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.

—

Installation and operating instruction
Automatic transfer switches, TruONE® ATS

OPERATING INSTRUCTIONS, TRUONE® ATS, OX_30...1600 CHAPTERS 1–7

1

INSTALLATION INSTRUCTIONS, TRUONE® ATS, OX_30...1600 CHAPTERS 8–10

2

1

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Operating instruction
Automatic transfer switches, TruONE® ATS

1

1

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.

—
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 OXCT_

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
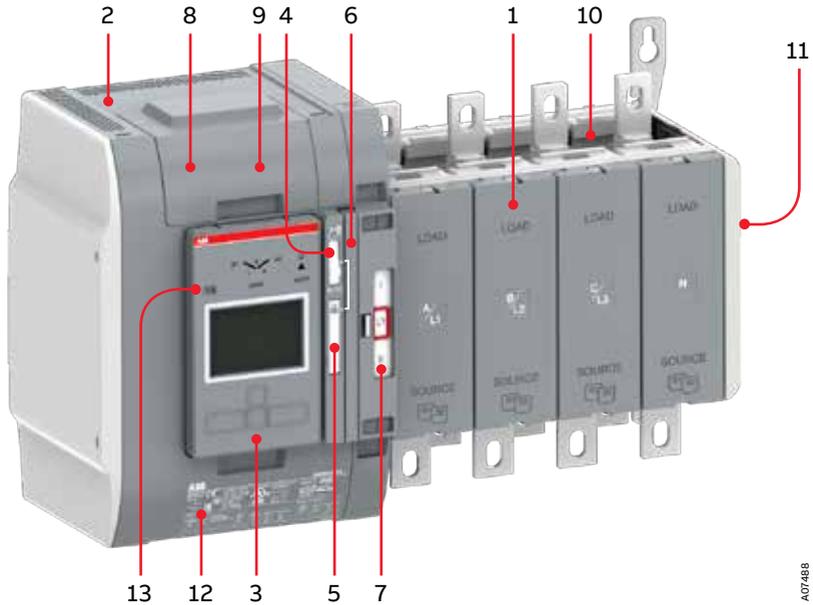
—
Fig. 2.1 Automatic transfer switch, TruONE® ATS, type OXB_B

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 as standard with Level 4 controls)
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	S1 I II S2	
Load	Load	
Level 2: HMI (with DIP-switches) and connections of control circuit		
		Not suitable

1

Operation types, TruONE® ATS, type OX_30...1600_		Ekip-modules suitable
Delayed transition, OXB_	Open transition, OXA_	
S1 I OII S2	S1 I II S2	
Load	Load	

Level 3: HMI (with LCD-screen) and connections of control circuit

Suitable

1 2 3	5 6	10 11 12 13 14
C NO NC	C O1	+ − FIRE 24V C I1 I2

1 2 3	5 6	12 13
C NO NC	C O1	C I1
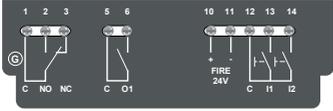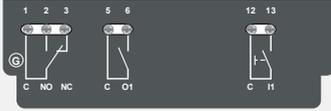
Level 4: HMI (with touch-screen) and connections of control circuit, sensor unit included

Suitable

1 2 3	5 6	10 11 12 13 14 15
C NO NC	C O1	+ − FIRE 24V C I1 I2 I3

1 2 3	5 6	12 13 14
C NO NC	C O1	C I1 I2
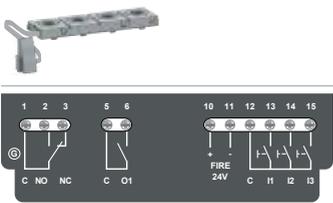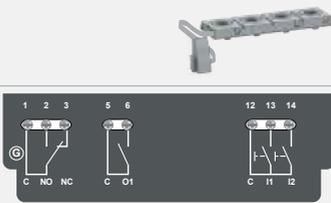
—
Table 2.1 The differences of controller level types / operation
types and the suitability of Ekip-modules

—

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 automatic operation.

Level 2:
HMI with
DIP-switches

Level 3:
HMI with
LCD-screen

Level 4:
HMI with
touch screen
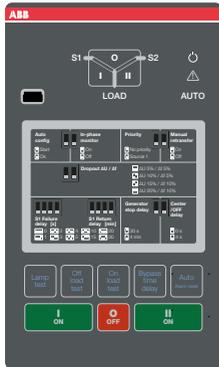
I - O - II (or II - O - I)

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

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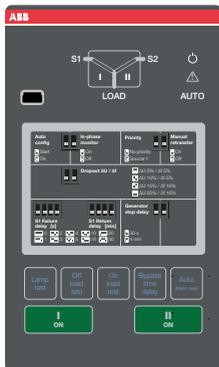
I - II (or II - I)

I - II (or II - I)

I - II (or II - I)

—

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: 200…1600 A	IEC: 200…1600 A	IEC: 200…1600 A
	UL: 30…1200 A	UL: 30…1200 A	UL: 30…1200 A
Rated voltage	200…480 Vac	200…480 Vac	200…480 Vac
Rated frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phase system	1 / 2 / 3	1 / 2 / 3	1 / 2 / 3
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%
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	1,5 (0…60 via Ekip Connect)	0…60	0…60

1

Feature comparison	Level 2 controls (DIP)	Level 3 controls (LCD)	Level 4 controls (TOUCH)
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
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

1

Feature comparison	Level 2 controls (DIP)	Level 3 controls (LCD)	Level 4 controls (TOUCH)
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	Accessory	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
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)	No	Yes	Yes
Modbus/TCP	No	Yes	Yes
Profibus DP	No	Yes	Yes
ProfiNet	No	Yes	Yes
DeviceNet	No	Yes	Yes
Ethernet IP	No	Yes	Yes
IEC 61850	No	Yes	Yes
Ekip Com Hub (monitoring via ABB Ability™: EDCS)	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

—
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 scenarios 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.
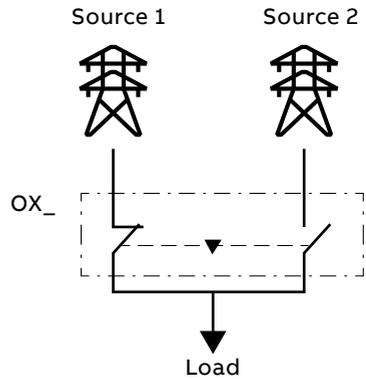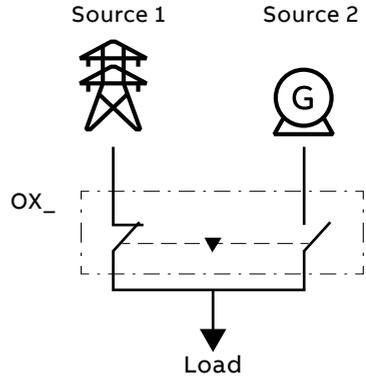
—
Fig. 2.3 Typical applications of automatic transfer switches

Phase A

Neutral

D

Single-phase, two-wire

Phase A

Neutral

Phase B

D

D

E

Two-phase, three-wire

Phase A

Phase B

Neutral

Phase C

F

D

D

F

Three-phase, four-wire

Phase A

Phase B

Phase C

F

F

F
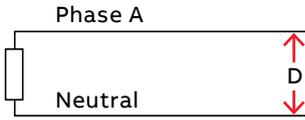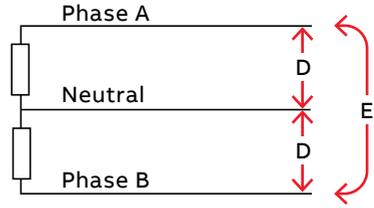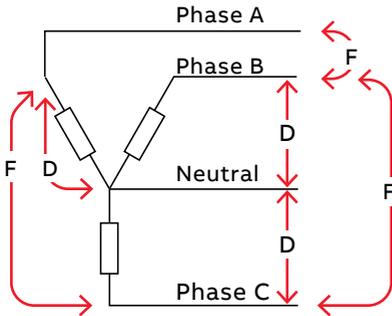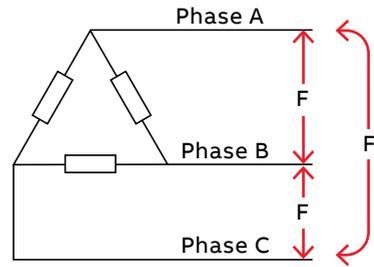
Three-phase, three-wire

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

Phase A

High Leg

Phase B

Phase C

120 Vac

120 Vac

240 Vac

240 Vac

240 Vac

208 Vac
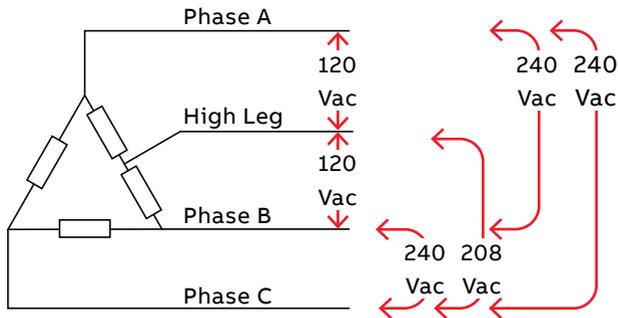
Three-phase, with high leg delta

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—
Fig. 2.4 Possible supply phase scenarios

—

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)
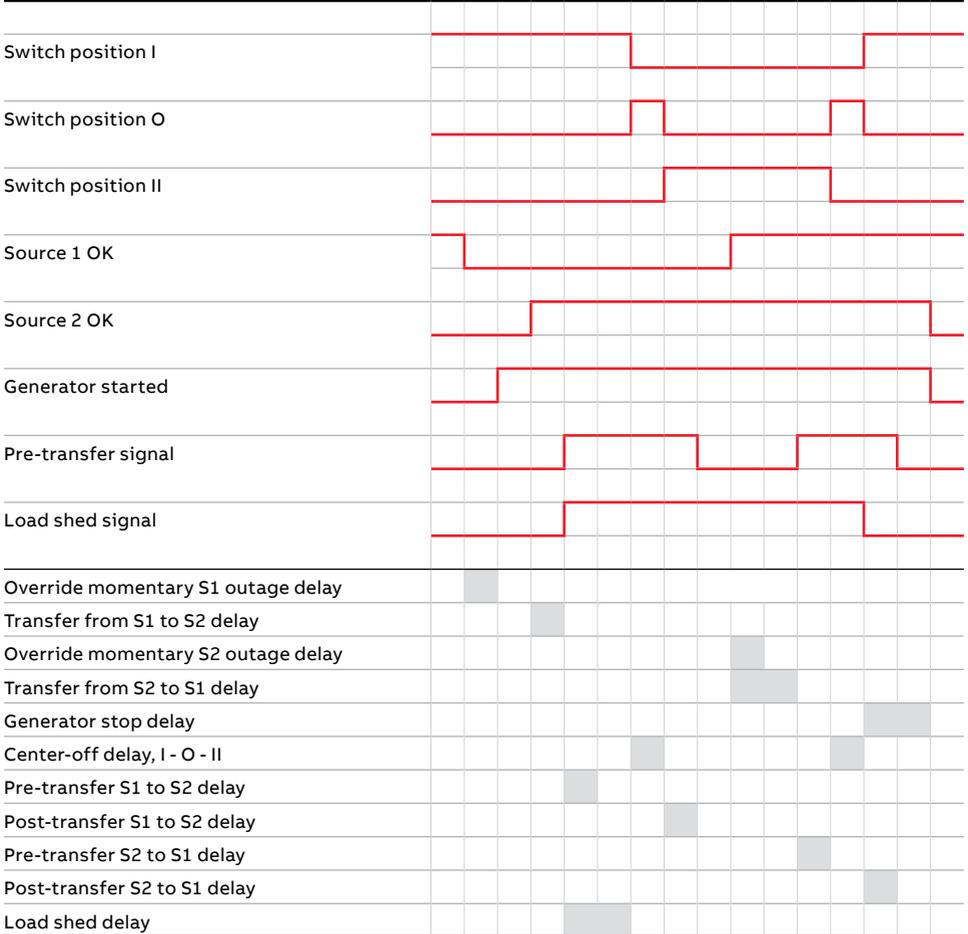
Switch position I

Switch position O

Switch position II

Source 1 OK

Source 2 OK

Generator started

Pre-transfer signal

Load shed signal

Override momentary S1 outage delay

Transfer from S1 to S2 delay

Override momentary S2 outage delay

Transfer from S2 to S1 delay

Generator stop 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

Load shed delay

Note: The functionality and sequence of 'Elevator pre- and post-signals' is equivalent to 'Pre- and Post-transfer' features.
—
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
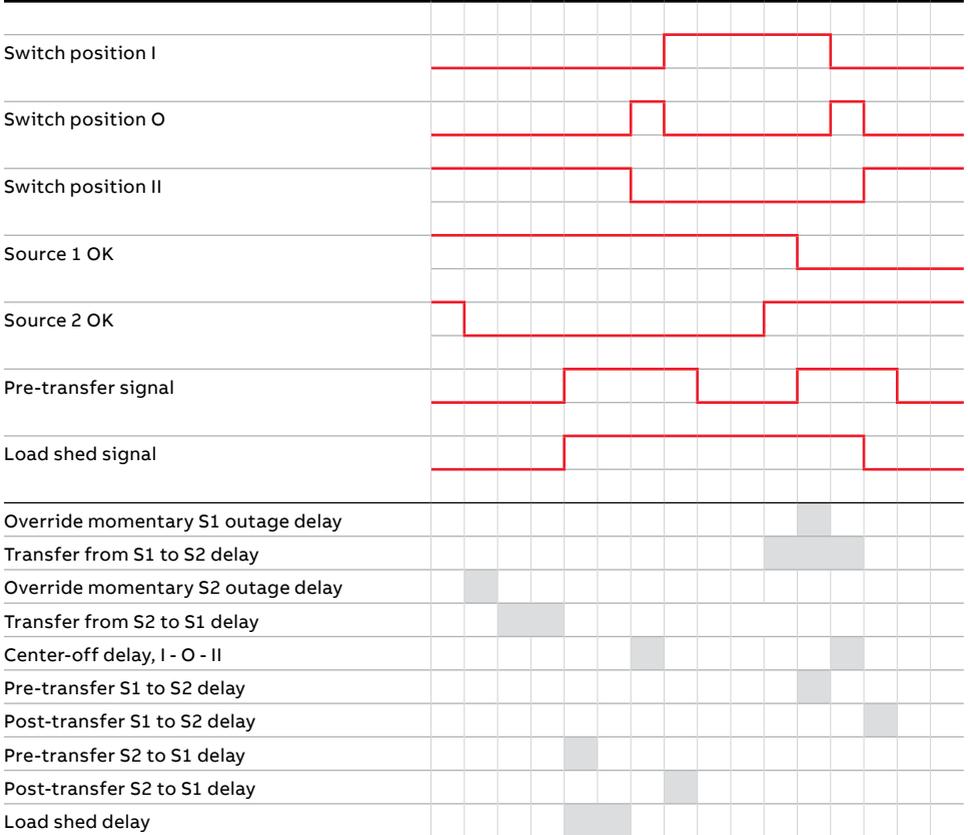
1

