but they are identical in terms of their characteristics and manner of installation.

Component	Characteristics
Output contacts	Maximum switching voltage*: 150 V DC / 250 V AC
	Breaking power*: 2 A @ 30 V DC, 0.8 A @ 50 V DC, 0.2 A @ 150 V DC, 4A @ 250 V AC
	Dielectric strength between each contact and coil: 1000 V AC (1 minute @ 50 Hz)
	Dielectric strength between open contacts: 1000 V AC (1 minute @ 50 Hz)
Input contacts	5V@2.5mA Do not connect to any power supply

*Data relating to a resistive load

Table 5.3 Electrical characteristics of Ekip Signalling 2K-_ -module

5.4.1 Electrical characteristics of Ekip Signalling 2K-_ -module

The following table lists the electrical characteristics of the module:



Fig. 5.8 Ekip Signalling 2K -module

5.4.2 Access from the display / Ekip Signalling 2K-_ -module

With modules energized, and Local Bus enabled, the presence of the modules on the module slot activates additional menus on the display:

- In order to configure the inputs and output contacts.
- To display information on the modules and the state of inputs and outputs.

The following table illustrates the path for accessing the configuration parameters of the module from the display:

Settings (*Default)			Description
Modules (Optional modules)			
Ekip Signalling 2K-1 / -2 / -3			
I 11/12, I 21/22, I 31/32			
	Function	No Function*	Input disabled
		Emergency Stop	Transfers to O position in delayed transition I-O-II type switches. Disables automatic control mode in both delayed and open transition types.
		Remote Test on Load	Start/stop test on load sequence in rising (NO) or falling (NC) edge of the input signal.
		Remote Test off Load	Start/stop test off load sequence in rising (NO) or falling (NC) edge of the input signal.
		Inhibit ATS	Prevent switch control operations, configuration, test sequences and generator start in case of priority source failure.
		Manual Retransfer	Disables automatic transfer back to priority source.
		Source Priority S1	Sets priority for source 1 in transformer-transformer application.
		Source Priority S2	Sets priority for source 2 in transformer-transformer application.
		Inhibit Transfer	Disables automatic transfer from priority source to non-priority source. When input is activated, transfer to non-priority can be initiated by pressing HMI control button and entering the device password.
		Bypass Running Time Delays	Bypass any currently running time delay.
		Remote Control to S1	Transfer to S1 when active. Overridden by activated 'Remote Control to OFF' signal.
		Remote Control to OFF	Transfer to position O when active.
		Remote Control to S2	Transfer to S2 when active. Overridden by activated 'Remote Control to OFF' or 'Remote Control to S1' signals.
		Reset Alarm	Reset any active switch control alarms (open I failure, close I failure, open II failure, close II failure).
		Inhibit Transfer w/ Override	Prevents ATS to transfer away from acceptable power source. If connected power source fails ATS can transfer to another source if it is OK.
		Load Shed Input Signal	Allows generator to signal to ATS to transfer away from the generator source to prevent overload. Input works differently with OXA_ and OXB_ switch types. OXA_ models: ATS transfers to priority source and stays there while the input is activated. OXB_ models: Transfers switch to O-position. If priority source restores while the input is activated ATS will transfer to it.
		Manual-Auto Mode	Toggle automatic/HMI control mode, input is active only in rising/falling edge according to contact type.
		Peak Shaving Input	ATS will transfer to generator and stay on generator regardless of primary source condition. If generator fails and primary source is available ATS will automatically transfer to primary source.
	Contact Type	NC	Active open
		NO*	Active closed

Continued on the next page

Settings (*Default)			Description
Modules (Optional modules) (continued)			
	O 11/12, O 21/22, O 31/32		
		Function	No Function*	Output disabled
			Alarm/Product Availability	Signal is activated if any condition (both intentional and unintentional) prevents automatic operation.
			ATS in Position S1	Switch in position I.
			ATS in Position OFF	Switch in position OFF.
			ATS in Position S2	Switch in position II.
			Pre-transfer Signal 1	Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.
			Pre-transfer Signal 2	Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.
			Pre-transfer Signal 3	Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.
			Pre-transfer Signal 4	Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.
			Source 1 Available	No anomalies in S1 voltage supply.
			Source 2 Available	No anomalies in S2 voltage supply.
			Load Shed Output Signal	Used for shedding non-essential loads before transferring to non-priority source. Signal is activated before transferring to non-priority source according to load shed delay and kept activated until load is transferred back to priority source.
			Elevator pre-signal 1	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
			Elevator pre-signal 2	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
			Elevator pre-signal 3	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
			Elevator pre-signal 4	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
			Transfer Alarm [1)]	Activated when ATS has transferred on non-priority source. Silence alarm popup will be shown in HMI after output has activated. It allows user to deactivate the the output.
			ATS in AUTO Mode	Automatic control mode active
			ATS in MAN Retransfer Mode	Manual retransfer control mode active

[1)] Only available with Level 4 controls.

Continued on the next page

Settings (*Default)			Description
Modules (Optional modules) (continued)			
O 11/12, O 21/22, O 31/32			
	Function	Ready for MAN Retransfer	Manual retransfer control mode active, ATS is on non-priority source and priority source is available
		Product Malfunction	Signal is activated if product malfunction prevents automatic operation
	Contact Type	NC	Active open
		NO*	Active closed

Test	
:	
Modules (Optional modules)	
Ekip Signalling 2K-1 / -2 / -3	Auto Test
:	

—

Table 5.5 Configuration and test parameters of Ekip Signalling 2K-_ -module in HMI

The following table illustrates the path from the display for accessing information on the module:

About		Description
:		
Modules (Optional modules)		
Ekip Signalling 2K-1 / -2 / -3		
	SN	Serial number
	Version	Software version
	Input 1	The logical state of the inputs: “Off” if not active, “On” if active
	Input 2	
	Output 1	The state of the output contacts: “Open” if open, “Closed” if closed
	Output 2	
:		

—

Table 5.4 Information of Ekip Signalling 2K-_ -module in HMI

5.4.3 Signals and inputs/outputs of Ekip Signalling 2K-_ -module

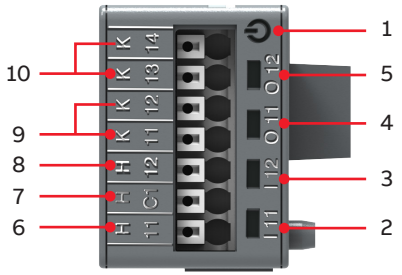


Fig. 5.9 Signals and inputs/outputs of Ekip Signalling 2K-_ -module

1 Power LED, green. The possible states are:
- Off: power supply absent.
- On fixed: power supply and communication with the device present (with a device with the Alive LED option disabled).
- On, with one flash per second (synchronized with that of the green LED on the device): power supply and communication with device present (with a device with the Alive LED option enabled)
- On, with two quick flashes per second (not synchronized with those of the green LED on the device): power supply present, and communication with device absent (for example: for Local Bus disabled) [1)]

2 Green[3)] LED for signalling the physical state of the input H x1[2)]. The possible states are:
- Off: floating input
- On fixed: input short-circuited on H Cx[2)]

3 Green[3)] LED for signalling the physical state of the input H x2[2)]. The possible states are:
- Off: floating input
- On fixed: input short-circuited on H Cx

4 Green[3)] LED for signalling contact K x1 - K x2[2)]. The possible states are:
- Off: contact open
- On fixed: contact closed

5 Green[3)] LED for signalling the state of the contact K x3 - K x4[2)]. The possible states are:
- Off: contact open
- On fixed: contact closed

6 Input I x1

7 Conductive part of the inputs H x1 and H x2[2)]

8 Input I x2[2)]

9 Output contact pin O x1[2)]

10 Output contact pin O x2[2)]

1) The absence of communication is signalled immediately by the power LED, unlike the outputs which (apart from those programmed to be activated in the case of disconnection) are deactivated if the condition persists for at least 8 s
2) With x = 1, 2, or 3
3) The LED turns on and off according to the physical state of the input, without taking any account of how the Delay parameter is set.

Connections are push-in spring terminals, no tool is required.

For external wiring, cable cross section; AWG 22-16 / 0,5-1,5 mm^2.

5.5 Ekip Signalling 10K

The Ekip Signalling 10K is an external signalling accessory module that can be installed on a DIN rail. It is suitable Level 3 and Level 4 controllers (LCD and touch control interfaces). This Ekip signalling module provides:

- 10 contacts for output signals.
- 10 digital inputs. Input I S11 (HS21, HS22) is not supported.
- A power LED, and 20 signalling LEDs (one for each output/input).

The module can communicate with the outside in two **alternative** ways:

- Via Local Bus, with a single control unit equipped with the power supply module Ekip Supply.
- Via Link Bus, with a maximum of four control units each equipped with an Ekip Link module.

Further information on Ekip Signalling 10K is available from the web site: http://www.abb.com/abblibrary/DownloadCenter/ , in particular in the manual 1SDH001318R0002.



Fig. 5.10 Ekip Signalling 10K module

Legal Disclaimer
The module can be connected only to internal Ethernet networks with one or more switchboards, to which the switch or the accessories are connected. It is the installer's responsibility to ensure that all the necessary safety measures are adopted for all the connected devices (for example, the necessary access authorisations, and so on). The module cannot be connected to other Ethernet networks (for example, with the purpose of monitoring the system, or the office), or to the Internet.

With communication via Local Bus, unless the control unit is disconnected, then module contacs closing/opening is controlled by the control unit and the information on the input status is transmitted by the module to the control unit. In particular, the control unit can be programmed so that:

- The closing/opening of a contact corresponds to a desired event or combination of events detected by the control unit.
- The activation of an input corresponds to an action by the control unit.

NOTE! The Ekip Signalling 10K-1 module is equipped with ten inputs (with as many LEDs, giving a total of twenty LEDs). Ekip Signalling 10K-2 and 10K-3 modules are not supported.

With communication via Link Bus:

- The module is connected to a network on which the control units equipped with an Ekip Link module share data packets containing information on their own state.
- The IP addresses of the control units to which you wish to connect the module must be inserted into the module, and each contact can be programmed to be closed/opened in response to an event or combination of events regarding a control unit connected.
- If the module receives a packet sent from a control unit connected, the module reads the content of the packet and triggers any action that may have been programmed.

With Link Bus communication, the ports used by the module are:

Port	Service	Notes
502/ tcp	Modbus	TCP When the module is used as a communication module.
18/ udp	ABB proprietary	In case of exchange of fast information between ABB devices.

Table 5.6 Ports used with Link Bus communication

The module must be powered independently from the control units to which it's connected, and can be powered in AC or DC.

Information
AC and DC power supplies cannot be present at the same time.

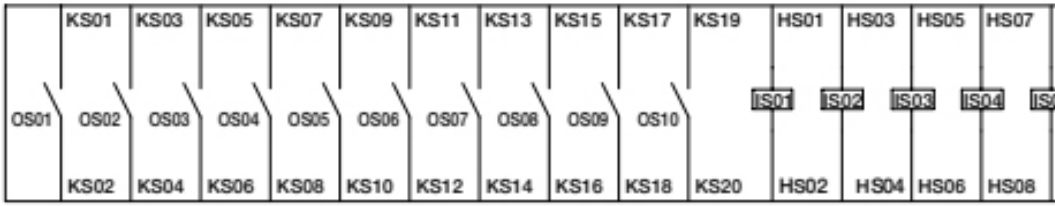


Fig. 5.11 Ekip Signalling 10K module, connection diagram

5.5.1 Connections

The module must be mounted on a DIN rail, and connected by wiring the connectors on the module. With communication via Local Bus, the communication lines on the module must be connected to the corresponding lines on the power supply module of the switch. On the contrary, with communication via Link Bus, the Link Bus connector on the module must be connected to an Ethernet switch.

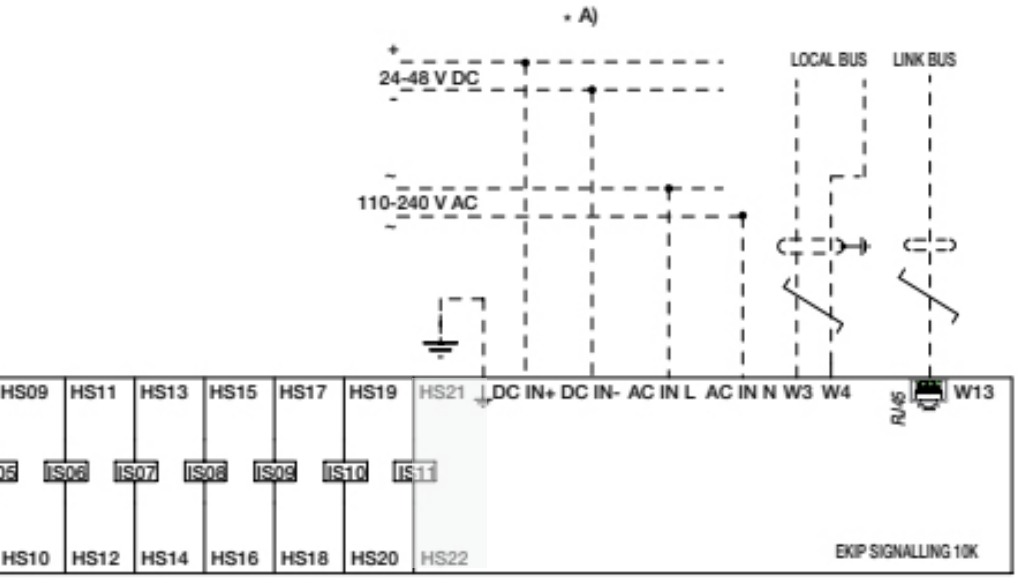
5.5.2 Wiring

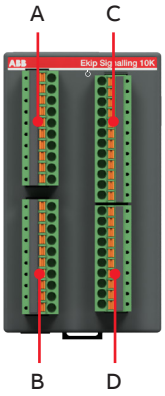
For the wirings:

- For the Local Bus, Belden type 3105A or equivalent cables must be used, that is with a pair of twisted and shielded cables, with a characteristic impedance equal to 120 Ω. The screen of the cables must be connected to earth on one side of the connection, on the control unit side. The maximum recommended length for the connection is 15 m.
- For communication via Link Bus, a cable of type Cat.6 S/FTP must be used (Cat.6 with S/FTP double shielding).

5.5.3 Outputs inputs and signals

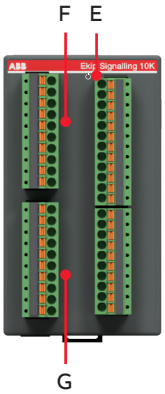
The outputs and the inputs are accessible on the connectors positioned on the front of the module. Tables on next pages illustrates the pins of these connectors, the signals related to the outputs and the signals related to the inputs, and their meanings.





Position	Pin	Description
A	KS01, KS02	Pins of the output contact O S01.
	KS03, KS04	Pins of the output contact O S02.
	KS05, KS06	Pins of the output contact O S03.
	KS07, KS08	Pins of the output contact O S04.
	KS09, KS10	Pins of the output contact O S05.
B	KS11, KS12	Pins of the output contact O S06.
	KS13, KS14	Pins of the output contact O S07.
	KS15, KS16	Pins of the output contact O S08.
	KS17, KS18	Pins of the output contact O S09.
	KS19, KS20	Pins of the output contact O S10.
C	HS01, HS02	Input I S01 and its reference.
	HS03, HS04	Input I S02 and its reference.
	HS05, HS06	Input I S03 and its reference.
	HS07, HS08	Input I S04 and its reference.
	HS09, HS10	Input I S05 and its reference.
	HS11, HS12	Input I S06 and its reference.
D	HS13, HS14	Input I S07 and its reference.
	HS15, HS16	Input I S08 and its reference.
	HS17, HS18	Input I S09 and its reference.
	HS19, HS20	Input I S10 and its reference.
	HS21, HS22	Input I S11, not supported.

—
Table 5.7 Outputs and inputs



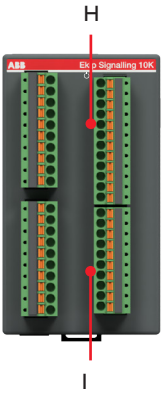
[1] The LED Alive option with communication via Local Bus is the one set on the trip unit, with communication via Link Bus it's the one set on the module.

[2] With communication via Link Bus, absence of communication is signalled if any trip unit associated to the module is disconnected.

[3] The absence of communication is signalled if it persists for at least 8 s.

Position	Pin	Description
E	-	Power LED, green. The possible states are: • Off: power supply absent. • On, fixed: power supply present, and communication via Local Bus/Link Bus active (with LED Alive option disabled [1]). • On, flashing once per second: power supply present, and communication via Local Bus/Link Bus active (with LED Alive option enabled [1]). • On, with two quick flashes per second: power supply present, and commu-nication via Local Bus/Link Bus absent (e.g. because of Local Bus deactivation, or trip unit disconnection [2], or physical disconnection) [3].
F	O S01	Signalling LED of the contact O S01 status, green. The possible states are: • Off: contact open. • On, fixed: contact closed.
	O S02	Signalling LED of the contact O S02 status, green. The possible states are: • Off: contact open. • On, fixed: contact closed.
	O S03	Signalling LED of the contact O S03 status, green. The possible states are: • Off: contact open. • On, fixed: contact closed
	O S04	Signalling LED of the contact O S04 status, green. The possible states are: • Off: contact open. • On, fixed: contact closed.
	O S05	Signalling LED of the contact O S05 status, green.The possible states are: • Off: contact open. • On, fixed: contact closed.
G	O S06	Signalling LED of the contact O S06 status, green.The possible states are: • Off: contact open. • On, fixed: contact closed.
	O S07	Signalling LED of the contact O S07 status, green.The possible states are: • Off: contact open. • On, fixed: contact closed.
	O S08	Signalling LED of the contact O S08 status, green.The possible states are: • Off: contact open. • On, fixed: contact closed.
	O S09	Signalling LED of the contact O S09 status, green.The possible states are: • Off: contact open. • On, fixed: contact closed.
	O S10	Signalling LED of the contact O S10 status, green.The possible states are: • Off: contact open. • On, fixed: contact closed.

