INSTALLATION AND OPERATING INSTRUCTION

Bypass-Isolation Automatic Transfer Switches

Zenith ZBTS T-series, 100 - 1200 A

Receiving, Handling and Storage

Warning
Hazard of equipment overturning. Failure to follow this instruction will result in personal injury or equipment damage.

HAZARD OF EQUIPMENT OVERTURNING

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

Receiving and Handling

Upon receipt, carefully inspect the Bypass-Isolation Automatic Transfer 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 Bypass-Isolation Automatic Transfer Switch.

Storage

If the unit will not be placed into service immediately, store the Bypass-Isolation Automatic Transfer 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 Bypass-Isolation Automatic Transfer Switch enclosure.

Read these safety instructions carefully before using this product!

Danger
Hazard of electric shock, explosion, or arc flash. Failure to follow these instructions could result in death or serious injury or equipment damage.

Warning
Indicates a hazardous situation that, if not avoided, could result in death or serious injury or equipment damage.

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 Bypass-isolation automatic transfer switch before removing or making load side connections.
- Always use a properly rated voltage sensing device at all line and load to confirm Bypass-isolation automatic transfer switch is off.

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

HI-POT OR DIELECTRIC TEST

- Performing a hi-pot or dielectric test on the power section, Remove control voltage connectors from fixed type switch and if switch is rack out type take it to the ISOLATED locations.
- If the mechanism needs to be REMOVED from the switch, see the Service instruction manual for details.

Installation and Operating Instruction

Bypass-Isolation Automatic Transfer Switches

OPERATING INSTRUCTIONS, ZENITH ZBTS T-SERIES 100-1200A

CHAPTERS 1–6

INSTALLATION INSTRUCTIONS, ZENITH ZBTS T-SERIES 100-1200A

CHAPTERS 7-8

MAINTENANCE, ZENITH ZBTS T-SERIES 100-1200A

CHAPTER 9

DIMENSION DRAWINGS, ZENITH ZBTS T-SERIES 100-1200A

CHAPTER 10

Operating Instruction

Bypass-Isolation Automatic Transfer Switches, Zenith ZBTS T-series 100-1200A

PART 1

1. Introduction

Operating instruction part of the manual (Chapters 1...6) describes the basic operation of the Bypass-isolation automatic transfer switches Zenith ZBTS T-series 100-1200A, manufactured by ABB.

Mounting instructions for the Bypass-isolation automatic transfer switches and for the available accessories, see Part 2, Chapters 7 and 8.

The regular maintenance instructions and useful tricks for service operations are descriped in Part 3, Chapter 9.

Dimension drawings, see Part 4, Chapter 10.

The safe operation of your Bypass-Isolation Automatic Transfer Switch is ABB's focus. The proper storage, installation, operation and maintenance will help increase the life of Bypass-Isolation Automatic Transfer Switch.

Danger
Indicates a hazardous situation that, if not avoided, will result in death or serious injury or equipment damage.

Warning
Indicates a hazardous situation that, if not avoided, could result in death or serious injury or equipment damage.

Caution
Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury. Failure to comply with these instructions may result in product damage.

Notice
It is used to notify of practices not related to personal injury. Failure to comply with these instructions may result in product damage.

1.1 Hazard Categories

The following important highlighted information appears throughout this document to warn of potential hazards or to call attention to information that clarifies a procedure.

Carefully read all instructions and become familiar with the devices before trying to install, operate, service or maintain this equipment.

1.2 Warranty

This document is based on information available at the time of its publication. While efforts have been made to ensure accuracy, the information contained herein does not cover all details or variations in hardware and software, nor does it provide for every possible contingency in connection with installation, operation, and maintenance. Features may be described herein that are not present in all hardware and software systems.

ABB Zenith assumes no obligation of notice to holders of this document with respect to changes subsequently made. ABB Zenith makes no representation or warranty, expressed, implied, or statutory, and assumes no responsibility for the accuracy, completeness, sufficiency, or usefulness of the information contained herein. No warrantees of merchantability or fitness for purpose shall apply.

Contact your local sales office if further information is required concerning any aspect of the Zenith ZBTS T-series Bypass-Isolation automatic transfer switch operation or maintenance.

Warranty Period
The Warranty Period for Zenith ZBTS T-series Bypass-Isolation automatic transfer switch products is twenty-four (24) months from the date of shipment.

Notes:
This warranty is valid only for products sold in the United States – consult your local ABB representative for Non-US warranty terms and conditions.

For support in the United States, contact service team at: +1 800 637 1738 or epis.pqservice@abb.com for 24-hour support.

For international support, contact epis.pqservice@abb.com.

1.3 Product Specification

Quality Assurance
All Zenith ZBTS T-series Bypass-Isolation automatic transfer switches have been designed and manufactured to the highest technical standards. Strict procedures ensure firstclass product quality.

Product Rating / Applicable Standards
For UL 1008 'withstand' and 'close on short circuit' ratings, refer to ABB publication number 1SCC303020C0201.

Product Serial Number
Please have the serial number available when communicating about the Bypass-Isolation automatic transfer switch. The serial number can be found on the product nameplate affixed to each power panel assembly. See example below.

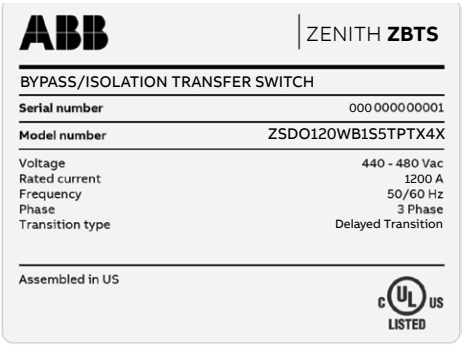


Fig. 1.1 Sample nameplate

1.4 Definitions

ATS
Automatic transfer switches

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

HMI
Control interface (Human Machine Interface), operating and configuration, with touch scren (Level 4).

Level 4
HMI with touch screen and sensor module OXCT_

OX_
Automatic transfer switches, type name

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

Slide switch (in the ATS and Bypass)
Switch for operating mode selection (Hand - Locking - AUTO), AUTO default

S1
Source 1, relate to a Normal Power Source

S2
Source 2, relate to an Emergency or Alternative Power Source

TruONE™ ATS
Automatic transfer switches, product name

Zenith ZBTS T-series
Bypass-Isolation automatic transfer switch, product name

2. Product Overview

Bypass-Isolation Automatic Transfer Switches, Zenith ZBTS T-series, from 100 A up to 1200 A, are used to provide a continuous source of power for critical loads by automatically transferring from Source 1 power to Source 2 power in the event that Source 1 voltage falls below preset limits. The Bypass-Isolation features allow the primary automatic transfer switch to be inspected, tested, and maintained without interrupting power to the load. They also provide redundant power transfer if the ATS is disabled or removed from service.

Bypass-Isolation Automatic Transfer Switch, consist of two ABB Zenith Automatic Transfer Switches (TruONE ATS) from 100A up to 1200A, are used to provide a continuous source of power for critical loads. The transformation from one source to another is performed automatically even in the event that Source 1 voltage falls below preset limits.

System controller PCBA is located inside of the bottom cabinet door, on control panel (back side). ABB Zenith Automatic Transfer Switch is designed for use on emergency or stanby systems and are rated for total system or motor loads.

—
Fig. 2.1 Bypass-Isolation Automatic Transfer Switch, Zenith ZBTS T-series

Notice
A protective device such as a moulded case circuit breaker or fused disconnect switch MUST be installed on both sources of incoming power for circuit protection and as a disconnection device.

The Bypass-Isolation Automatic Transfer Switch consists of these main modules:

- The two automatic transfer switches:
  - ATS is always draw-out version (lower switch module)
  - Bypass can be fixed or draw-out version (upper switch module)
- Customer main connections, Source 1, Source 2 and Load, on the top of the cabin
- The Control Plate (bottom module)
  - Customer connections: Generator start/stop terminals
  - Control circuit
  - Place for optional accessories
- Racking in/out -mechanism
- Both switches have operation panel HMI at the door

The modules containing the switch are connected to the busbars located at the rear of the modules and the entire package is mounted in an enclosure. The ATS switch in the lower switch module is always a draw-out version that includes an in/out rack for easy maintenance. The upper switch module, the Bypass switch, is available in either a fixed or draw-out version, but all the functions are exactly the same both Bypass and ATS switches.

The top module of enclosure is for cable lugs for Source 1, Source 2 and for Load. The lugs are located behind transparent covers. See the location of lugs in Fig. 2.6.

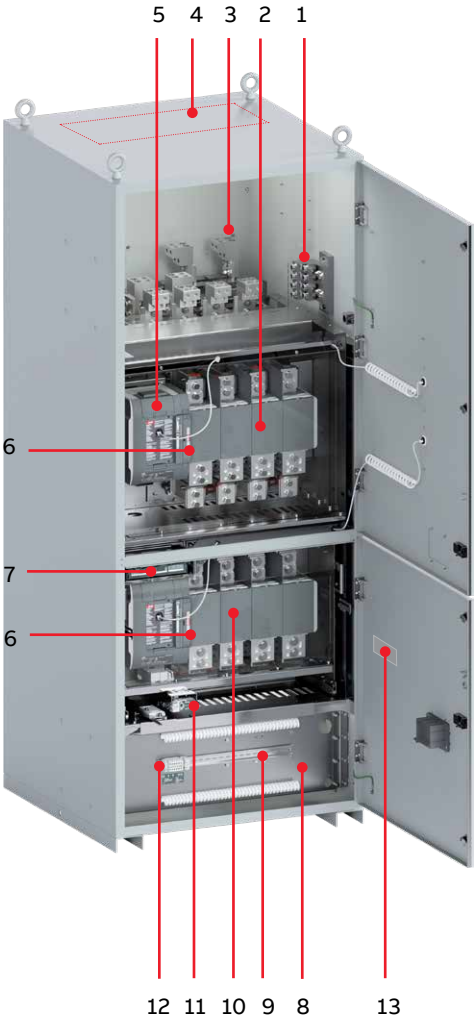
The Control Plate is located in the bottom module equipped with own inside door. The front side of the door is reserved for the customer connections e.g. generator start/stop terminals and also included an empty space for the accessories. Back side of the Control Plate door are all other components which are necessary for the control system.

The switch racking in/out mechanism is on enclosure's door also in the upper switch module, when the Bypass switch is draw-out version. The tool for the racking in/out system is located in the mechanism behind the transparent cover. The default location is the lower switch module, where ATS is always the draw-out version.

Danger
Hazardous voltage. Turn OFF all power before installation, adjustment, or removal of the transfer switch or any of its components.

Warning
Due to hazardous voltage and current, ABB recommends that ABB certified technician or qualified electrician perform the installation and maintenance.

2.1 General Overview



1 Ground Terminal
2 Fixed Bypass in the picture (alternative: Bypass is draw-out version), behind transparent cover
3 Customer connections: Source 1, Source 2 and Load, behind transparent cover
4 Conduit area for the cable entries, cable wiring directly to the connectors
5 I/O connections (in Fixed Bypass)
6 Manual control by switch own handle
7 I/O connections in Connection Module (for ATS)
8 Control Plate
9 Place for optional accessories
10 ATS, always the draw-out version
11 Racking in/out mechanism
12 Generator start/stop terminals
13 Product nameplate

Fig. 2.2 Bypass-Isolation Automatic Transfer Switch overview (Bypass: fixed version)

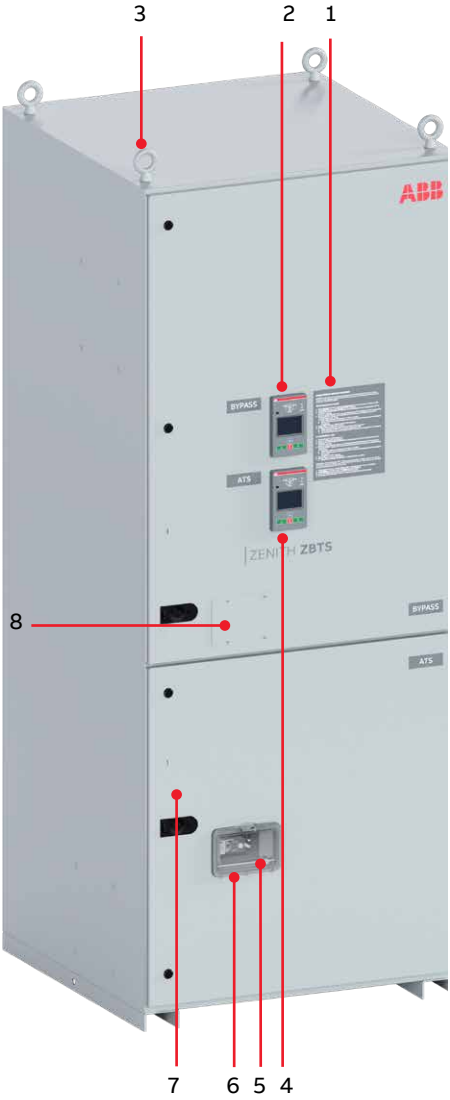


Fig. 2.3 Bypass-Isolation Automatic Transfer Switch overview (Bypass: fixed version)

1 Operation instruction
2 HMI unit on the door, Level 4 (touch) for configuration and automatic operation, operation of the Bypass switch
3 Lifting eyes
4 HMI unit on the door, Level 4 (touch) for configuration and automatic operation, operation of ATS switch
5 Place for racking in/out tool
6 Racking in/out mechanism
7 Release of the door locking, for authorized persons only
8 Place for racking in/out mechanism, in case the Bypass switch is also draw-out version
9 Situation of programming port in both HMIs (Bypass and ATS switches), only for Ekip Programming-module

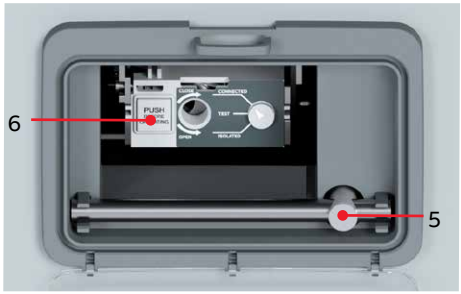


Fig. 2.4 Racking in/out mechanism

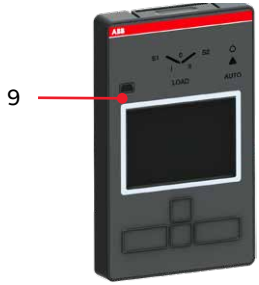


Fig. 2.5 The HMI units on the door

2.2 Main and Control Connections

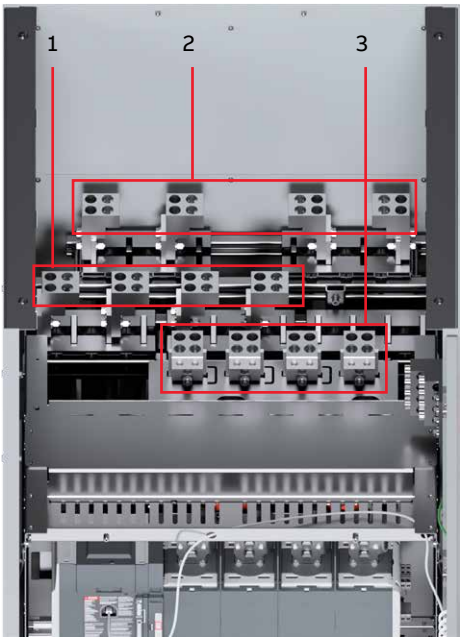


Fig. 2.6 Cable lugs for Source 1, for Source 2 and for Load on the top module of enclosure

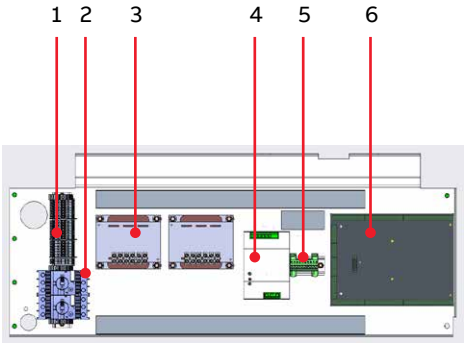


Fig. 2.7 Control Plate, back side

2.2.1 Main Connections

The top module of enclosure is for cable lugs for Source 1, for Source 2 and for Load. The lugs are located behind transparent covers.