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Source 2 priority (no generator)

Switch position I

Switch position O

Switch position II

Source 1 OK

Source 2 OK

Pre-transfer signal

Load shed signal

Override momentary S1 outage delay

Transfer from S1 to S2 delay

Override momentary S2 outage delay

Transfer from S2 to S1 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

Load shed delay

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
- 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 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
- 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 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)
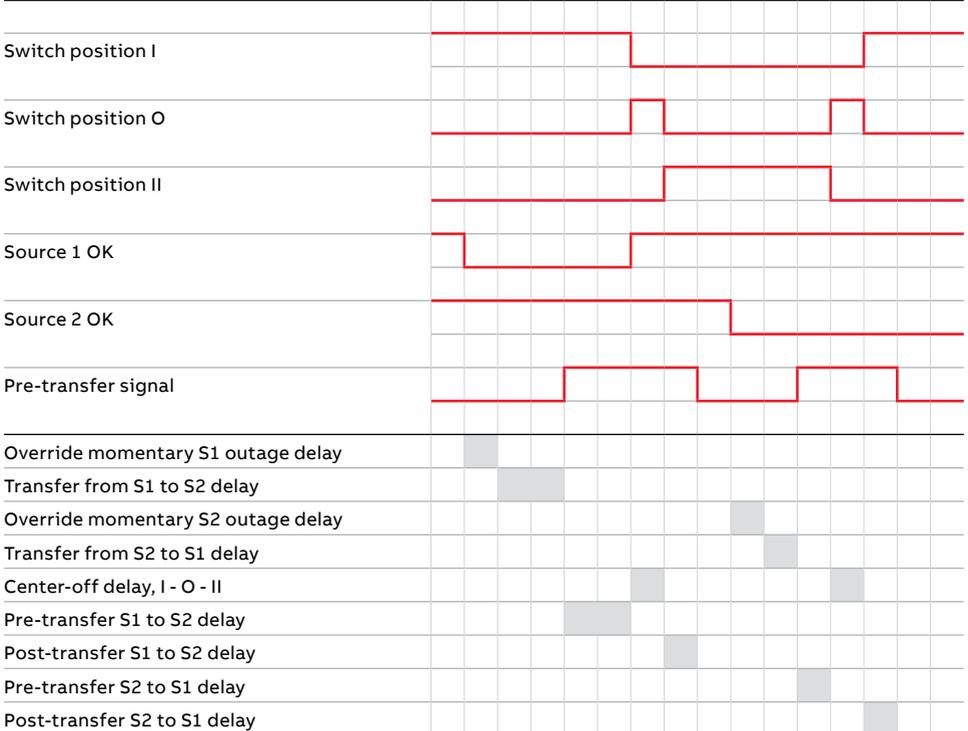
Switch position I	
Switch position O	
Switch position II	
Source 1 OK	
Source 2 OK	
Pre-transfer signal	
Override momentary S1 outage delay	
Transfer from S1 to S2 delay	
Override momentary S2 outage delay	
Transfer from S2 to S1 delay	
Center-off delay, I - O - II	
Pre-transfer S1 to S2 delay	
Post-transfer 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 position
 - 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.

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.

Automatic transfer to a healthy source is enabled after a configurable time 'Synchronization Delay' when the device is able to detect frequency only in one source.

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.

1

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3. Operating

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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)

OXA_B: I - II   OXA_T: II - I   OXB_B: I - O - II   OXB_T: II - O - I
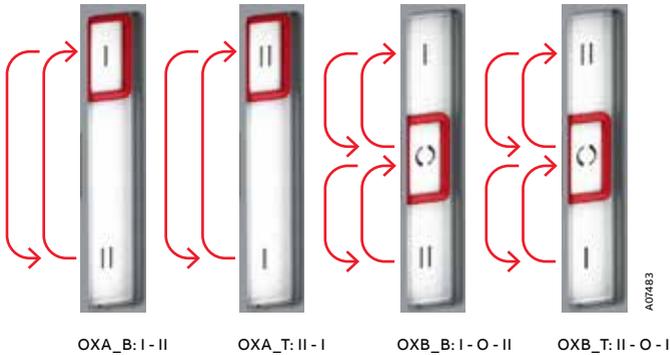
—
Fig. 3.1 Contact movement / position indication:
OXA_, Open transition; OXB_, Delayed transition,
_B, bottom entry versions; _T, top entry versions

—

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.
- **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).
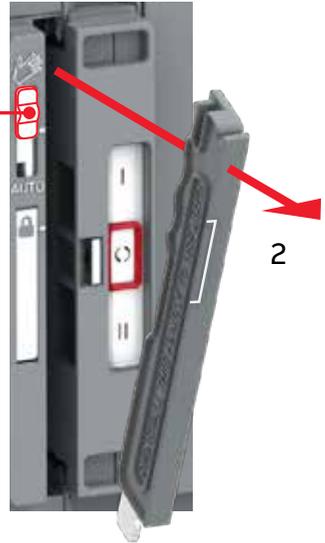
Manual mode

—
Fig. 3.3 Manual mode: installing handle

I-position

OXB_B: I - O - II
OXB_T: II - O - I

O-position

O-position

II-position

1
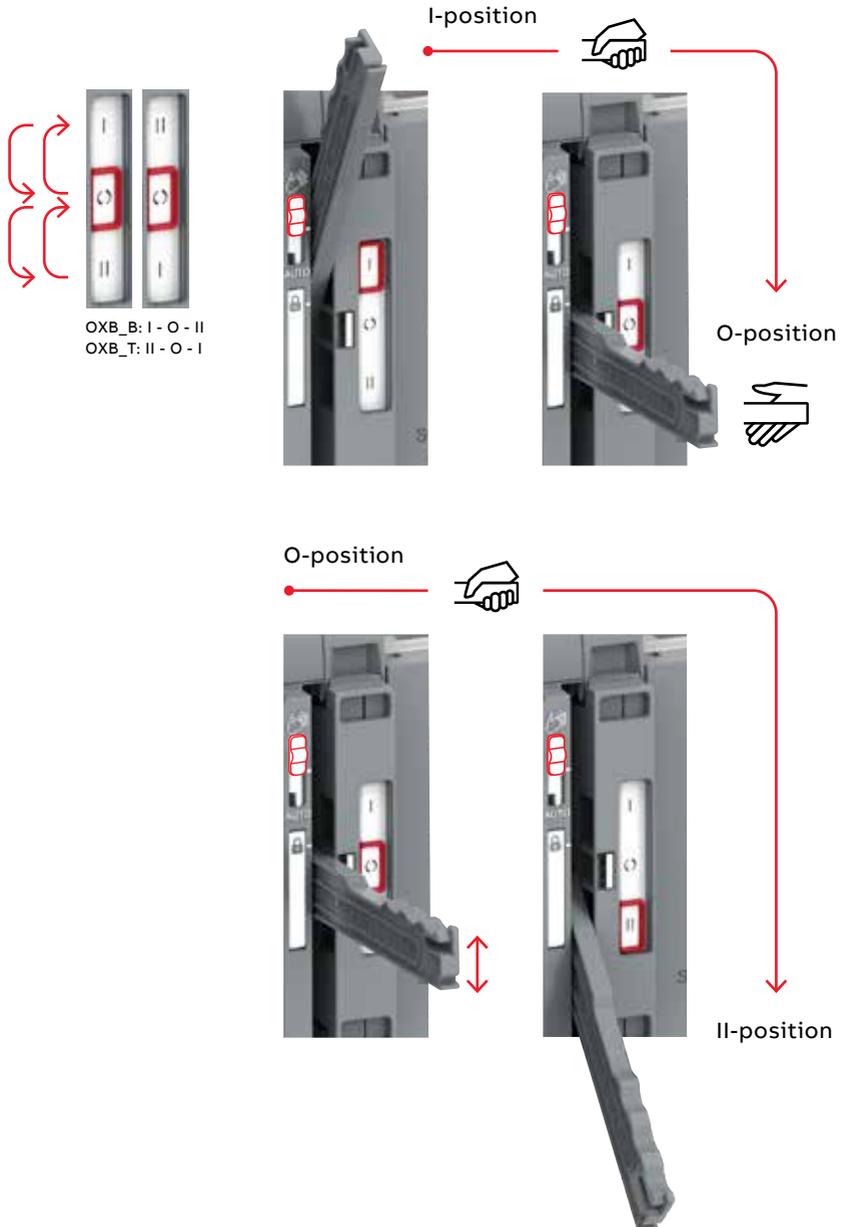
—
Fig. 3.4 Manual mode, operating by handle,
delayed transition I - O - II or II - O - I. To move
from position I to II (or II to I), move handle to
O position and release hand from handle.

1

I-position ——————→ II-position

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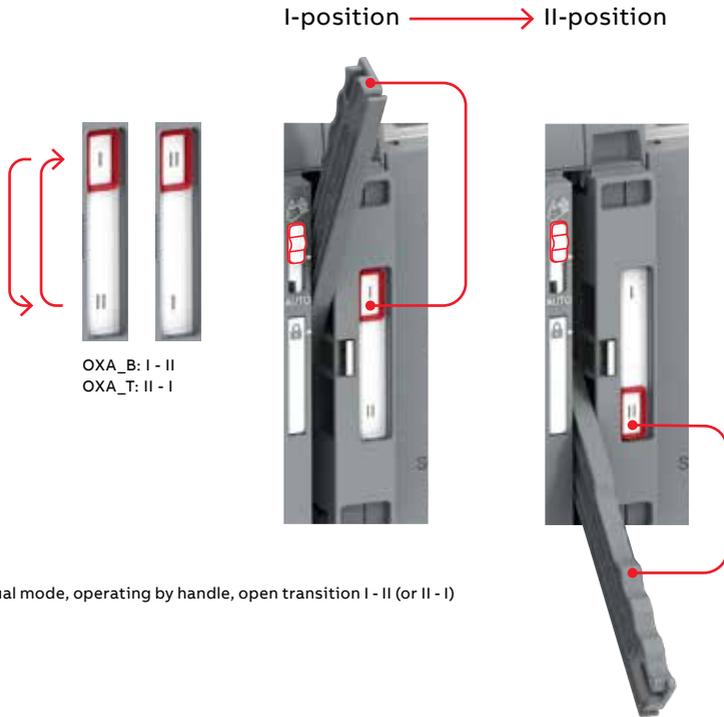
—
Fig. 3.5 Manual mode, operating by handle, open transition I - II (or II - I)

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.
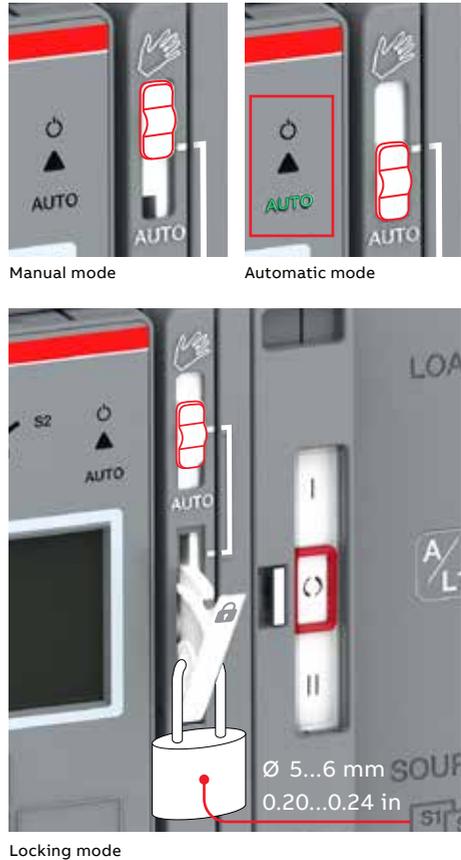

Automatic mode

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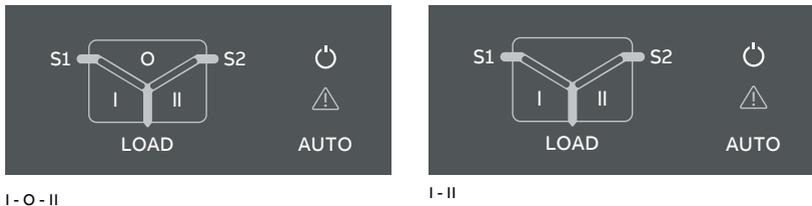
—
Fig. 3.7 On left: LEDs in OXB_, delayed transition, I - O - II. On right: LEDs in OXA_, open transition I - II.