Table 5.8 Output signals

	Position	Pin	Description
	H	I S01	Signalling LED of the input I S01 physical status, green.The possible states are: • Off: input floating. • On, fixed: short-circuit between pins HS01 and HS02
		I S02	Signalling LED of the input I S02 physical status, green.The possible states are: • Off: input floating. • On, fixed: short-circuit between pins HS03 and HS04.
		I S03	Signalling LED of the input I S03 physical status, green.The possible states are: • Off: input floating. • On, fixed: short-circuit between pins HS05 and HS06.
		I S04	Signalling LED of the input I S04 physical status, green.The possible states are: • Off: input floating. • On, fixed: short-circuit between pins HS07 and HS08.
		I S05	Signalling LED of the input I S05 physical status, green.The possible states are: • Off: input floating. • On, fixed: short-circuit between pins HS09 and HS10.
		I S06	Signalling LED of the input I S06 physical status, green.The possible states are: • Off: input floating. • On, fixed: short-circuit between pins HS11 and HS12.
	I	I S07	Signalling LED of the input I S07 physical status, green.The possible states are: • Off: input floating. • On, fixed: short-circuit between pins HS13 and HS14.
		I S08	Signalling LED of the input I S08 physical status, green.The possible states are: • Off: input floating. • On, fixed: short-circuit between pins HS15 and HS16.
		I S09	Signalling LED of the input I S09 physical status, green.The possible states are: • Off: input floating. • On, fixed: short-circuit between pins HS17 and HS18.
		I S10	Signalling LED of the input I S10 physical status, green.The possible states are: • Off: input floating. • On, fixed: short-circuit between pins HS19 and HS20.
		I S11	Not supported

—
Table 5.9 Input signals

5.5.4 Communication connectors

The communication connectors are positioned on the upper side of the module. The following table illustrates the communication connectors:

Position	Name	Description
A	Local Bus W3	Line H of the Local Bus
	Local Bus W4	Line L of the Local Bus
B	Link Bus W13	Link Bus Connector

Table 5.10 Communication connectors

The following table illustrates the possible signals on connector W13, and their meaning:

Position	Description
C	Link LED, green. The possible states are: • Off: connection error (signal absent). • On, fixed: correct connection.
D	Activity LED, yellow. The possible states are: • Off: absence of activity on the line. • On, fixed or flashing: activity present on the line (reception and/or transmission).

Table 5.11 Signals on connector W13

5.5.5 Power supply connectors

The power supply connectors are positioned on the lower side of the module. The following table illustrates the power supply inputs:

Position	Name	Description
E	AC IN N	AC power input
	AC IN L	AC power input
	⏚	Earth connection
F	DC IN +	DC + power input
	DC IN -	DC - power input

Table 5.12 Power supply connectors

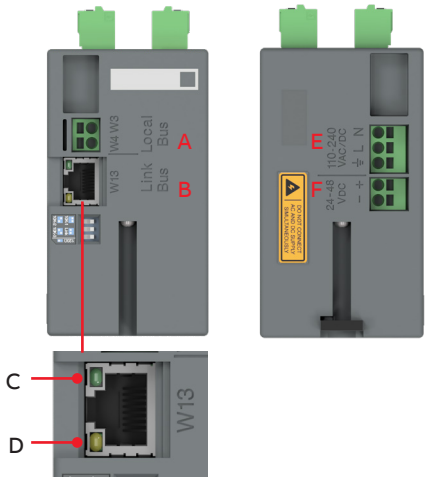


Fig. 5.12 Ekip Signalling 10K module, Communication connectors on left, Power supply connectors on right

If there is used some external power source, make sure that supply voltage complies with the recommendations below:

Component	Characteristics
AC power supply	• Voltage: 105...265 V AC. • Frequency: 45...66 Hz. • Power absorbed with 10 contacts closed: 10 VA.
DC power supply	• Voltage: 21.5...53 V DC. • Power absorbed with 10 contacts closed: 10W.
Output contacts	• Maximum switching power (1): 1250 VA. • Maximum switching voltage (1): 150 V DC / 250 V AC. • Breaking capacity (1): 2 A @ 30V DC, 0.8 A @ 50V DC, 0.2 A @ 150V DC, 4 A @250V AC. • Dielectric strength between open contacts and between every contact and coil: 1000 V AC (1 minute @ 50 Hz).

(1) Data related to a resistive load.

Table 5.13 The electrical specifications of the module power supplies and outputs

5.5.6 DIP switch configuration

At installation, the module must be configured to communicate via Local Bus or Link Bus.

With communication via Local Bus, a 120 Ω termination resistor must be inserted on the communication lines. This 120 Ω termination resistor is switched to the ON-position by the DIP switch 1 positioned on the upper side of the module:

DIP Switch	Termination resistor	
	No	Yes
1	OFF	ON

Table 5.14 Inserting the termination resistor ON

The Ekip Signalling 10K module configured for a basic module 10K-1 is already done in the factory; configuration is done with the DIP switches 2 and 3, both are in OFF-position, see the Fig.4.18. The DIP switches are positioned on the upper side of the module. The following tables describe the possible configurations, 10K-2 and 10K-3 configurations are not supported in automatic transfer switches:

DIP Switch	Ekip Signalling			LinkBus
	10K-1	10K-2	10K-3	
2	OFF	ON	OFF	ON
3	OFF	OFF	ON	ON

Table 5.15 Configurations

NOTE! The operational configuration is read only at power on. Therefore, if the module is on, it must be turned OFF and ON in order for it to recognise a new configuration.

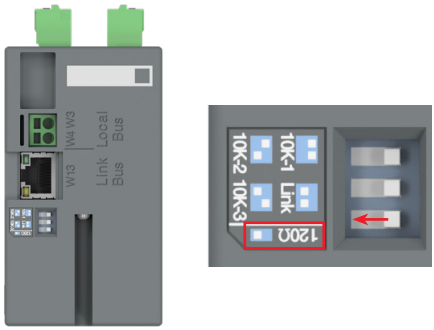


Fig. 5.13 Ekip Signaling 10K module; When using a local bus, the 120 Ω termination resistor must be switched to the ON position with DIP switch 1. By default, the Ekip Signaling 10K module type is already 10K-1 position (= DIP switches 2 and 3 are on OFF-position)

5.5.7 Access via Local Bus

Access via Local Bus allows the module to be shown on the display of the conrol unit to which the module is connected.

In order to show the module on the display of the control unit, the module must be powered, configured through switches as a 10K-1 (10K-2 or 10K-3 are not supported) (see the paragraph 5.5.6 DIP switch configuration), and connected correctly to the control unit, and the Local Bus must be enabled on the control unit. Then the presence of the module activates on display additional menus, that allow information on the module and the inputs and outputs status to be displayed. For operation with communication via Local Bus, the module can be configured only with the Ekip Connect software connected to the control unit.

Information
If the control unit is disconnected for at least 8 s, the outputs are deactivated, except those programmed to be activated in case of disconnection. Normal operation is restored at reconnection. See next page the Settings.

The following table illustrates the configuration parameters of the inputs, and their possible values.

NOTE: Ekip Signalling 10K-1 -module is not configurable trough HMI. Only Ekip Connect can be used to change the settings.

Settings (*Default)		Description
Modules (Optional modules)		
Ekip Signalling 10K-1		
I S01 - I S10		
Function	No Function*	Input disabled
	Emergency Stop	Transfers to O position in delayed transition I-O-II type switches. Disables automatic control mode in both delayed and open transition types.
	Remote Test on Load	Start/stop test on load sequence in rising (NO) or falling (NC) edge of the input signal.
	Remote Test off Load	Start/stop test off load sequence in rising (NO) or falling (NC) edge of the input signal.
	Inhibit ATS	Prevent switch control operations, configuration, test sequences and generator start in case of priority source failure.
	Manual Retransfer	Disables automatic transfer back to priority source.
	Source Priority S1	Sets priority for source 1 in transformer-transformer application.
	Source Priority S2	Sets priority for source 2 in transformer-transformer application.
	Inhibit Transfer	Disables automatic transfer from priority source to non-priority source. When input is activated, transfer to non-priority can be initiated by pressing HMI control button and entering the device password.
	Bypass Running Time Delays	Bypass any currently running time delay.
	Remote Control to S1	Transfer to S1 when active. Overridden by activated 'Remote Control to OFF' signal.
	Remote Control to OFF	Transfer to position O when active.
	Remote Control to S2	Transfer to S2 when active. Overridden by activated 'Remote Control to OFF' or 'Remote Control to S1' signals.
	Reset Alarm	Reset any active switch control alarms (open I failure, close I failure, open II failure, close II failure).
	Inhibit Transfer w/ Override	Prevents ATS to transfer away from acceptable power source. If connected power source fails ATS can transfer to another source if it is OK.
	Load Shed Input Signal	Allows generator to signal to ATS to transfer away from the generator source to prevent overload. Input works differently with OXA_ and OXB_ switch types. OXA_ models: ATS transfers to priority source and stays there while the input is activated. OXB_ models: Transfers switch to O-position. If priority source restores while the input is activated ATS will transfer to it.

Continued on the next page

Settings (*Default)			Description
Modules (Optional modules) (continued)			
Ekip Signalling 10K-1 (continued)			
I S01 - I S10 (continued)			
	Function	(continued)	
		Manual-Auto Mode	Toggle automatic/HMI control mode, input is active only in rising/falling edge according to contact type.
		Peak Shaving Input	ATS will transfer to generator and stay on generator regardless of primary source condition. If generator fails and primary source is available ATS will automatically transfer to primary source.
	Contact Type	NC	Active open
		NO*	Active closed
O S01 - O S10			
	Function	No Function*	Output disabled
		Alarm/Product Availability	Signal is activated if any condition (both intentional and unintentional) prevents automatic operation
		ATS in Position S1	Switch in position I.
		ATS in Position OFF	Switch in position OFF.
		ATS in Position S2	Switch in position II.
		Pre-transfer Signal 1	Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.
		Pre-transfer Signal 2	Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.
		Pre-transfer Signal 3	Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.
		Pre-transfer Signal 4	Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.
		Source 1 Available	No anomalies in S1 voltage supply.
		Source 2 Available	No anomalies in S2 voltage supply.
		Load Shed Output Signal	Used for shedding non-essential loads before transferring to non-priority source. Signal is activated before transferring to non-priority source according to load shed delay and kept activated until load is transferred back to priority source.
		Elevator pre-signal 1	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
		Elevator pre-signal 2	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
		Elevator pre-signal 3	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
		Elevator pre-signal 4	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.

Continued on the next page

Settings (*Default)			Description
Modules (Optional modules) (continued)			
Ekip Signalling 10K-1 (continued)			
O S01 - O S10 (continued)			
Function	(continued)		
		Transfer Alarm [1]	Activated when ATS has transferred on non-priority source. Silence alarm popup will be shown in HMI after output has activated. It allows user to deactivate the the output.
		ATS in AUTO Mode	Automatic control mode active.
		ATS in MAN Retransfer Mode	Manual retransfer control mode active.
		Ready for MAN Retransfer	Manual retransfer control mode active, ATS is on non-priority source and priority source is available.
		Product Malfunction	Signal is activated if product malfunction prevents automatic operation.
	Contact Type	NC	Active open
		NO*	Active closed

[1] Only available with Level 4 controls.

—

Table 5.17 Configuration parameters of Ekip Signalling 10K-1 -module. Only Ekip Connect can be used to change settings.

The following table illustrates the path from the display for accessing information on the module:

About		Description
:		
Modules (Optional modules)		
Ekip Signalling 10K-1		
	SN	Serial number
	Version	Software version
	Inputs 1-10	The logical state of the inputs: “Off” if not active, “On” if active
	Outputs 1-10	The state of the output contacts: “Open” if open, “Closed” if closed
:		

—

Table 5.16 Information of Ekip Signalling 10K-1 -module

5.5.8 Access via Link Bus

Via Link Bus, the module can be configured only with the Ekip Connect application, by running the Ethernet scan and selecting the module from the devices found. From Ekip Connect, at most three accesses to the module are possible.

With the Ekip Connect application and the Ethernet scan, various pages are available, in which you can:

- Display information on the module.
- Insert the TAG Name, in order to facilitate the module recognition in subsequent Ethernet scans.
- Connect the module to up to four devices (actors) connected to the network.
- Protect the configuration of the module.
- Configure the inputs and the outputs.
- Enable/disable the LED Alive option (see the paragraph “Outputs inputs and signals”).

Information

The information on the module that can be displayed is:

- The serial number and the software version.
- The IP address, the Network Mask, and the Gateway address.
- The MAC address.
- The logical state of the inputs (“Off” if not active, “On” if active).
- The state of the output contacts (“Open” if open, “Closed” if closed).

The following table illustrates the information on the module:

Information	Description
IP address	It's the address assigned to the module at the moment of connection to the network. It consists of four bytes (for a total of 32 bits), each of which can have value from 0 to 255. By default, allocation is dynamic. With dynamic allocation, the module waits to receive the IP address from a DHCP server. Without a DHCP server, the module adopts an Autoconfiguration IP address in the range 169.254.xxx.xxx, calculated in a pseudo-random way so that it's the same at every power on. Alternatively, it's possible to enable the Static IP address option, that allows the IP address to be forced. Then it's necessary to make sure that the inserted IP address is different from the ones of the other devices connected to the same network.
Network Mask	It's the subnet mask, and it identifies the method to recognize the subnet to which the module belongs, with the possibility to search for the module within a defined set of recipients. If the Static IP address option is enabled, the correct Network Mask must also be inserted.
Gateway address	It's the IP address of the node to which the module is connected, in the presence of multiple subnets. If the Static IP address option is enabled, the correct Gateway address must also be inserted.
MAC address	It's the address assigned by ABB, having an OUI equal to ac:d3:64.

—

Table 5.18 The information on the Ekip Signalling 10K-1 module

Connection
In order to connect the module to devices (actors) connected to the network, four positions are available with values from 0 to 3. In each position it's possible to insert the IP address of a trip unit equipped with an Ekip Link module, the IP address of the module, or a null value (meaning no IP address inserted).

Information
Except for the null value, it's not possible to insert the same IP address in more than one position.

If a control unit of which the IP address is inserted results disconnected for at least 8 s, this is signalled both by Ekip Connect, and by the module through the power LED with two quick flashes and a pause.

Protection
The module can be protected in two ways:
- By changing access from remote to local.
- By password.

With local access:
- All further modifications performed from Ekip Connect are prevented.
- In order to restore remote access, the switches of the module must be positioned to OFF for at least 1 s, and repositioned to ON (see the paragraph 5.5.6 DIP switch configuration").

NOTE:
To restore remote access, after the commutation of the switches, it's not necessary to turn the module off and on.

In order to protect the module by password, access must be remote, and the “Password Required” operating mode must be selected instead of the "Standard mode" one: then, any modification from Ekip Connect can be performed only after the password insertion. The password:
- Has a default value equal to 1.
- Can be modified only in “Password Required” mode, by selecting the “Change Password” command and filling the “Insert new password” field.
- Can have only a numerical value between 0 and 99999.
- Can be reset (with restoration of the default value), by positioning the switches to OFF for at least 1 s, and repositioning them to ON (see the paragraph "Configuration using switches").

NOTE:
If any zero is inserted before the numerical value of the password, it's ignored.
To reset the password, after the commutation of the switches, it's not necessary to turn the module off and on.

Inputs and outputs
The configuration of inputs and outputs is identical to that via Local Bus (see the paragraph "Access via Local Bus”).

Precisely:
- The setting of the Polarity and Delay parameters for the inputs, and of the Contact Type, Latched, Signal Source, Delay, and min Activation Time parameters for the outputs.
- The possibility to match the activation of an output to a wide range of combinations of a trip unit status bits, or to its disconnection.

In addition:

- For each output, an actor - that is, one of the four available positions for the insertion of the IP addresses
  - must be selected (by default, the position 0 is selected).
- Each output can be programmed to be activated at the disconnection of any combination of the trip units selected and of the Ethernet cable (physical disconnection).
- By selecting the actor corresponding to the IP address of the module, the output can be programmed to be activated on the basis of the module status bits (e.g. the state of inputs and/or outputs).

NOTE:
To program the activation of an output in case of disconnection, the actor to which the output has to be associated must not be selected by setting the Actor Number parameter. Instead, the control units and the module must be selected via the Signal Source menu, setting to 1 the bits associated to the actor disconnection events (to select the control units for which disconnection must be signalled) and to the physical disconnection event (to signal the disconnection of the module). If the output is programmed to be activated in case of disconnection (of one or more control units and/or the module), the value assigned to the Actor.
Number parameter is ignored.

Information
The outputs programmed to be activated in case of disconnection are activated if the disconnection persists for at least 8 s.

NOTE:
If a control unit results disconnected from the network, only the outputs associated to the control unit are deactivated (except those programmed to be activated in case of disconnection of the control unit, that are activated). On the contrary, if it's the module that disconnects from the network, all the outputs are deactivated (except all those programmed to be activated in case of disconnection, of the module and/or of the control units). In both cases, normal operation is restored on reconnection (of the control unit in the first case, of the module in the second).

5.6 Using Ekip Com _ -modules

Suitable Ekip Com_ -modules are:

- Ekip Com Modbus RTU-OX
- Ekip Com Modbus TCP-OX
- Ekip Com Profibus DP
- Ekip Com DeviceNet
- Ekip Com Profinet
- Ekip Com EtherNet/IP
- Ekip Com Hub

5.6.1 Ekip Com Modbus RTU -module

The Ekip Com Modbus RTU is a communication accessory module, that integrates the automatic transfer switch in an industrial remote supervision and control network. The module is suitable for Level 3 and Level 4 controllers (LCD and touch control interfaces).

It can be connected to a RS-485 network with a Modbus RTU communication protocol, and allows you to:

- Connect the automatic transfer switch to the network, with dialog functionality.
- Provide the status information of the automatic transfer switch (open, closed).

For the communication lines W1 and W2, Belden type 3105A or equivalent cables must be used.

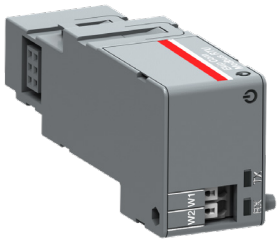


Fig. 5.14 Ekip Com Modbus RTU -module

5.6.1.1 Signallings

The following table illustrates the possible signals, and their meaning:

LED	Indication	Description
Power LED, green	Off	Power supply absent.
	On fixed	Power supply and communication with the device present.
	On, with two quick flashes per second	Power supply present, and communication with device absent.
RX and TX LEDs, green	Off	Modbus RTU communication not active.
	On, flashing rapidly	Modbus RTU communication active.