1 Cable lugs for Source 1
2 Cable lugs for Source 2
3 Cable lugs for Load

See mounting instructions, Part 2, chapter 7.

2.2.2 Control Connections

The lowest module of enclosure, the Control Plate, is for control connections. The customer connections such as “Gen. Start/Stop” are on the Control Plate (front side) and have terminal blocks for very easy access. See next page where the front side is described, see Fig. 2.8.

The back side of the Control Plate is descriped in the Fig. 2.7.

1 Terminals for internal use
2 Protection devices
3 Transformers
4 Power Supply
5 Service terminals
6 PCBA

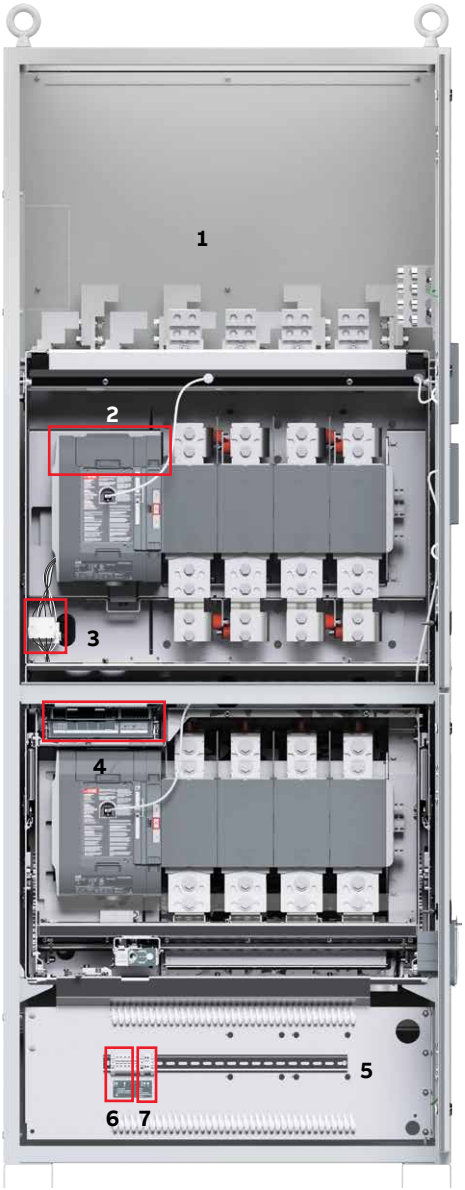


Fig. 2.8 Bypass-Isolation Automatic Transfer Switch

The upper switch is the Bypass switch. It can be fixed or draw-out version. In this manual the Bypass switch is fixed. The lower switch, ATS, is always draw-out version.

1 Main connections
2 Fixed Bypass, I/O connections
3 Fixed Bypass, control voltage connectors
4 Draw-out ATS, Connection Module, control voltage and I/O connections
5 Control Plate, front side, see back side on previous page
6 Generator start/stop terminals
7 Aux. voltage for Ekip modules / HMI

2.2.3 Interlocks

Automatic transfer switches are electrically interlocked to prevent switches from being operated to different sources at the same time. The doors are mechanically interlocked with draw-out switch versions so that the doors do not open when the switch is energized or in Connected/Test locations. If the Bypass switch is fixed, then there is no mechanical interlock on the upper door.

The system provides the ability to withdraw the ATS (or the Bypass switch, if it is the draw-out version) for test and / or maintenance purposes without interrupting the load. During operation, the contacts of Bypass switch are closed paralleling the ATS contacts, which then allows withdrawal of the ATS to the “TEST” or “ISOLATE” locations. The systems include mechanical and electrical interlocks that prevent cross-service.

2.3 HMI

HMIs are the control interfaces (Human Machine Interface), available as level 4 for both switches in Bypass-Isolation Automatic Transfer Switch. HMIs are with touch screen for both switches Bypass and ATS. The HMIs are used for configuration and automatic operation.

Bypass
Level 4:
HMI with touch screen

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

ATS
Level 4:
HMI with touch screen

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

Fig. 2.9 HMIs for both Bypass and ATS switches are available as Level 4 type with touch screen, delayed transition I - O - II (or II - O - I)

2.4 Bypass and ATS Switches, Features

Features	**Level 4 controls (TOUCH)**
	
Ampere sizes available	IEC: 400...1250 A
	UL: 100...1200 A
Rated voltage, three phase	200...480 Vac
Rated voltage, single phase	200...240 Vac
Rated frequency	50 / 60 Hz
Phase system	Single and Three
Number of poles	3 and 4
Neutral configuration	
Switched	Yes
Overlapping	Yes
Product type	
Open transition	Yes
Delayed transition (I - O - II or II - O - I)	Yes
Voltage and frequency settings	
Pick up Voltage Source 1	71...99%, 101...119%
Drop out Voltage Source 1	70...98%, 102...120%
Pick up Voltage Source 2	71...99%, 101...119%
Drop out Voltage Source 2	70...98%, 102...120%
Pick up Frequency Source 1	80,5...99,5%, 100,5...119,5%
Drop out Frequency Source 1	80...99%, 101...120%
Pick up Frequency Source 2	80,5...99,5%, 100,5...119,5%
Drop out Frequency Source 2	80...99%, 101...120%
Time delay settings	
Override momentary Source 1 Outage, sec	0...60
Transfer from source 1 to source 2, sec	0...3600

Continued on next page

Features	Level 4 controls (TOUCH)
	
Override momentary Source 2 Outage, sec	0...60
Transfer from source 2 to source 1, min	0...120
Generator stop delay, min	0...60
Center-OFF delay, sec	0...300
Pre-transfer delay S1 to S2, sec	0...300
Post-transfer delay S1 to S2, sec	0...300
Pre-transfer delay S2 to S1, sec	0...300
Post-transfer delay S2 to S1, sec	0...300
Elevator Pre-signal delay S1 to S2, sec	0...60
Elevator Post-signal delay S1 to S2, sec	0...60
Elevator Pre-signal delay S2 to S1, sec	0...60
Elevator Post-signal delay S2 to S1, sec	0...60
Load shed delay, sec	0...60
Source failure detections	
No voltage	Yes
Undervoltage	Yes
Overvoltage	Yes
Phase/ neutral missing	Yes
Voltage unbalance	Yes
Invalid frequency	Yes
Incorrect phase sequence	Yes
Features	
Controls	Touch + keys
LED indications for ATS, S1 and S2 status	Yes
Programmable digital inputs/outputs	Yes
Auto config (voltage, frequency, phase system)	Yes
Source priority	Source 1/2, No priority
Manual retransfer	Yes
In-phase monitor (synchro check)	Yes

Continued on next page

Features	**Level 4 controls (TOUCH)**
	
Genset exercising: on-load, off-load	Yes
In-built power meter module	Yes
Load shedding	Yes
Real time clock	Yes
Event log	Yes
Predictive maintenance	Yes
Harmonics measuring	Voltage, current
Field-mount accessories	
Auxiliary contacts for position indication	Yes
Digital input/output modules	Yes
12-24 Vdc aux supply module for controller (already in use on both switches)	Yes
Communication modules	Yes
Connectivity	
Modbus RTU (RS-485) [2]	Yes
Modbus/TCP [2]	Yes
Profibus DP [2]	Yes
ProfiNet [2]	Yes
DeviceNet [2]	Yes
Ethernet IP [2]	Yes
Ekip Com Hub (monitoring via ABB Ability™ EAM)	Yes
For applications	
Mains - Mains	Yes
Mains - Generator[1]	Yes

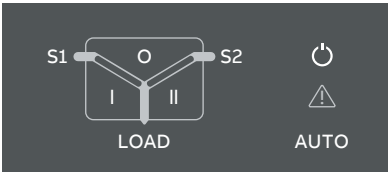
[1] Contact ABB for applications with smaller than 20 kVA gensets
[2] Includes support for redundant module

—
Table 2.1 ATS feature comparison, main features - but not limited to - in the table above

3. Operating

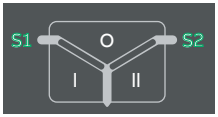
3.1 LED Functionality in HMIs

LED functionality in HMIs is similiar for both Bypass and ATS switches.



I - O - II

Fig. 3.1 LEDs in delayed transition -type switches, I - O - II.

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

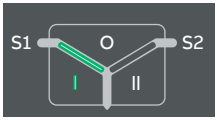
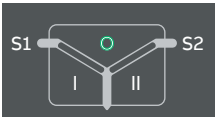
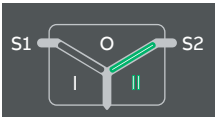
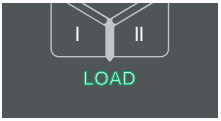
I, II and 0 leds		
	ON, fixed light	Switch position is indicated with fixed light in I, O or II led. Only one can be illuminated
	Flash/1 s, 50 %/50 %	Indicating running time delay
		
Load led		
	ON	Supply ok and Connected to load
	OFF	Connected supply to load not ok or load disconnected (switch in O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

Table 3.1 LED functionality in HMIs, similiar for both Bypass and ATS switches

3.2 Using the Control Interface HMI

3.2.1 Keypad

Keypad functionality in HMIs is similiar for both Bypass and ATS switches

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).

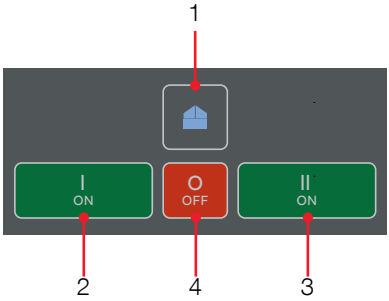


Fig. 3.2 Keypad in Level 4 HMI with touch screen, similiar for both Bypass and ATS switches

3.2.2 Navigating in Menu

See the detailed menu tree in the manual: Automatic transfer switches TruONE™ ATS, OX_ 30. . .1600_, 34OX_30-1600 / 1SCC303011M0201, Chapter 4.

3.3 HMI, menu tree

Password

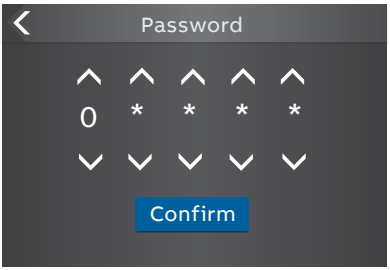


Fig. 3.3 Enter the password when asked, choose the right number by arrowheads and confirm, go forward entering number after number

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

Description of the Icons

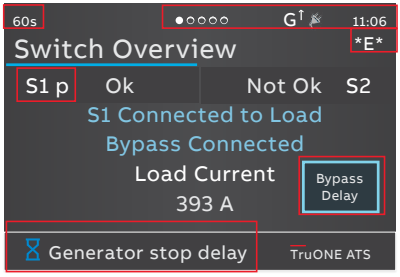


Fig. 3.4 The location of the small icons and the alarms

The small icons in Switch Overview -pages are:

On upper right corner

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

Auxiliary voltage connected

11:06 Time

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

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

E Indicates that generator exerciser is programmed.

On upper left corner

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

On middle area

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

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

Alarm List

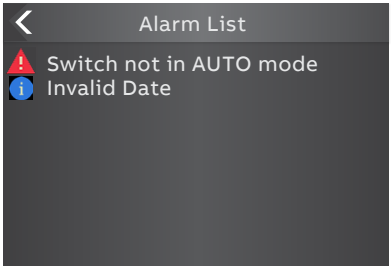


Fig. 3.5 By touching on the alarm indication on the lower edge of the screen you will get the Alarm List

On the lower edge of the screen you can see the Alarms, see Fig. 3.4. Touching the alarm name in bottom bar will open alarm list. It lists all active informations, warnings and alarms.

To Define the Home Page

Fig. 3.6 Home page definition, acceptance of the function

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

To Confirm the Change

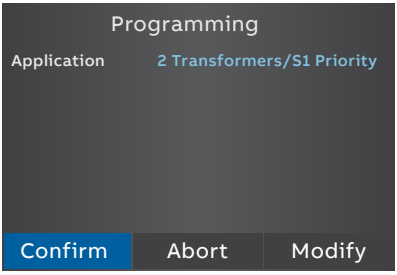


Fig. 3.7 After you have changed the parameter, go back in the menu by pressing the " < " on the top left corner or Home key and when prompted confirm changes by "Confirm" option

3.3.1 Start Menu

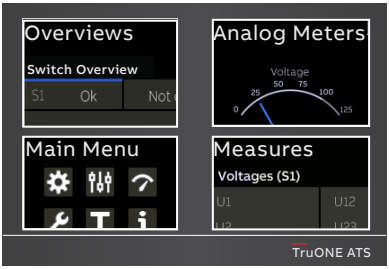


Fig. 3.8

Fig. 3.8 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. 3.9 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. Switch Overview page shows switch own status.