LED	Indication	Description
Power led		
	ON, fixed light ▮▮▮▮	Power supply and communication present
	2 quick flashes/1s ▮▮▮▮	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/1s ▮▮▮▮	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
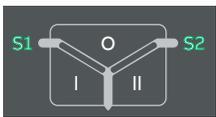
I, II and 0 leds
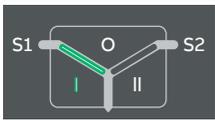
	ON, fixed light ▰▰▰▰	Switch position is indicated with fixed light in I, O or II led. Only one can be illuminated
	Flash/1 s, 50%/50 % ▰▪	Indicating running time delay
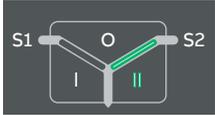
Load led

	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
	5 flashes/1 s, 50%/50 % ▮▮▮▮▮▮▮	Autoconfig completed

Alarm led

	OFF ▪▪▪▪	No alarms
	ON, fixed light ▰▰▰▰	Handle attached, locked, other alarm
	2 quick flashes/1s ▪▪▰▪▰	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

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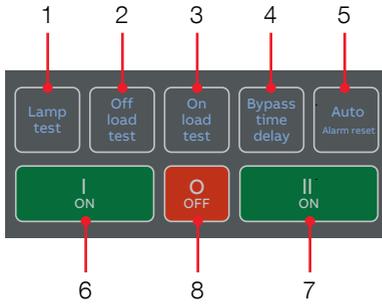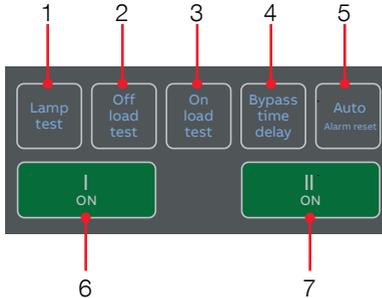
1 **Lamp test:** Turns on all LEDs simultaneously to confirm all LEDs are operational

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

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

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/HMI control modes

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)

1

DIP

3.6.2 Configuration by DIP-switches
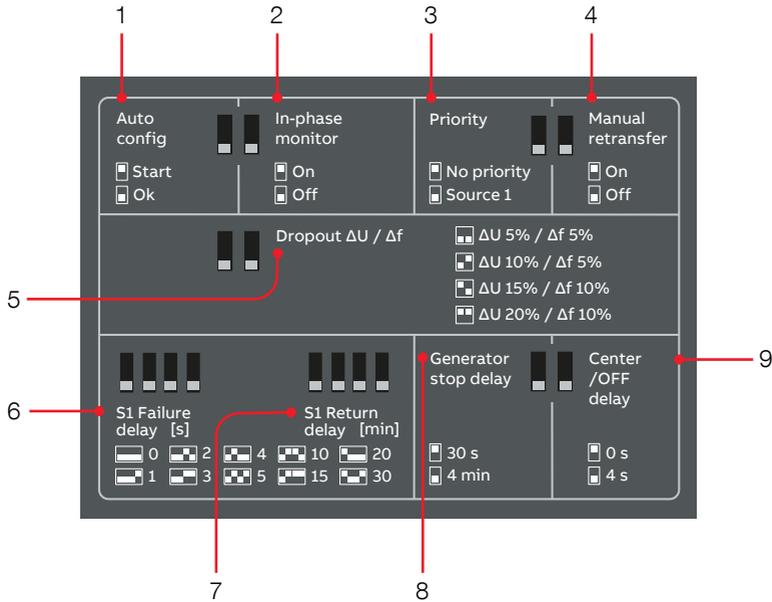
—
Fig. 3.9 DIP-switches for configuration in Level 2 HMI

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.

—

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 automatic/HMI control modes.
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).
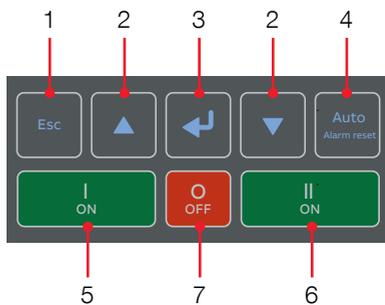
3.7.2 Navigating in menu
See the menu tree in Chapter 4.

OXB_, delayed transition, I - O - II
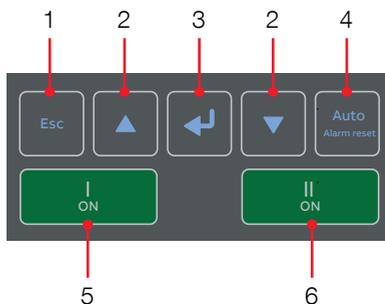
OXA_, open transition, I - II

—
Fig. 3.10 Keypad in Level 3 HMI with LCD screen

—

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.
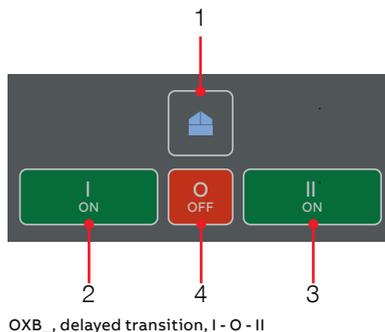
OXB_, delayed transition, I - O - II
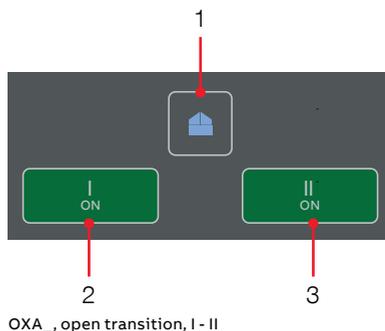
OXA_, open transition, I - II

—
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 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
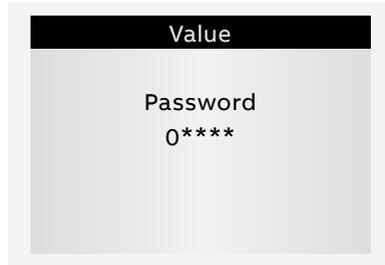
—
Fig. 4.1 Enter the password when asked, choose the right number by Up and Down -keys (2) and confirm by Enter-key (3), go forward setting number after number
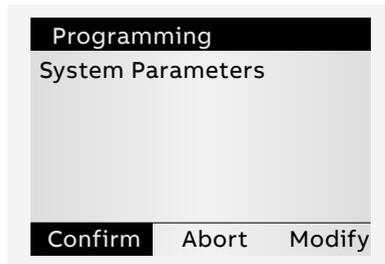
—
Fig. 4.2 After you have changed the parameter, always go back in the menu by pressing Esc-key and when prompted confirm changes with Enter-key

Description of the icons
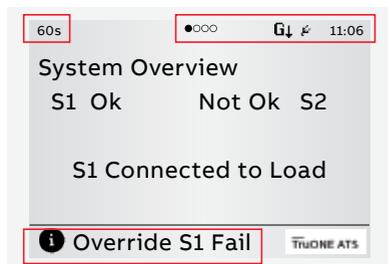
—
Fig. 4.3 Location of the small icons and the alarms

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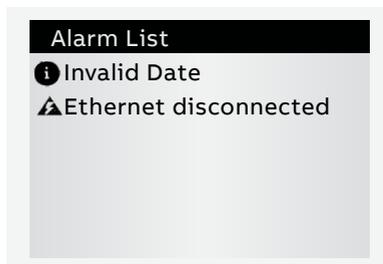
—
Fig. 4.4 When pressed Esc-key (1) in System Overview -pages, the alarm list is shown.

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

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

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

System Overview
●○○○   G↓ ⚡ 11:06
System Overview
S1 Ok   Not Ok S2
S1 Connected to Load
TruONE ATS

Voltages (S1)
○○●○   G↓ ⚡ 11:06
Voltages (S1)
U1 ---   U12 - - -
U2 ---   U23 - - -
U3 ---   U31 - - -
U0 ---
TruONE ATS
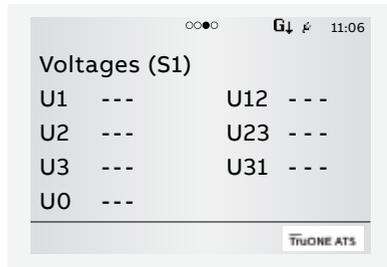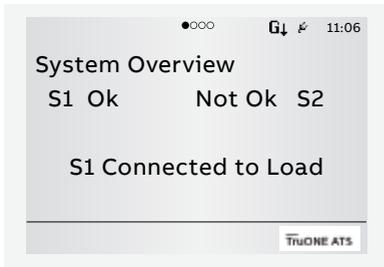
—
Fig. 4.5 From System Overview screen you will find
Switch status and Supply info views, and by pressing Up
and Down -keys (2), you can go forward to see Voltages
and Synchronization view, see the table below.

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

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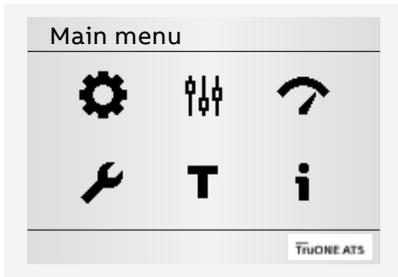
—
Fig. 4.6
By pressing Enter-key (3) you will move to the main menu page of Operation, Parameters, Measurements, Settings, Test and About, see the table below for the selections. You can move in menu or choose parameter values by Up and Down -keys (2) and by Enter-key (3) you can accept function and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

1

LCD

Operation		*Default
Bypass Time Delay		
	Bypass any currently running time delay	
HMI Control Keys (I, II)		
	Enabled*	
	Disabled	
Energy Counters	Reset	

| Parameters			*Default
🎚️ System parameters			
	Start Automatic Configuration		
	Power distribution systems (see Fig. 2.2)		
	Source 1	1 Phase, 2 Wire	
		2 Phases, 3 Wire (Split Neutral)	
		3 Phases, no Neutral (3ph3w)	
		3 Phase with Neutral (3ph4w)*	
		3 Phase, High-Leg Delta	
	Source 2	1 Phase, 2 Wire	
		2 Phases, 3 Wire (Split Neutral)	
		3 Phases, no Neutral (3ph3w)	
		3 Phase with Neutral (3ph4w)*	
		3 Phase, High-Leg Delta	
	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 (1ph)		
	Rated Frequency		
	50 Hz*		
	60 Hz		
	Neutral Position		
	Pole 4*		
	Pole 1		
	Phase Sequence		
	ABC*		
	ACB		
	Not Enabled		

Parameters (continued)   *Default

🎛️ Device Parameters

In-phase Monitor

	Enable	Off*	
		On	
	Synchronization Delay	0*...60 s	

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.
	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 S1 to S2	0*...300 s	Enabled only when any digital output is configured as 'Pre-transfer Signal'. How long the device is keeping pre-transfer signal activated before transferring from S1 to S2.
	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.
	Post-transfer S1 to S2	0*...300 s	Enabled only when any digital output is configured as 'Pre-transfer Signal'. How long the device is keeping pre-transfer signal activated after transferring from S1 to S2.
	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.

Parameters (continued)   ***Default**

🎚️ Device Parameters (continued)

        Time Delays (continued)

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.
Pre-transfer S2 to S1	0*...300 s	Enabled only when any digital output is configured as 'Pre-transfer Signal'. How long the device is keeping pre-transfer signal activated before transferring from S2 to S1.
Post-transfer S2 to S1	0*...300 s	Enabled only when any digital output is configured as 'Pre-transfer Signal'. How long the device is keeping pre-transfer signal activated after transferring 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.
Elevator Pre-signal S1 to S2	0*...60 s	Enabled only when any digital output is configured as 'Elevator pre-signal'. How long the device is keeping pre-signal signal activated before transferring from S1 to S2.
Elevator Post-signal S1 to S2	0*...60 s	Enabled only when any digital output is configured as 'Elevator pre-signal'. How long the device is keeping pre-signal signal activated after transferring from S1 to S2.
Elevator Pre-signal S2 to S1	0*...60 s	Enabled only when any digital output is configured as 'Elevator pre-signal'. How long the device is keeping pre-signal signal activated before transferring from S2 to S1.
Elevator Post-signal S2 to S1	0*...60 s	Enabled only when any digital output is configured as 'Elevator pre-signal'. How long the device is keeping pre-signal signal activated after transferring from S2 to S1.

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 (86* % 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 (86* % 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)	
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		

1

LCD

Parameters (continued)				***Default**
ᚋ Device Parameters (continued)				
	Generator Exercisers (continued)			
		Exerciser 1 / 2 / 3 / 4 (continued)		
			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, 2000... (---*)
	Application			
		S1-Transformer/S2-Generator*		
		S2-Transformer/S1-Generator		
		2 Transformers/S1 Priority		
		2 Transformers/S2 Priority		
		2 Transformers/No Priority		
	Manual Retransfer			
		Off*		Automatic retransfer sequence enabled. Load is automatically retransferred to priority source upon the restoration of priority source.
		On		Automatic retransfer sequence 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. Load is also retransferred when the feature is set OFF.
	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.
	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.

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	MMM 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		250 time stamped events, latest first.	
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.	

1

LCD

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 AUTO Mode	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.
		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)
		Manual-Auto Mode	Toggle automatic/HMI control mode, input is active only in rising/falling edge according to contact type.
	Contact type	NC	Active open.
		NO*	Active closed.
	O 01		
	Function	No Function	Output disabled.
		Alarm / Product availability*	Signals any active alarms or ATS being disabled for automatic transfer operations.
		Load Connected to S1	Switch in position I.
		Load Disconnected	Switch in position O.
		Load Connected to S2	Switch in position II.

Settings (continued)				***Default**

🔧	Standard I/O Settings (continued)			
	O 01 (continued)			
		Function (continued)		
			Pre-transfer Signal	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 1	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	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.
		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 %*)	

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

1

LCD

Test			***Default**
T	On-Load Test Settings		
		Bypass Local Test	
			Bypass if Gen. fails*.
			Stay on Gen.
		Bypass Remote Test	
			Bypass if Gen. fails*.
			Stay on Gen.
	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.	
	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
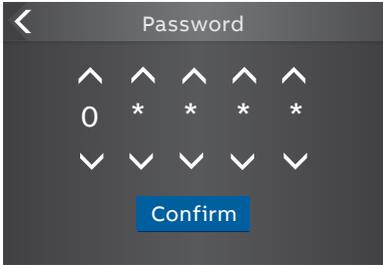
—
Fig. 4.8

The default password is 00001, enter the password when prompted (see Fig. 4.1).

—
Fig. 4.9

—
Fig. 4.8
Enter the password when asked, choose the right number by arrowheads and confirm, go forward entering number after number
—
Fig. 4.9
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'
—
Fig. 4.10
The location of the small icons and the alarms

Description of the icons

—
Fig. 4.10

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

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

Alarm List

—
Fig. 4.11

To define the home page

—
Fig. 4.12
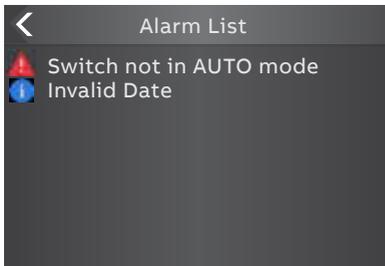
On the lower edge of the screen you can see the Alarms. If you touch on the alarm you will get the Alarm List.

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.