Table 5.19 Indication / Ekip Com Modbus RTU -module

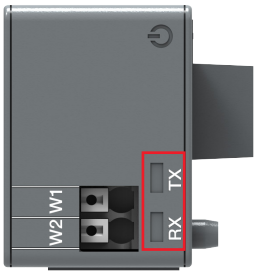


Fig. 5.15 Signals of Ekip Com Modbus RTU -module

5.6.1.2 Termination resistor

On the Ekip Com Modbus RTU module it is possible to activate the terminating resistance Rterm = 120 Ω. To enable the Rterm, the corresponding dip-switches 1 and 2 (on the side of the module) must be positioned to ON. This option must be selected before the installation of the module. With the Ekip Com Modbus RTU modules, the dip-switches 3 and 4 of the Rpol (polarization resistance), are not used.

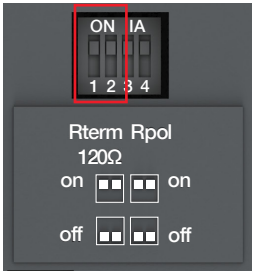


Fig. 5.16 Termination resistor; To enable the Rterm, the dip-switches 1 and 2 must be positioned to ON. This option must be selected before the installation of the module

5.6.1.3 Access from the display / Ekip Com Modbus RTU –module

With modules energized the presence of the modules on the module slot activates additional menus on the display.
The following table illustrates the path for accessing the configuration parameters of the modules from the display:

Settings (*Default value)			Description
:			
Modules (Optional modules)			
	Ekip Com Modbus RTU		
		Serial address	1… 247, default 247*	Address to be assigned to the modules. NOTE: devices connected to the same network must have different addresses
		Baudrate	9600 bit/s, 19200 bit/s*, 38400 bit/s	Data transmission speed
		Physical protocol	8.E,1*, 8.O,1, 8.N,2, 8.N,1	8.E,1 = 8 data bits, 1 EVEN parity bit, 1 STOP bit
				8.O,1 = 8 data bits, 1 ODD parity bit, 1 STOP bit
				8.N,2 = 8 data bits, no parity bit, 2 STOP bits
				8.N,1 = 8 data bits, no parity bit, 1 STOP bit
:				

—

Table 5.20 The path for accessing the configuration parameters of the Ekip Com Modbus RTU -module from the display

The following table illustrates the path from the display for accessing information on the module:

About		Description
:		
Modules (Optional modules)		
	Ekip Com Modbus RTU	
		SN	Serial number
		Version	Software version
:		

—

Table 5.21 Information of Ekip Com Modbus RTU -module in HMI

5.6.2 Ekip Com Profibus DP -module

The Ekip Com Profibus DP is a communication accessory module, that integrates the automatic transfer switch in an industrial remote supervision and control network. The module is suitable Level 3 and Level 4 controllers (LCD and touch control interfaces).

It can be connected to a network RS-485 with protocol of Profibus communication, and allows of:

- Connect the automatic transfer switch as slaves to the network, with dialog functionality.
- Provide the status information of the automatic transfer switch (open, closed).

For the communication lines W5 and W6, Belden type 3079A or equivalent cables must be used.

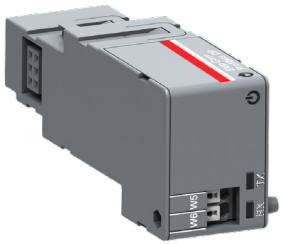


Fig. 5.17 Ekip Com Profibus DP -module

5.6.2.1 Signallings

The following table illustrates the possible signals, and their meaning:

LED	Indication	Description
Power LED, green	Off	Power supply absent.
	On fixed	Power supply and communication with the device present.
	On, with two quick flashes per second	Power supply present, and communication with device absent.
RX LED, green	Off	Communication not active.
	On, fixed	Communication active.
TX LED, green	Off	Communication not active.
	On, flashing	Communication active.

Table 5.22 Indication / Ekip Com Profibus DP-module

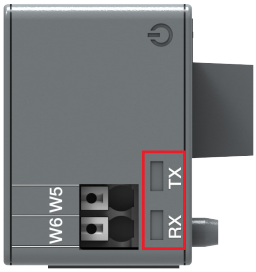


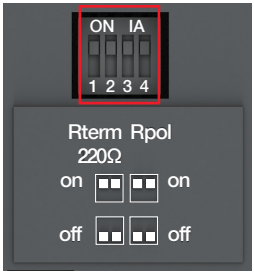
Fig. 5.18 Signals of Ekip Com Profibus DP -module

5.6.2.2 Termination resistor

The Ekip Com Profibus DP modules provide the possibility to insert a 220 Ω termination resistor on the RS-485 bus, by setting the DIP-switches Rterm (1 and 2) on the side of the modules, in position ON.

In the event of termination of the bus, a 390 Ω pull-up or pull-down resistor must also be inserted on the lines, by setting the DIP-switches Rpol (3 and 4), in position ON.

These options must be selected before installation of the modules.



—
Fig. 5.19 Termination resistor; To enable the Rterm, the dip-switches 1 and 2 must be positioned to ON. When Rterm is activated, the Rpol must also be activated by turning dip-switches 3 and 4 to ON-position. These options must be selected before the installation of the modules

5.6.2.3 Access from the display / Ekip Com Profibus DP -module

With modules energized the presence of the modules on the module slot activates additional menus on the display.

The following table illustrates the path for accessing the configuration parameters of the modules from the display:

Settings (*Default value)		Description
:		
Modules (Optional modules)		
Ekip Com Profibus DP		
Serial address	1...125, default 125*	Address to be assigned to the modules. IMPORTANT: devices connected to the same network must have different addresses
:		

—

Table 5.23 Configuration of Ekip Com Profibus DP -module in HMI

The following table illustrates the path from the display for accessing information on the module:

About	Description
:	
Modules (Optional modules)	
Ekip Com Profibus DP -module	
SN	Serial number
Version	Software version
:	

—

Table 5.24 Information of Ekip Com Profibus DP -module in HMI

5.6.3 Ekip Com DeviceNet -module

The Ekip Com DeviceNet –module is a communication accessory module, that integrates the automatic transfer switch in an industrial remote supervision and control network. The module is suitable for Level 3 and Level 4 controllers (LCD and touch control interfaces).

It can be connected to a CAN network with a DeviceNetTM communication protocol, and allows you to:

- Connect the automatic transfer switch as slaves to the network, with dialog functionality.
- Provide the status information of the automatic transfer switch (open, closed).

For the communication lines, Belden type 3084A or equivalent cables must be used.

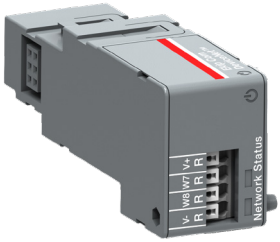


Fig. 5.20 Ekip Com DeviceNet -module

5.6.3.1 Signallings

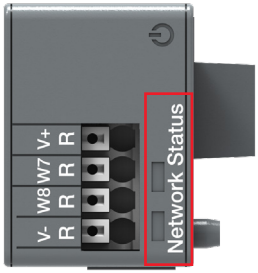
The following table illustrates the possible signals, and their meaning:

LED	Indication	Description
Power LED, green	Off	Power supply absent.
	On fixed	Power supply and communication with the device present.
	On, with two quick flashes per second	Power supply present, and communication with device absent.
Network LED, red	Off	Device off line (with red LED off) [1], or in error conditions (with red LED on).
	On, fixed	Device on line, and allocated on a master (operating condition).
	On, flashing	Device on line, but not allocated on a master (device ready for communication).
Status LED, green	Off	No error.
	On, fixed	Device in bus off, or Network Power absent condition.
	On, flashing	I/O connection (cyclic data) in timeout.

[1] The device has not yet sent Duplicate ID sequence on line.

—

Table 5.25 Indication / Ekip Com DeviceNet -module in HMI



—

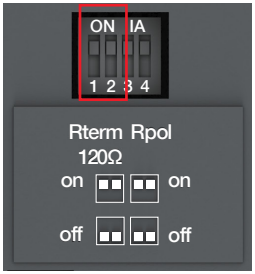
Fig. 5.21 Signals of Ekip Com DeviceNet -module

5.6.3.2 Termination resistor

The modules provide the possibility to insert a 120 Ω termination resistor on the CAN bus, by setting the DIP-switches Rterm (1 and 2) on the side of the modules, in position ON. This option must be selected before the installation of the modules. With the Ekip Com DeviceNet - modules, the dip-switches 3 and 4 of the Rpol (polarization resistance), are not used.

Information
The termination resistors must never be included in the nodes. The inclusion of this capability could easily lead to a network with improper termination (impedance too high or too low), potentially causing a failure. For example the removal of a node, which includes a termination resistor, could result in a network failure.

The termination resistors must not be installed at the end of a branch (drop line), only at the two ends of the main backbone (trunk line).



—
Fig. 5.22 Termination resistor; To enable the Rterm, the dip-switches 1 and 2 must be positioned to ON. This option must be selected before the installation of the module.

5.6.3.3 Access from the display / Ekip Com DeviceNet –module

With modules energized the presence of the modules on the module slot activates additional menus on the display.

The following table illustrates the path for accessing the configuration parameters of the modules from the display:

Settings (*Default value)			Description
:			
Modules (Optional modules)			
	Ekip Com DeviceNet		
		MAC address	1… 63, default 63*	Address to be assigned to the modules. IMPORTANT: devices connected to the same network must have different addresses
		Baudrate	125 kbit/s, 250 kbit/s*, 500 kbit/s	Data transmission speed
:			

—

Table 5.26 The path for accessing the configuration parameters of the Ekip Com DeviceNet -module from the display

The following table illustrates the path from the display for accessing information on the module:

About		Description
:		
Modules (Optional modules)		
	Ekip Com DeviceNet	
		SN	Serial number
		Version	Software version
:		

—

Table 5.27 Information of Ekip Com DeviceNet -module in HMI

5.6.4 Ekip Com Modbus TCP -module

Ekip Com Modbus TCP is an accessory module that can function as a communication module integrating the automatic transfer switch in an industrial remote supervision and control network. The module is suitable for Level 3 and Level 4 controllers (LCD and touch control interfaces)
.

As a communication module, it can be connected to an Ethernet network with the Modbus TCP communication, and allows:

- Connect the automatic transfer switch to the network, with dialog functionality.
- Provide the status information of the automatic transfer switch (open, closed).

Legal Disclaimer
Since the module allows access to the data contained in the automatic transfer switch, it can only be connected to networks that meet all the necessary requirements for safety and prevention of unauthorized access (for example, the network of the control system of an installation). It is the installer's responsibility to ensure that all the necessary safety measures are adopted (for example, firewalls, and so on). The module cannot be connected directly to the Internet. It is recommended to connect it only to dedicated Ethernet networks, with the Modbus TCP communication protocol.

For the communication bus, a cable of type Cat.6 S/FTP must be used (Cat.6 with S/FTP double shielding).



Fig. 5.23 Ekip Com Modbus TCP -module

The following table illustrates the ports used by the module:

Port	Service	Notes
502/tcp	Modbus TCP	When the module is used as a Modbus TCP/IP communication module.
319/udp	IEEE 1588	When IEEE protocol 1588 is enabled
320/udp		

Table 5.28 Ports of Ekip Com Modbus TCP -module

5.6.4.1 Signallings

The following table illustrates the possible signals, and their meaning:

LED	Indication	Description
Power LED, green	Off	Power supply absent.
	On fixed	Power supply and communication with the device present.
	On, with two quick flashes per second	Power supply present, and communication with device absent.
Link LED, green	Off	Connection error (signal absent).
	On, fixed	Correct connection.
Activity LED, yellow	Off	No activity on the line.
	On, flashing	Activity present on the line (in reception and/or transmission).

Table 5.29 Indication / Ekip Com Modbus TCP -module

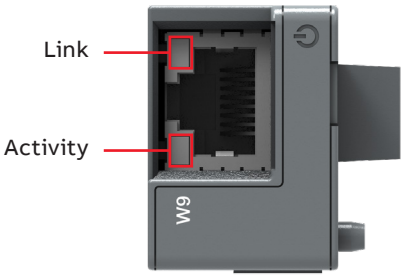


Fig. 5.24 Signals of Ekip Com Modbus TCP -module

5.6.4.2 Access from the display / Ekip Com Modbus TCP –module

With modules energized the presence of the modules on the module slot activates additional menus on the display:

- For setting the function and addressing of the modules.
- In order to display information on the modules.

The following table illustrates the path from the display, for setting the function and addressing of the modules:

Settings (* Default value)		Description
:		
Modules (Optional modules)		
Ekip Com Modbus TCP		
Force Static IP address	Off*	Dynamic IP address.
	On	Static IP address.
Static IP Address		Displayed with static IP Address enabled, it must be selected in order to insert the IP Address of the modules.
Static Network Mask		Displayed with static IP Address enabled, it must be selected in order to insert the subnet mask of the modules.
Static Gateway addr		Displayed with static IP Address enabled, it must be selected in the presence of multiple subnets, in order to insert the IP Address of the node to which the modules are connected.
:		

—

Table 5.30 The path for setting the function and addressing of the modules of the Ekip Com Modbus TCP -module from the display

The following table illustrates the path from the display for accessing information on the module:

About	Description
:	
Modules (Optional modules)	
Ekip Com Modbus TCP	
SN	Serial number
Version	Software version
IP Address	This is the address assigned to the modules at the moment of connection to the network. It consists of four bytes (for a total of 32 bits), each of which can have value from 0 to 255. By default, allocation is dynamic. With dynamic allocation, the modules wait to receive the IP address from a DHCP server. Without a DHCP server, the modules adopt an Autoconfiguration IP Address in the range 169.254.xxx.xxx, calculated in a pseudo random manner so as to be the same at every switch-on. Alternatively, you can enable the static IP address option, which allows the IP address to be forced. In this case, you must make sure that the IP Address inserted is different to that of the other devices connected to the same network.
Network Mask	This is the subnet mask, and identifies the method to recognize the subnet to which the modules belong, with the possibility of searching for the modules within a defined set of recipients. If you enabled the option Static IP Address, you must also enter the correct Network Mask.
Gateway Address	The IP address of the node to which the module it is connected, in the presence of multiple subnets. If you enabled the Static IP Address option, you must also enter the correct Gateway Address.
TCP Client	There are three IP Addresses of the client devices connected to the modules.
MAC Address	It is the address assigned by ABB, having a OUI equal to ac:d3:64[1)].
:	

[1)] Organizationally Unique Identifier, formed from the first three bytes of a MAC address, and which uniquely identifies the manufacturer of an Ethernet device.

—

Table 5.31 Information of Ekip Com Modbus TCP -module in HMI

5.6.5 Ekip Com Profinet -module

The Ekip Com Profinet is a communication accessory module, that integrates the automatic transfer switch in an industrial remote supervision and control network. The module is suitable for Level 3 and Level 4 controllers (LCD and touch control interfaces) .

It can be connected to an Ethernet network with a Profinet communication protocol, and allows you to:

- Connect the automatic transfer switch to the network, with dialog functionality.
- Provide the status information of the automatic transfer switch (open, closed).

Legal Disclaimer
The module can only be connected to networks that meet all the necessary requirements for safety and prevention of unauthorized access (for example, the network of the control system of an installation). It is the installer's responsibility to ensure that all the necessary safety measures are adopted (for example, firewalls, and so on). It is recommended to connect it only to dedicated Ethernet networks, with the Profinet communication protocol. The module cannot be connected to the Internet.

For the communication bus, a cable of type Cat.6 S/FTP must be used (Cat.6 with S/FTP double shielding).



Fig. 5.25 Ekip Com Profinet -module

The following table illustrates the ports used by the module:

Ethertype	Port	Service	Notes
0x88CC	-	LLDP	Link Layer Discovery Protocol
0x8892 (Profinet)	-	Profinet IO	Specific for real time communications (RT)
0x0800	34964/udp	Profinet-cm (Context Manager)	DCE/RP

Table 5.32 Ports of Ekip Com Profinet –module

5.6.5.1 Signallings

The following table illustrates the possible signals, and their meaning:

LED	Indication	Description
Power LED, green	Off	Power supply absent.
	On fixed	Power supply and communication with the device present.
	On, with two quick flashes per second	Power supply present, and communication with device absent.
Link LED, green	Off	Connection error (signal absent).
	On, fixed	Correct connection.
Activity LED, yellow	Off	No activity on the line.
	On, flashing	Activity present on the line (in reception and/or transmission.

Table 5.33 Indication / Ekip Com Profinet -module

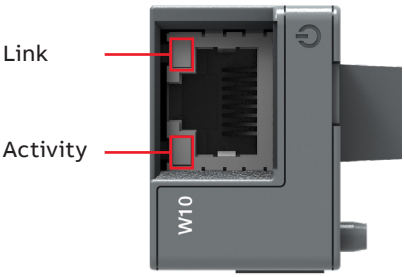


Fig. 5.26 Signals of Ekip Com Profinet -module

5.6.5.2 Access from the display / Ekip Com Profinet -module

The following table illustrates the path from the display for accessing information on the module:

About		
:		
Modules (Optional modules)		
	Ekip Com Profinet -module	
		SN — Serial number
		Version — Software version
		MAC Address — It is the address assigned by ABB and with an OUI (Organizationally Unique Identifier, formed of the first three bytes of a MAC address, and which uniquely identifies the manufacturer of an Ethernet device) equal to ac:d3:64.
:		

Table 5.34 Information of Ekip Com Profinet -module

5.6.6 Ekip Com EtherNet/IP -module

The Ekip Com EtherNet/IP is an accessory module that can act as a communication module integrating the automatic transfer switch in an industrial remote supervision and control network. The module is suitable for Level 3 and Level 4 controllers (LCD and touch control interfaces) .

It can be connected to an Ethernet network with a EtherNet/IP™ -communication protocol, and allows you to:

- Connect the automatic transfer switch to the network, with dialog functionality.
- Provide the status information of the automatic transfer switch (open, closed).

Legal Disclaimer
Since this module allows the access to the data contained in the automatic transfer switch, it can only be connected to networks possessing all the necessary requirements for security and prevention of unauthorized access (for example, the network of the control system of an installation). It is responsibility of the installer to make sure that all the necessary security measures are adopted (for example firewalls and so on). The module cannot be connected directly to the Internet. It is recommended to connect it only to dedicated Ethernet networks using the EtherNet/IP™ -communication protocol.

For the communication bus, a cable of type Cat.6 S/FTP must be used (Cat.6 with S/FTP double shielding).