3.3.1.1 Overviews

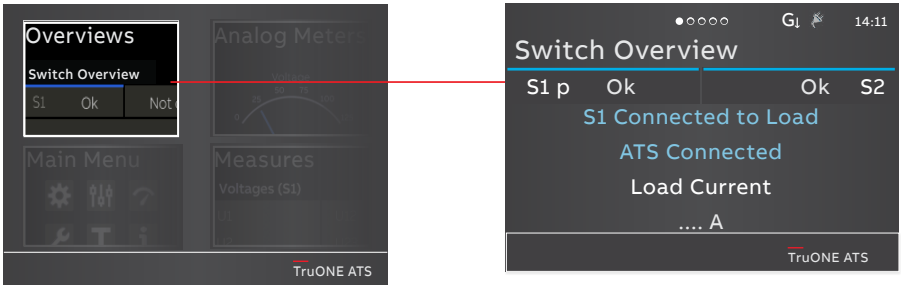


Fig. 3.9

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

3.3.1.2 Bypass System Overview

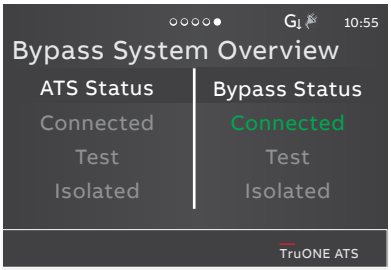


Fig. 3.10 Last page shows Bypass System Overview

Draw-out Locations

- **Connected** = Main and Control circuit connected
- **Test** = Main circuit isolated
- **Isolated** = Main and Control circuit isolated
- **Connected - Test - Isolated** = Location error; If another switch is moved in/out or there is some failure in location status

Basic information can be found in both switches' own HMI, see Fig. 3.12:

1 Source Available
2 Switch position I-O-II
3 Switch location
4 Supply ok and connected to load

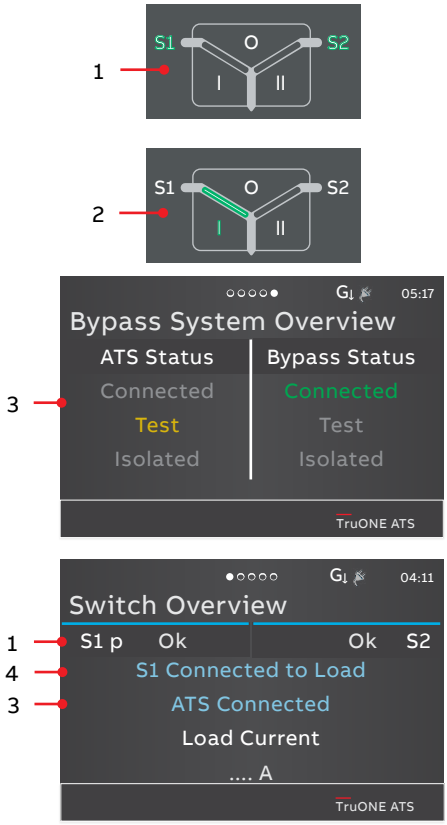


Fig. 3.12 Basic information can be found in both switches' own HMI

NOTE! The LOAD led should be ON when the switch is at **Connected** location and on I or II-position. At **Test** location the LOAD led should be OFF because the main circuit of the switch is isolated.

Fig. 3.11 Connected location and I-position: LED is ON, Test location: LED is OFF

NOTE! Normally, the ATS is in the rack at **Connected** location and on the I-position, it supplies the load. At the same time, the Bypass switch is also at **Connected** location, but it is on the O-position. Remark; The fixed type Bypass is always considered to be at **Connected** location.

3.3.1.3 Main Menu

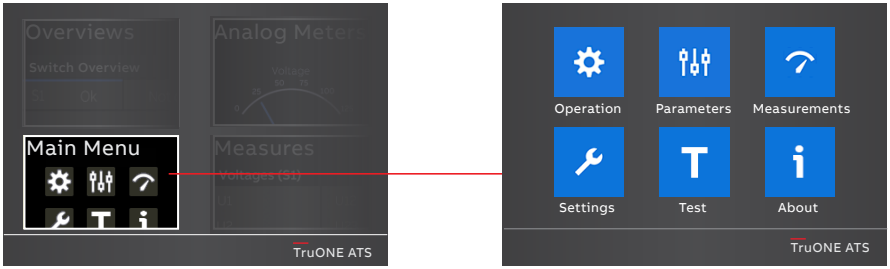


Fig. 3.13 By touching on Start Menu lower left corner -image you can move to the Main Menu page of Operation, Parameters, Measurements, Settings, Test and About, see the table below for the selections

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

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

NOTE! Setting the switch to AUTO mode: MAIN MENU –> Operation –> Operation Mode –> AUTO, see the table on next page.

Operation modes:
- Bypass switch default settings: MAN permanent
- ATS switch default settings: MAN momentary

NOTE! If the switch is controlled with the HMI keys I-O-II, the switch mode automatically switches to MAN momentary mode.

NOTE! See the "BASIC OPERATION INSTRUCTION" on the door of Bypass-Isolation Automatic Transfer Switch and more detailed information from chapter 3.4 "Description of Basic Functionality".

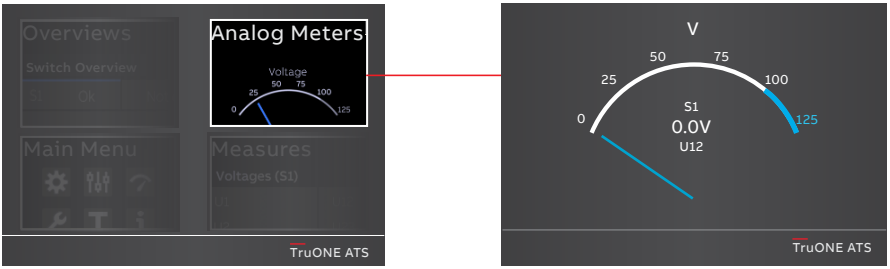
When connecting the Bypass-Isolation Automatic Transfer Switch to operation the Operation modes of the switches have to set:
- In ATS HMI operations menu, set ATS to AUTO mode.
- In Bypass HMI operations menu, set Bypass switch to MAN Permanent mode.

Operation			*Default
	Alarm Reset	Reset any active switch control alarms (open I failure, close I failure, open II failure, close II failure)	
	Bypass Time Delay		
		Bypass any currently running time delay	
	HMI Control Keys [1]		
		Enabled*	
		Disabled	
	Energy Counters	Reset energy values	
	Operation mode		
		AUTO*	Automatic switch control mode. [2]
		MAN momentary	Manual operation mode but warning that device is in manual mode will be shown by HMI. ATS will automatically send and remove the generator start signal but user intervention is required to initiate transfer and retransfer.
		MAN permanent	Manual operation mode but no manual mode warnings are shown by HMI. ATS will automatically send and remove the generator start signal but user intervention is required to initiate transfer and retransfer.
		MAN retransfer	Same as AUTO but automatic retransfer sequence is disabled. Load will be kept on non-priority source until operator manually (by HMI or manual handle) or remotely operates the load back to priority source.

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

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

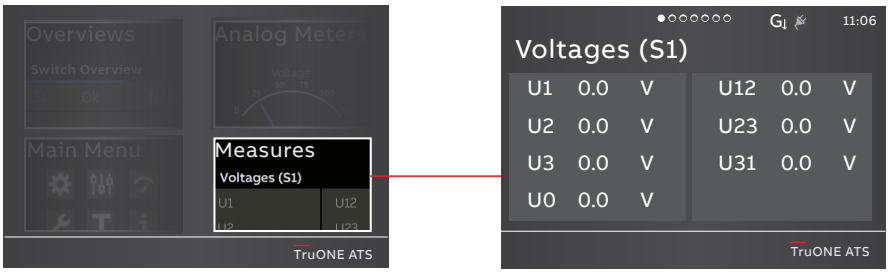
3.3.1.4 Analog Meters



—
Fig. 3.14 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

3.3.1.5 Measures



—
Fig. 3.15 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

3.4 Description of Basic Functionality

The system provides the ability to withdraw the ATS for test and / or maintenance purposes without interrupting the load. During operation, the contacts of Bypass switch are closed paralleling the ATS contacts, which then allows withdrawal of the ATS to the “TEST” or “ISOLATE” locations. The systems include mechanical and electrical interlocks that prevent cross-service.

By default ATS is in Operation mode: MAN momentary, **it is highly recommended to set the ATS to Operation mode: Auto.** ATS is connected to the Source 1 (or Source 2) and it is supplying the load. The contacts of the manually controlled Bypass switch are open. The Bypass switch is in the operation mode: MAN permanent, which means Connected location; ready for use. Both switches have their own HMI that shows the location and position of the switch.

Fig. 3.16 The Slide Switches in both the ATS and Bypass switch bodies are set to AUTO-position at the factory

Both ATS and Bypass switches have a Slide Switch (see Fig. 3.16) in the switch body. Both Slide Switches are set to AUTO-position at the factory. This position allows also the use of the HMIs on both switches. There is no need to change this setting at any stage of use.

3.4.1 How to draw out the switch to Test and Isolated locations – Bypassing the ATS switch

This paragraph includes the functional step-by-step description of bypassing the ATS switch. Normally, the ATS switch is set in operation mode: Auto, connected to Source 1 (or Source 2) and supplying the system load. The Bypass switch is manual operated in the operation mode: MAN permanent, the contacts are open but ready for use.

3.4.1.1 Step 1: Operate Bypass switch to same Power Source as ATS

Operate Bypass switch to same power source as ATS via HMI of Bypass (cross -control prevented). See both HMIs on the front cover. The power supply used by the ATS can be checked on the ATS HMI.

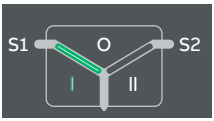


Fig. 3.17 HMI of ATS –> HMI of Bypass switch, the new Bypass switch position will be the same as ATS

The power supply is Source 1, if the green LED light is on at S1 as shown in the Fig. 3.17. You can operate the Bypass switch to the same power supply S1 by pressing the green "I ON" button on the HMI of the Bypass switch, see the Fig. 3.18.

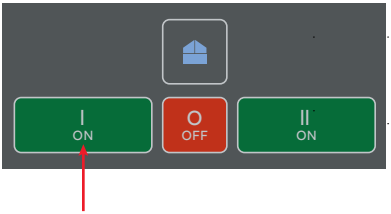


Fig. 3.18 HMI of Bypass switch, If the power supply of ATS is Source 1, the new Bypass switch position will be the the same as ATS by pressing "I ON" button

If the power supply of ATS is Source 2 (the green LED lights up at S2 in HMI of ATS) You can operate the Bypass switch to the same power supply S2 by pressing the green "II ON" button (right side) on the HMI of the Bypass switch.

Both switches are connected to the same power source for a while. The ATS switch automatically exits the operation mode: Auto, when the Bypass switch is controlled to operate the load from Source 1 (or source 2). Only one switch can be in operation mode: Auto at a same time.

3.4.1.2 Step 2: Operate ATS to OFF-Position

Push the red button "O OFF" on the HMI of ATS, see Fig. 3.19. The contacts of ATS are now open, but the plug connectors on racking out system are still attached to the busbar.

It is now possible to set the Bypass switch to Operation mode: Auto (–> Main Menu –> Operation –> Operation mode –> AUTO), see paragraph 3.3.1.3 Main Menu. Bypass switch works like a normal automatic transfer switch and now supplies the system load.

Warning
ATS and Bypass switch "OFF" Position keys are always enabled. Be sure to read the instructions carefully to ensure operation of the intended device. Failure to do so may result in an unintended disconnection of the load.

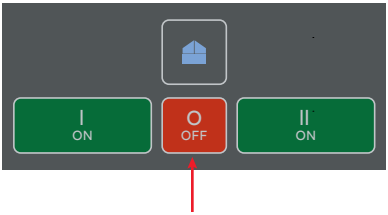


Fig. 3.19 HMI of ATS, to open the main contacts of ATS, push the red "O OFF" button

3.4.1.3 Step 3: Operate ATS to TEST Location with the Racking in/out Tool

Push the button of the ATS Racking out mechanism and rotate counterclockwise with Racking in/out tool until button returns. See the detailed instructions in paragraph 3.4.2 "How to use the draw-out mechanism to rack out the switch".

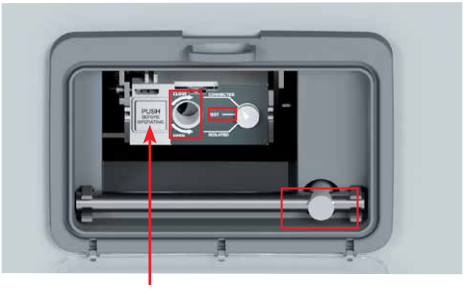


Fig. 3.20 Racking out mechanism of ATS, Push the button and rotate counterclockwise with Racking in/out tool up to Test location, see also the Fig. 3.28

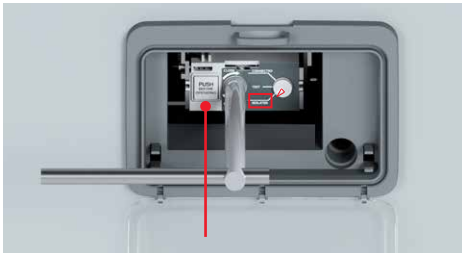
—
Fig. 3.21 HMI of ATS, ATS status is Test, see also the Fig. 3.29

After the button is returned the HMI of ATS switch shows when switch is in Test location, the indication is: “ATS TEST”, see Fig. 3.21.

In test location, the ATS is disconnected from the load, but control power is available. All electrical operations are allowed to ATS.

3.4.1.4 Step 4: Operate ATS to ISOLATED Location with the Racking in/out tool

Push the button of the ATS Racking out mechanism and rotate counterclockwise with the Racking in/out tool until button returns. See the detailed instructions in paragraph 3.4.2 "How to use the draw-out mechanism to rack out the switch".



—
Fig. 3.22 Racking out mechanism of ATS, Push the button and rotate counterclockwise with Racking in/out tool up to Isolation location, see also the Fig. 3.28

The switch and HMI of ATS has now lost the power, the ATS is completely disconnected from the system load and control power. It is now safe to open the door and the ATS can be removed from the cabinet. Lift ATS out of the track if needed. The fixing screws must be unfasten. See the lifting instructions in Part 2, Chapter 7 Installation.

After the isolation operation of ATS the Bypass switch is feeding the system load and it is highly recommended to set the Bypass switch to Operation mode: Auto, if not set earlier in Step 2. If Bypass switch is connected on Source 1 and if this source fails, Bypass switch will automatically start the generator and when this source (Source 2) is available, Bypass switch automatic transfer to this available source. This is only available when the Bypass switch is set to Operation mode: Auto.

3.4.2 How to use the Draw-out Mechanism to rack out the Switch

This guide applies to switches with a draw-out mechanism. At the beginning of this procedure, the switch is in the Connected location. See pictures Fig. 3.28 and Fig. 3.29.

1 Open the cover of the Racking in/out mechanism .

2 Take the Racking in/out tool, which is located default on the lower switch Racking in/out mechanism .

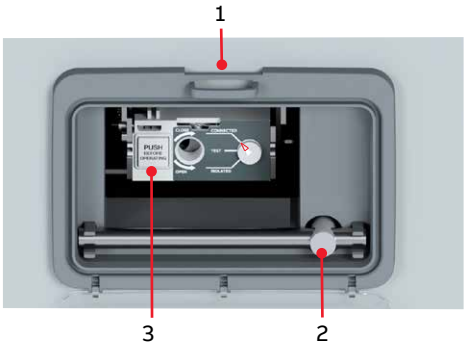


Fig. 3.23 Overview of the Racking out mechanism

NOTE! Before operations make sure that Bypass switch is connected to the load, if the ATS is to be taken for maintenance. ATS switch must be in OFF-position.

3 Push the Racking in/out mechanism button.

NOTE! This button prevents the I-O-II control of the racking in/out switch. It also activates the Racking enabled -alarm in ATS; The alarm is also displayed in the HMI of ATS, see Fig. 3.24.

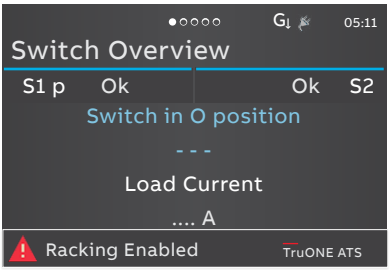


Fig. 3.24 The Racking enabled -alarm is also displayed in the HMI of ATS

4 The arrow shows the locations of the switch, also the HMI of the switch shows this, see pictures Fig. 3.28 and Fig. 3.29.