Fig. 4.11
By touching on the alarm indication on the lower edge of the screen you will get the Alarm List

—
Fig. 4.12
Home page definition, acceptance of the function

4.2.1 Start Menu
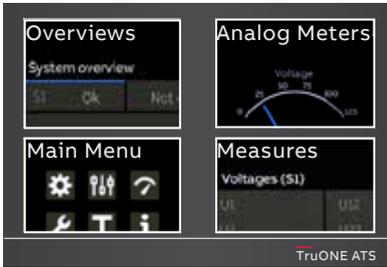
—
Fig. 4.13 By touching on one of Start Menu choices, you can choose the Overviews -pages (upper left corner), Main Menu -pages (lower left corner), Analog Meters -pages (upper right corner) or Measures -pages (lower right corner)
—
Fig. 4.14 By touching on Start Menu upper left corner -image you can move to the Overviews -pages, where you will find Switch status and Supply info views, see the table below

—
Fig. 4.13
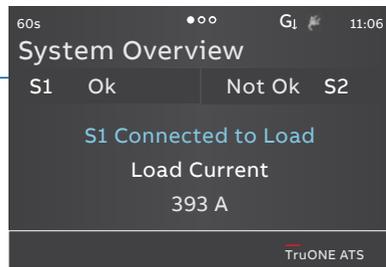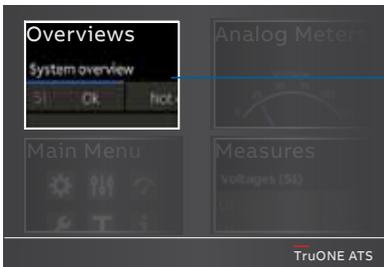
4.2.1.1 Overviews

—
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.

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

1

TOUCH

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	
Automatic Mode	On*	Automatic switch control mode
	Off	HMI control mode
HMI Control Keys (I, II)	Enabled*	
	Disabled	
Energy Counters	Reset energy values	

1

TOUCH

Parameters			*Default
System parameters			
	Start Automatic Configuration		
	Power distribution systems (see Fig. 2.2)		
		Source 1	1 Phase, 2 Wire
			2 Phases, 3 Wire (Split Neutral)
			3 Phases, no Neutral (3ph3w)
			3 Phase with Neutral (3ph4w)*
			3 Phase, High-Leg Delta
		Source 2	1 Phase, 2 Wire
			2 Phases, 3 Wire (Split Neutral)
			3 Phases, no Neutral (3ph3w)
			3 Phase with Neutral (3ph4w)*
			3 Phase, High-Leg Delta
	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 (1ph)	
	Rated Frequency	50 Hz*	
		60 Hz	
	Neutral Position	Pole 4*	
		Pole 1	
	Phase Sequence	ABC*	
		ACB	
		Not Enabled	

Parameters (continued)   *Default

Device Parameters			
In-phase Monitor			
	Enable	Off*	
		On	
	Synchronization Delay	0*...60 s	
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.
	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 S1 to S2	0*...300 s	Enabled only when any digital output is configured as 'Pre-transfer Signal'. How long the device is keeping pre-transfer signal activated before transferring from S1 to S2.
	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.
	Post-transfer S1 to S2	0*...300 s	Enabled only when any digital output is configured as 'Pre-transfer Signal'. How long the device is keeping pre-transfer signal activated after transferring from S1 to S2.

1

TOUCH

TOUCH **1**

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.
Pre-transfer S2 to S1	0*...300 s		Enabled only when any digital output is configured as 'Pre-transfer Signal'. How long the device is keeping pre-transfer signal activated before transferring from S2 to S1.
Post-transfer S2 to S1	0*...300 s		Enabled only when any digital output is configured as 'Pre-transfer Signal'. How long the device is keeping pre-transfer signal activated after transferring 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.
Elevator Pre-signal S1 to S2	0*...60 s		Enabled only when any digital output is configured as 'Elevator pre-signal'. How long the device is keeping pre-signal signal activated before transferring from S1 to S2.
Elevator Post-signal S1 to S2	0*...60 s		Enabled only when any digital output is configured as 'Elevator pre-signal'. How long the device is keeping pre-signal signal activated after transferring from S1 to S2.
Elevator Pre-signal S2 to S1	0*...60 s		Enabled only when any digital output is configured as 'Elevator pre-signal'. How long the device is keeping pre-signal signal activated before transferring from S2 to S1.
Elevator Post-signal S2 to S1	0*...60 s		Enabled only when any digital output is configured as 'Elevator pre-signal'. How long the device is keeping pre-signal signal activated after transferring from S2 to S1.

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 (86* % 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 (86* % 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)

1

TOUCH

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, 2000... (---*)	
Application				
	S1-Transformer/S2-Generator*			
	S2-Transformer/S1-Generator			
	2 Transformers/S1 Priority			
	2 Transformers/S2 Priority			
	2 Transformers/No Priority			

Parameters (continued)   ***Default**

Device Parameters (continued)

Manual Retransfer

	Off*	Automatic retransfer sequence enabled. Load is automatically retransferred to priority source upon the restoration of priority source.
	On	Automatic retransfer sequence 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. Load is also retransferred when the feature is set OFF.

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.

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.

1

TOUCH

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		MMM 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			250 time stamped events, latest first.
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 AUTO Mode	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 to non-priority source.
		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).
		Manual-Auto Mode	Toggle automatic/HMI control mode, input is active only in rising/falling edge according to contact type.
	Contact Type	NC	Active open
		NO*	Active closed

O 01

	Function	No Function	Output disabled
		Alarm / Product availability*	Signals any active alarms or ATS being disabled for automatic transfer operations.
		Load Connected to S1	Switch in position I.
		Load Disconnected	Switch in position O.
		Load Connected to S2	Switch in position II.

TOUCH 1

Settings (continued)				***Default**
🔧	Standard I/O settings (continued)			
	O 01 (continued)			
		Function (continued)		
			Pre-transfer Signal	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 1	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	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.
		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	

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

Settings (continued)   ***Default**

	View

Ammeter Phase

    I Max*

    Ne

    L1

    L2

    L3

S1 Voltmeter Phase

    V Max*

    U12

    U23

    U31

S2 Voltmeter Phase

    V Max*

    U12

    U23

    U31

1

TOUCH

TOUCH

1

Test			*Default
	On-Load Test Settings		Initiate display test screen and turn all LED's on
		Bypass Local Test	Bypass if Gen. Fails*
			Stay on Gen.
		Bypass Remote Test	Bypass if Gen. Fails*
			Stay on Gen.
	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.
	Optional modules (See Chapter 5, Electronic accessories)		

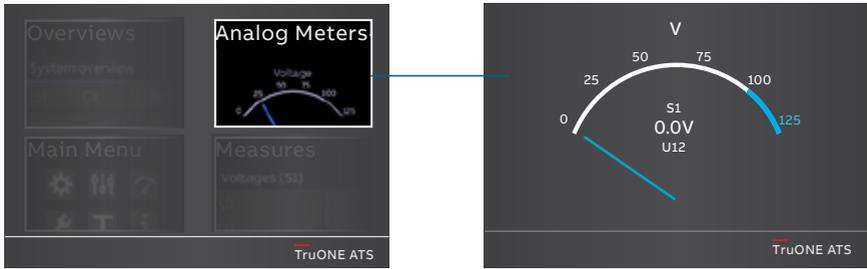| About		
	HMI	HMI serial number
		Software version
		Software subversion
		HMI Type code
	Controller Unit	Time
		Date
		Serial number
		Normative
		Controller software version
		Controller software subversion
	Automatic Transfer Switch	TAG name
		ATS Type Code
		ATS serial number
		Rated current
		Number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

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

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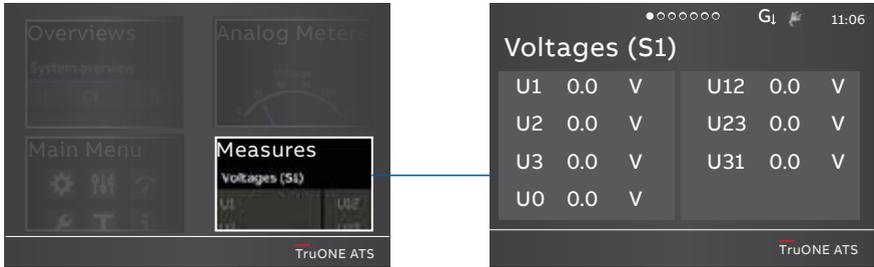Fig. 4.17 By touching on Start Menu lower
right corner -image you can find the
measured data, see the table below

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

5. Electronic accessories

Ekip Connect Sofware and Bluetooth and Programming -modules are suitable for all TruONE automatic transfer switches, see chapters 5.1…5.3.

• Ekip Connect -software
• Ekip Bluetooth -module
• 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 5.4 …5.6):

• Ekip signalling modules;
  - Ekip signalling 2K-1-OX
  - Ekip signalling 2K-2-OX
  - Ekip signalling 2K-3-OX
• 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 IEC 61850
  - Ekip Com Hub

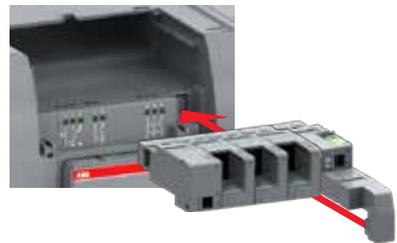
—
Fig. 5.1 Programming and bluetooth -modules

—
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 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.

Further information on the Ekip Connect application is available from the web site, see the address below, in particular in the manual 1SDH000891R0002.

—
Fig. 5.3 Ekip Connect -software

—

5.2 Using Ekip Bluetooth-module

The Ekip Bluetooth allows connection via Bluetooth between the automatic transfer switch and a support (PC, tablet, or smart phone) with the Ekip Connect software installed (see the previous paragraph). Ekip Bluetooth -module is suitable to use with all TruONE automatic transfer switches.

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

It draws its power from a rechargeable lithium-polymer battery supplied with the unit. It is connected directly to the programming port (see Fig. 5.6) and allows the controller without auxiliary voltage to be powered. The programming port can only be used with Ekip Bluetooth and Ekip Programming -modules.

Note
Ekip Bluetooth only powers the controller (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 5.4).

5.2.1 Signallings
Ekip Bluetooth -module is switched on by pressing the power button on the side, and is equipped with two LEDs:

• The first lit in green with the device on and the battery charge, red with the device turned on and low battery.
• The second flashing blue with active Bluetooth communication.
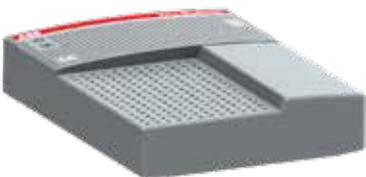

—
Fig. 5.4 Ekip Bluetooth-module

—

5.3 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. 5.6. The programming port can only be used with Ekip Programming and Ekip Bluetooth -modules.

Ekip Programming -module allows you to:

• With Ekip Connect software update the softwares and load, set and read the parameters

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

Ekip Programming -module draws its power from the PC and connects one side directly to the programming port (see Fig. 5.6) 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 5.4).

5.3.1 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.

—
Fig. 5.5 Ekip Programming -module

—
Fig. 5.6 Programming port (USB port) is situated in the front of the HMI, on left side

—

5.4 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 section; AWG 22-16 / 0,5-1,5 mm².

5.4.1 Electrical characteristics
The following table lists the electrical characteristics:

Module	OXEA1
Power supply input voltage	12 - 24 V DC ± 10% SELV
Nominal power consumption	5 - 12 W
Inrush current	Maximum 2 A

—
Table 5.1 Electrical characteristics of auxiliary power supply module OXEA1

5.4.2 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. 5.7 Auxiliary power supply module, type OXEA1, is needed when Ekip Signalling and Com -modules are mounted to TruONE automatic transfer switch

—
Fig. 5.8 Signals of auxiliary power supply module OXEA1

—

5.5 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.

5.5.1 Electrical characteristics of Ekip Signalling 2K-_ -module
The following table lists the electrical characteristics of the module:

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

5.5.2 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:

—
Fig. 5.9 Ekip Signalling 2K -module

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 AUTO Mode	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.
		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).
		Manual-Auto Mode	Toggle automatic/HMI control mode, input is active only in rising/falling edge according to contact type.
	Contact Type	NC	Active open
		NO*	Active closed
	O 11/12, O 21/22, O 31/32		
	Function	No Function*	Output disabled
		Alarm/Product Availability	Signals any active alarms or ATS being disabled for automatic transfer operations.
		Load Connected to S1	Switch in position I.
		Load Disconnected	Switch in position O.
		Load Connected to S2	Switch in position II.
		Pre-transfer Signal	Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.

1

LCD, TOUCH

Settings (*Default) (continued)			Description
Modules (Optional modules) (continued)			
Ekip Signalling 2K-1 / -2 / -3 (continued)			
O 11/12, O 21/22, O 31/32 (continued)			
Function (continued)			
		Source 1 Available	No anomalies in S1 voltage supply.
		Source 2 Available	No anomalies in S2 voltage supply.
		Load Shed 1	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	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.
	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:
Input 2	"Off" if not active, "On" if active
Output 1	The state of the output contacts:
Output 2	"Open" if open, "Closed" if closed
:	

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

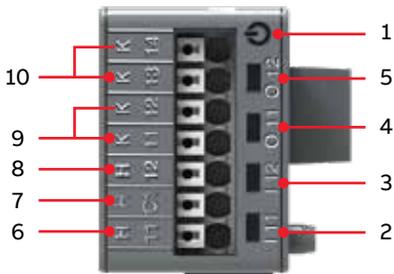### 5.5.3 Signals and inputs/outputs of Ekip Signalling 2K-_ -module

—
Fig. 5.10 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.

—

5.6 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 IEC 61850
- 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. 5.11 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 5.6 Indication / 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.

—
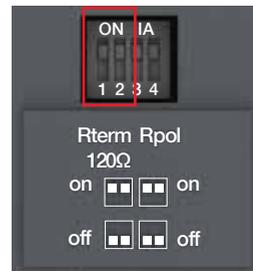Fig. 5.12 Signals of Ekip Com Modbus RTU -module

—
Fig. 5.13 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 5.7 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 5.8 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.

1

LCD, TOUCH

—
Fig. 5.14 Ekip Com Profibus DP -module

5.6.2.1 Signallings

The following table illustrates the possi-
ble 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 5.9 Indication / Ekip Com Profibus DP-module

—
Fig. 5.15 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.

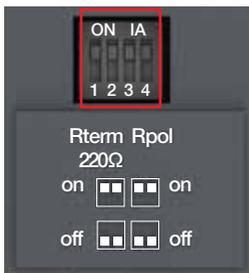These options must be selected before installation of the modules.

—
Fig. 5.16 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 5.10 Configuration of Ekip Com Profibus DP -module in HMI

The following table illustrates the path
from the display for accessing informa-
tion on the module:

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

—
Table 5.11 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.