The following table illustrates the ports used by the module:

Port	Protocol	Notes
44818	TCP	Encapsulation Protocol (example: ListIdentity, UCMM, CIP Transport Class 3)
44818	UDP	Encapsulation Protocol (example: ListIdentity)
2222	UDP	CIP Transport Class 0 or 1

Table 5.35 Ports of Ekip Com EtherNet/IP -module

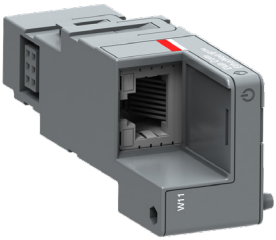


Fig. 5.27 Ekip Com EtherNet/IP -module

5.6.6.1 Signallings

The following table illustrates the possible signals, and their meaning:

LED	Indication	Description
Power LED, green	Off	Power supply absent.
	On fixed	Power supply and communication with the device present.
	On, with two quick flashes per second	Power supply present, and communication with device absent.
Link LED, green	Off	Connection error (signal absent).
	On, fixed	Correct connection.
Activity LED, yellow	Off	No activity on the line.
	On, flashing	Activity present on the line (in reception and/or transmission).

Table 5.36 Indication / Ekip Com EtherNet/IP -module

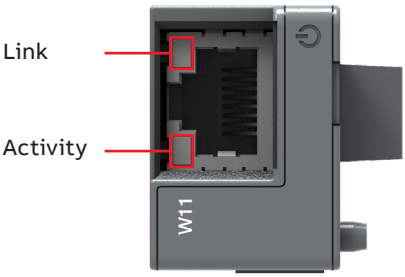


Fig. 5.28 Signals of Ekip Com EtherNet/IP -module

5.6.6.2 Access from the display / Ekip Com EtherNet/IP

With modules energized the presence of the modules on the module slot activates additional menus on the display:

- To set the addressing of the modules.
- In order to display information on the modules.

The following table illustrates the path from the display, for setting the function and addressing of the modules:

Settings (*Default value)		Description
:		
Modules (Optional modules)		
Ekip Com EtherNet/IP		
Force Static IP address	Off*	Dynamic IP address.
	On	Static IP address.
Static IP Address		Displayed with static IP Address enabled, it must be selected in order to insert the IP Address of the modules.
Static Network Mask		Displayed with static IP Address enabled, it must be selected in order to insert the subnet mask of the modules.
Static Gateway addr		Displayed with static IP Address enabled, it must be selected in the presence of multiple subnets, in order to insert the IP Address of the node to which the modules are connected.
:		

—

Table 5.37 The path for setting the function and addressing of the modules of the Ekip Com EtherNet/IP -module from the display

The following table illustrates the path from the display for accessing information on the module:

About	Description
:	
Modules (Optional modules)	
Ekip Com EtherNet/IP	
SN	Serial number
Version	Software version
IP Address	This is the address assigned to the modules at the moment of connection to the network. It consists of four bytes (for a total of 32 bits), each of which can have value from 0 to 255. By default, allocation is dynamic. With dynamic allocation, the modules wait to receive the IP address from a DHCP server. Without a DHCP server, the modules adopt an Autoconfiguration IP Address in the range 169.254.xxx.xxx, calculated in a pseudo random manner so as to be the same at every switch-on. Alternatively, you can enable the static IP address option, which allows the IP address to be forced. In this case, you must make sure that the IP Address inserted is different to that of the other devices connected to the same network.
Network Mask	This is the subnet mask, and identifies the method to recognize the subnet to which the modules belong, with the possibility of searching for the modules within a defined set of recipients. If you enabled the option Static IP Address, you must also enter the correct Network Mask.
Gateway Address	The IP address of the node to which the module it is connected, in the presence of multiple subnets. If you enabled the Static IP Address option, you must also enter the correct Gateway Address.
TCP Client	There are three IP Addresses of the client devices connected to the modules.
MAC Address	It is the address assigned by ABB, having a OUI equal to ac:d3:64[1)].
:	

[1)] Organizationally Unique Identifier, formed from the first three bytes of a MAC address, and which uniquely identifies the manufacturer of an Ethernet device.

—

Table 5.38 Information of Ekip Com EtherNet/IP -module in HMI

5.6.7 Ekip Com Hub -module

Ekip Com Hub is a communication module for cloud-based connectivity through the ABB Ability™ Energy and Asset Manager (EAM).

TruONE equipped with Ekip Com Hub can establish the connection to ABB Ability for the whole low-voltage power distribution panel. This dedicated cartridge-type communication module just needs to be inserted into the TruONE and connected to the internet.

The module is suitable for Level 3 and Level 4 controllers (LCD and touch control interfaces) .

The Ekip Com Modbus RTU and Ekip Com Modbus TCP modules can be configured to support Ekip Com Hub in the collection of data to send to cloud.

Information
It is the customer's sole responsibility to provide and continuously ensure a secure connection between Ekip Com Hub and customer network or any other network (as the case may be). The plant manager must establish and maintain appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of antivirus programs, etc.) to protect the product, the network, the customer system and interface against any kind of security breaches, unauthorized access, interference, intrusion, loss and/ or theft of data or information. ABB and its affiliates are not liable for damages and/ or losses related to such security breaches, unauthorized accesses, interference, intrusion, loss and/or theft of data or information.

For the communication bus, a cable of type Cat.6 S/FTP must be used (Cat.6 with S/FTP double shielding).



Fig. 5.29 Ekip Com Hub -module

The following table illustrates the ports used by the module:

Port	Service	Notes
67/udp 68/udp	DHCP client	Client DHCP enabled as an alternative to Static address = On
443/tcp	HTTPS	Always active when module is enabled
123/udp	SNTP	Active with SNTP client enabled
53/udp	DNS	Always active

Table 5.39 Ports of Ekip Com Hub -module

5.6.7.1 Signallings

The following table illustrates the possible signals, and their meaning:

LED	Indication	Description
Power LED, green	Off	Power supply absent.
	On fixed	Power supply and communication with the device present.
	On, with two quick flashes per second	Power supply present, and communication with device absent.
Link LED, green	Off	Connection error (signal absent).
	On, fixed	Correct connection.
Activity LED, yellow	Off	No activity on the line.
	On, flashing	Activity present on the line (in reception and/or transmission).

Table 5.40 Indication / Ekip Com Hub -module

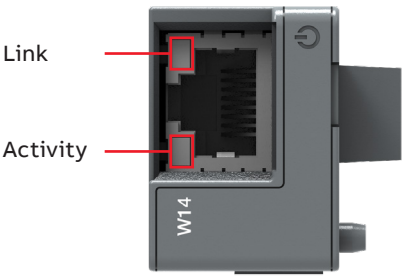


Fig. 5.30 Signals of Ekip Com Hub -module

5.6.7.2 Access from the display / Ekip Com Hub

With modules energized the presence of the modules on the module slot activates additional menus on the display:

- To set the addressing of the modules.
- In order to display information on the modules.

The following table illustrates the path from the display, for setting the function and addressing of the modules:

Settings (*Default value)			Description
:			
Modules (Optional modules)			
Ekip Com Hub			
	Enable	Off*	Switch communication between module and server
		On	
	Force Static IP address	Off*	Dynamic IP address.
		On	Static IP address.
		Se	On all the associated parameters are enabled.
	Static IP Address	0.0.0.0*	Enables the static IP to be selected.
	Network Mask Static	0.0.0.0*	Enables the subnet mask to be selected.
	Static Gateway addr	0.0.0.0*	When there are several subnets, enables the IP address of the node to which the module is connected to be selected.
	SNTP Client Enabled	Off*	Enables the SNTP protocol for distribution of the clock and synchronization signal to be enabled.
		On	
	SNTP Server Address	0.0.0.0*	Enables the network server that supplies the SNTP to be set.
	Password	---	Code required to register module on cloud.
	Remote firmware update		Enables the firmware of the module to be updated.
		OFF Automatic*	
		Enable	To configure firmware download.
		Automatic	To automate module update.
:			

Table 5.41 The path for setting the function and addressing of the modules of the Ekip Com Hub -module from the display

The following table illustrates the path from the display for accessing information on the module:

About	Description
:	
Modules (Optional modules)	
Ekip Com Hub	
SN	Serial number
Version	Software version
IP Addres	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 can be set via the menu in the event of a static IP. NOTE: without a DHCP server, the module automatically adopts a random IP address within the 169.254.xxx.xxx range.
Network Mask	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.
Gateway Address	IP address of the node to which the module is connected, in the presence of several subnets.
MAC Address	Address assigned by ABB, with OUI (Organizationally Unique Identifier) equal to ac:d3:64, which uniquely identifies the manufacturer of an Ethernet device.
:	

Table 5.42 Information of Ekip Com Hub -module in HMI

6. Troubleshooting

6.1 Alarms

 LCD  Touch

Message	Fault	Action
Locked, Alarm LED on	Lock input activated	Unlock
Switch not in AUTO mode, Alarm LED on	Slide switch is in handle or lock position	Turn slide switch into the AUTO position
Phases crossed	Phase rotation of sources 1 and 2 are different	Connect the phases of both sources in the same order
S1 undervoltage	Voltage of source 1 is under the threshold level set in parameter “Drop-out voltage, lower threshold“	Check the correlation between power source and device configuration
S1 overvoltage	Voltage of source 1 is over the threshold level set in parameter “Drop-out voltage, upper threshold“	Check the correlation between power source and device configuration
S1 phase missing	One or two phases of source 1 are missing	Check the power source and connections
S1 unbalance	Phases of source 1 are not symmetric	Check the power source
S1 phase rotation	Phase rotation of source 1 is different from the value of parameter “Phase sequence“	Connect the phases according to the configuration
S1 invalid frequency	Frequency of source 1 is out of range set in parameters “Drop-out frequency, upper threshold“ and “Drop-out frequency, lower threshold“	Check the correlation between power source and device configuration
S2 undervoltage	Voltage of source 2 is under the threshold level set in parameter “Drop-out voltage, lower threshold“	Check the correlation between power source and device configuration
S2 overvoltage	Voltage of source 2 is over the threshold level set in parameter “Drop-out voltage, upper threshold“	Check the correlation between power source and device configuration
S2 phase missing	One or two phases of source 2 are missing	Check the power source and connections
S2 unbalance	Phases of source 2 are not symmetric	Check the power source
S2 phase rotation	Phase rotation of source 2 is different from the value of parameter “Phase sequence“	Connect the phases according to the configuration

Continued on the next page

Message	Fault	Action
S2 invalid frequency	Frequency of source 2 is out of range set in parameters “Drop-out frequency, upper threshold“ and “Drop-out frequency, lower threshold“	Check the correlation between power source and device configuration
Frequency Difference	Frequency difference of voltage sources is greater than 3 Hz while in-phase monitor is on	Alarm is active and transfer operations disabled as long as the frequency difference is above the accepted level
High current alarm	Measured current is higher than ten times the nominal value	Alarm is active and transfer operations disabled as long as the high current status remains
Open I failure, Alarm LED blinking	Switch transfer from position I to O or II failed	Reset alarm by pressing Auto button or via menu page Operation / Alarm Reset
Close I failure, Alarm LED blinking	Switch transfer to position I failed	Reset alarm by pressing Auto button or via menu page Operation / Alarm Reset
Open II failure, Alarm LED blinking	Switch transfer from position II to O or I failed	Reset alarm by pressing Auto button or via menu page Operation / Alarm Reset
Close II failure, Alarm LED blinking	Switch transfer to position II failed	Reset alarm by pressing Auto button or via menu page Operation / Alarm Reset
Switch position alarm, Alarm LED on	More than one switch position indication inputs are activated	Switch service needed
Pole temperature alarm	Measured pole temperature is too high	Switch service needed
Contact wear alarm	Switch contact wear is near the limit that requires maintenance	Switch service needed
Local bus	Communication between HMI and switch controller is off	Check connection
Ethernet disconnected	Ethernet module not connected	Check connection
Fire Fighting	Fire fighting input activated	Alarm is active and disables transfer operations as long as the input is active
Control Voltage Failure	Control voltage dropped during switch control	Check power source
Control Voltage Low	Switch control voltage is below the minimum	Check power source
Configuration Error	Invalid configuration	Check parameter values
Ekip Com Hub Alarm	Ekip Com Hub failure	Check configuration
HMI Not Compatible	Firmware versions of HMI and device are not compatible to be used together	Check current versions and update compatible versions
Session Expired	Configuration session timeout elapsed	Reopen configuration session with the password

Continued on the next page

Table 6.1 Alarms-list in level 3 and 4, LCD and touch control interfaces

6.2 Warnings

LCD Touch

Message	Reason
S1 and S2 not in sync	Voltage sources are not synchronized
Voltage Not Calibrated	Calibration data in power module is invalid or unavailable
Current Not Calibrated	Calibration data in current measurement module is invalid or unavailable
Pole temperature warning	Measured pole temperature is near the alarm level
Control Retry	Failed transfer sequence retry activated
Auto Control Disabled	Device is in manual operating mode
Local Bus	Module heartbeat error. Check connection. Can be cleared using "Alarm Reset".
Configuration	Configuration session ports are open
Clock capacitor charging	Real time clock is not yet operational, date & time setting is disabled as long as this warning is active. Clock capacitor is charged from source voltage (not AUX) and takes about 10 minutes
Generator failed to start	Generator has not been started within 1 minute after sending start signal or it has failed during any test sequence

Table 6.2 Warnings-list in level 3 and 4, LCD and touch control interfaces

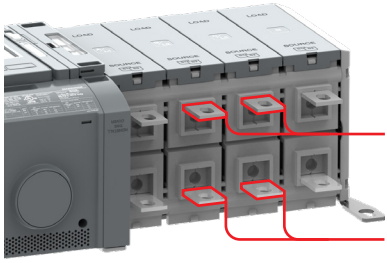
6.3 Information

LCD Touch

Message	Description
Invalid Date	Date not set
Test on Load	Test on load sequence active
Test off Load	Test off load sequence active
Alarm/Product Availability	Digital output function activated
In Position I	Digital output function activated
In Position O	Digital output function activated
In Position II	Digital output function activated
Pre-transfer Signal 1	Digital output function activated
Pre-transfer Signal 2	Digital output function activated
Pre-transfer Signal 3	Digital output function activated
Pre-transfer Signal 4	Digital output function activated
Source 1 Available	Digital output function activated
Source 2 Available	Digital output function activated
Transfer Alarm	Digital output function activated
Load Shed Output Signal	Digital output function activated
Elevator Pre-transfer Signal 1	Digital output function activated
Elevator Pre-transfer Signal 2	Digital output function activated
Elevator Pre-transfer Signal 3	Digital output function activated
Elevator Pre-transfer Signal 4	Digital output function activated
ATS in AUTO Mode	Digital output function activated
ATS in MAN Retransfer Mode	Digital output function activated
Ready for MAN Retransfer	Digital output function activated
Product Malfunction	Digital output function activated
Emergency Stop	Digital input function activated
Remote Test on Load	Digital input function activated
Remote Test off Load	Digital input function activated
Inhibit ATS	Digital input function activated
Manual Retransfer	Digital input function activated
Priority S1	Digital input function activated
Priority S2	Digital input function activated
Inhibit Transfer	Digital input function activated
Bypass Running Delays	Digital input function activated
Remote Control to S1	Digital input function activated
Remote Control to Off	Digital input function activated
Remote Control to S2	Digital input function activated
Alarm Reset	Digital input function activated
Manual-Auto Mode	Digital input function activated
Inhibt Transfer /w Override	Digital input function activated
Load Shed Input Signal	Digital input function activated
Peak Shaving Input	Digital input function activated

Table 6.3 Info statements in level 3 and 4, LCD and touch control interfaces

7. Technical data



Operating voltage for control circuit 200...480 Vac. Generator supply; min. power rating 20 kVA.