- Connected
- Test
- Isolated

Fig. 3.25 The arrow shows the locations of the switch in the Racking in/out mechanism

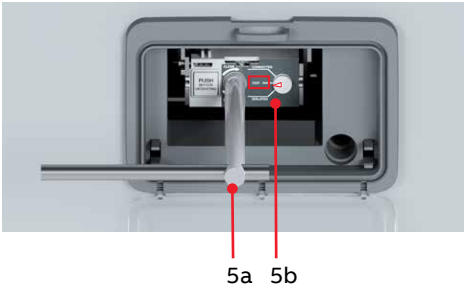
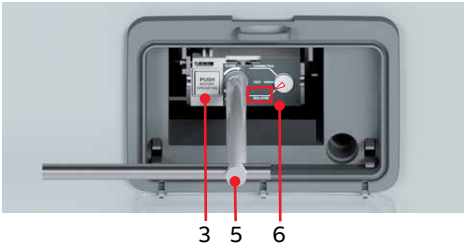


Fig. 3.26 Transferring to the Test location

5 Insert the Racking in/out tool to the hole (5a) and rotate counterclockwise until button returns. It is a sign that next location has been reached and in this case it is “test” (5b).

NOTE! In Test location all electrical operations are allowed. The switch can be operated I-O-II.

6 When rack out the ATS to Isolated location, the switch must be in OFF-position. Now follow the steps 3 to 5. When button returns, it is a sign that next locations has been reached and the location now is “Isolated”.



—
Fig. 3.27 Transferring to Isolation location, numbers refer to the steps

NOTE! In Isolated location there is no power available.

"Bypass System Overview" -page in HMI of Bypass switch: When ATS is drawn in/out the list "**Connected - Test - Isolated**" (all in grey) indicates a Location error because the IO-connection is disconnected from the contacts at different times while the switch is racked in/out. When the locations are reached the colours in the list will change; when reached the Test location, Test will be in yellow (**Test**), all the other in grey and when the Isolation location is reached, Isolation will be in orange (Isolated) and all the other in grey, see Fig. 3.29.

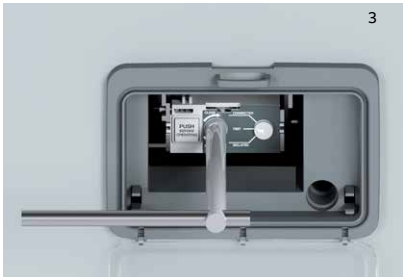
While the ATS is racked out to the Test location, "**Switch Overview " -page in HMI of ATS** do not display the location status. When the Test location is reached and the "Racking in/out mechanism" button returns to the normal position, the HMI display updates the latest location.

When the ATS is racked out to the Isolated location, the plug-in connections are disconnected from the busbar and the switch loses the power. In this case, all connections (including I/O signals) are disconnected, which also interrupts the power supply to the HMI. In this case, the HMI of the Bypass switch shows the status of both switches on the “Bypass System Overviw” -page.

See the next two pages the Fig. 3.28 for the use of the draw-out mechanism to rack out the switch and Fig. 3.29 for status of the switches on the HMIs of both switches while racking out the ATS.

In CONNECTED location

In CONNECTED location, Push button pushed, Racking in/out tool inserted, ready to start rotation



Push button returns, TEST location reached, Push button pushed agen, Racking in/out tool inserted, ready to start rotation

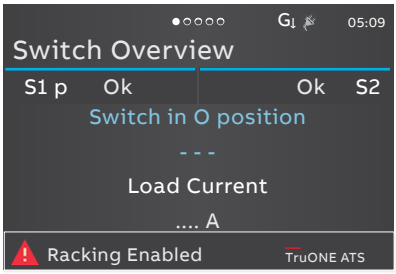
Push button returns, ISOLATED location reached

In ISOLATED location, Racking in/out tool inserted back into storage

—

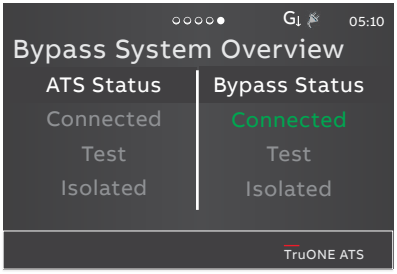
Fig. 3.28 The use of the Draw-out mechanism to rack out the switch

HMI of ATS:
Page “Switch Overview”

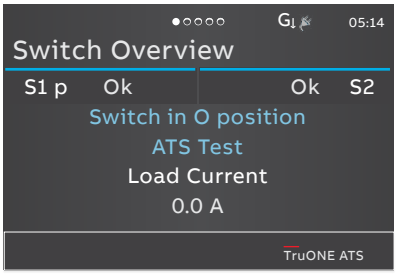


ATS is swithed OFF, the racking out is started; Bypass is connected to the same source as ATS was earlier and operates the load

HMI of Bypass:
Page “Bypass System Overview”
(the last page in “Switch Overview” -navigation)

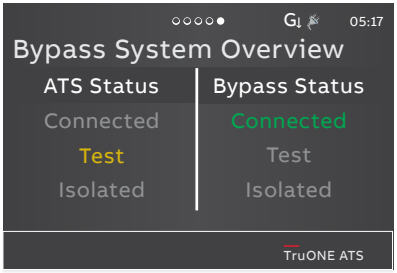


The racking out is started in ATS (to TEST location); Bypass supplies the load



ATS is reached the Test location, control power is available. All electrical operations are still allowed to ATS

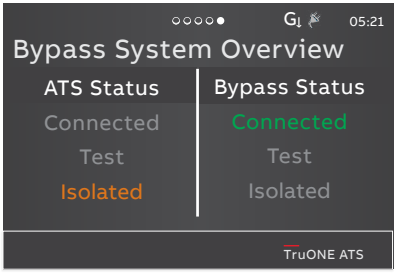
Test



ATS has reached the Test location, Bypass supplies the load. The next step; the racking out is started in ATS (to Isolated location), the display will be same as in the upper picture (ATS Status: all in gray)

ATS is reached the Isolated location, HMI of ATS lost the power

Iso-
lated



The racking out is completed in ATS; Bypass supplies the load, HMI of Bypass is working as normal and shows the status of both switches

—
Fig. 3.29 Status of the switches on the HMIs of both switches while racking out the ATS

3.4.3 To Reconnect ATS Switch

Reconnecting the ATS switch after maintenance:

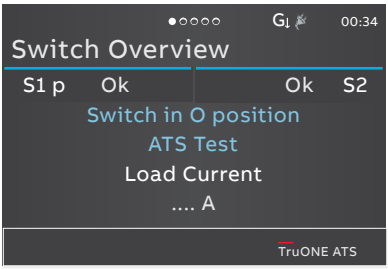
1 Place the ATS back on the track, if lifted out. Install the mounting screws, see the lifting instructions Part 2, Chapter 7 Installation.

2 Make sure that ATS switch is in OFF-position (O) and then close the door.

—

Fig. 3.30 Position of ATS switch is seen from the switch body

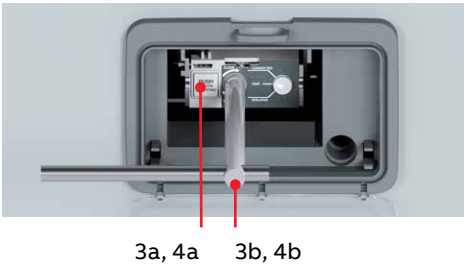
3 Push the button of the ATS Racking in/out mechanism (3a) and rotate clockwise with the Racking in/out tool (3b) until button returns (see details in the paragraph 3.4.2). ATS switch and HMI are energized and now HMI shows that switch is in Test location. All electrical operations are allowed to ATS switch.



—

Fig. 3.31 Position and location indications on the HMI of ATS

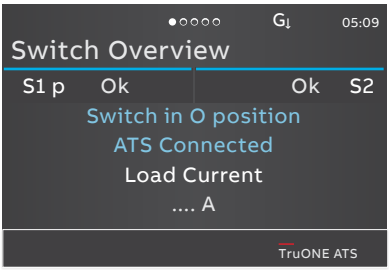
NOTE! Remember that ATS must be in OFF-position, when moving in/out. That allows the use of the push button of the Racking in/out mechanism .



—

Fig. 3.32 ATS racking out mechanism

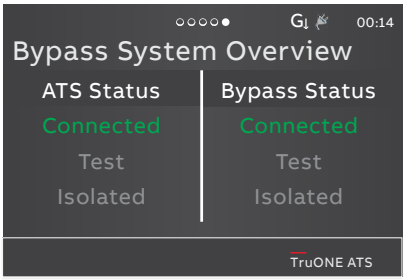
4 Push the button of the ATS Racking in/out mechanism (4a) and rotate clockwise with the Racking in/out tool (4b) until button returns. ATS switch is now in Connected location, HMI of ATS indicates: “ATS CONNECTED”.



—

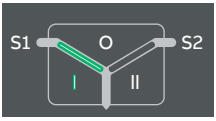
Fig. 3.33 Position and location indications on the HMI of ATS

Note! Now both switches (ATS and By-pass) are in Connected location.

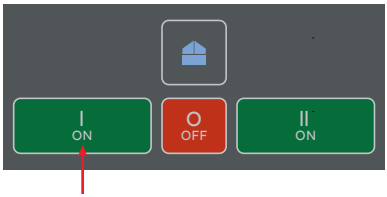


—
Fig. 3.34 Position and location indications on the both HMIs

5 Operate ATS to same source as Bypass switch. Now both switches are connected to the same power source for a while. This operation will move at the same time the Bypass switch automatically from Operation mode: Auto to Operation mode: MAN permanent.

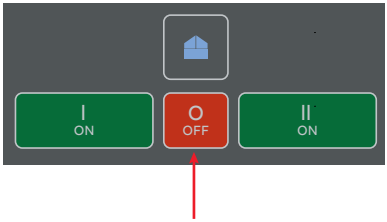


—
Fig. 3.35 The Bypass switch position is seen on the HMI of Bypass switch –> HMI of ATS; ATS operated to the same position, see the picture below



—
Fig. 3.36 If the power supply of Bypass switch is Source 1, the ATS position will be the the same as Bypass switch by pressing "I ON" button in HMI of ATS

6 Operate Bypass switch to OFF-position as shown in the Fig. 3.36.



—
Fig. 3.37 Operation of the Bypass switch to OFF position by pushing the "O OFF"push button on the HMI of Bypass switch.

7 Set ATS to AUTO-mode by the HMI of ATS (–> Main Menu –> Operation mode –> AUTO), see paragraph 3.3.1.3 Main Menu.

NOTE! Make sure the ATS is left in AUTO-mode after performing any service.

For more information of OX_ Automatic Transfer Switches, see manual: Automatic transfer switches TruONE™ ATS, OX_ 30. . .1600_, 34OX_30-1600 / 1SCC303011M0201

4. Electronic Accessories

Warning
Hazardous voltage may be present within the panel when connecting electronic accessories. Remove all sources of power to the ATS / Bypass panel before connecting Ekip modules.

Ekip Connect Sofware and Programming -modules are suitable for both ATS and Bypass switches.

- Ekip Connect -software
- Ekip Programming -module

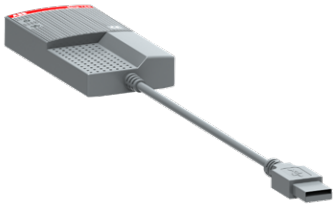


Fig. 4.1 Programming module

Both switches already have a factory-installed I/O signal modules Ekip Signaling 2K-1 and Ekip Signaling 2K-2 powered by auxiliary power supply module OXEA1 in fixed Bypass switch and in Connection Module in draw-out switch (ATS always) powered by Ekip supply module.

NOTE! It is still possible to add two pieces of Ekip modules to the fixed Bypass switch version, and one Ekip module to the Connection Module of draw-out switch version (ATS always), eg. an Ekip Signaling 2K-3 and/or alternatively a communication module Ekip Com module. See mounting instructions on Part 2, Chapter 8.

The suitable Ekip modules of which one or two can be added:

- Ekip signalling modules;
  - 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 Hub

Notice
For more information of Ekip software or these above mentioned modules, see manual: Automatic transfer switches TruONE™ ATS, OX_ 30. . .1600_, 34OX_30-1600 / 1SCC303011M0201, Chapter 5, Electronic accessories.

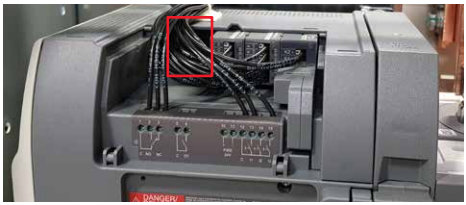


Fig. 4.2 Ekip Signalling and Com -modules are possible to add (two pieces) to fixed Bypass switch powered by the auxiliary power supply module, OXEA1

Fig. 4.3 Ekip Signalling or Com -module is possible to add to the Connection module of the draw-out switch powered by the auxiliary power supply module = Ekip Supply module

4.1 Auxiliary Power Supply Module OXEA1

The auxiliary power supply module, type OXEA1, supplies non-insulated power to the external Ekip-modules, HMI and the main control unit. The module is factory-installed to both switches. In the draw-out switches (always ATS) the OXEA1 module is also in internal use, not possible to use for other purposes. In **fixed type** Bypass switch it is possible add two Ekip modules according to your choice powered by OXEA1, see previous page and Chapter 8.

OXEA1 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, OXEA1, limits some operation functions of the Bypass control unit.

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

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

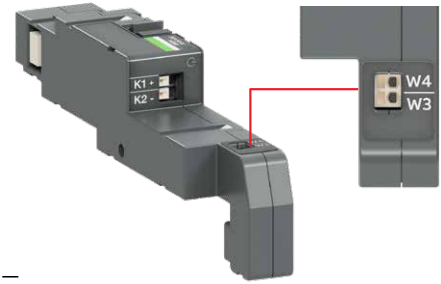


Fig. 4.5 Auxiliary power supply module, type OXEA1, is factory-installed in both switches. In **fixed** type Bypass switch it is possible add two Ekip modules powered by OXEA1

4.1.1 Electrical Characteristics

The following table lists the electrical characteristics:

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

4.1.2 Signallings

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

Fig. 4.4 Signals of auxiliary power supply module OXEA1

4.2 Ekip Supply Module

The Ekip Supply is a power supply accessory module.

4.2.1 Electrical Characteristics

The following table lists the electrical characteristics:

Power supply voltages	Frequency	Power input
Module: Ekip Supply 24-48Vdc		
21.5...53 V DC	-	Maximum 10W

The Ekip supply module is factory-installed in the Connection Module of the **draw-out switch** (always ATS). There is a possibility to add to the Connection Module one Ekip module according to your choice powered by Ekip Supply module, see Chapter 8.

For external wiring cable cross sections are:
- K1+ / K2-; AWG 22-16 / 0,5-1,4 mm²
- W3 / W4; AWG 26-20 / flexible, with ferrule; with plastic sleeve 0,25-0,34mm² / without plastic sleeve 0,25-0,5mm²

See the wiring routes in the cabinet, Fig. 4.9.

Fig. 4.6 Ekip Supply module is factory-installed with Ekip Signalling 2K modules to the Connection Module in **draw-out** switches (always in ATS). It is possible to add one Ekip module to the Connection Module powered by Ekip Supply module

4.2.2 Signallings

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

Pos.	Description
A	Power LED, green. The possible states are: • Off: power supply absent. • On fixed: power supply present.