LCD, TOUCH

—
Fig. 5.17 Ekip Com DeviceNet -module

5.6.3.1 Signallings

The following table illustrates the possi-
ble 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 5.12 Indication / Ekip Com DeviceNet -module in HMI

—
Fig. 5.18 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).
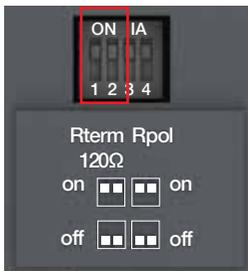
1

LCD, TOUCH

—
Fig. 5.19 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 5.13 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 5.14 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 or as an HTTP Server. 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).

As an HTTP Server, connected to an Ethernet network it allows read-only access to the information of the automatic transfer switch. This access is possible through a browser, inserting the IP address of the module as the URL. Once the switch has been found, a login page is opened that asks for the user password to be inserted, which is the same password to be inserted in the display in order to edit parameters.

(i) **Information**
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. 5.20 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.
80/tcp	Server HTTP	When the module is used as a Server HTTP.
319/udp	IEEE 1588	When IEEE protocol 1588 is enabled
320/udp		

—
Table 5.15 Ports of Ekip Com Modbus TCP -module

5.6.4.1 Signallings
The following table illustrates the possi-
ble 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).

—
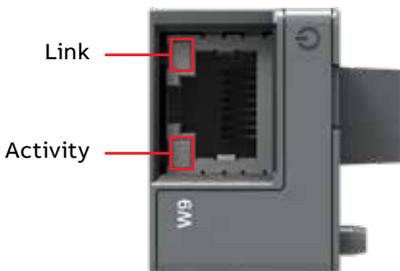Table 5.16 Indication / Ekip Com Modbus TCP -module

—
Fig. 5.21 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			
Function	HTTP Server		HTTP Server operating mode.
	TCPModbus*		Communication module operating mode.
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 5.17 The path for setting the function and addressing of the
modules of the Ekip Com Modbus TCP -module from the display

LCD, TOUCH

1

The following table illustrates the path
from the display for accessing informa-
tion 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 5.18 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).

(i) **Information**
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).

LCD, TOUCH

1

—

Fig. 5.22 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 5.19 Ports of Ekip Com Profinet –module

5.6.5.1 Signallings
The following table illustrates the possi-
ble 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 5.20 Indication / Ekip Com Profinet -module

Link

Activity
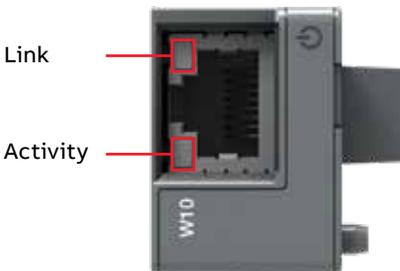
—
Fig. 5.23 Signals of Ekip Com Profinet -module

5.6.5.2 Access from the display
/ Ekip Com Profinet -module

The following table illustrates the path
from the display for accessing informa-
tion 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 5.21 Information of Ekip Com Profinet -module

1

LCD, TOUCH

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).

(i) **Information**
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 5.22 Ports of Ekip Com EtherNet/IP -module

—
Fig. 5.24 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 5.23 Indication / Ekip Com EtherNet/IP -module

Link

Activity

—
Fig. 5.25 Signals of Ekip Com EtherNet/IP -module

LCD, TOUCH

1

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 5.24 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 informa-
tion 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 5.25 Information of Ekip Com EtherNet/IP -module in HMI

1

LCD, TOUCH

5.6.7 Ekip Com IEC 61850 -module

The Ekip Com IEC 61850 is an accessory module that can function as a communication module by 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 IEC 61850 -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).
- Provide vertical communication (report) towards higher-level supervision systems (SCADA) with states and measurements (re-transmitted whenever, and only if, they change with respect to the previous report).

Information
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 IEC 61850 -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. 5.26 Ekip Com IEC 61850 -module

The following table illustrates the ports
used by the module:

Ethertype	Port	Protocol
0x0800 - IP	102	ISO Transport Service on top of the TCP (RFC 1006)
0x88B8	-	GOOSE Messages
0x0800 - IP	123 UDP	NTP - Network Time Protocol
0x0800 - IP	69 UDP	TFTP - Trivial File Transfer Protocol

—
Table 5.26 Ports of Ekip Com IEC 61850 -module

5.6.7.1 Signallings

The following table illustrates the possi-
ble 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 5.27 Indication / Ekip Com IEC 61850 -module

Link

Activity
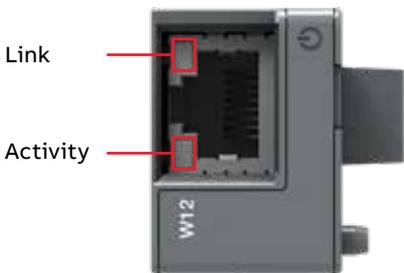
—
Fig. 5.27 Signals of Ekip Com IEC 61850 -module

5.6.7.2 Access from the display
/ Ekip Com IEC 61850

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 IEC 61850		
Force Static IP address	Off*	Dynamic IP address.
	On	Static IP address.
SNTP client abilit.	Off*	Synchronism with the SNTP clock signal disabled.
	On	Synchronism with the SNTP clock signal enabled.
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.
SNTP Indir. Server		Displayed with SNTP client enabled. "On" has to be selected to insert the IP address of the server with whose SNTP clock signal the modules are to be synchronised.
:		

—
Table 5.28 The path for setting the function and addressing of the modules
of the Ekip Com IEC 61850 -module from the display

The following table illustrates the path
from the display for accessing informa-
tion on the module:

About	Description
:	
Modules (Optional modules)	
Ekip Com IEC 61850	
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 5.29 Information of Ekip Com IEC 61850 -module in HMI

5.6.8 Ekip Com Hub -module

Ekip Com Hub is a communication module for cloud-based connectivity through the ABB Ability™ Electrical Distribution Control System (EDCS).

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. 5.28 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 5.30 Ports of Ekip Com Hub -module

5.6.8.1 Signallings
The following table illustrates the possi-
ble 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 5.31 Indication / Ekip Com Hub -module
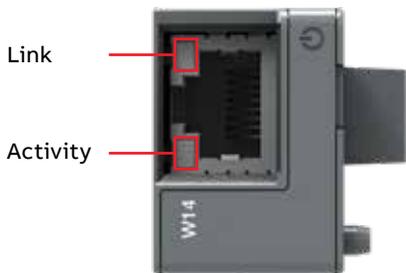
—
Fig. 5.29 Signals of Ekip Com Hub -module

5.6.8.2 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 5.32 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 informa-
tion 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 5.33 Information of Ekip Com Hub -module in HMI

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LCD, TOUCH

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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
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

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

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
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
IEC 61850 Error	IEC 61850 failure	Check configuration file
Ekip Com Hub Alarm	Ekip Com Hub failure	Check configuration

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
Configuration	Configuration session ports are open
RTC capacitor charging	Real time clock is not yet operational, date & time setting is disabled as long as this warning is active. RTC capacitor is charged from source voltage (not AUX) and takes about 10 minutes

—
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	Digital output function activated
Source 1 Available	Digital output function activated
Source 2 Available	Digital output function activated
Load Shed	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 Auto Mode	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

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

7. Technical data

U/SOURCE 2

U/SOURCE 1

Operating voltage for control circuit 200...480 Vac. Generator supply; min. power rating 20 kVA.
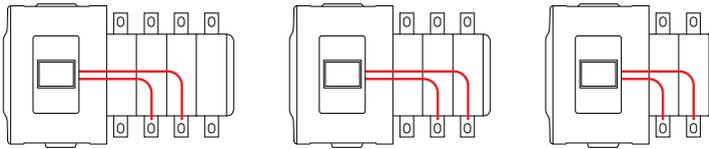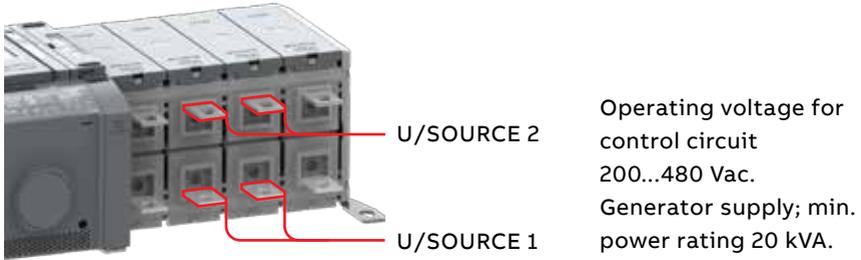
—
Fig. 7.1 Power supply for control circuit, in figure type OX_B (source on bottom)

Automatic transfer switch, power circuit	Value	
Rated operational voltage U	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	200…480 Vac	Integrated, see Fig. 7.1
Operating voltage range	±20%	
Voltage measurement accuracy		
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		
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 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 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 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	
Input contact features	Cable size:	0.5…2.5 mm² 24…14 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
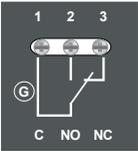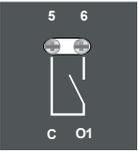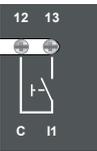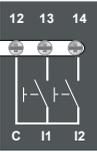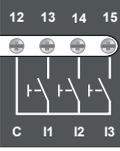
Environmental	Value
Environments category	E
EMC environment	A and B
Operating temperature (without derating)	-20... +40 °C
Operating temperature (with derating)	-25... +70 °C
Transportation and storage temperature	-40... +70 °C
Altitude (without derating)	Up to 2000 m

—
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 kA²s
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
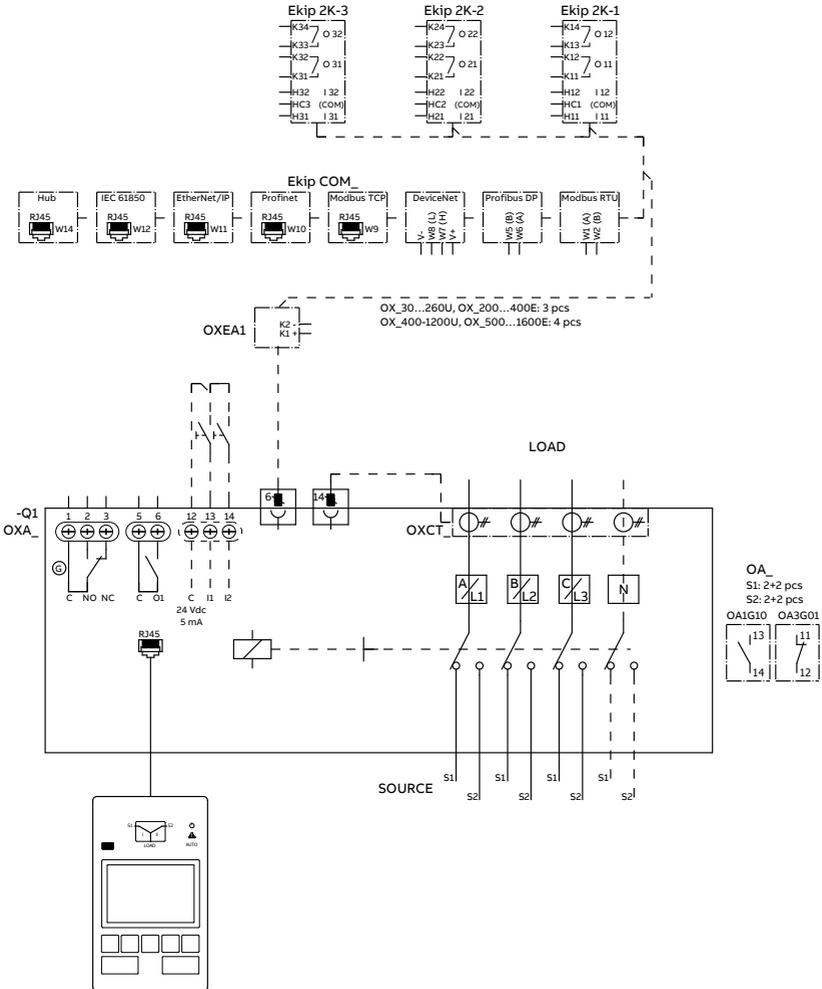
Fig. 7.2 Circuit diagram, OXA_B

1

Ekip 2K-3 | Ekip 2K-2 | Ekip 2K-1

K34 O 32 | K24 O 22 | K14 O 12
K33 | K23 | K13
K32 O 31 | K22 O 21 | K12 O 11
K31 | K21 | K11
H32 I 32 | H22 I 22 | H12 I 12
HC3 (COM) | HC2 (COM) | HC1 (COM)
H31 I 31 | H21 I 21 | H11 I 11

Ekip COM_

Hub	IEC 61850	EtherNet/IP	Profinet	Modbus TCP	DeviceNet	Profibus DP	Modbus RTU
RJ45 W14	RJ45 W12	RJ45 W11	RJ45 W10	RJ45 W9	V- W8 (L) W7 (H) V+	W5 (B) W6 (A)	W1 (A) W2 (B)

OX_30...260U, OX_200...400E: 3 pcs
OX_400-1200U, OX_500...1600E: 4 pcs

OXEA1   K2
         K1

SOURCE   S2 S2 S2 S2
          S1 S1 S1 S1

-Q1
OXA_   1 2 3   5 6   12 13 14
       C NO NC C O1 C I1 I2
                         24 Vdc
                         5 mA
       RJ45