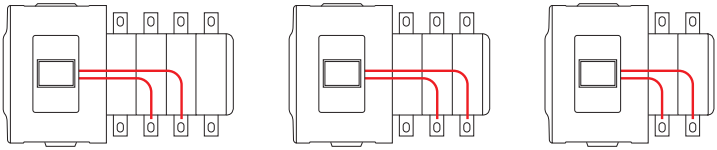
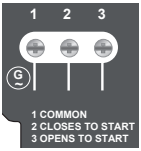
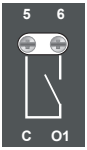
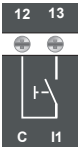
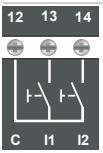
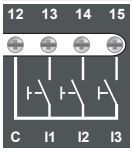


Fig. 7.1 Power supply for control circuit, in figure type OX_B (source on bottom)

Automatic transfer switch, power circuit	Value	
Rated operational voltage U, three phase	200...480 Vac	
Rated operational voltage U, single phase	200...480 Vac	
Rated frequency f	50 / 60 Hz	
Rated impulse withstand voltage U_{imp}	12 / 8 kV	
Operating times	See Table 7.2	
Automatic transfer switch, control circuit	**Value**	**Remark**
Voltage supply, three phase	200...480 Vac	Integrated, see Fig. 7.1
Voltage supply, single phase	200...480 Vac	Integrated, see Fig. 7.1
Operating voltage range	±20 %	
Voltage measurement accuracy	1 %	
Rated frequency f	50 / 60 Hz	
Operating frequency range, Level 2	±10 %	Level 2 = HMI with DIP-switches
Operating frequency range, Level 3 and 4	±20 %	Level 3 = HMI with LCD screen, Level 4 = HMI with touch screen
Frequency measurement accuracy	0.5 %	
Rated impulse withstand voltage U_{imp}	6 kV	

Automatic transfer switch, I/O contacts		**Cabling**	**Rating / Remark**
Generator start/stop	Cable size:	0.5…2.5 mm² 24...14(12) AWG	Stripping length; 6,5 mm, 0,255"
	Common, voltage supply	1	5 A@250 Vac (AC-1), 5 A@30 Vdc
	Generator start/stop NO	2	
	Generator start/stop NC	3	
Output relay features	Cable size:	0.5…2.5 mm² 24...14(12) AWG	
Common, voltage supply		5	5 A@250 Vac (AC-1), 5 A@30 Vdc
	Level 2		Level 2 = HMI with DIP-switches
	Alarm/Product available	6	
	Level 3 and 4		Level 3 = HMI with LCD screen, Level 4 = HMI with touch screen
	Programmable output (default; Alarm/Product available)	6	
Fire Fighting applications	Cable size:	0.5…2.5 mm² 24...14(12) AWG	Only in OXB_-types, delayed transition, I – O – II or II – O – I
	Fire fighting input 24 Vdc (+)	10	SELV
	Fire fighting input 24 Vdc (-)	11	Transfers to O/OFF position, locks the logic and signals alarm
Input contact features	Cable size:	0.5…2.5 mm² 24...14(12) AWG	Do not connect to any power supply
Common input		12	24 Vdc 5 mA
	Level 2		Level 2 = HMI with DIP-switches
	Emergency stop	13	Only in OXB_-types, delayed transition, I – O – II or II – O – I
	Level 3		Level 3 = HMI with LCD screen
	Programmable input (default; Emergency stop)	13	
	Programmable input (default; Remote test on load)	14	Only in OXB_-types, delayed transition, I – O – II or II – O – I
	Level 4		Level 4 = HMI with touch screen
	Programmable input (default; Emergency stop)	13	
	Programmable input (default; Remote test on load)	14	
	Programmable input (default; Remote test off load)	15	Only in OXB_-types, delayed transition, I – O – II or II – O – I

Environmental	Value
Environments category	E
EMC environment	A and B
Operating temperature (without derating)	-20... +40 °C
Operating temperature (with derating)	-25... +70 °C
Transportation and storage temperature	-40... +70 °C
Altitude (without derating)	Up to 2000 m

—

Table 7.1 General technical data of automatic transfer switch

Type	Voltage U_e [Vac]	Nominal current* I_n [A]	Operating time* = current duration I-0, 0-I, 0-II, II-0 [ms]	Operating transfer time* AUTO mode I-II or II-I [ms]	Contact transfer time* I-II or II-I [ms]
OXA30...260U_	200...480	37	-	< 500	< 50
OXB200...400E_	200...480	37	< 110	< 500	< 50
OXA400...600U_	200...480	40	-	< 500	< 50
OXB500...800E_	200...480	40	< 130	< 500	< 50
OXA800...1200U_	200...480	40	-	< 500	< 50
OXB1000...1600E_	200...480	40	< 130	< 500	< 50

* Under nominal conditions

—

Table 7.2 Specified technical data of operating times

Type	Iq/ 500 V			I_{peak} [kA]	I^2t kA^2s
OX_30...250_	Iq 100 kA rms.		OFA_400 A gG	35.2	803
			OFA_400 A aM	39	1030
	Iq 50 kA rms.		ABB T5L630_	29.8	2084
OX_260...OX_400E_	Iq 100 kA rms.		OFA_630 A gG	56.2	2790
			OFA_630 A aM	56.8	3670
	Iq 50 kA rms.		ABB T6L630_	52.0	13778
OX_400U	Iq 100 kA rms.		OFA_800 A gG	68	7311
			OFA_800 A aM	64.2	4800
	Iq 50 kA rms.		ABB T6L630_	53.1	14860
OX_500...800E_	Iq 100 kA rms.		OFA_1000 A gG	67.7	5235
			OFA_1000 A aM	77.1	7155
	Iq 50 kA rms.		ABB T6L1000_	57.2	16800
OX_800U-1600_	Iq 100 kA rms.		OFA_1600 A gG	80.8	9900
			OFA_1250 A aM	91.3	11600
	Iq 85 kA rms.		ABB T7L1600_	111.6	44900

—

Table 7.3 Rated conditional short-circuit values

7.1 Circuit diagrams

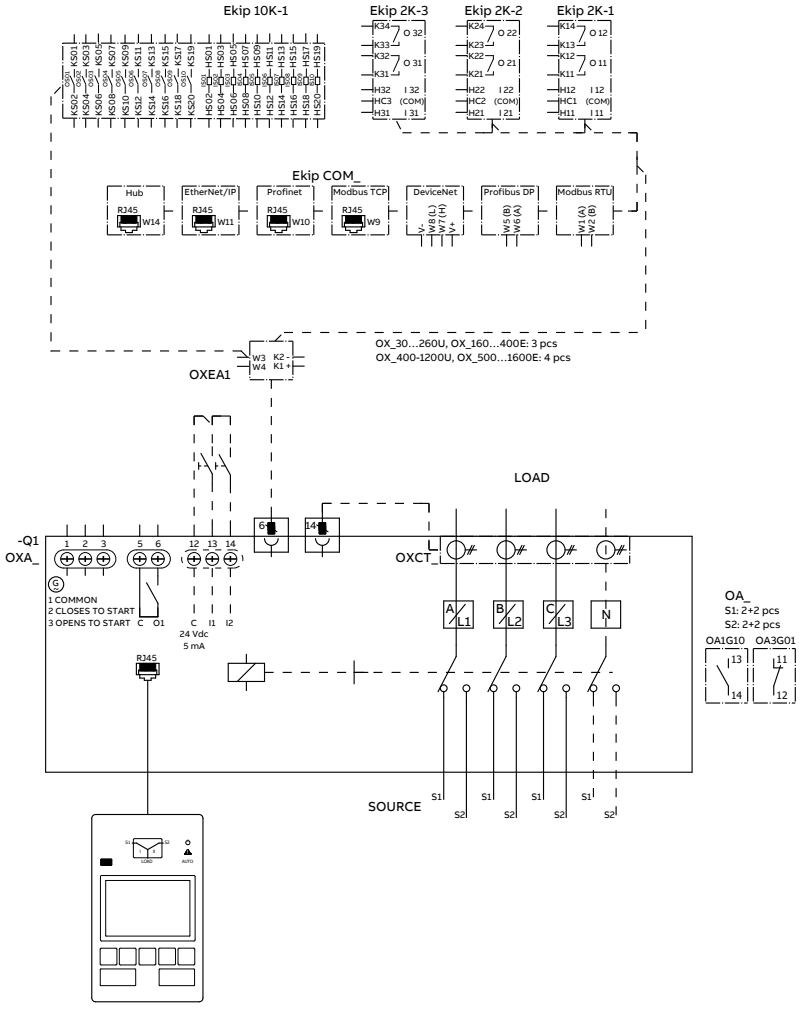


Fig. 7.2 Circuit diagram, OXA_B

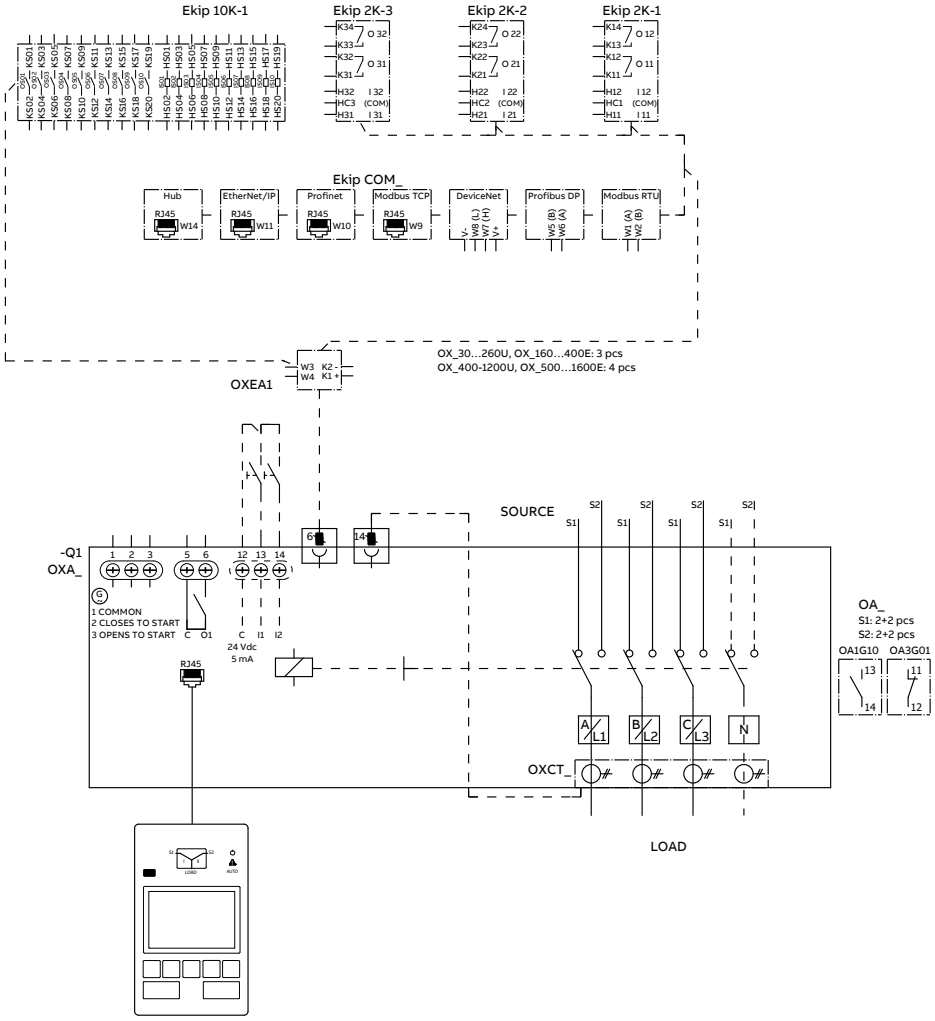


Fig. 7.3 Circuit diagram, OXA_T

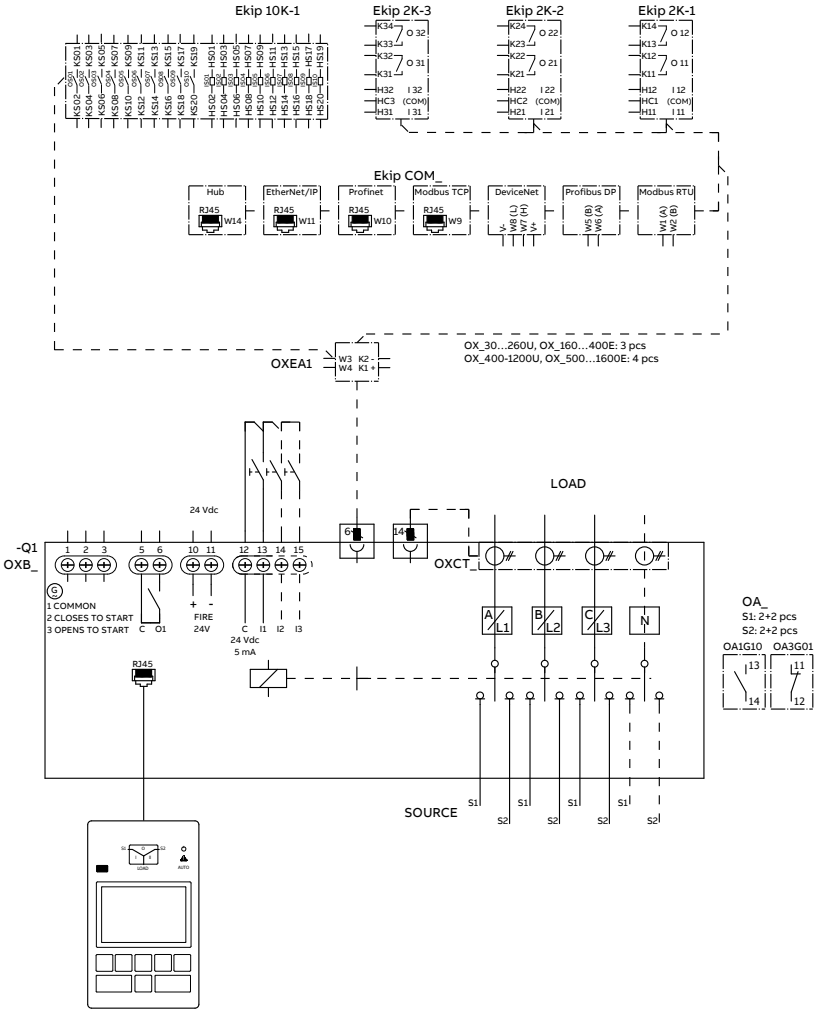


Fig. 7.4 Circuit diagram, OXB_B

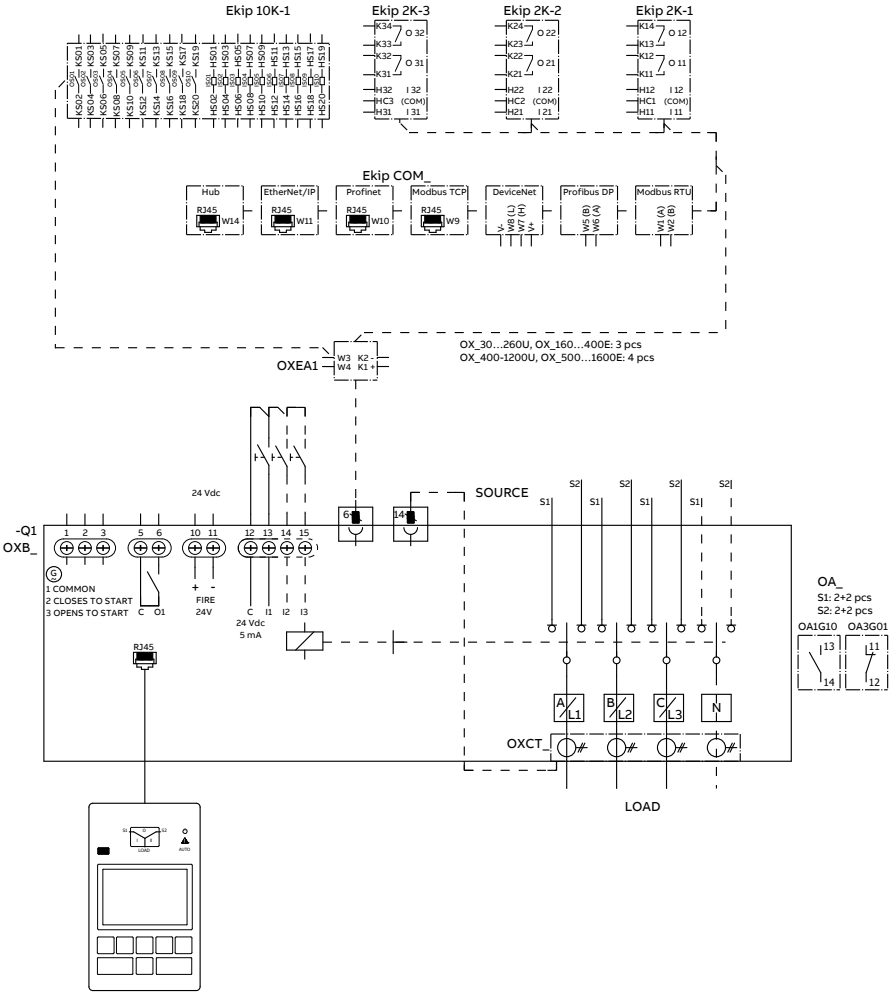


Fig. 7.5 Circuit diagram, OXB_T

Installation instruction
Automatic transfer switches

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8. Installation

Before mounting the product, please, check the product identification from the product identification label, which is located on the front panel under the control interface unit (HMI). This label indicates the product model (type number), some important technical data information, minimum enclosure size, suitable wire information, etc.

8.1 Mounting the OX30...1600 automatic transfer switch

8.1.1 Drilling hole distances and labeling

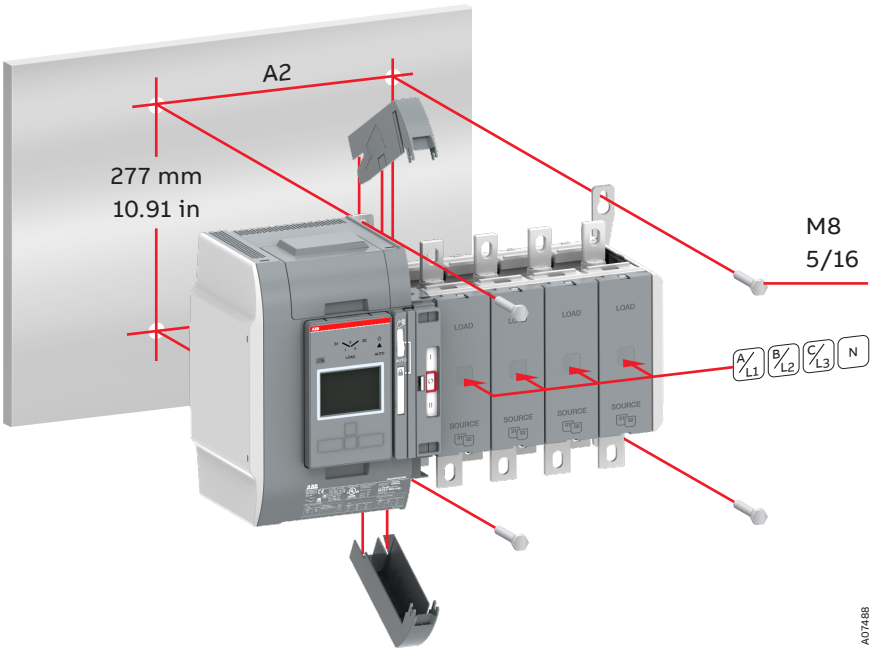


Fig. 8.1 Automatic transfer switches, drilling hole distances / screw-mounting, [mm/in] and attachment of the self-adhesive labels

Automatic transfer switch	A2 [mm / in]		
	2-pole	3-pole	4-pole
OX_30...250_	120 / 4.72	165 / 6.50	210 / 8.27
OX_260...400_	160 / 6.30	225 / 8.86	290 / 11.42
OX_500...800_	160 / 6.30	225 / 8.86	290 / 11.42
OX_800U...1600_	-	375 / 14.77	490 / 19.30

Table 8.1 Automatic transfer switches, drilling

8.1.2 Protection against direct contact

For protection against direct contact you can use the terminal shrouds when possible or a plexiglass mounted over the product.



—

Fig. 8.2 On top: Protection against direct contact with terminal shrouds.
On bottom: Protection against direct contact with a plexiglass mounted over the product

8.2 Wiring

8.2.1 Wiring of OX_30...800 / cable lugs

Automatic transfer switch	Bolt size	Tightening torque T [Nm / lb.in]
OX_30...250_	M8	15...22 / 133...195
OX_260...400_	M10	30...44 / 266...390
OX_500...800_	M12	50...75 / 443...664

Table 8.2 OX_30...800_/ bolt sizes and tightening torques

Hazardous voltage
Only an authorised electrician may perform the electrical installation and maintenance of OX_ automatic transfer switches. Do not attempt any installation or maintenance actions when an OX_ automatic transfer switch is connected to the electrical mains. Before starting work, make sure that the switch is de-energised.