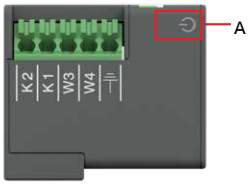


Fig. 4.7 Ekip Supply, signalling

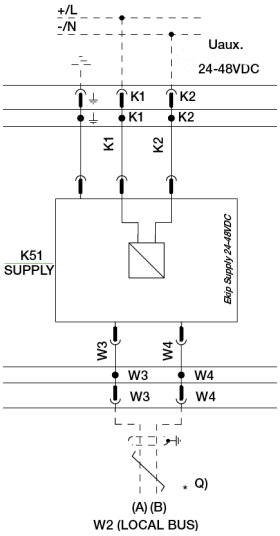


Fig. 4.8 Ekip Supply, wiring

4.3 Ekip Signalling 2K -module

The Ekip Signalling 2K-3 is a signalling accessory module, which can be installed afterwards. On both switches there are already installed and used in the system Ekip Signalling 2K-1 and 2K-2 -modules.

The Ekip Signalling 2K -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).

Notice
On ATS and Bypass, a maximum of three Ekip Signalling 2K modules can be installed: one 2K-1, one 2K-2 (these both are factory installed and already used in the system) and one 2K-3 (can be installed afterwards). 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.

4.3.1 Electrical characteristics of Ekip Signalling 2K -module

The following table lists the electrical characteristics of the module:

Fig. 4.9 Ekip Signalling 2K -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 4.1 Electrical characteristics of Ekip Signalling 2K -module

4.3.2 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. Only Ekip Signalling 2K-3 can be installed afterwards; inputs I 31/32 and outputs O 31/32 are available for use.

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

Continued on the next page

Settings (*Default)			Description
Modules (Optional modules) (continued)			
O 11/12, O 21/22, O 31/32			
	Function*	Function No	Output disabled
		Alarm/Product Availabilit	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 1	Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.
		Pre-transfer Signal 2	Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.
		Pre-transfer Signal 3	Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.
		Pre-transfer Signal 4	Signal is activated and transfer is delayed according to pre-transfer delay. Signal is kept activated according to post-transfer delay after transfer.
		Source 1 Available	No anomalies in S1 voltage supply.
		Source 2 Available	No anomalies in S2 voltage supply.
		Load Shed Output Signal	Used for shedding non-essential loads before transferring to non-priority source. Signal is activated before transferring to non-priority source according to load shed delay and kept activated until load is transferred back to priority source.
		Elevator pre-signal 1	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
		Elevator pre-signal 2	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
		Elevator pre-signal 3	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
		Elevator pre-signal 4	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
		Transfer Alarm [1)]	Activated when ATS has transferred on non-priority source. Silence alarm popup will be shown in HMI after output has activated. It allows user to deactivate the the output.
	Contact Type	NC	Active open
		NO*	Active closed

[1)] Only available with Level 4 controls.

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

—

Table 4.3 Configuration and test parameters of Ekip Signalling 2K -module in HMI

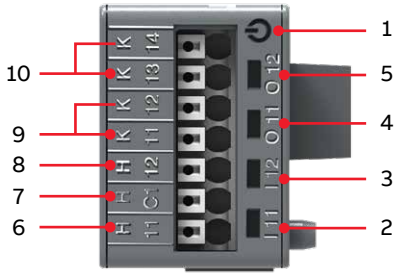
The following table illustrates the path from the display for accessing information on the module:

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

—

Table 4.2 Information of Ekip Signalling 2K -module in HMI

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



—
Fig. 4.10 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. Troubleshooting

Warning
Any troubleshooting should be conducted by trained and authorized personnel only. Appropriate personal protective equipment (PPE) shall be used when troubleshooting the ATS / Bypass switch panel.

Danger
Hazardous voltage may be present. Disconnect all power sources before performing work inside the ATS / Bypass switch panel. Failure to do so may result in serious injury or death.

5.1 Alarms

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
S1 neutral disconnected	Neutral is disconnected from source 1. Note: The loss of neutral will be detected in 3 phase distribution systems with unbalanced loads	Check connection of neutral in source 1 and that the corresponding power distribution system parameter is set correctly

Continued on the next page

Alarms, continued from previous page

Message	Fault	Action
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
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
S2 neutral disconnected	Neutral is disconnected from source 2. Note: The loss of neutral will be detected in 3 phase distribution systems with unbalanced loads	Alarm is active and transfer operations disabled as long as the frequency difference is above the accepted level
Frequency Difference	Frequency difference of voltage sources is greater than 3 Hz while in-phase monitor is on	Check connection of neutral in source 2 and that the corresponding power distribution system parameter is set correctly
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

Continued on the next page

Alarms, continued from previous page

Message	Fault	Action
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
Control Voltage Failure	Control voltage dropped during switch control	Check power source
Control Voltage Low	Switch control voltage is below the minimum	Check power source
Configuration Error	Invalid configuration	Check parameter values
Ekip Com Hub Alarm	Ekip Com Hub failure	Check configuration
HMI Not Compatible	Firmware versions of HMI and device are not compatible to be used together	Check current versions and update compatible versions
Racking Enabled	ATS rack-out mechanism button pressed	Complete the racking operation

Table 5.1 Alarms -list in ATS and Bypass

5.2 Warnings

Message	Reason
S1 and S2 not in sync	Voltage sources are not synchronized
Voltage Not Calibrated	Calibration data in power module is invalid or unavailable
Current Not Calibrated	Calibration data in current measurement module is invalid or unavailable
Pole temperature warning	Measured pole temperature is near the alarm level
Control Retry	Failed transfer sequence retry activated
Auto Control Disabled	Device is in manual operating mode
Local Bus	Module heartbeat error. Check connection. Can be cleared using "Alarm Reset".
Configuration	Configuration session ports are open
Clock capacitor charging	Real time clock is not yet operational, date & time setting is disabled as long as this warning is active. Clock capacitor is charged from source voltage (not AUX) and takes about 10 minutes
Generator failed to start	Generator has not been started within 1 minute after sending start signal or it has failed during any test sequence
Contact wear warning	Contact wear is at 90% and will need maintenance soon

Table 5.2 Warnings -list in ATS and Bypass

5.3 Information

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

Table 6.3 Info statements in ATS and Bypass

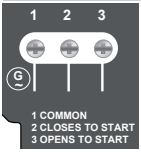
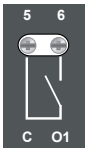
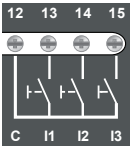
6. Technical Data

6.1 Technical Data of Bypass-Isolation Transfer Switches

Bypass-Isolation Transfer Switch, Power Circuit	Value
Rated operational voltage U, three phase	200...480 Vac
Rated frequency f	50 / 60 Hz
Rated impulse withstand voltage U_{imp}	8 kV
Operating times	See Table 6.4
Bypass-Isolation Transfer Switch, Control Circuit	**Value**
Voltage supply, B/L2 - C/L2	208 - 240 - 277 - 380 - 415 - 480 Vac
Operating voltage range	±20 %
Voltage measurement accuracy	1 %
Rated frequency f	50 / 60 Hz
Operating frequency range	±20 %
Frequency measurement accuracy	0.5 %
Rated impulse withstand voltage U_{imp}	4 kV

—

Table 6.1 Bypass-Isolation Transfer Switches, General technical data

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

* See Chapter 7.2.7 Engine/Generator Start Control Connections

** See Chapter 7.2.8 Customer Connections, I/O Signals

—

Table 6.2 I/O Contacts; cabling In ATS and Bybass. Available for customer connections is only "Common, Voltage Supply". All other I/O contacts in switches are for internal use only.
See also the table 6.6, Bypass-Isolation Transfer Switch: I/O contacts, default settings

Environmental	Value
Environments category	B
EMC environment	A
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
Pollution degree	2

—

Table 6.3 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]
100...1200	200...480	40	< 130	< 500	< 50

* Under nominal conditions

—

Table 6.4 Automatic transfer switches: Specified technical data of operating times

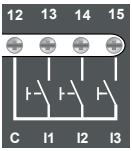
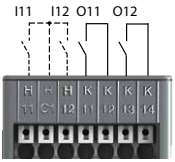
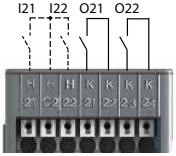
Type	Iq/ 500 V			I_{peak} [kA]	I^2t kA^2s
100...1200	Iq 100 kA rms.		OFA_1600 A gG	80.8	9900
			OFA_1250 A aM	91.3	11600
	Iq 85 kA rms.		ABB T7L1600_	111.6	44900

—

Table 6.5 Automatic transfer switches: Rated conditional short-circuit values

6.1.1 I/O Contacts, Default Settings / Bypass-Isolation Automatic Transfer Switch

These settings are for internal use only, these settings cannot be changed.

I/O contacts	Switch type: ATS, default settings	Switch type: Bypass, default settings
	I01 = ATS Connected I02 = ATS test I03 = Bypass Connected	I01 = Bypass Connected I02 = Bypass Test I03 = ATS Connected
 Ekip Signalling Ekip 2K-1	I11 = Bypass in I I12 = Bypass in II O11 = Load connected to S1 (ATS in position I) O12 = Load connected to S2 (ATS in position II)	I11 = ATS in I I12 = ATS in II O11 = Load connected to S1 (Bypass in position I) O12 = Load connected to S2 (Bypass in position II)
 Ekip Signalling Ekip 2K-2	I21 = Bypass in O I22 = Bypass Test O21 = ATS in position OI O22 = ATS in position OII	I21 = ATS in O I22 = ATS Test O21 = ATS in position OI (Bypass in position OI) O22 = ATS in position OII (Bypass in position OII)
	When moving the switch in / out to a different location (eg. Connected –> Test), the button of the ATS racking in/out mechanism "PUSH BEFORE OPERATING" must be pressed, and when the button is pressed, the HMI displays the information "Racking Enabled". For safety reasons, the switch cannot change position during a move to different locations. 10 = Fire fighting input 24 Vdc (+), Rating: SELV 11 = Fire fighting input 24 Vdc (-), Remark: Transfers to O/OFF position, locks the logic and signals alarm	

—

Table 6.6 Bypass-Isolation automatic transfer switch: I/O contacts, default settings, for internal use only

6.2 Circuit Diagrams

The following pages contain simplified circuit diagrams for Bypass-Isolation automatic transfer switch products.

Complete circuit diagram drawings are provided with the cabinet and can also be downloaded from the web.

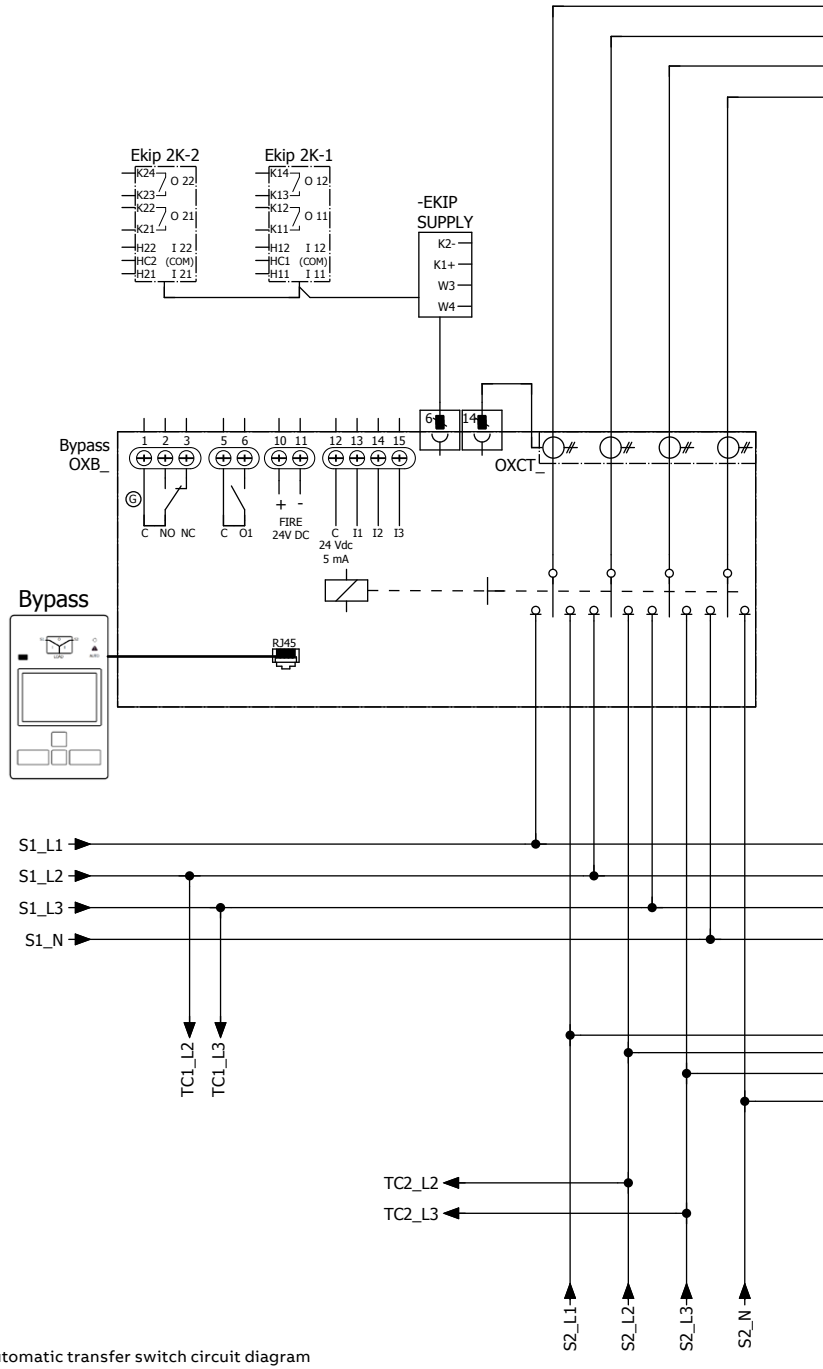
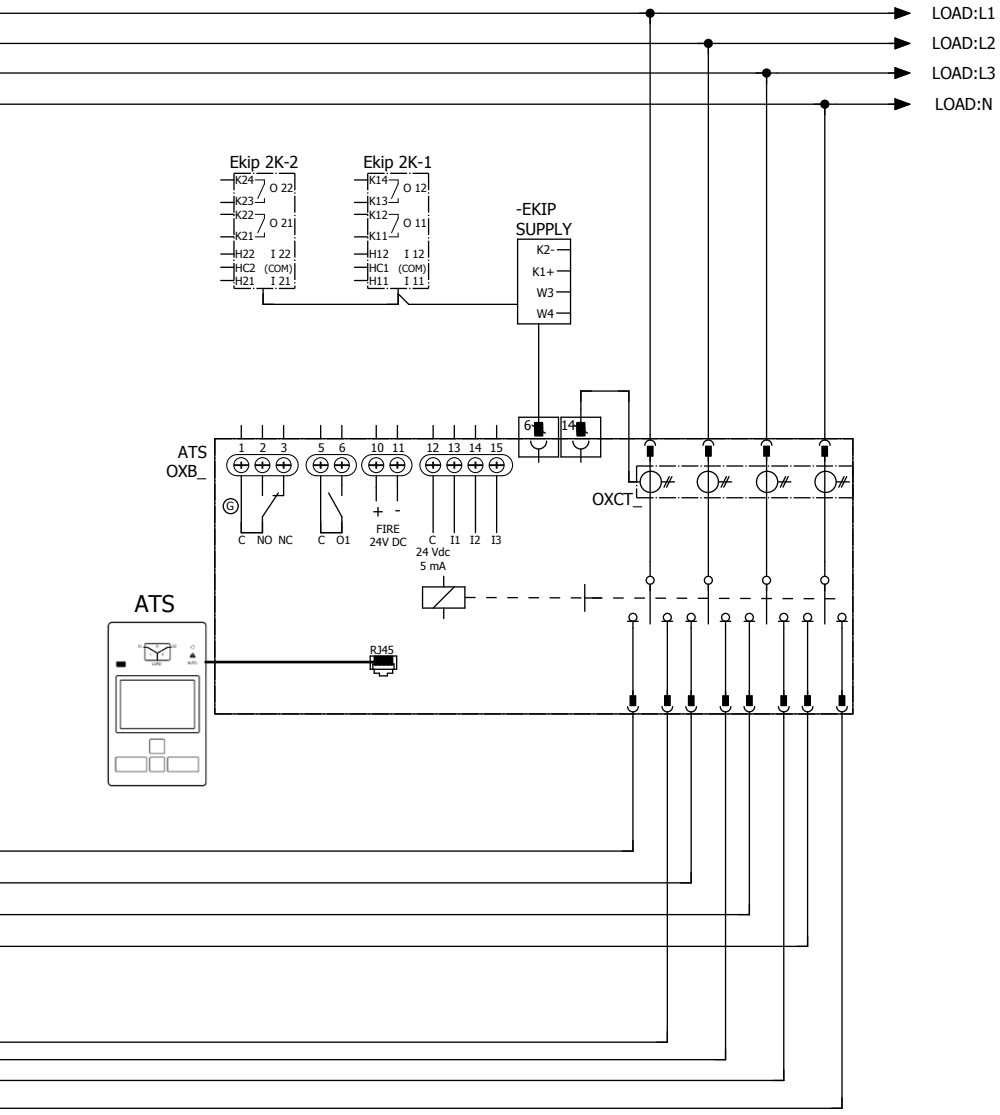