OA_
S1: 2+2 pcs
S2: 2+2 pcs

OA1G10   OA3G01
   13   11
   14   12

A/L1   B/L2   C/L3   N

OXCT_   #   #   #   #

LOAD

LOAD
AUTO

Fig. 7.3 Circuit diagram, OXA_T
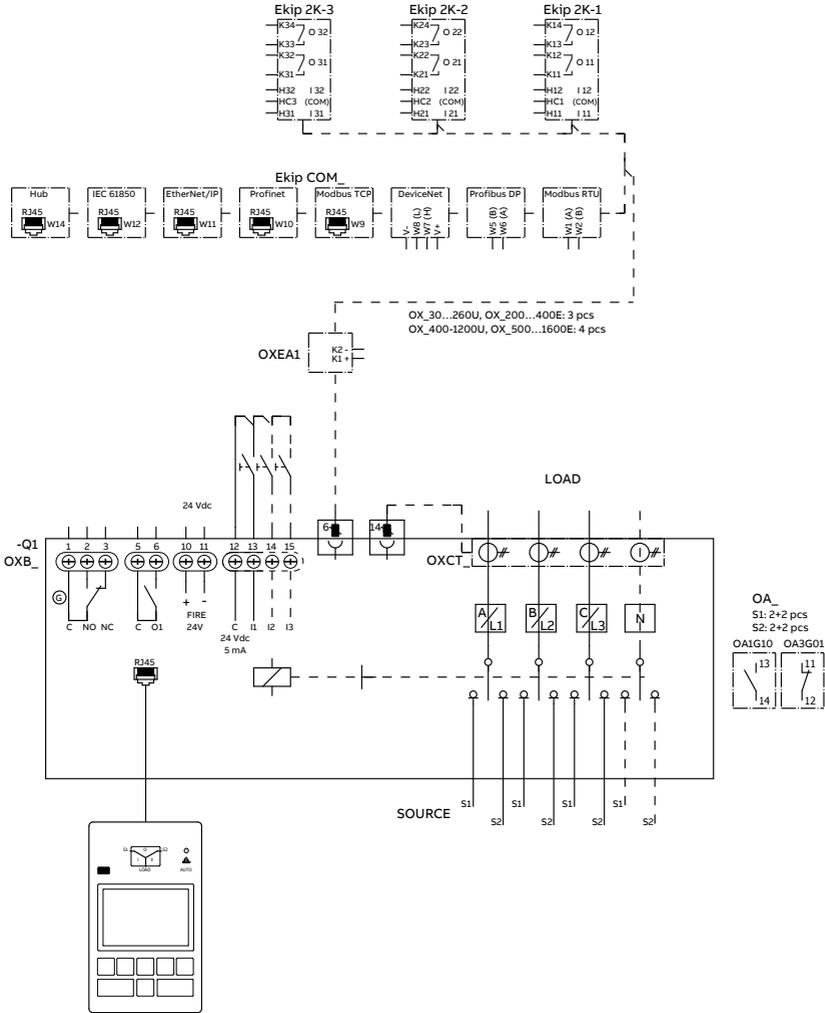
Fig. 7.4 Circuit diagram, OXB_B
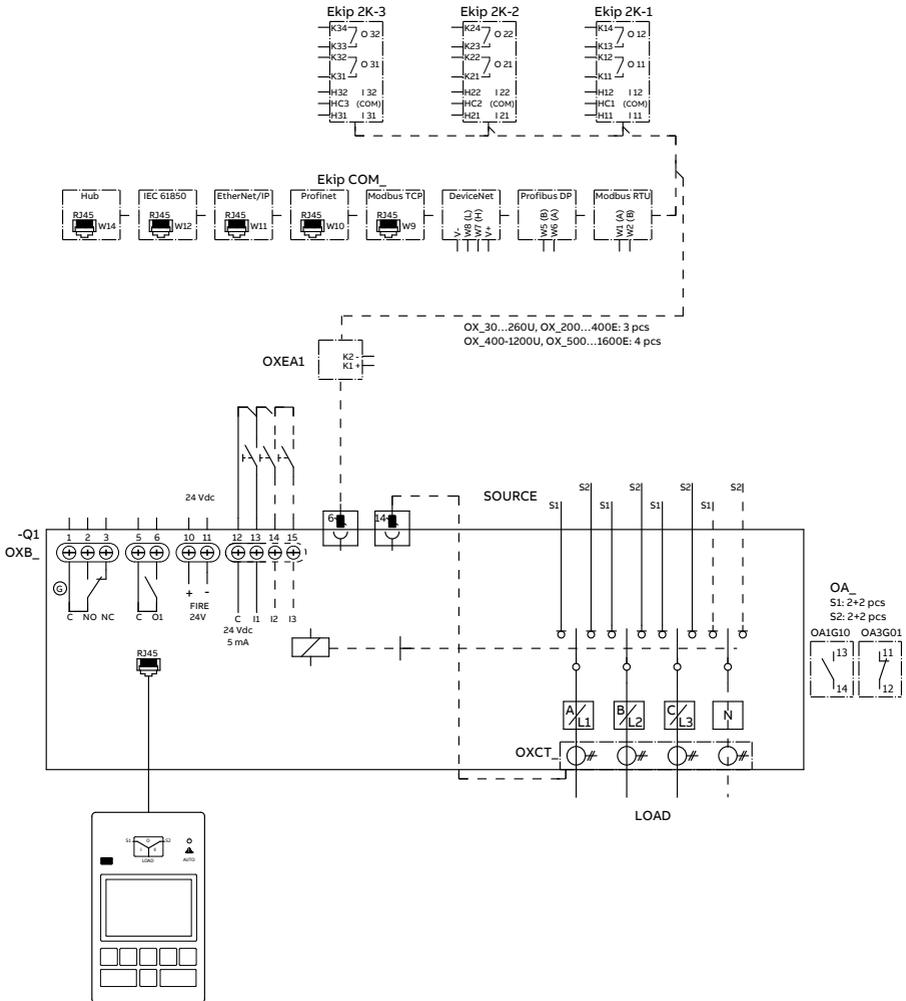
Fig. 7.5 Circuit diagram, OXB_T

—

Installation instruction
Automatic transfer switches

2

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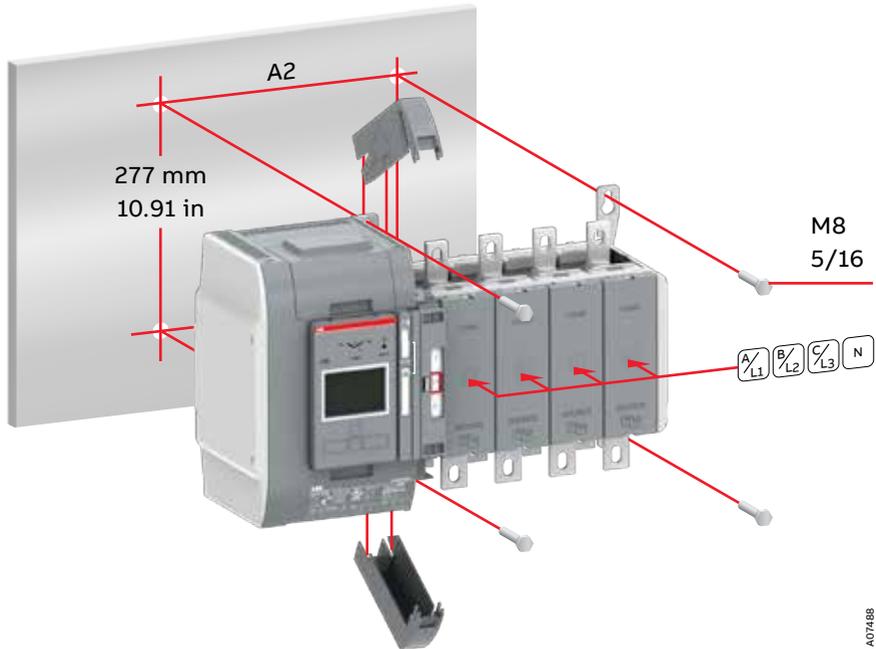
—
Fig. 8.1 Automatic transfer switches, drilling hole distances / screw-mounting, [mm/in] and attachment of the self-adhesive labels

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

Automatic transfer switch	Max. distance from switch frame to nearest cable support	
	SOURCE	LOAD
	[mm / in]	[mm / in]
OX_30…250_	300 / 11.8	150 / 5.9
OX_260…400_	300 / 11.8	150 / 5.9
OX_500…800_	300 / 11.8	150 / 5.9

—
Table 8.3 OX_30…800_/ cable support
with breaker or fuses (SCPD)

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.
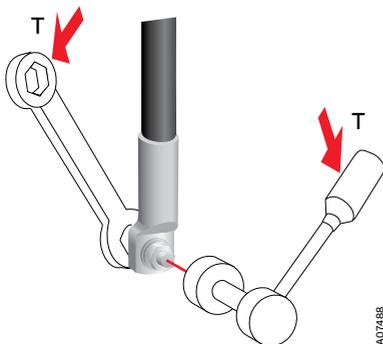
—
Fig. 8.3 Wiring, the tightening torques,
see the tables 8.2 and 8.3
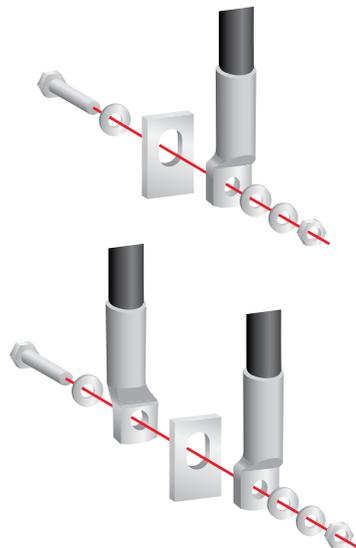
—
Fig. 8.4 OX_30…800, wiring by cable lugs

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 8.4 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.

Automatic transfer switch	Max. distance from switch frame to nearest cable/busbar support	
	SOURCE [mm / in]	LOAD [mm / in]
OX_500...800_	300 / 11.8	150 / 5.9
- Busbar	225 / 8.9	150 / 5.9
OX_800U...1600_	400 / 15.7	200 / 7.8

—
Table 8.5 OX_500…1600_/ cable/busbar support with breaker or fuses (SCPD)

4×

4×

A07488
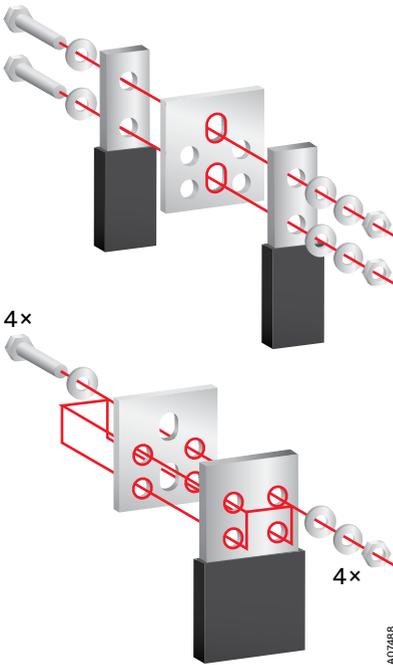
—
Fig. 8.5 OX_800U…1600, busbar connection

A07488
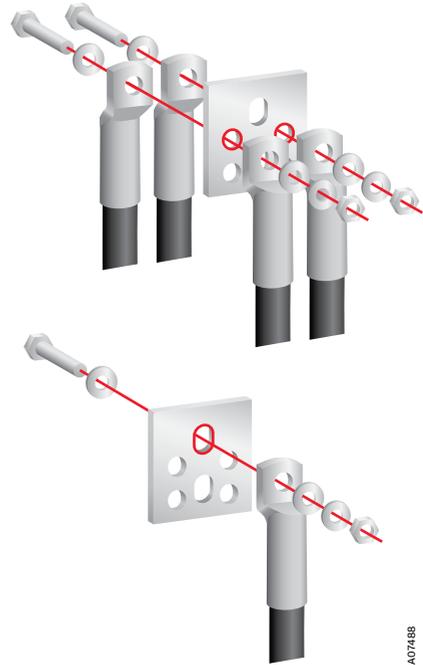
—
Fig. 8.6 OX_800U…1600, wiring / cable lugs

OXEW1600_

A07488
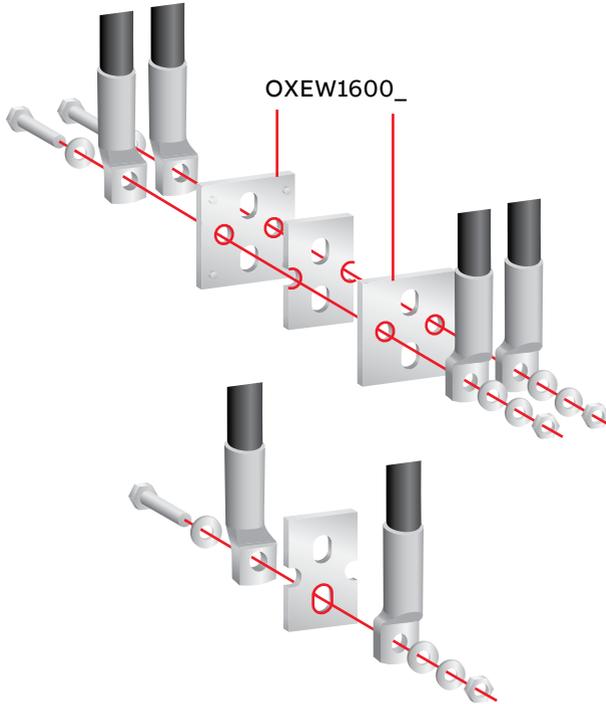
—
Fig. 8.7 Wiring with cable lugs in automatic transfer
switches OX_800U...3200: For load side terminals the
busbars OXEW1600_ are needed to mount on both sides
of the switch terminal for connecting the cable lugs.
Tightening torque and bolt size, see the table 8.4

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		200 / 22.6
OZXA-25	1	177 / 20		275 / 31.1
OZXA-400	1	228 / 25.8		375 / 42.4
OZXA-26	1	228 / 25.8		375 / 42.4
OZXA-800E, OZXA-800S	1	480 / 54.2		500 / 56.5
OXZA-800L	1	480 / 54.2		500 / 56.5
OZXA-30, OZXA-1200	2	443 / 50.1		500 / 56.5

—
Table 8.6 Lug assembly, mounting information
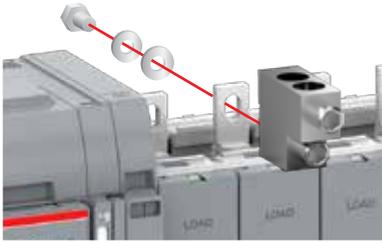
OZXA-100...400, OZXA-800E, OZXA-800S
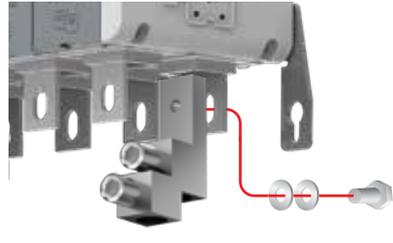
OZXA-24...26, OZXA-800L

OZXA-30, OZXA-1200

LOAD

SOURCE 1 (S1)

SOURCE 2 (S2)
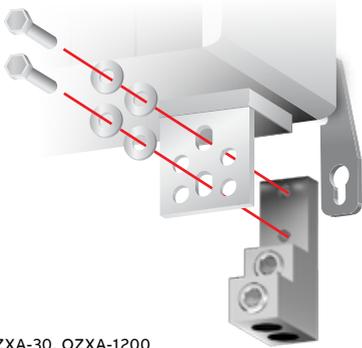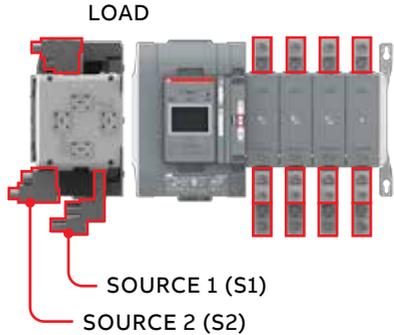
A07489

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-800E	OZXA-800S / OZXA-800E	OZXA-30
OX_1000/1200_	OZXA-1200	2 x OZXA-800S (_E)	OZXA-1200

—
Table 8.7 OX_30...1200_ / suitable lug assembly

Automatic transfer switch	Max. distance from switch frame to nearest cable/busbar 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

—
Table 8.8 OX_30...1200_ / cable/busbar support with breaker or fuses (SCPD)

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.
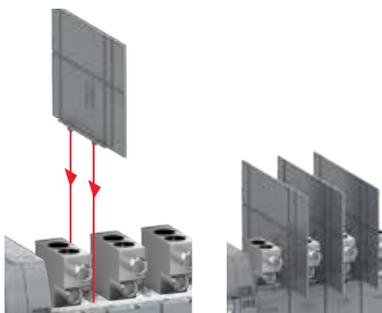
—
Fig. 8.9 Mounting of phase barriers.