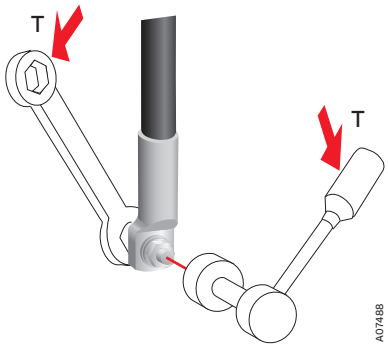


Fig. 8.3 Wiring, the tightening torques, see the tables 8.2 and 8.3

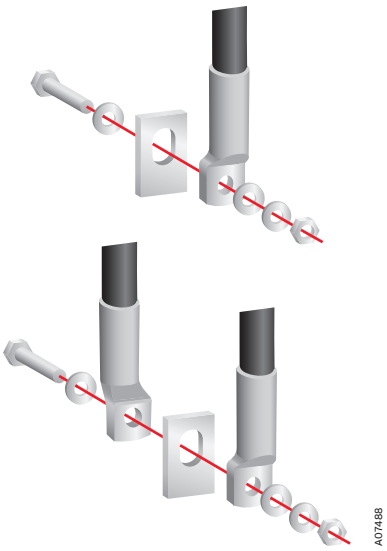


Fig. 8.4 OX_30...800, wiring by cable lugs

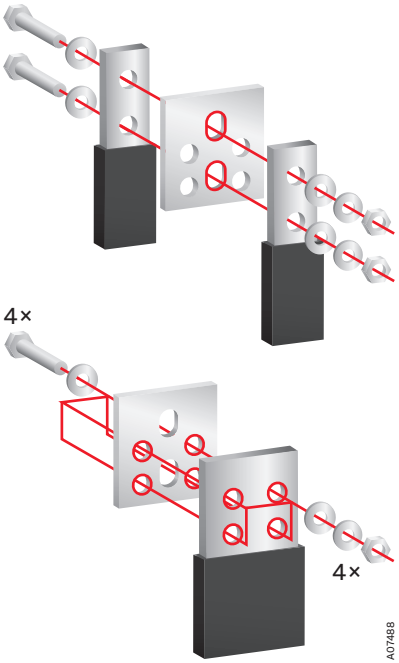
8.2.2 Wiring of OX_800U...1600 / busbar connections and cable lugs

Automatic transfer switch	Bolt size	Tightening torque [Nm / lb.in]
OX_800U...1600_	M12	50...75 / 443...664

—

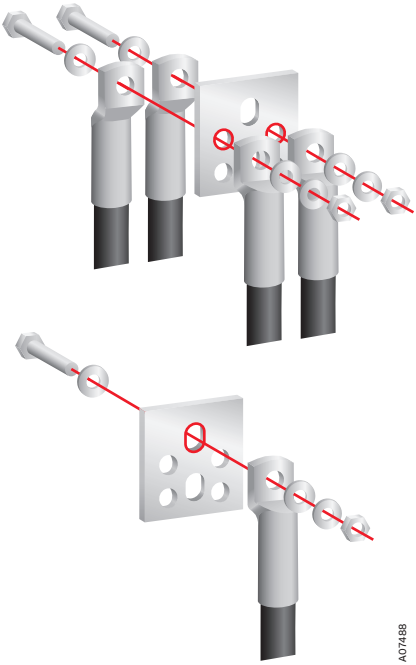
Table 8.3 OX_800U...1600_/ bolt size and tightening torque

General warning
The cable lug must be pushed into the oval hole of the terminal as close as possible to the switch pole.



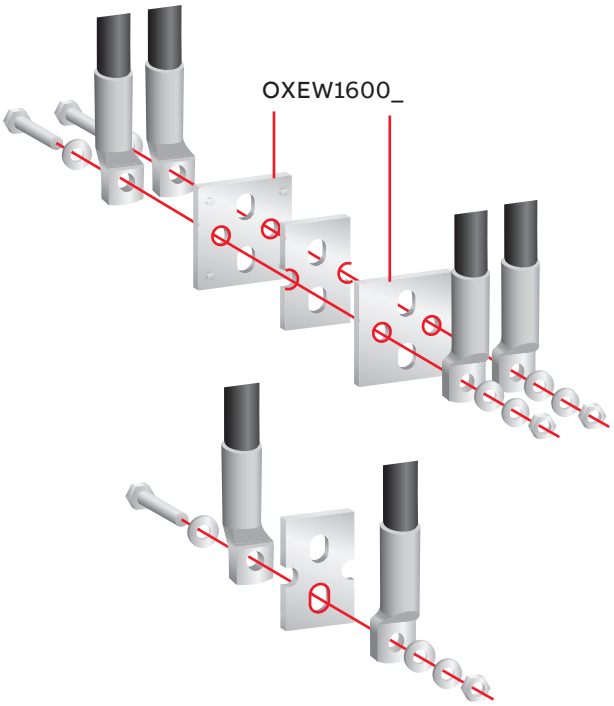
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Fig. 8.5 OX_800U...1600, busbar connection



—

Fig. 8.6 OX_800U...1600, wiring / cable lugs



—
Fig. 8.7 Wiring with cable lugs in automatic transfer switches OX_800U...3200: For load side terminals the busbars OXEW1600_ are needed to mount on both sides of the switch terminal for connecting the cable lugs. Tightening torque and bolt size, see the table 8.4

8.2.3 Lug assembly

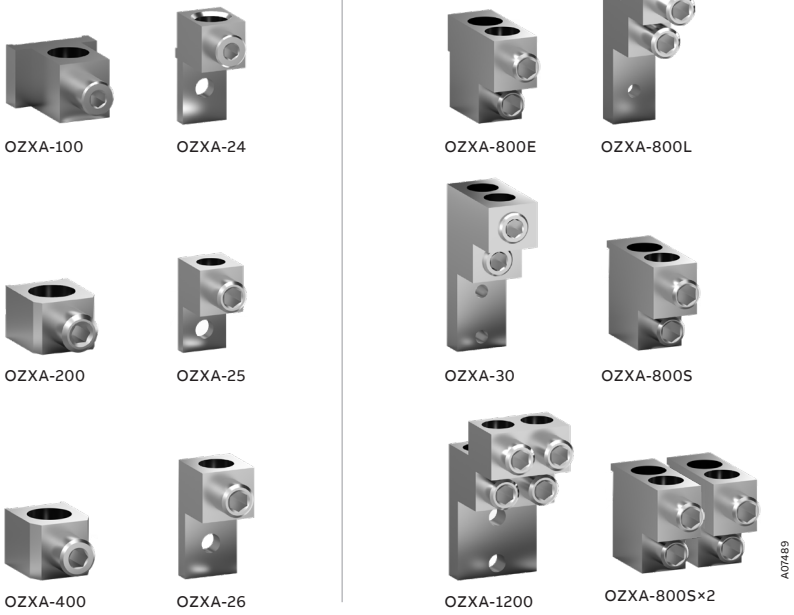
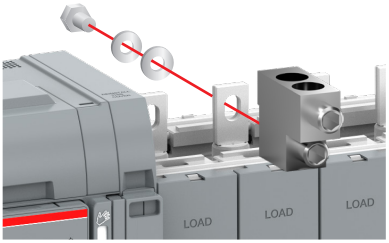


Fig. 8.8 Lug assembly

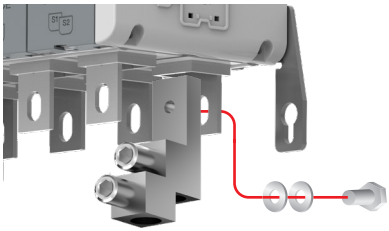
General warning
Torquing lugs with the improper tool and/or to a torque value exceeding the defined parameters may result in damage to the switch.

Lug assembly	Lug assembly/ Fixing screws [pcs]	Lug assembly/ Mounting torque [lb.in / Nm]	Wire/ Size	Wire/ Tightening torque [lb.in / Nm]
OZXA-100, OZXA-24	1	OZXA-100: 124 / 14	14...10 AWG	35 / 4
		OZXA-24: 132 / 14.9	8 AWG	40 / 4.5
			6...4 AWG	45 / 5.1
			3...2/0 AWG	50 / 5.6
OZXA-200	1	132 / 14.9	4 AWG -300 kcmil	200 / 22.6
OZXA-25	1	177 / 20	6 AWG - 300 kcmil	275 / 31.1
OZXA-400	1	228 / 25.8	2 AWG - 600 kcmil	375 / 42.4
OZXA-26	1	228 / 25.8	2 AWG - 600 kcmil	375 / 42.4
OZXA-800E, OZXA-800S	1	480 / 54.2	2 x 2 AWG - 600 kcmil	500 / 56.5
OZXA-800L	1	480 / 54.2	2 x 2 AWG - 600 kcmil	500 / 56.5
OZXA-30, OZXA-1200	2	443 / 50.1	2 x 2 AWG - 600 kcmil 4 x 2 AWG - 600 kcmil	500 / 56.5

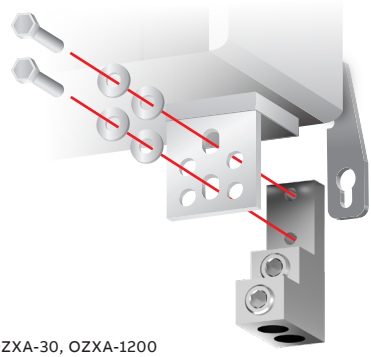
Table 8.4 Lug assembly, mounting information



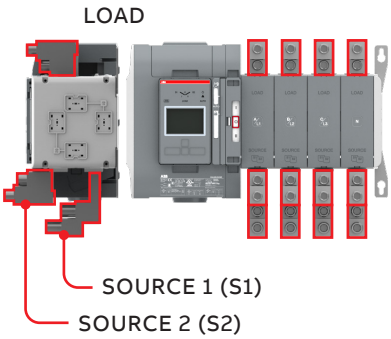
OZXA-100...400, OZXA-800E, OZXA-800S



OZXA-24...26, OZXA-800L



OZXA-30, OZXA-1200



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Automatic transfer switch	Lug assembly		
	LOAD	SOURCE S2	SOURCE S1
OX_30...100_	OZXA-100	OZXA-100	OZXA-24
OX_30...200_	OZXA-200	OZXA-200	OZXA-25
OX_260/400_	OZXA-400	OZXA-400	OZXA-26
OX_600_	OZXA-800E	OZXA-800E	OZXA-800L
OX_800_	OZXA-800S	OZXA-800S	OZXA-30
OX_1000/1200_	OZXA-1200	2 x OZXA-800S	OZXA-1200

—

Table 8.5 OX_30...1200_ / suitable lug assembly

Automatic transfer switch	Max. distance from switch frame to nearest cable support	
	SOURCE [in / mm]	LOAD [in / mm]
OX_30...200_	11.8 / 300	5.9 / 150
OX_260_	11.8 / 300	5.9 / 150
OX_400_	11.8 / 300	5.9 / 150
OX_600_	11.8 / 300	5.9 / 150
OX_800_	15.7 / 400	7.8 / 200
OX_1200_*	15.7 / 400	7.8 / 200

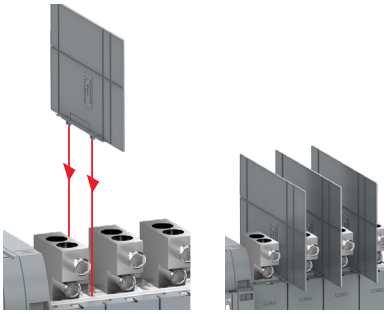
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Table 8.6 Optional cable support distances

*Supports mandatory over 65kA

8.2.4 Phase barriers

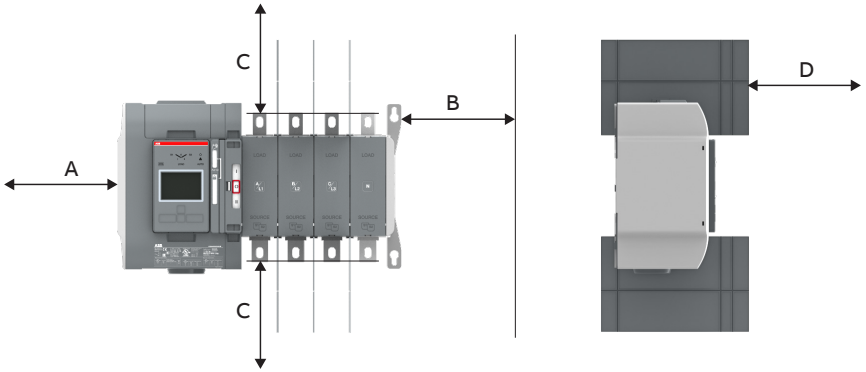
Phase barriers must be used between the LOAD side terminals of TruONE™ automatic transfers switches with switch types OX_400U/500E...1200U/1600E. These switch types include the phase barriers for LOAD side from the factory. Additional phase barriers to be used for the SOURCE side terminals must be ordered separately when needed.



A07491

Fig. 8.9 Mounting of phase barriers.

8.3 Clearances per UL1008



A07489

Fig. 8.10 UL standard switches, clearances per UL1008

Size (Current)	A [in /mm]	B [in /mm]	D [in /mm]	C
OX_30...200U_	1 / 26	0.5 / 13	0.5 / 13	According to the
OX_260...400U_	1 / 26	0.5 / 13	0.5 / 13	UL1008 standard
OX_600U_	1 / 26	0.5 / 13	0.5 / 13	
OX_800U_ ...OX_1200U_	1 / 26	0.5 / 13	0.5 / 13	

Minimum enclosure size or equivalent volume

Size (Current)	Width [in /mm]	Height [in /mm]	Depth [in /mm]
OX_30...200U_	23.6 / 600	31.5 / 800	11.8 / 300
OX_260...400U_	23.6 / 600	31.5 / 800	11.8 / 300
OX_600U_	23.6 / 600	31.5 / 800	11.8 / 300
OX_800U_ ...OX_1200U_	31.5 / 800	39.4 / 1000	11.8 / 300

8.4 Mounting of the handle and HMI

For more information of operating, position indication and the selection of the operating mode, see the Chapter 3.2 Operating and locking.

More information, see animation: Manual and automatic operation - TruONE™ ATS (https://youtu.be/bosvSPVi2sM).

General warning
Verify the condition of power source prior to manually transferring. Manual operation may result in out-of-phase transfer when both sources are energized.

8.4.1 Manual mode; mounting of the handle to operation position

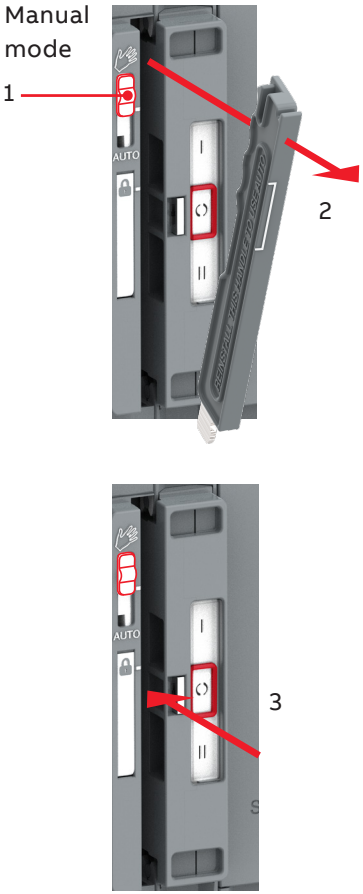
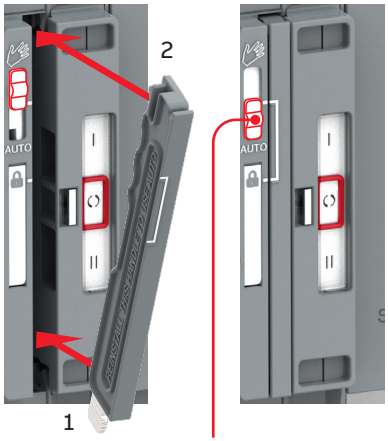


Fig. 8.11 Mounting the handle to the operating position; turn the slide switch to the Manual mode (Hand), lift the handle and place it to the operating position

8.4.2 Automatic mode; mounting of the handle to standby slot



Information
When the slide switch is moved to the AUTO position, the automatic control mode is activated after a three second delay.

More information, see animation: Installation of ATS in the panel and HMI on door - TruONE™ ATS (https://youtu.be/PnvjhCVWQak).