Fig. 6.1 Bypass-Isolation automatic transfer switch circuit diagram


LOAD:L1
LOAD:L2
LOAD:L3
LOAD:N
Ekip 2K-2
K24
K23
K22
K21
O 22
O 21
H22 I 22
HC2 (COM)
H21 I 21
Ekip 2K-1
K14
K13
K12
K11
O 12
O 11
H12 I 12
HC1 (COM)
H11 I 11
-EKIP
SUPPLY
K2-
K1+
W3
W4
6
14
ATS
OXB_
1 2 3 5 6 10 11 12 13 14 15
C NO NC C O1 + - C I1 I2 I3
FIRE
24V DC
24 Vdc
5 mA
OXCT_
ATS
RJ45

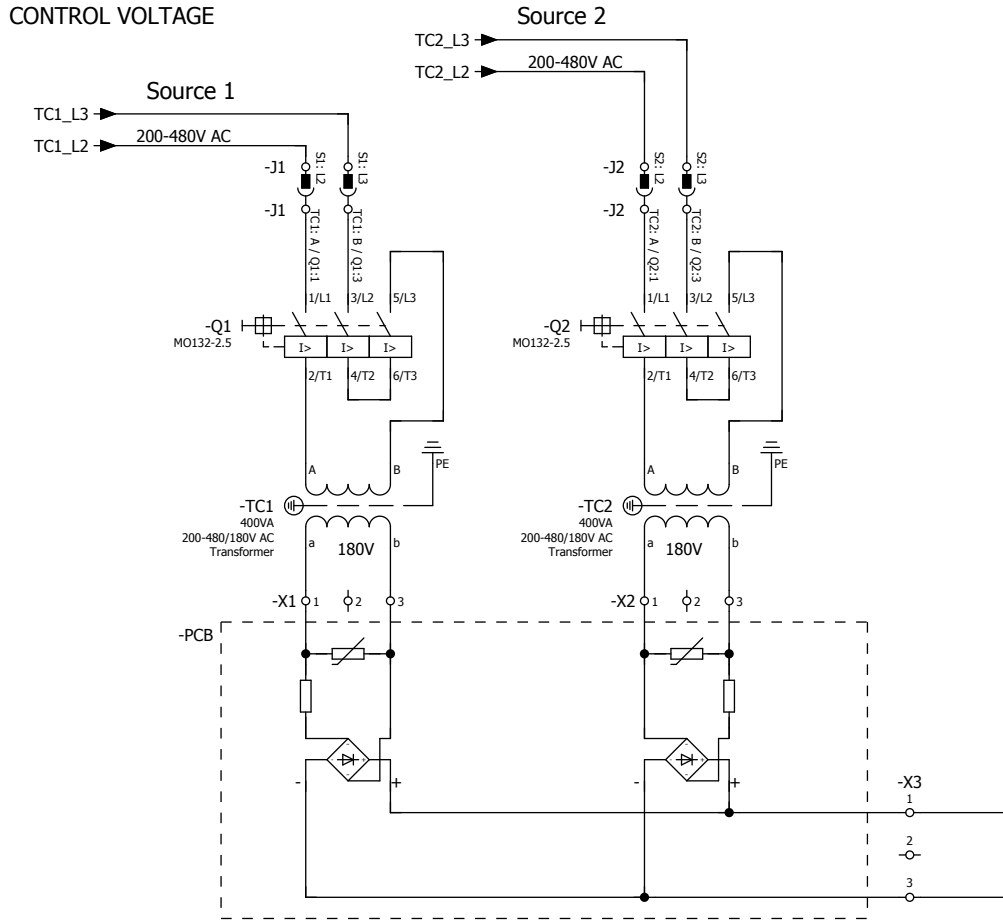
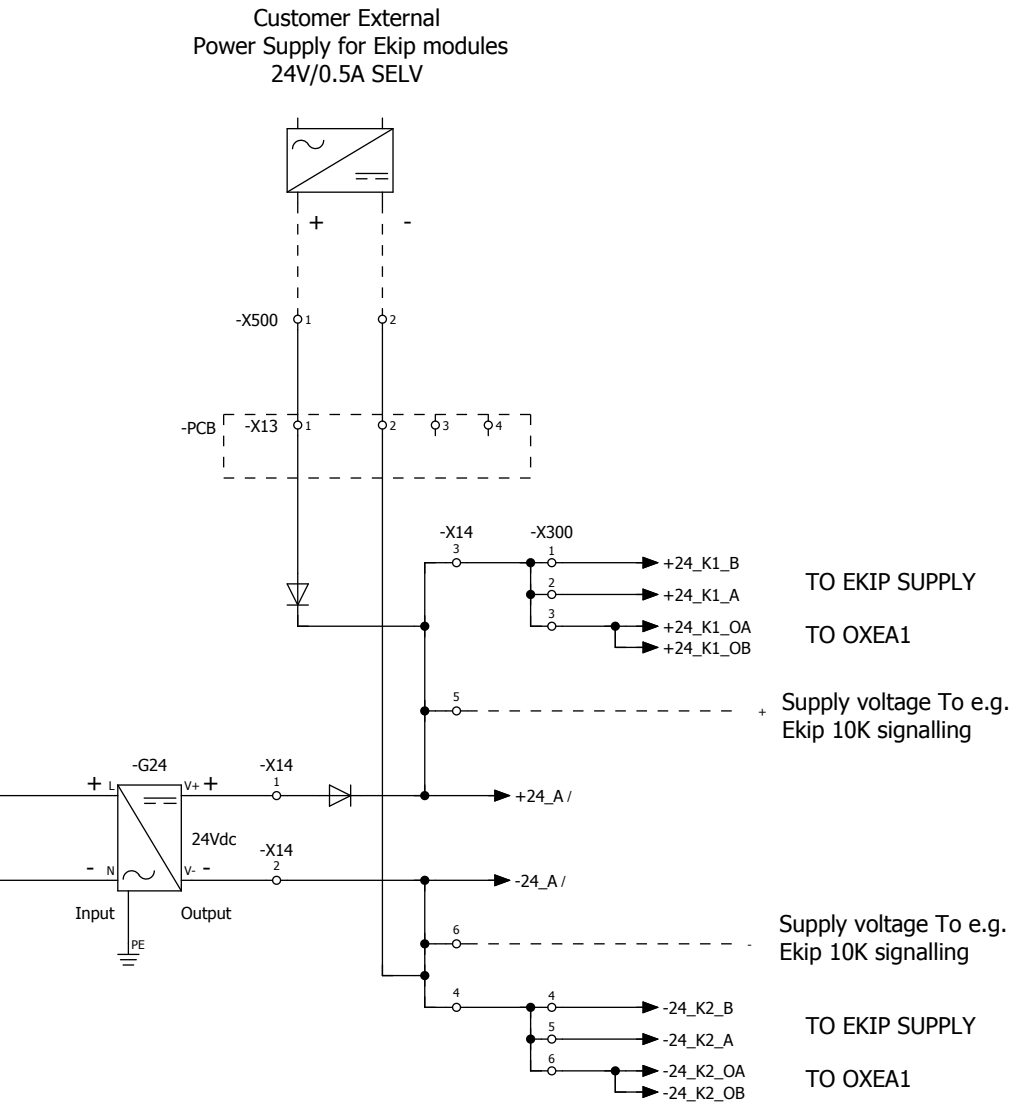


Fig. 6.2 Bypass-Isolation automatic transfer switch circuit diagram


Customer External
Power Supply for Ekip modules
24V/0.5A SELV
+
-
-X500
1
2
-PCB
-X13
1
2
3
4
-X14
3
-X300
1
+24_K1_B
2
+24_K1_A
3
+24_K1_OA
+24_K1_OB
TO EKIP SUPPLY
TO OXEA1
5
+
Supply voltage To e.g.
Ekip 10K signalling
-G24
+ L
V+ +
-X14
1
+24_A /
24Vdc
- N
V- -
-X14
2
-24_A /
Input
Output
PE
6
-
Supply voltage To e.g.
Ekip 10K signalling
4
4
-24_K2_B
5
-24_K2_A
6
-24_K2_OA
-24_K2_OB
TO EKIP SUPPLY
TO OXEA1

Installation Instruction

Bypass-Isolation Automatic Transfer Switches Zenith ZBTS T-series 100-1200A

7. Installation

This equipment must only be installed by qualified electrical personnel. Disconnect all sources of electrical supply before performing installation. Consider all sources of power, including the possibility of backfeeding.

7.1 Final System Inspection

Prior to energizing the automatic transfer switch:

1 Use a vacuum cleaner to remove all debris caused by transport or installation.

Warning
Do not use a blower since debris may become lodged in electrical and mechanical components and may cause damage and malfunction of the switch.

2 Verify that all cabled connections are correct and that phase rotation of both sources match.
3 Check engine start connections.
4 Verify the correct connections of all control wires.
5 Adjust any optional accessories as required.
6 Check the lug torque values of the power connections, see the lug torque values in table 7.1.
7 Make sure that all covers and barriers are installed and properly fastened.

Each ABB Zenith Bypass-isolation automatic transfer switch is factory wired and tested. A complete information package is furnished with each switch which includes:

- Sequence of operation.
- Description and operation of all accessories supplied.
- Control panel connection diagram and schematic.
- Description and identification of all customer field connections.

Installation of ABB Zenith Bypass-isolation automatic transfer switch includes:

- Mounting the Bypass-isolation transfer switch cabinet/enclosure.

- Connection of Source 1, Source 2, and Load bus bars.
- Connection of external control circuits as required.

7.1.1 Mounting / Lifting

Proper lifting equipment must be used to mount the Bypass-isolation transfer switch cabinet into place (Note: The weight of 4-pole Standard ABB Zenith Bypass-Isolation automatic transfer switch is 775kg/1709 lb, see the weight information in Dimension Drawings). The recommended method for moving the cabinet is ZBTS using the lifting eyes. Enough room should be allowed to open the cabinet doors fully for inspection and servicing of the switches per NEC and local codes.

Danger
Hazardous voltage may be present. 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 Bypass-Isolation automatic transfer switch is connected to the electrical mains. Before starting work, make sure that the switch is de-energised.

Warning
Before drilling conduit entry holes or any accessory mounting holes, cover and protect the switch and control panel to prevent dirt and metal fragments from entering the mechanical and electrical components.
Failure to do so may result in damage and malfunction of the switch.

Warning
Not following ABB lifting guidelines may result in severe injury or death.

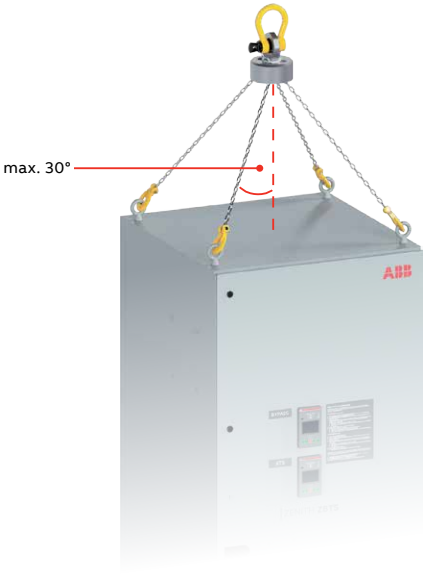


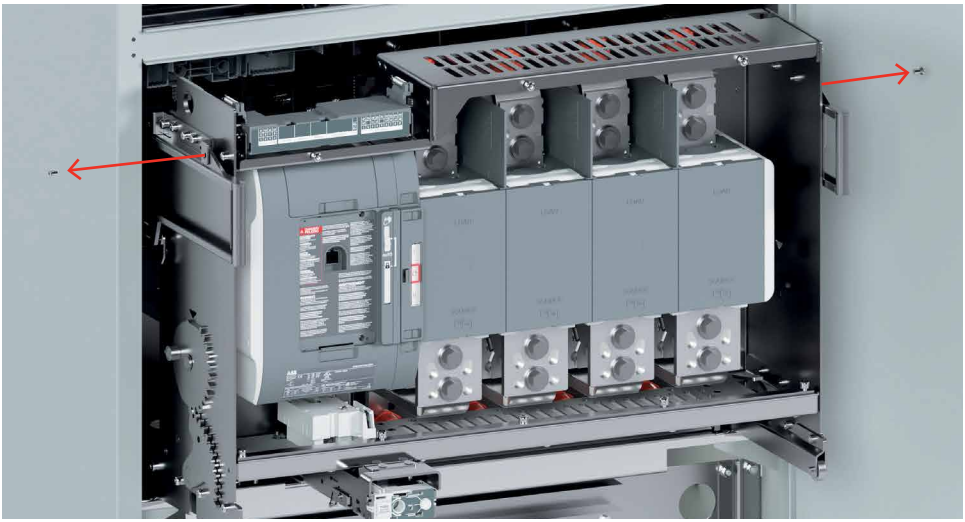
Fig. 7.1 Proper lifting equipment must be used to mount the Bypass-isolation transfer switch cabinet into place

7.1.2 Lifting the Draw-out Switch

Proper lifting equipment must be used to lift the draw-out switch for inspection and servicing (Note: eg. the weight of 4-pole draw-out switch is 100kg / 220 lb). A pull-out rod is used when lifting the switch, see the Fig. 7.3 on next page.