—

8.3 Clearances per UL1008
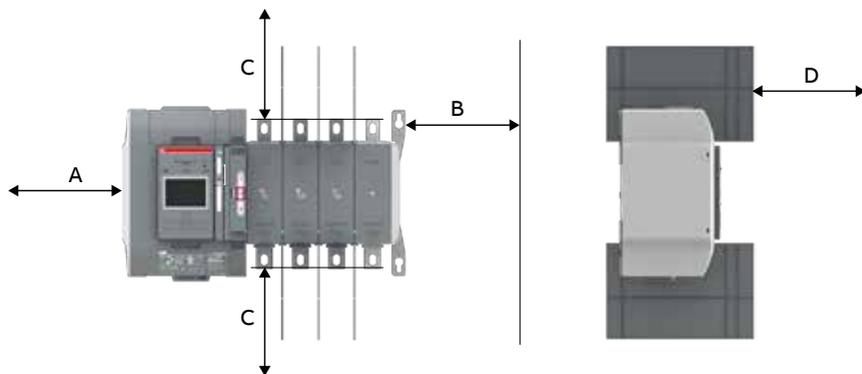
Fig. 8.10 UL standard switches, clearances per UL1008

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.

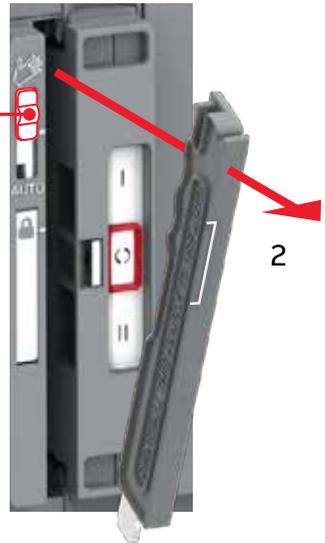More information, see animation: Manual and automatic operation - TruONE® ATS (https://youtu.be/ bosvSPVi2sM).

⚠ **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

8.4.3 Mounting of the HMI

2

1

3   Automatic mode

A07484

1

2

3

> **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).

A07490

—
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
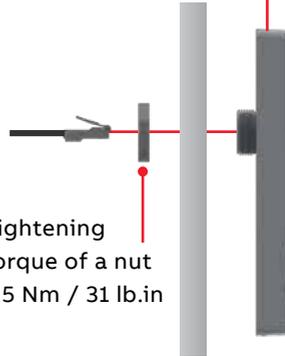
—
Fig. 8.13 Removing the HMI from the switch

OR

Max. 3 m,
HMI (RJ45) cable
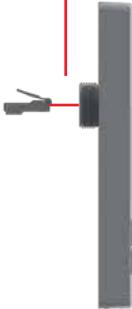
Tightening
torque of a nut
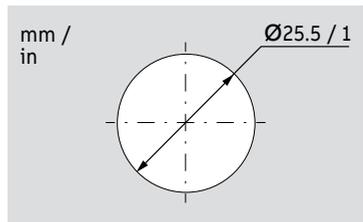3.5 Nm / 31 lb.in

A07490

mm /
in

Ø25.5 / 1

—
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_

OXES_S

OXES_L
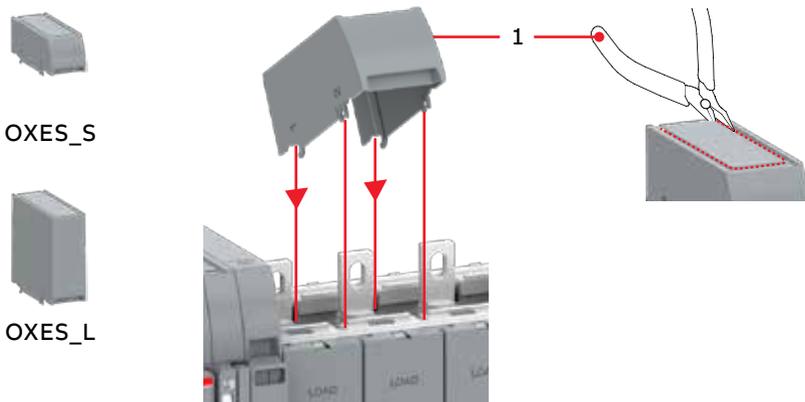
—
Fig. 9.1 Mounting of the terminal shrouds to the
automatic transfer switches, TruONE® ATS

—

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.
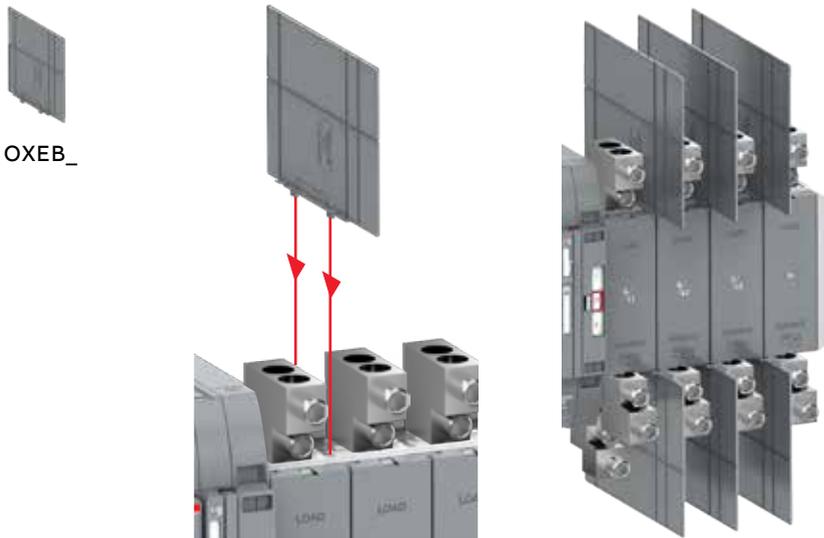
OXEB_

—
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
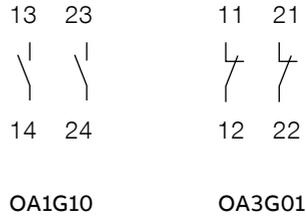
—
Fig. 9.4 Labels for contact numbering

2
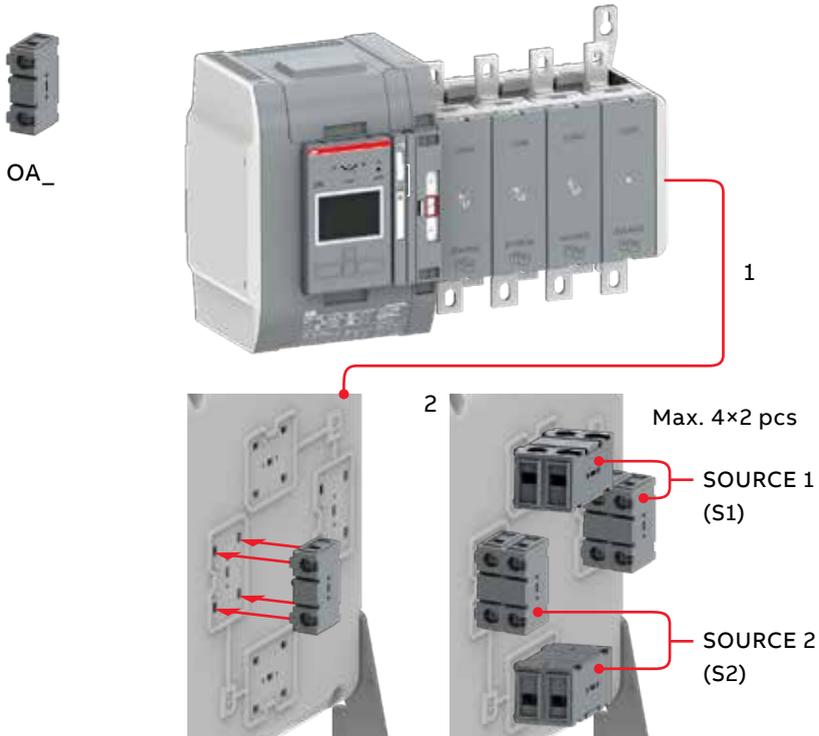
OA_

Max. 4×2 pcs

SOURCE 1 (S1)

SOURCE 2 (S2)

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

A07491

—

9.4 Sensor module

Sensor module, type OXCT_, is used for energy and temperature measurement. There are available modules for 2, 3 and 4-pole switches and for different switch sizes.

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

—
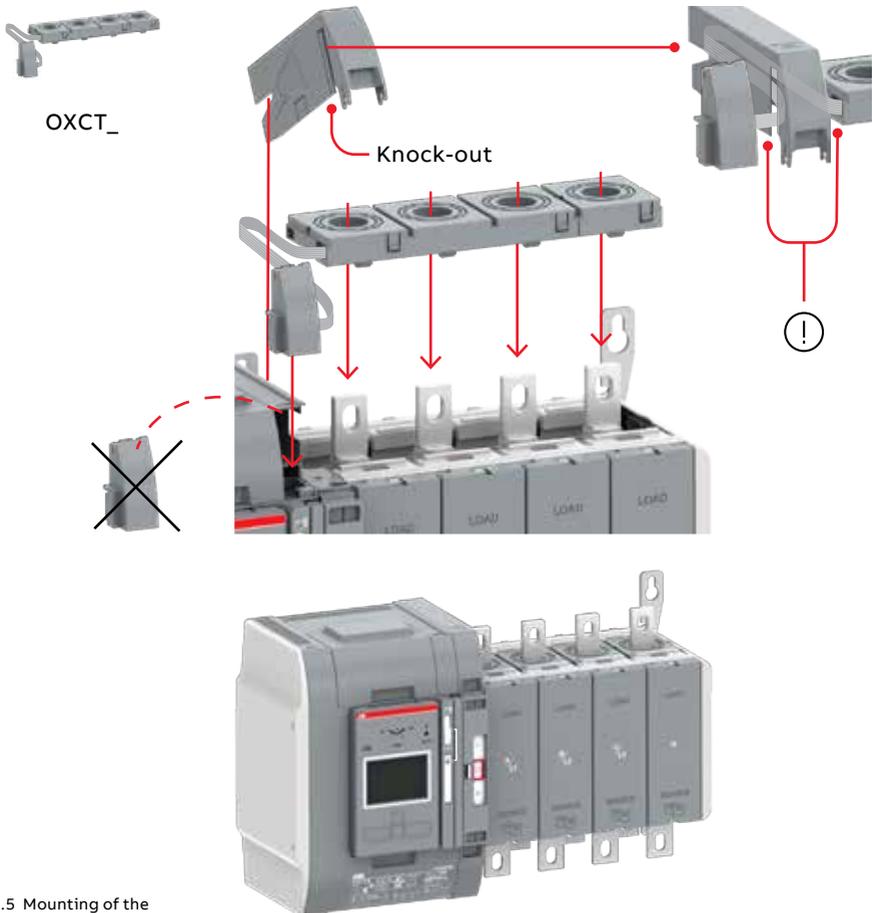Table 9.3 Nominal currents

OXCT_

Knock-out

—
Fig. 9.5 Mounting of the sensor module, type OXCT_

A07491

—

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_200…400E: 3 pcs
- OX_400-1200U, OX_500…1600E: 4pcs

2

OXEA1

Ekip

A07491

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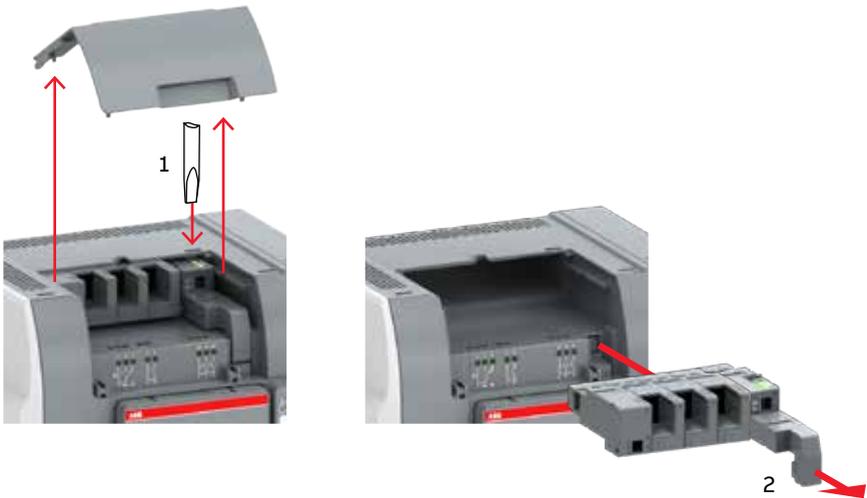module OXEA1 and Ekip –modules

A07491

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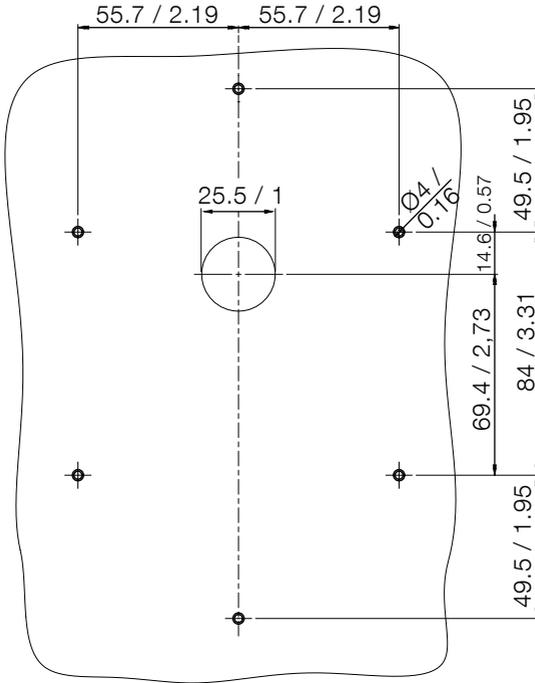from the automatic transfer switch