Fig. 8.12 Before moving to the Automatic mode, the operating handle must set to its place. When the handle is in its place properly, the slide switch will move to the Locking mode automatically and the switch is allowed to be padlocked, if needed. From the Locking mode the slide switch can be moved to the Automatic mode

8.4.3 Mounting of the HMI

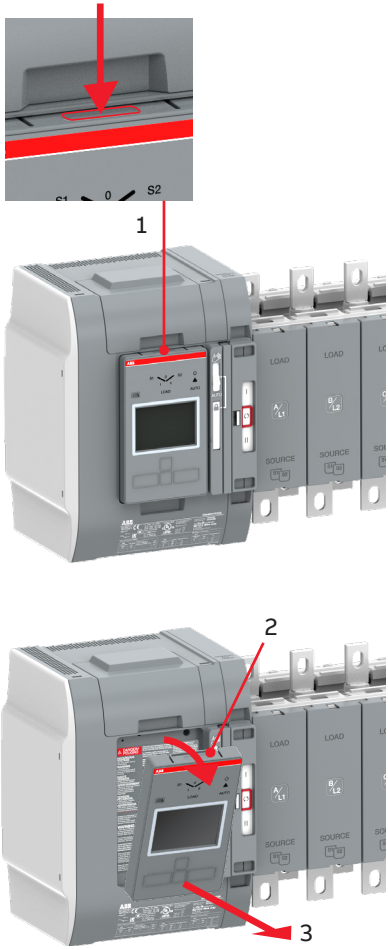
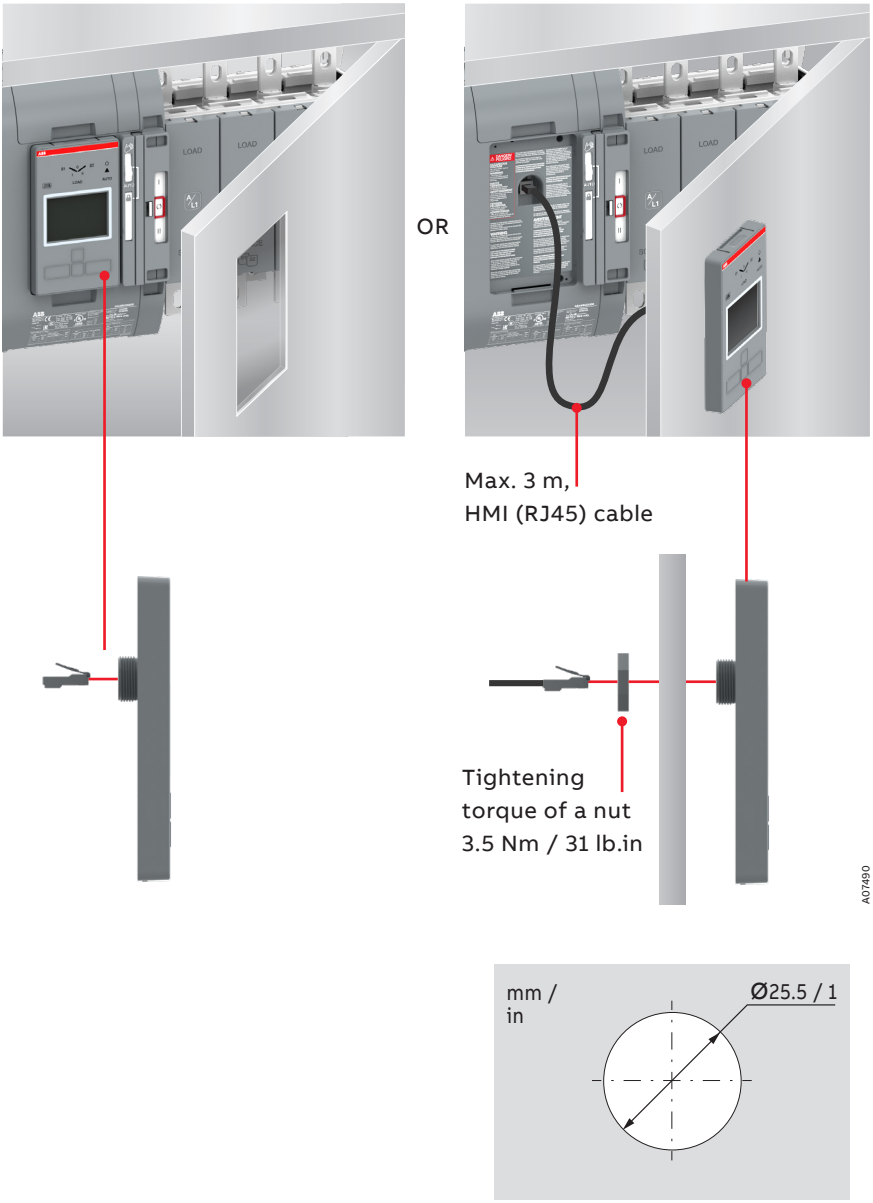


Fig. 8.13 Removing the HMI from the switch



—

Fig. 8.14 HMI can be mounted on the switch or the door, door drilling. HMI protective cover available as accessory, type OXEC21, provides protection against accidental contact, see Chapter 9, Mounting of accessories

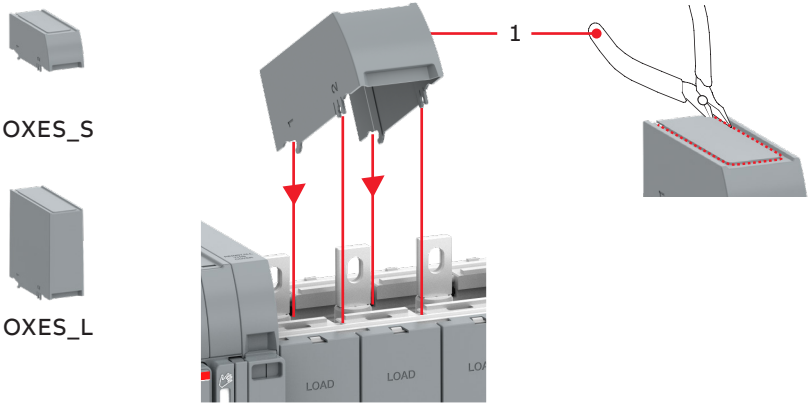
9. Mounting of accessories

More information, see animation:
Installation of accessories - TruONE™ ATS
(https://youtu.be/qV2KoIv38GY).

9.1 Terminal shrouds

Automatic transfer switch	Suitable terminal shroud G= Grey	
	Short type	Long type
OX_30...250	OXES250G1S	OXES250G1L
OX_260...800	OXES800G1S	OXES800G1L
OX_800U...1600	-	OXES1600G1L

Table 9.1 Terminal shrouds, type OXES_



Note: Terminal shrouds cannot be used together with OZXA lug kits

Fig. 9.1 Mounting of the terminal shrouds to the automatic transfer switches, TruONE™ ATS

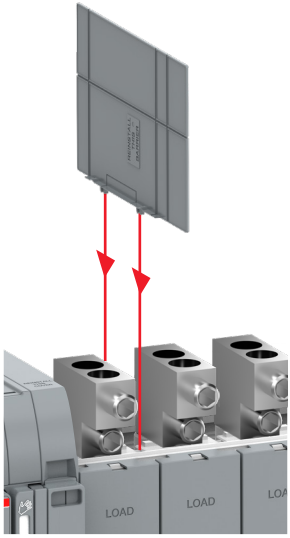
9.2 Phase barriers

Phase barriers must be used to maintain a clearance of 1 inch on the automatic transfer switch types.

These are not required with the standard UL mechanical lug offering, but may be required when alternate connections do not have anti-rotation features, or when alternate connections reduce over-air clearance between phase conductors to less than 1 inch.



OXEB_





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Fig. 9.2 Mounting of phase barriers, type OXEB_

9.3 Auxiliary contact blocks

Position	OA1G10	OA3G01
SOURCE 1 (S1), max 2+2		
I		
O		
II		
SOURCE 2 (S2), max 2+2		
I		
O		
II		

Table 9.2 Contact positions

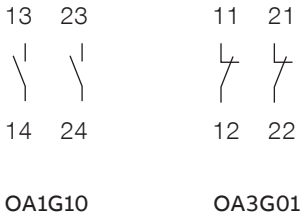


Fig. 9.4 Labels for contact numbering

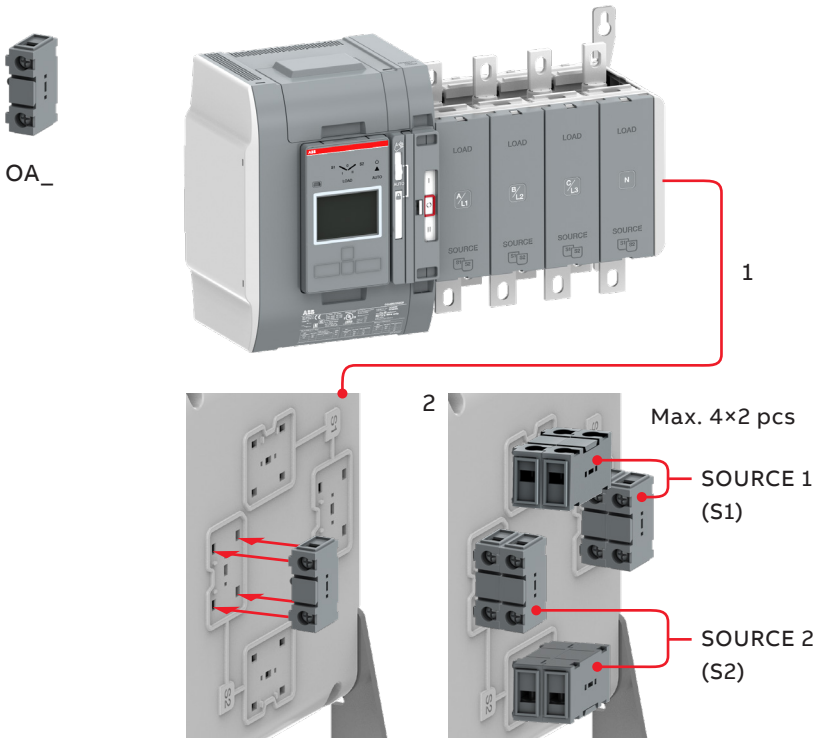


Fig. 9.3 Mounting of the auxiliary contact blocks, type OA_

9.4 Sensor module

Sensor module is used for energy and temperature measurement.

Note: Sensor module cannot be purchased separately, it is assembled at factory. Pictures are just for reference.

Switch size	Nominal current of OXCT_ [A]
OX_30...250	250
OX_260...800	800
OX_800U...1600	1600

Table 9.3 Nominal currents

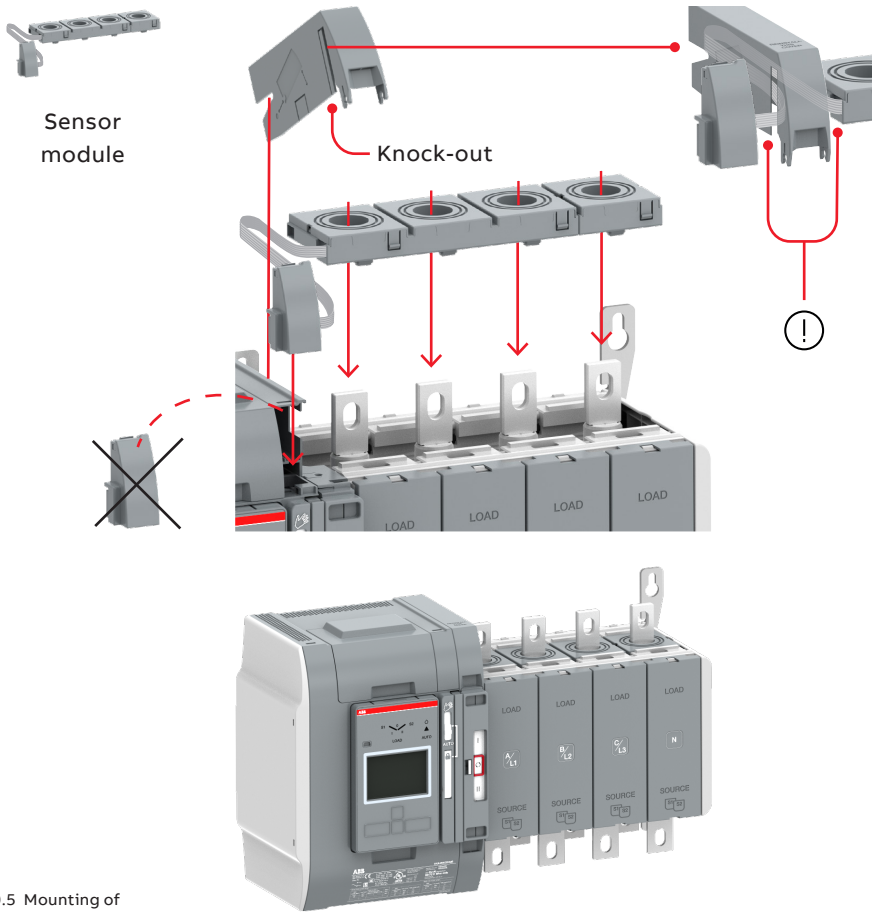


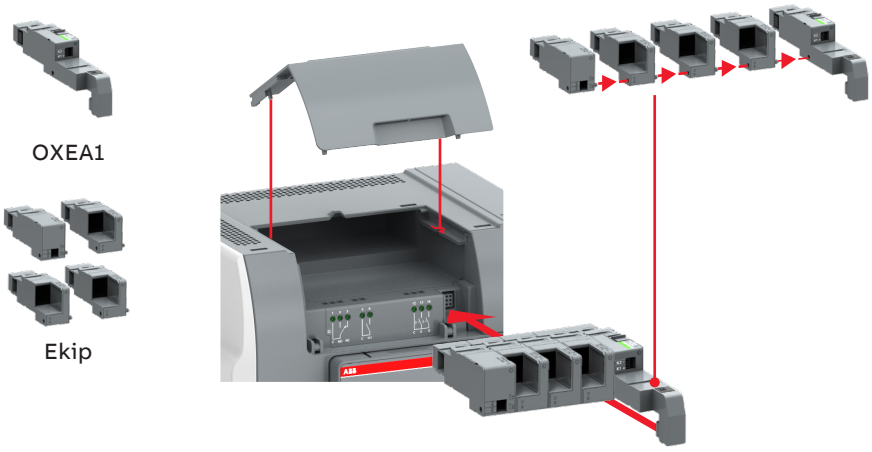
Fig. 9.5 Mounting of the sensor module

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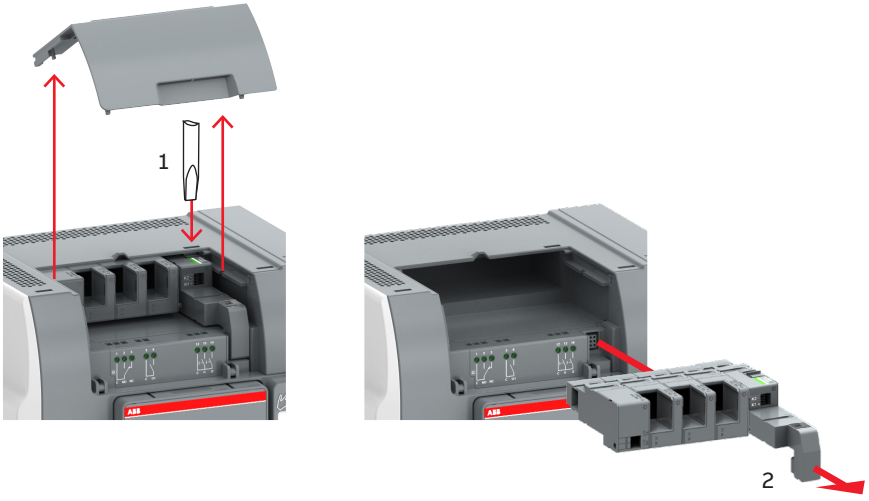
9.5 Auxiliary power supply and Ekip -modules

Automatic transfer switches OX_ can be equipped with Ekip-modules. Ekip-modules are mounted with a auxiliary power supply module, OXEA1. Suitable Ekip-modules are: Signalling and connectivity modules. For more information, see Chapter 5, Electronic accessories.

Max. Ekip-modules:
- OX_30…260U, OX_160…400E: 3 pcs
- OX_400-1200U, OX_500…1600E: 4pcs



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Fig. 9.6 Mounting of the auxiliary power supply module OXEA1 and Ekip –modules



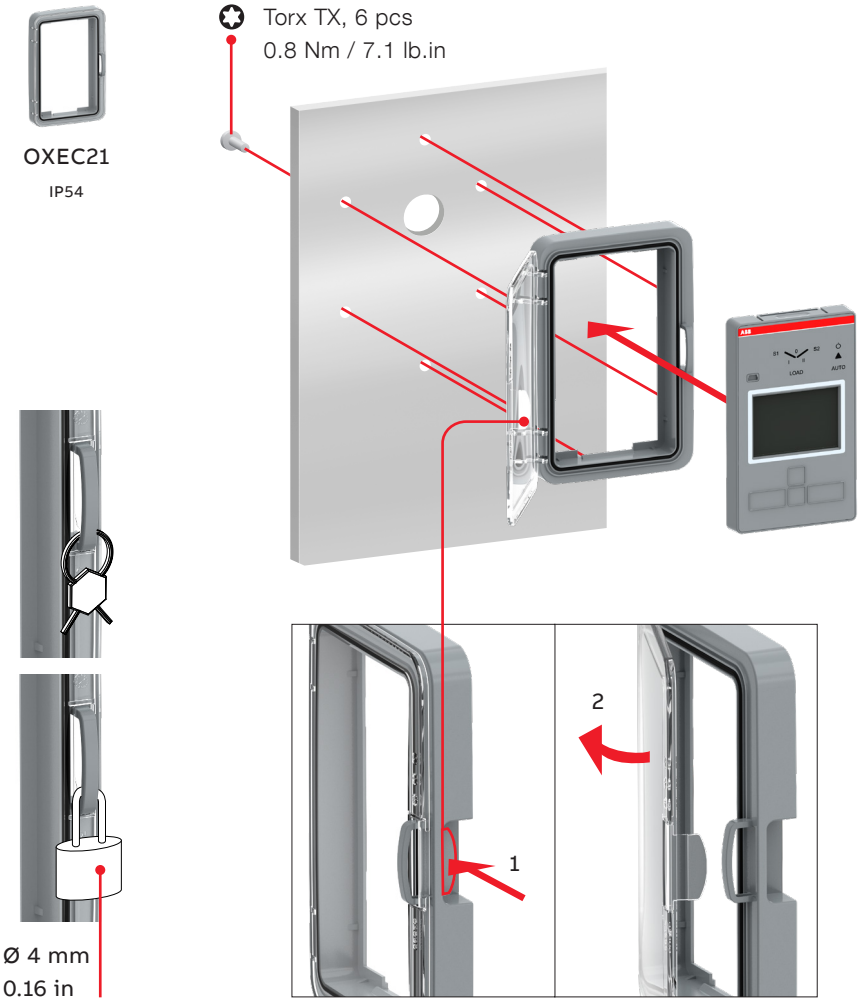
—
Fig. 9.7 Removing the auxiliary power supply module OXEA1 and Ekip –modules from the automatic transfer switch

9.6 HMI protective cover

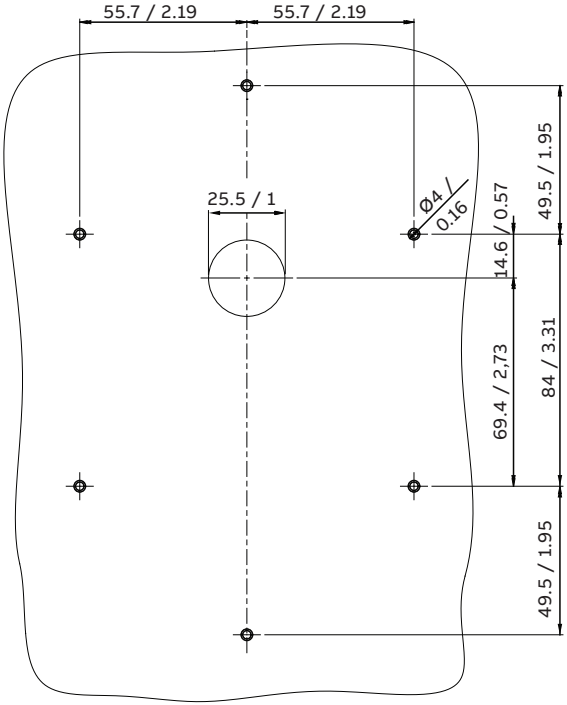
9.6.1 Type OXEC21

HMI protective cover is available as accessory, type OXEC21, provides protection against accidental contact.