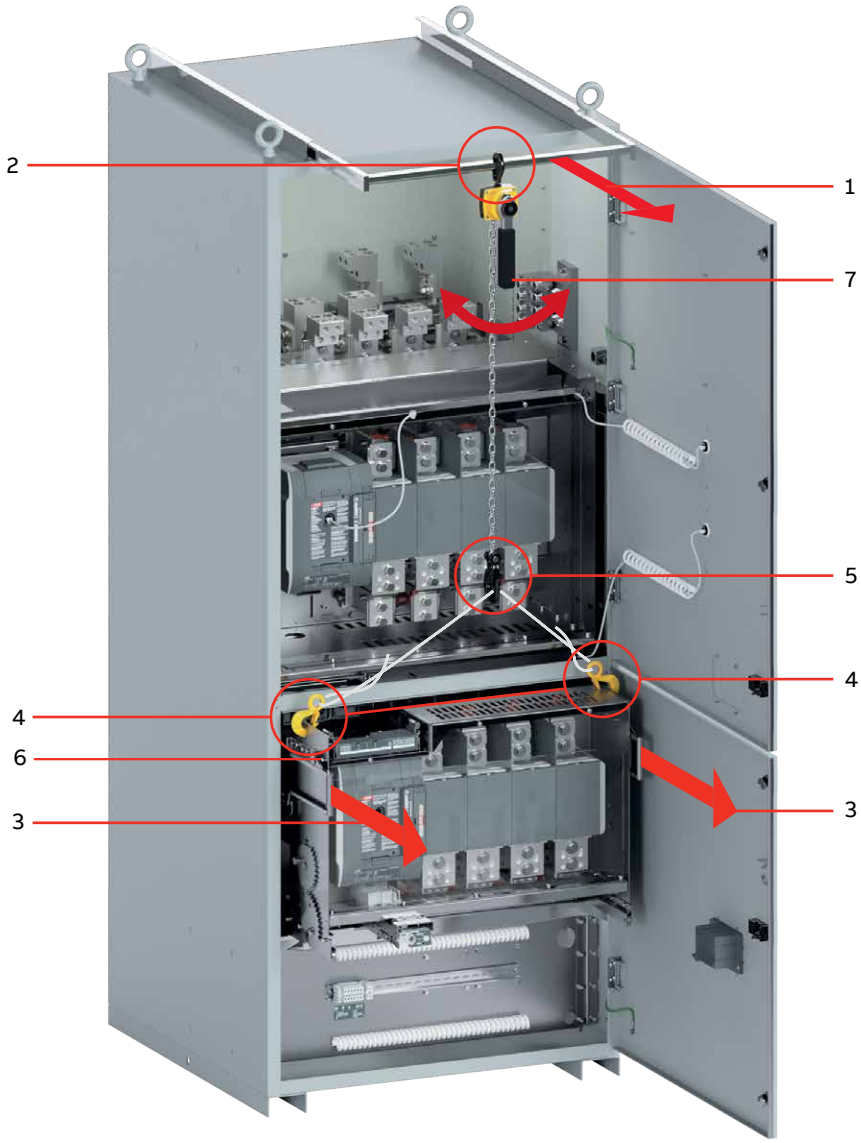
If it is necessary to remove the switch from the track mechanism, the fixing screws must be unfasten, see the Fig. 7.2.

NOTE! When the switch is attached back to the track mechanism, the fixing screws have to fasten!



–

Fig. 7.2 If it is necessary to detach the switch from the track mechanism, the fixing screws must be unfasten, see next page Fig. 7.3, the stage 6



–

Fig. 7.3 Lifting the switch must be performed using an adequate lifting means. The numbers in the picture will tell the different stages of the task. The stage number 6, refer Fig 7.2 on previous page

7.2 Installation

Danger
Hazardous voltage may be present. 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 Bypass-Isolation automatic transfer switch is connected to the electrical mains. Before starting work, make sure that the switch is de-energised.

Warning
Torquing srew-type terminal or compression lugs with the improper tool and/or to a torque value exceeding the defined parameters may result in damage to the switch.

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

7.2.1 Power Connections with Screw Type Terminals (as standard)

ABB Zenith Bypass-isolation automatic transfer switches are supplied with UL listed solderless screw-type terminals as standard for the Source 1, Source 2 and Load power connections.

Connect the Source 1, Source 2 and Load conductors to the clearly marked terminals on the busbars, see Fig. 7.4:

1 Source 1 Connectors
2 Source 2 Connectors
3 Load Connectors

Remove surface oxides from cables by cleaning with a wire brush. Verify that all connections are correct places before tightening the terminals. All connections must be tightened to the proper torque values as shown in Table 7.1.

ZBTS T-series Al/Cu UL Listed Solderless Screw-Type Terminals for External Power Connections

Model	Amperage	Cables per phase & neutral	Lug Type	Cables per pole	Range of wire sizes		Cables - Tightening Torque*, lb-in (Nm)
ZBTS	100-200	1	OZXA-25	1	6 AWG - 300 kcmil	(14 - 152 mm²)	275 / 31.1
	260-400	1 / 2	OZXA-412L	1 / 2	1x 4 AWG - 600 kcmil/ 2x 1/0 - 250 kcmil	(1x 25 - 304 mm²/ 2x 55 - 127 mm²)	500 / 56.5
	600	2	OZXA-800S	2	2 AWG - 600 kcmil	(34 - 304 mm²)	500/56.5
	800-1200	4	OZXA-1200	4	2 AWG - 600 kcmil	(34 - 304 mm²)	500/56.5

* Do not exceed this value - may cause damage to switch, voiding warranty

Table 7.1 Tightening torque and wire size for screw-type terminals, see Fig. 7.5

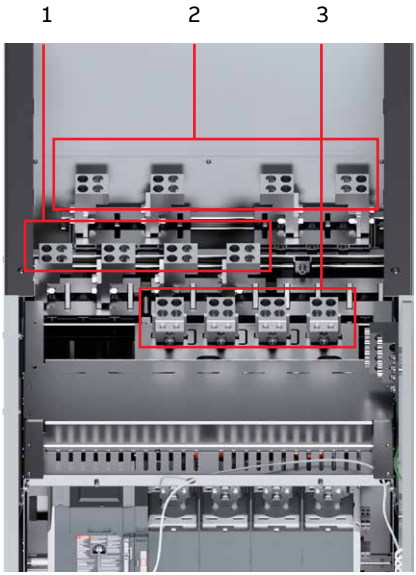


Fig. 7.4 Bypass-isolation transfer switch has solderless screw-type terminals as standard for the Source 1, Source 2 and Load power connections

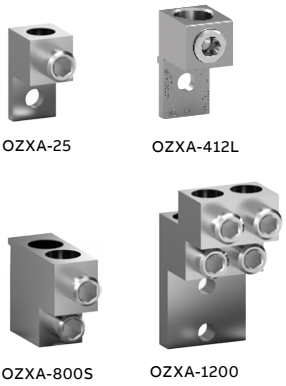


Fig. 7.5 Screw-type terminals for the Source 1, Source 2 and Load power connections, see Table 7.1.

7.2.2 Power Connections with Compression Lugs (option)

ABB Zenith Bypass-isolation automatic transfer switches are supplied as an option for cable lug connections. Below the bolt size and tightening torque for compression lugs. Connect the Source 1, Source 2 and Load conductors to the clearly marked busbars. Remove surface oxides from cables by cleaning with a wire brush. Verify that all connections are correct places before tightening the compression lugs. All connections must be tightened to the proper torque values as shown in Table 7.2. See also the warnings on previous pages.

Switch size	Bolt size	Tightening torque [Nm / lb.in]
600 A...1200A	M12	50...75 / 443...664

Table 7.2 Bolt size and tightening torque for compression lugs

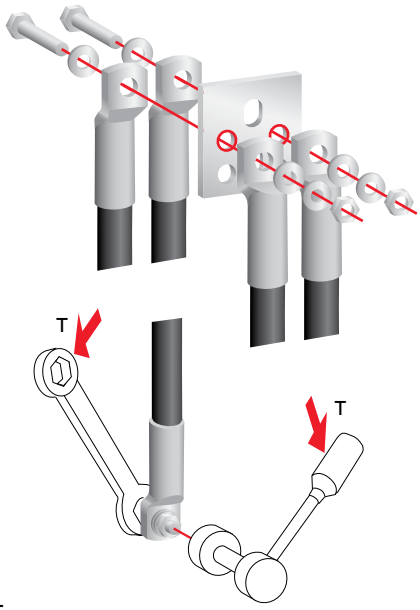


Fig. 7.6 Wiring / Compression lugs

7.2.3 Ground Connections with Screw Type Terminals

ABB Zenith Bypass-isolation automatic transfer switches are supplied with UL listed solderless screw-type ground terminal as optional choice. Ground terminal is always factory-mounted and it is situated on the top module of Bypass-isolation transfer switch, see Fig. 7.7.

Fig. 7.7 Ground terminal is situated on the top module of Bypass-isolation transfer switch.

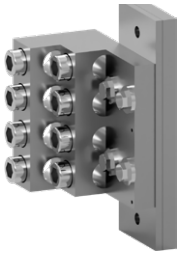


Fig. 7.8 Screw-type terminal as optional choice for the ground connections

7.2.4 Neutral Connections with Screw Type Terminals

ABB Zenith Bypass-isolation automatic transfer switches are supplied with UL listed solderless screw-type neutral terminal as optional choice. Neutral terminal is always factory-mounted and it is situated on the top module of Bypass-isolation transfer switch.

Fig. 7.9 Screw-type terminal as optional choice for the neutral connections

7.2.5 Conduit Area, Top Cable Entry

The conduit area for top cable entry of the cabinet must be done in such a way that the cables can be brought as directly as

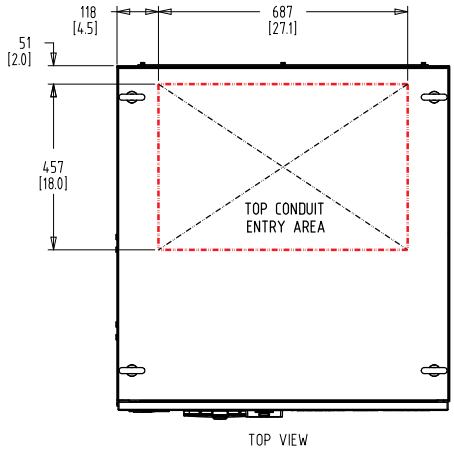


Fig. 7.10 The conduit area for top cable entry

possible to the connectors, see the conduit area in picture below. While installing the units keep adequate space in the sides & rear of the unit for ease of accessing the power cables. Be careful not to stand on any of the components while accessing the power cables.

7.2.6 Cable Entry from Bottom / Adapter Bay

Adapter bay is an accessory that is used when the power connections are coming from the bottom. In the adapter bay, all the panels are removable. It is installed on backside of the Bypass-Isolation Transfer Switch cabinet. Conduit entry areas are on bottom but also on top.

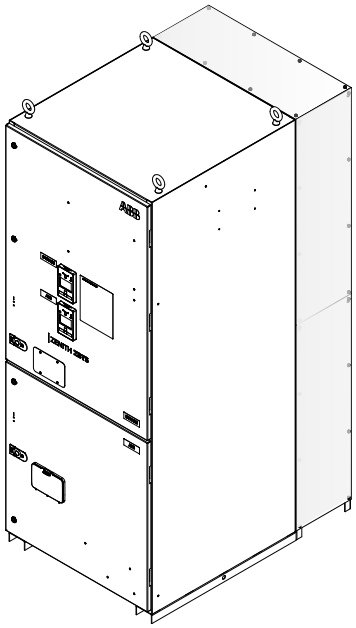


Fig. 7.11 Adapter bay is an accessory for power connections from bottom

7.2.7 Engine/Generator Start Control Connections

The generator start and stop signals are wired at the factory from the switches to the Control Plate terminal block XGEN (in the lowest module of cabinet), see picture below.

- **Common**, voltage supply –> From ATS (1) to XGEN: 1 and from Bypass (1) to XGEN: 2, these are factory-connected –> Customer connection **XGEN: 1**
- **Closes to start** / NO –> From ATS (2) to XGEN: 3 and from Bypass (2) to XGEN: 4, these are factory-connected –> Customer connection **XGEN: 3**
- **Opens to start** / NC –> From ATS (3) to XGEN: 5 and from Bypass (3) to XGEN: 6, these are factory-connected –> Customer connection **XGEN: 5**

Cable size: 0.5…10 mm², 22-8 AWG
Stripping length: 12 mm, 0,47 in
Tightening torgue: 0.8...1 Nm, 7.1...8.9 lb.in

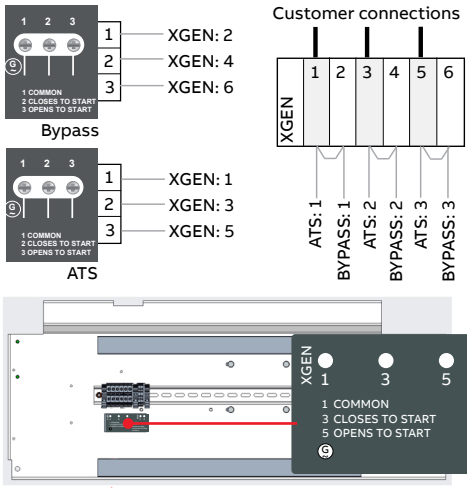


Fig. 7.12 Generator start and stop signals are installed at the factory to the terminal block XGEN. The terminal block XGEN is ready for customer connections

7.2.8 Customer Connections, I/O Signals

In ABB Zenith Bypass-Isolation Automatic Transfer Switches there are some I/O connections, which are available for customer use, if needed.

7.2.8.1 External Voltage Supply for Ekip-Modules

External voltage supply for Ekip-modules can be wired to the switches I/O connections from the Control Plate terminal block X500 (in the lowest module of cabinet), if needed.

Terminal block connections, see Fig. 7.13;
Wiring rotes, see Fig. 8.5.

- **+24V** –> External voltage supply, customer connection –> From **X500: 1**
- **GND** –> From **X500: 2**

Cable size:
- Solid: 0.2…4 mm², 22-12 AWG
- Flexible: 0.22…2.5 mm²

Stripping length: 10 mm, 0,39 in
Tightening torgue: 0.4...0.6 Nm, 3.5...5.3 lb.in

7.2.8.2 Output O1 Connections for Fixed and Draw-out switch

There are possibility to use Output O1 connections for both fixed and draw-out switches when needed.
- Fixed switch in I/O connections: Terminals 5 and 6
- Draw-out switch / Terminals in Connection Module: O1 and C

Connections, see Fig. 7.13;
Wiring rotes, see Fig. 8.5.

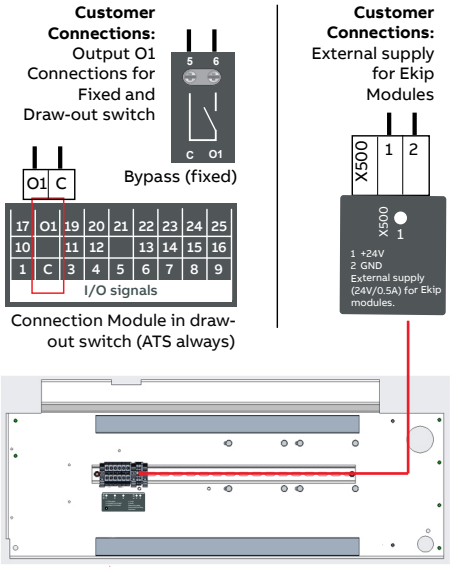


Fig. 7.13 Customer Connections, I/O Signals

7.2.8.3 I/O Signals, Ekip -Modules

There is a possibility to add more Ekip modules as accessory, see Chapter 8.