—

9.6 HMI protective cover

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

OXEC21

IP54

Torx TX, 6 pcs
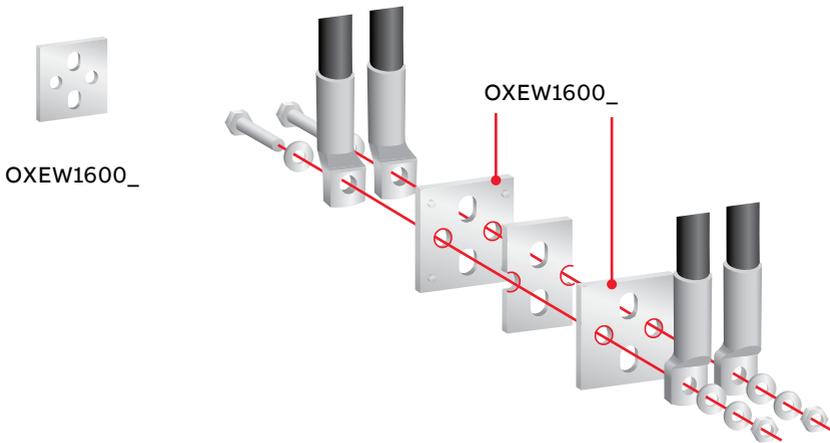0.8 Nm / 7.1 lb.in

Ø 4 mm
0.16 in
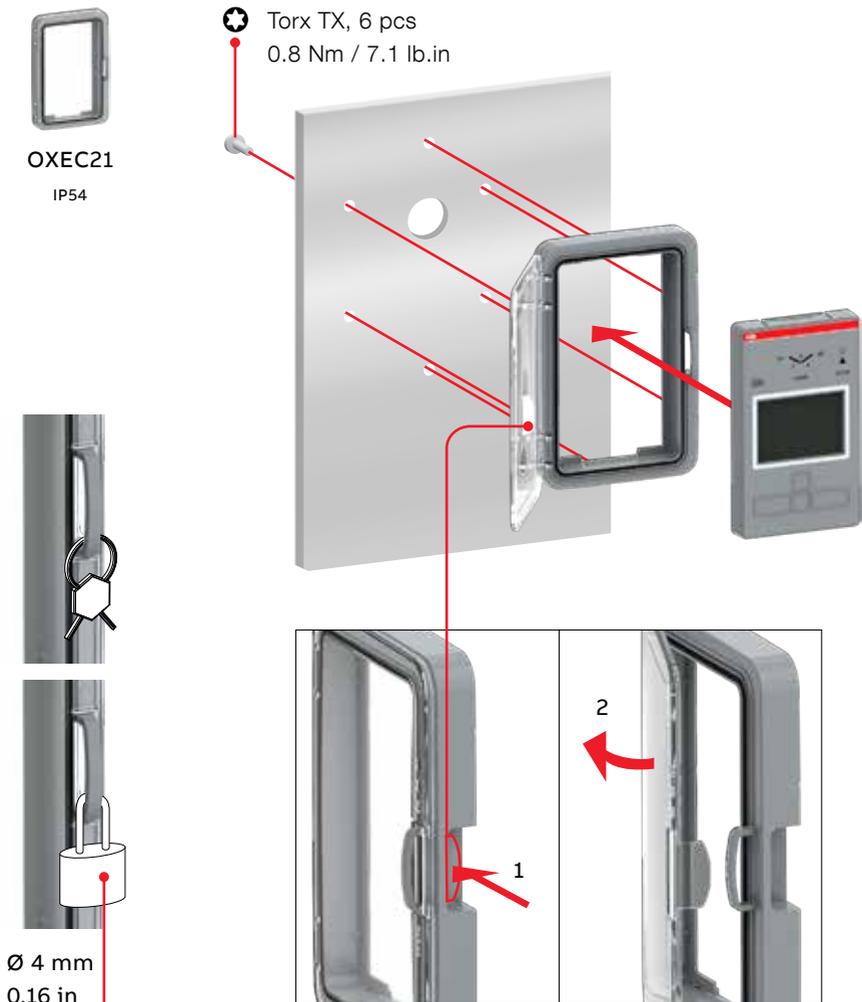
A07491

mm / in

—
Fig. 9.9 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 ter-
minal for connecting the cable lug.

OXEW1600_

OXEW1600_

OXEW1600_

A07491

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Fig. 9.10 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

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10. Dimension drawings
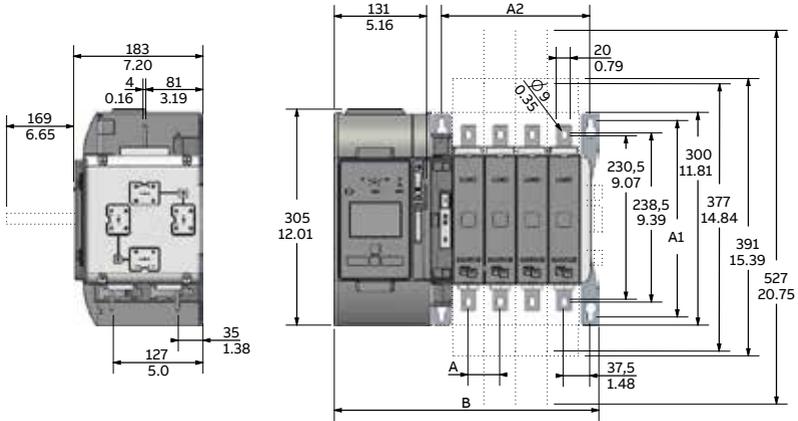
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Fig. 10.1 OX_30...250_B

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)

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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)
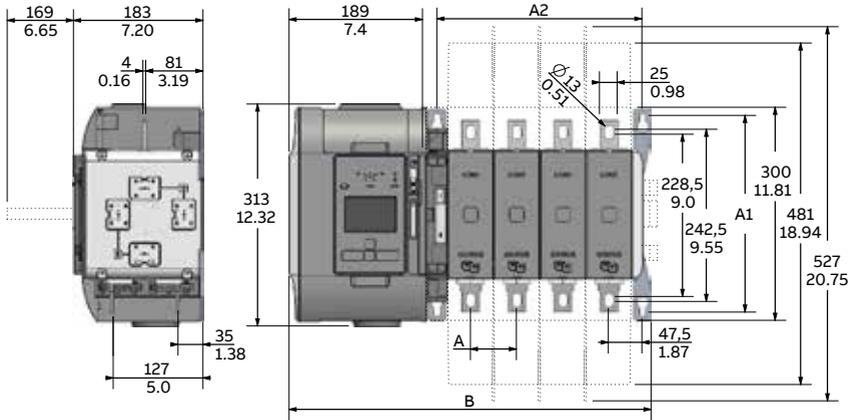
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Fig. 10.3 OX_400U_B

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 re-moving the mechanism)
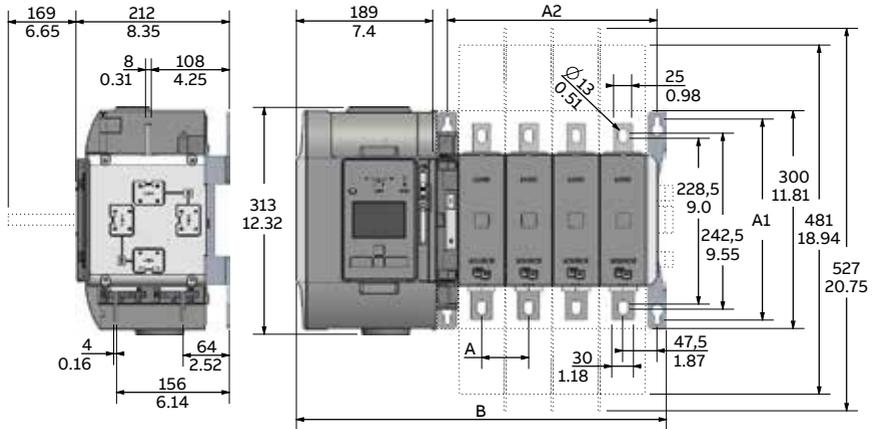
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Fig. 10.4 OX_500…800_B
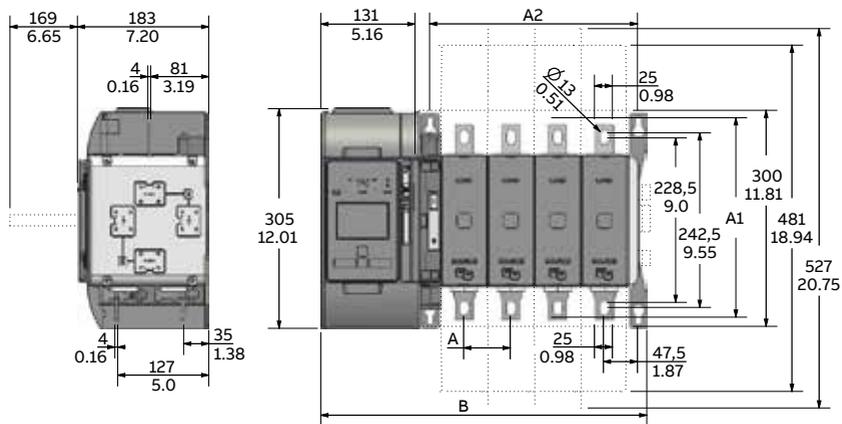
OX_500-800_

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)

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Fig. 10.5 OX_800U...1600_B

OX_800U-1600		
No. of poles	3	4
A	115/4.53	115/4.53
A1	227/10.91	227/10.91
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 re-moving the mechanism)

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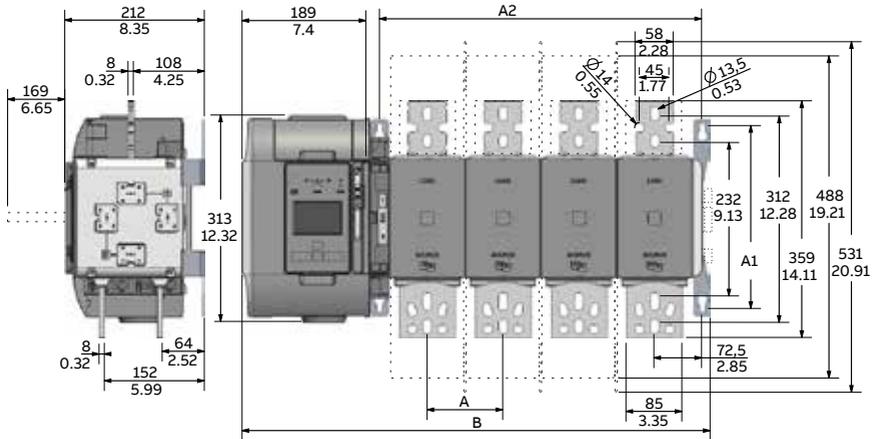
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BG	Внимание! Опасно напрежение! Да се монтира само от лице с електротехническа квалификация.
FR	Avertissement! Tension électrique dangereuse! Installation uniquement par des personnes qualifiées en électrotechnique.
MT	Twissija! Vultaġġ perikoluż! Għandu jiġi installat biss minn persuna b'kompetenza elettroteknika.
HR	Upozorenje! Opasan napon! Postavljati smije samo elektrotehnički stručnjak.
DE	Warnung! Gefährliche Spannung! Installation nur durch elektrotechnische Fachkraft.
PL	Ostrzeżenie! Niebezpieczne napięcie! Instalacji może dokonać wyłącznie osoba z fachową wiedzą w dziedzinie elektrotechniki.
CZ	Varování! Nebezpečné napětí! Montáž smí provádět výhradně elektrotechnik!
EL	Προειδοποίηση! Υψηλή τάση! Η εγκατάσταση πρέπει να γίνεται μόνο από εξειδικευμένους ηλεκτροτεχνικούς.
PT	Aviso! Tensão perigosa! A instalação só deve ser realizada por um eletricista especializado.
DA	Advarsel! Farlig elektrisk spænding! Installation må kun foretages af personer med elektroteknisk ekspertise.
HU	Figyelmeztetés! Veszélyes feszültség! Csak elektrotechnikai tapasztalattal rendelkező szakember helyezheti üzembe.
RO	Avertizare! Tensiune periculoasă! Instalarea trebuie efectuată numai de către o persoană cu experiență în electrotehnică.
NL	Waarschuwing! Gevaarlijke spanning! Mag alleen geïnstalleerd worden door een deskundige elektrotechnicus.
IE	Rabhadh! Voltas guaiseach! Ba chóir do dhuine ag a bhfuil saineolas leictriteicniúil, agus an té sin amháin, é seo a shuiteáil.
SK	Varovanie! Nebezpečné napätie! Montáž môže vykonávať iba skúsený elektrotechnik.
EN	Warning! Hazardous voltage! Installation by person with electrotechnical expertise only.
IT	Avvertenza! Tensione pericolosa! Fare installare solo da un elettricista qualificato.
SL	Opozorilo! Nevarna napetost! Vgradnjo lahko opravi le oseba z elektrotehničnim strokovnim znanjem.
ET	Hoiatus! Ohtlik pinge. Paigaldada võib ainult elektrotehnika-alane ekspert.
LV	Uzmanību! Bīstami - elektrība! Montāžas darbus drīkst veikt tikai personas, kurām ir atbilstošas elektrotehniskās zināšanas.
ES	¡Advertencia! ¡Tensión peligrosa! La instalación deberá ser realizada únicamente por electricistas especializados.
FI	Varoitus! Vaarallinen jännite! Asennuksen voi tehdä vain sähköalan ammattihenkilö.
LT	Dėmesio! Pavojinga įtampa! Dirbti leidžiama tik elektrotechniko patirties turintiems asmenims.
SE	Varning! Farlig spänning! Installation får endast utföras av en elektriker.
CN	警告！电压危险！只能由专业电工进行安装。
RU	Осторожно! Опасное напряжение! Монтаж должен выполняться только специалистом-электриком.

ABB

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