Fig. 9.8 Mounting of HMI protective cover, type OXEC21, door drilling, see next page



mm / in



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Fig. 9.9 Door drilling of the HMI protective cover

9.6.2 Type OXEC22

HMI protective cover is available as accessory, type OXEC22, provides protection against accidental contact.

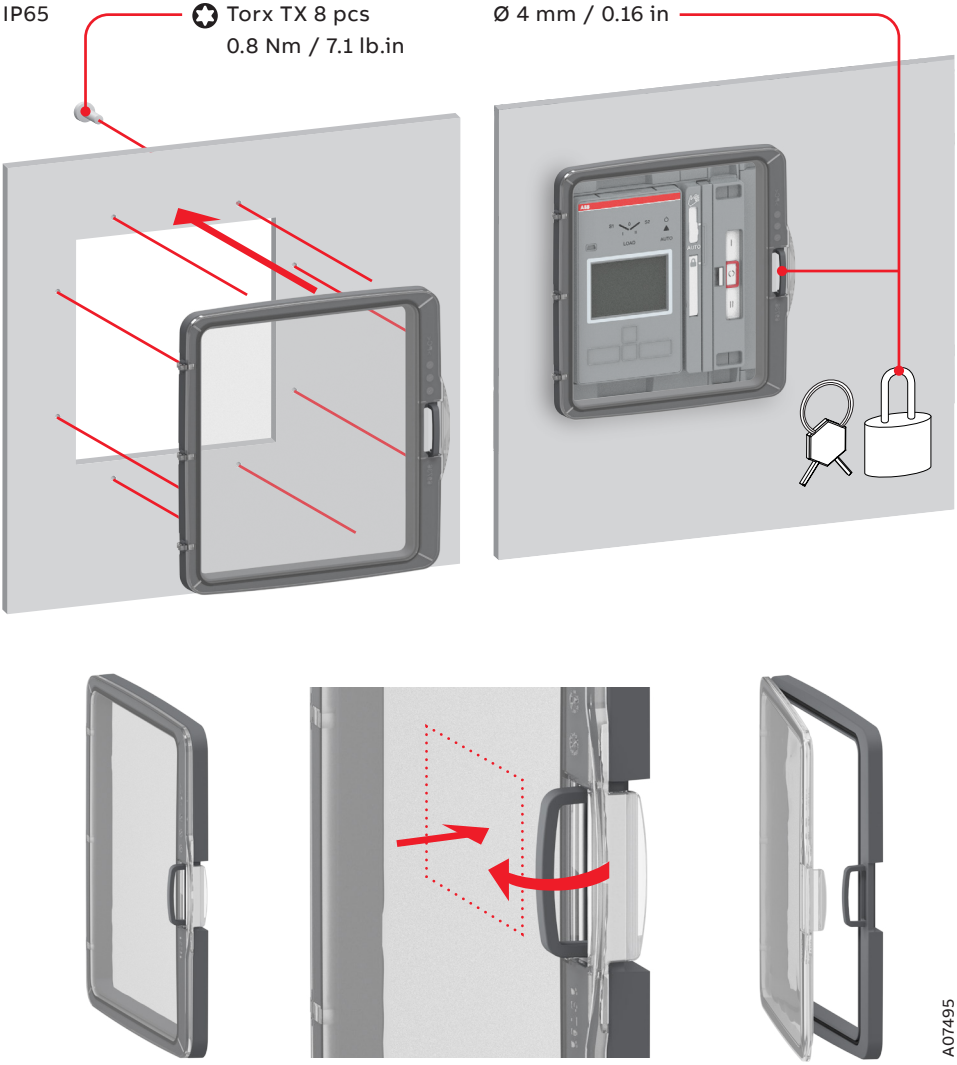
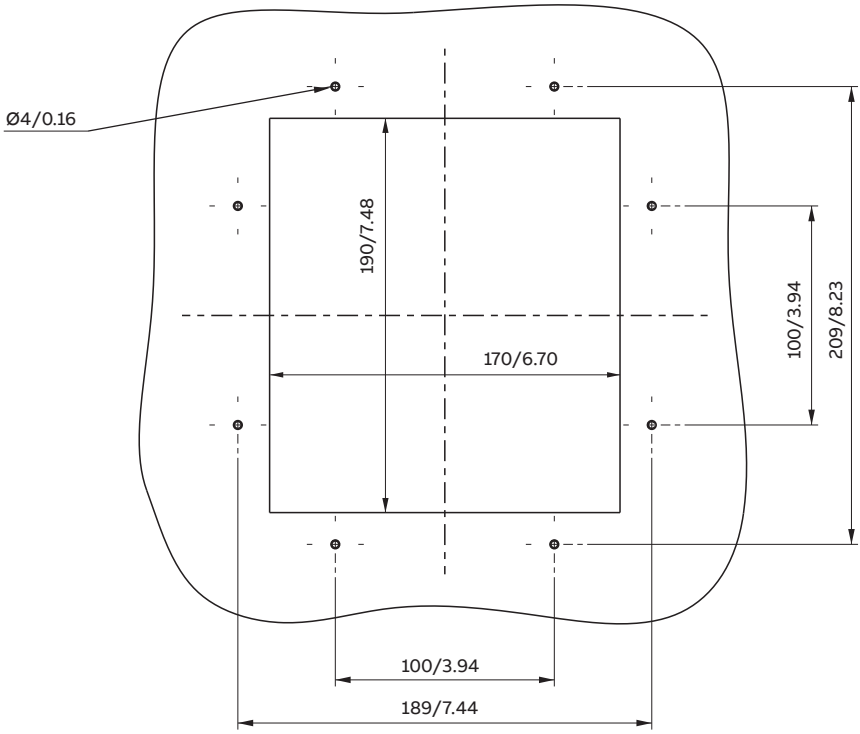


Fig. 9.10 Mounting of HMI protective cover, type OXEC22, door drilling, see next page

mm / in



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Fig. 9.11 Door drilling of the HMI protective cover

9.7 Terminal busbar

Terminal busbar, type OXEW1600_, is needed for automatic transfer switches OX_800U...3200A on LOAD side terminals, when wiring is done with cable lugs. It is needed to mount on both sides of the terminal for connecting the cable lug.

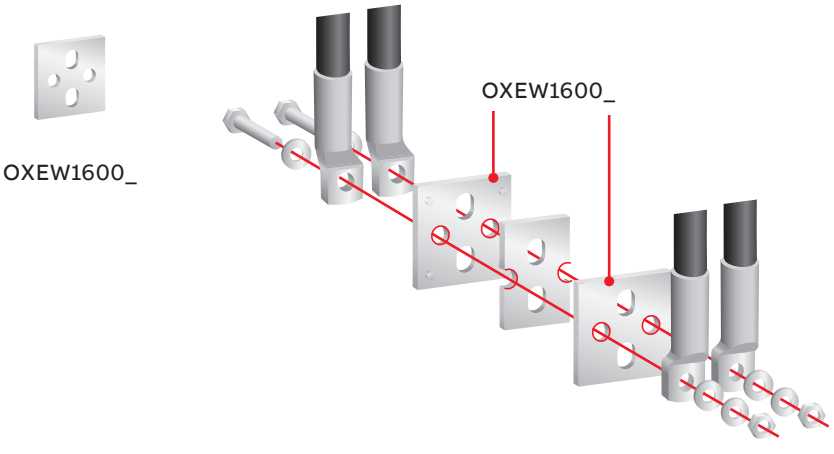
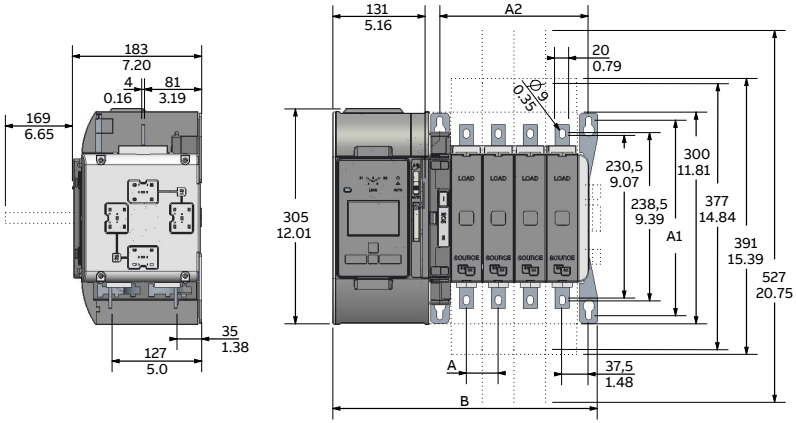


Fig. 9.12 For OX_800U...3200 is needed the terminal busbars, type OXEW1600_, for connecting the cable lug. The busbars have to be mount on both sides of the load side terminals. Tightening torque and bolt size, see the table 8.4

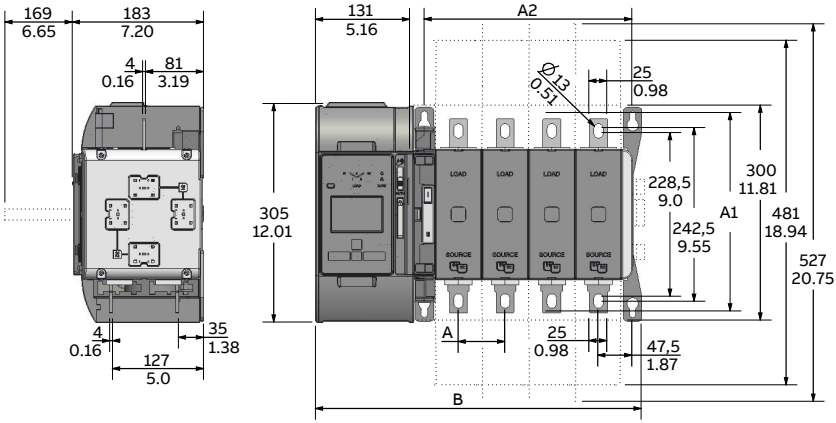
10. Dimension drawings



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Fig. 10.1 OX_30...250_B

OX_30-250_			
No. of poles	**2**	**3**	**4**
A	45/1.77	45/1.77	45/1.77
A1	277/10.91	277/10.91	277/10.91
A2	120/4.72	165/6.50	210/8.27
B	285/11.22	330/12.99	375/14.76

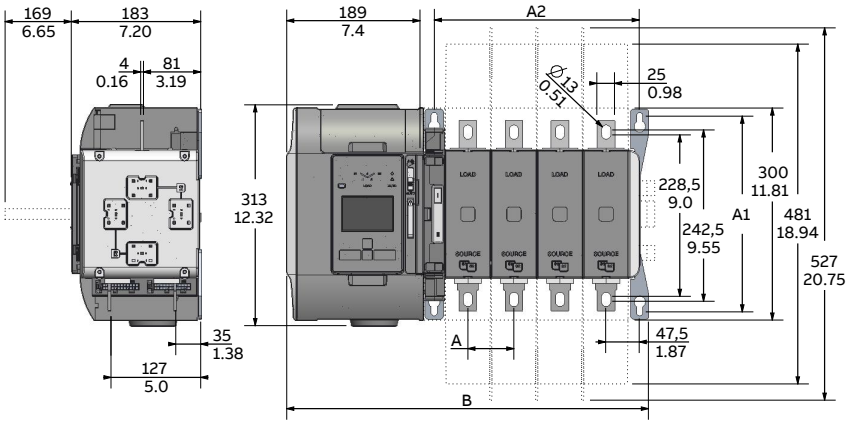
Note: B dimension, recommended to leave 2 cm/1" free space on the left side (for removing the mechanism)



—
Fig. 10.2 OX_260...400_B

OX_260_400			
No. of poles	**2**	**3**	**4**
A	65/2.56	65/2.56	65/2.56
A1	277/10.91	277/10.91	277/10.91
A2	160/6.30	225/8.86	290/11.42
B	325/12.80	390/15.35	455/17.91

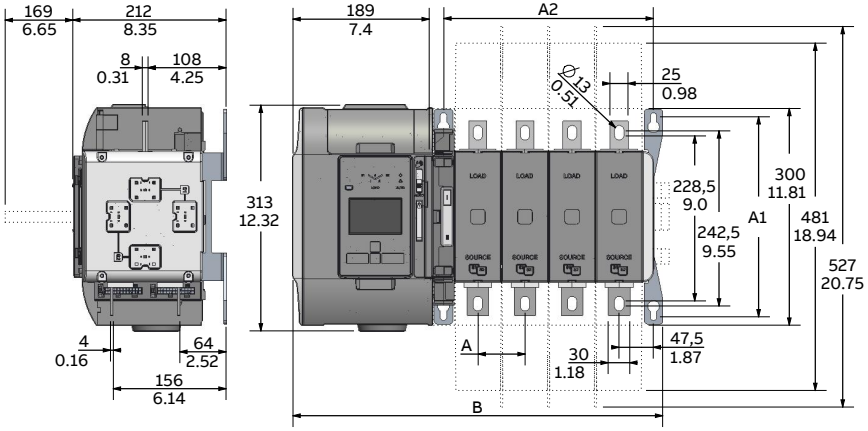
Note: B dimension, recommended to leave 2 cm/1" free space on the left side (for removing the mechanism)



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Fig. 10.3 OX_400U_B

OX_400U_B			
No. of poles	**2**	**3**	**4**
A	65/2.56	65/2.56	65/2.56
A1	277/10.91	277/10.91	277/10.91
A2	160/6.30	225/8.86	290/11.42
B	382/15.04	447/17.60	512/20.16

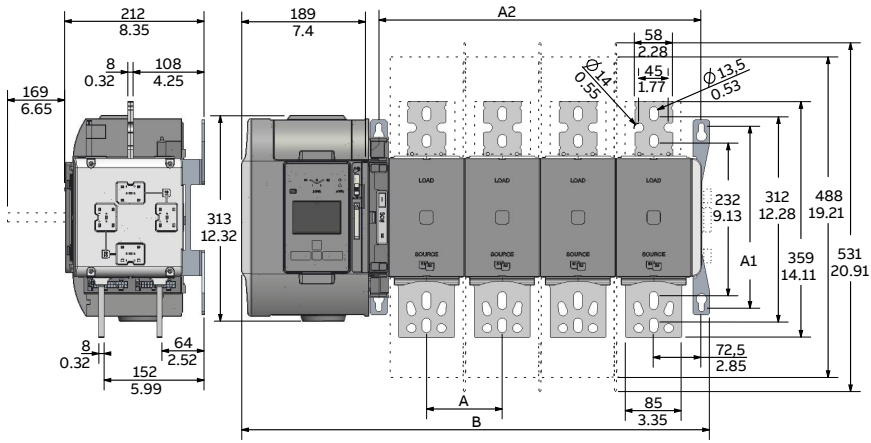
Note: B dimension, recommended to leave 2 cm/1" free space on the left side (for removing the mechanism)



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Fig. 10.4 OX_500...800_B

OX_500-800_			
No. of poles	**2**	**3**	**4**
A	65/2.56	65/2.56	65/2.56
A1	277/10.91	277/10.91	277/10.91
A2	160/6.30	225/8.86	290/11.42
B	382/15.04	447/17.60	512/20.16

Note: B dimension, recommended to leave 2 cm/1" free space on the left side (for removing the mechanism)



—
Fig. 10.5 OX_800U...1600_B

OX_800U-1600		
No. of poles	**3**	**4**
A	115/4.53	115/4.53
A1	277/10.91	277/10.91
A2	375/14.77	490/19.30
B	597/23.51	712/28.04

Note: B dimension, recommended to leave 2 cm/1" free space on the left side (for removing the mechanism)

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CN 警告！电压危险！只能由专业电工进行安装。
CZ Varování! Nebezpečné napětí! Montáž smí provádět výhradně elektrotechnik!
DA Advarsel! Farlig elektrisk spænding! Installation må kun foretages af personer med elektroteknisk ekspertise.
DE Warnung! Gefährliche Spannung! Installation nur durch elektrotechnische Fachkraft.
EL Προειδοποίηση! Υψηλή τάση! Η εγκατάσταση πρέπει να γίνεται μόνο από εξειδικευμένους ηλεκτροτεχνικούς.
EN Warning! Hazardous voltage! Installation by person with electrotechnical expertise only.
ES ¡Advertencia! ¡Tensión peligrosa! La instalación deberá ser realizada únicamente por electricistas especializados.
ET Hoiatus! Ohtlik pinge. Paigaldada võib ainult elektrotehnika-alane ekspert.
FI Varoitus! Vaarallinen jännite! Asennuksen voi tehdä vain sähköalan ammattihenkilö.
FR Avertissement! Tension électrique dangereuse! Installation uniquement par des personnes qualifiées en électrotechnique.
HR Upozorenje! Opasan napon! Postavljati smije samo elektrotehnički stručnjak.
HU Figyelmeztetés! Veszélyes feszültség! Csak elektrotechnikai tapasztalattal rendelkező szakember helyezheti üzembe.
IE Rabhadh! Voltas guaiseach! Ba chóir do dhuine ag a bhfuil saineolas leictriteicniúil, agus an té sin amháin, é seo a shuiteáil.
IT Avvertenza! Tensione pericolosa! Fare installare solo da un elettricista qualificato.
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LV Uzmanību! Bīstami - elektrība! Montāžas darbus drīkst veikt tikai personas, kurām ir atbilstošas elektrotehniskās zināšanas.
MT Twissija! Vultaġġ perikoluż! Għandu jiġi installat biss minn persuna b'kompetenza elettroteknika.
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PL Ostrzeżenie! Niebezpieczne napięcie! Instalacji może dokonać wyłącznie osoba z fachową wiedzą w dziedzinie elektrotechniki.
PT Aviso! Tensão perigosa! A instalação só deve ser realizada por um eletricista especializado.
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34OX_30-1600 rev. L / 1SCC303011M0201# 05.06.2026