8. Mounting of Accessories

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

Danger
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 Bypass-isolation automatic transfer switch is connected to the electrical mains. Before starting work, make sure that the switch is de-energised.

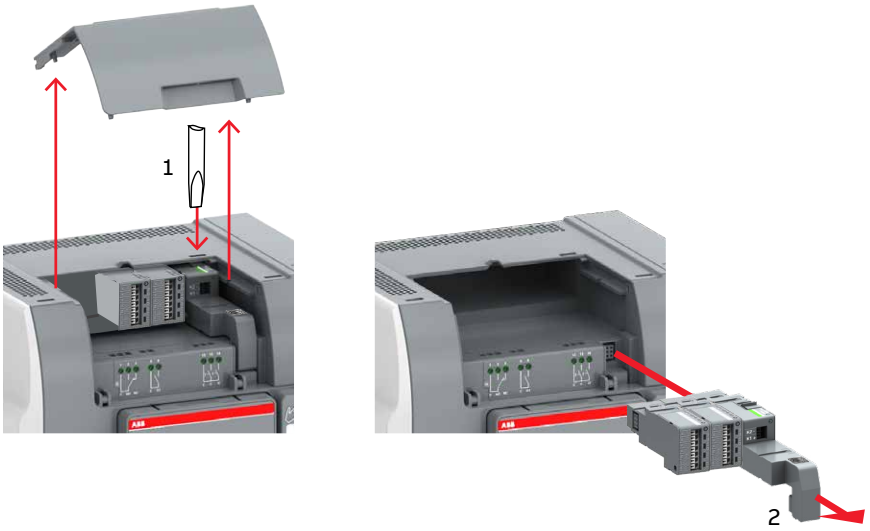
8.1 Ekip -Modules

Both switches already have a factory-installed auxiliary power supply module and I/O signal modules Ekip Signaling 2K-1 and Ekip Signaling 2K-2.

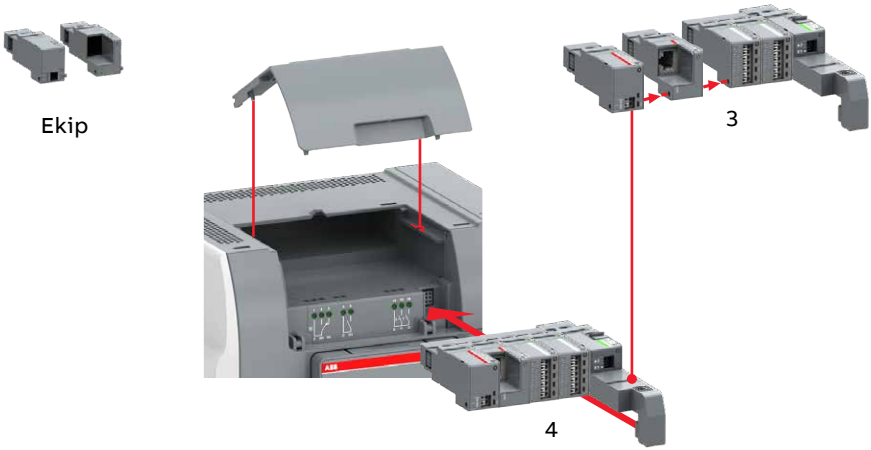
NOTE! It is still possible to add two pieces of Ekip modules to the switch if the switch is a fixed version, and one Ekip-module to the Connection Module of draw-out switch version. Eg. if more I/O signal modules are needed, it is possible to add an Ekip Signaling 2K-3 and/or alternatively a communication module Ekip Com module, if required.

The wiring route instruction for Ekip -modules in the cabinet, see the Part 1, Chapter 4.

8.1.1 Mounting of Ekip –modules to the fixed Bypass switch

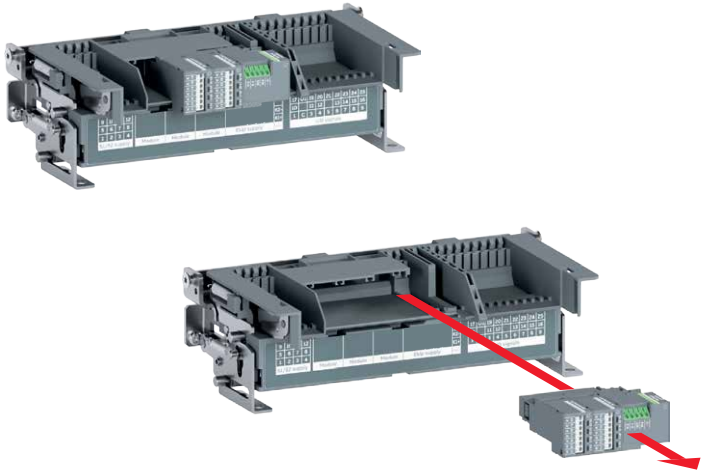


—
Fig. 8.1 First step: Remove carefully the factory mounted auxiliary power supply module OXEA1 and signal modules from the fixed Bypass switch. There is no need to remove the existing wirings.

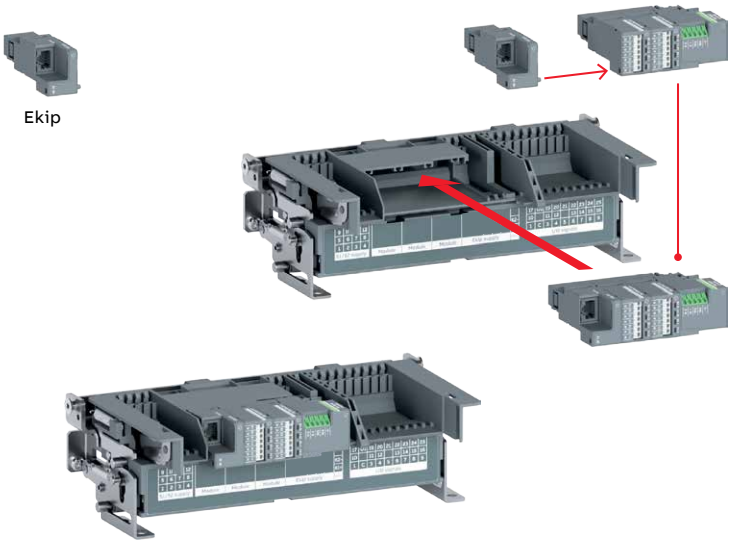


—
Fig. 8.2 Step two: Mount the Ekip –modules to the combination of auxiliary power supply module and signal modules, then place the entire assembly back to the fixed Bypass switch.

8.1.2 Mounting of the Ekip –modules to the draw-out switches



—
Fig. 8.3 First step: Remove carefully the factory mounted Ekip power supply module and signal modules from the draw-out switch Connection Module. There is no need to remove the existing wirings.



—
Fig. 8.4 Step two: Mount the Ekip –module to the combination of Ekip power supply module and signal modules, then place the entire assembly back to the draw-out switch Connection Module.

8.2 Wiring routes of I/O-connections / Ekip -modules inside the cabinet

Once all the afterwards added or factory installed Ekip -modules are on the right places in fixed Bypass or in Connection Module of draw-out switches, you need to add the connections to the modules. Below is one example of wiring from a switch to Control Plate.

1 Continue the connections on the right side of the housing in the same way as the HMI cable.
2 Insert the wires into the same hole as the HMI cable.
3 Attach the cables to the wall beam, there are holes from top to bottom and a free route for cables.

NOTE! Attach the cables if necessary.

Fig. 8.5 Wiring routes for Ekip-modules in Bypass-Isolation Automatic Transfer Switch

Maintenance

Bypass-isolation automatic transfer switches Zenith ZBTS T-series 100-1200A

9. Maintenance

9.1 Maintenance Principle

Warning
Due to hazardous voltage and current, ABB recommends that ABB certified technician or qualified electrician must perform the installation and maintenance. Appropriate personal protective equipment (PPE) shall be used when performing maintenance on the Bypass-isolation automatic transfer switches panel. Failure to comply with these instructions may result in death or serious injury.

Warning
Hazardous voltage may be present. Disconnect all power sources before performing work inside the Bypass-isolation automatic transfer switches panel. Failure to do so may result in serious injury or death.

Bypass / Isolation automatic transfer switches 100-1200A, powered by TruONE, are designed so that the contacts last their designed lifetime without any routine maintenance needs. If there are abnormal conditions such as a fault or overload without adequate protection, or extreme environment conditions, a failure of ATS components may occur. Fortunately, all critical modules, including controller, power module, HMI, and solenoid mechanism, as well as accessories are readily replaceable.

On the other hand, when the contacts have seen a damaging fault event, or have met the end of their endurance lifetime, the whole switch should be replaced – which can be done easily by replacing the complete draw-out ATS or draw-out Bypass switch. Note that the number of operations can be viewed by using Ekip Connect software.

9.1.1 Routine Inspection

ABB recommends a routine (such as annual) inspection to, e.g. check electrical termination temperatures, ensure unit is clean, check voltage levels, test transfers, number of operations, etc. to ensure everything is in proper working order.

9.1.1.1 Recommended Annual Inspection Includes:

- Review event log
- Check number of operations and other switch status figures
- Visual inspection both inside and outside of enclosure for damage or debris
- Test transfer of load
- Observe voltage levels of both sources within expected range
- Cable lug torque verification

9.2 Useful Tips for Service Situations

These operations are recommended for maintenance use only. In normal use, these operations are not recommended unless necessary.

9.2.1 Release the Door

For safety reasons, the enclosure doors of the withdrawable units have equipped with a lock that prevents the door from opening when the draw-out unit is connected or in the test location. When the switch reaches an isolated location, this automatically releases the door allowing it to open. It is possible to override the lock, but it is only permitted in service situations.

If the door needs to be opened for service situations even when the product is energized, it is possible to use a service mode trick:

1 Open the rotational locks and the latch lock.
2 Release the door lock by moving a screwdriver from top to bottom in the groove shown.

Fig. 9.1 Release the door

9.2.2 Release the Locking Solenoid

The locking solenoids are located behind the switch mechanism, which is not normally accessible when the switch is in use. The automatic transfer switches are electrically interlocked and prevent switches closing Source 1 and Source 2 at the same time in Connected location.

If something unexpected happens when both switches are in the Connected location and there is a need to operate another switch to OFF position or the switch needs to be removed, there is a way to release the locking solenoids. Even in a situation where the control circuit has lost its power, the solenoids are locked and can only be released when the voltage is switched on as described below.

Open the lower door of the enclosure. If the switch is in the Connected or Test position, see previous page the instructions how to release the door. PCBA and service solenoid terminals are situated on the back side of the control plate. See figure below. Service instructions are also located on the control plate on top of the service terminals.

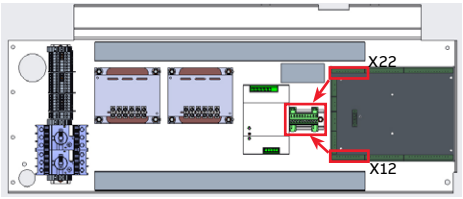


Fig. 9.2 Control plate (back side), PCBA and service solenoid terminals

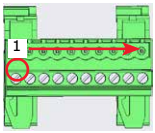
SERVICE: Release the locking solenoids S1 and S3.
1. Remove connector X22 (release ATS) or X12 (release BYPASS) from PCB and connect X22/X12 to the service connector below.
2. Supply 24V DC to the service connectors:
   +24V DC → Terminal 1 & 5
   - 24V DC → Terminal 2 & 6
3. Operate ATS/BYPASS via HMI or manually by handle.
4. Install the X22/X12 back to the PCB.

Fig. 9.3 Control plate (back side), Service instructions, located near the service terminals

Then follow the instructions:

1 Disconnect connector X22 from the PCBA if the ATS interlock solenoids need to be released. Disconnect connector X12 from the PCBA if the Bypass interlock solenoids need to be released. Connect the disconnected connector to the service terminals, see below.

2 Apply 24 V DC to the service terminals:
+ 24V dc –> to terminals 1 and 5
- 24V dc –> to terminals 2 and 6
If you are not sure of the order of the connectors, see the wiring markings or the instruction below:



UMSTBVK 2,5/10-G-5,08
- 1788198

3 You will hear a sound when the locking solenoids are released and then you can use the ATS or Bypass switch via the HMI or manually by the switch own handle e.g. to the OFF position, if it is necessary to take the switch out to the TEST or ISOLATED positions. For more information of the switch own handle, see the TruONE manual 34OX_30-1600.

NOTE! The rack in / out mechanism works only when the switch is in the OFF position and the other switch is in the I / II position.

4 Finally, reinstall X22 or X12 in the PCBA to allow normal operation to continue.

9.2.3 Release the Racking in/out Push Button

The in/out mechanism of the rack is electrically and mechanically locked. The racking in/out push button only works if the switch is in the OFF position and the other switch is connected to Source 1 or Source 2.

If you accidentally press the racking in/out push button (1), but there is no need to move the switch to the Test or Isolated location, there is one special trick: The racking in/out push button can be released by pressing the lever behind the label (2). Otherwise, rotate the switch to the following possible locations, for example from the Connected location to the Test location.

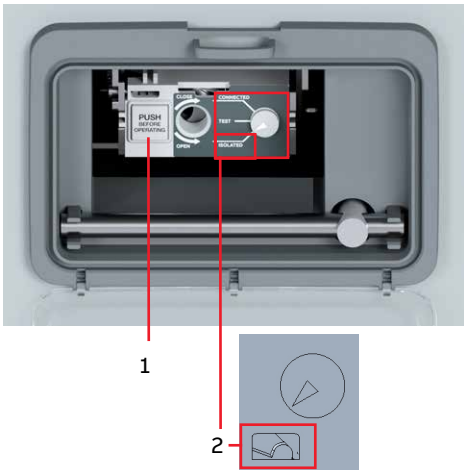


Fig. 9.4 Trick to release the racking in/out push button by pressing the lever behind the label (2)

9.3 Ekip Signalling 10K

The Ekip Signalling 10K is an external signalling accessory module, it is factory installed only. It is mounted on the DIN rail located on the cabinet control plate. This Ekip signalling module provides:

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

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

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

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

Fig. 9.5 Ekip Signalling 10K module

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

In Bypass-Isolation automatic transfer switch it is possible to use only one Ekip Signalling 10K module (= 10K-1 configuration). There is no possibility to use multiple Ekip Signalling 10K modules 10K-2 and 10K-3.

NOTE! The Ekip Signalling 10K-1 is equipped with ten inputs (with as many LEDs, giving a total of twenty LEDs).

Connections

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

9.3.1 Wiring

The power supply of Ekip signalling 10K module is taken directly from PCBA terminals X14: 5 (+24V DC) and X14: 6 (-24V DC) located on the control plate (back side). These terminals are ready for use in 24V DC supply. Figures show the wiring route example.

For the wirings:

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

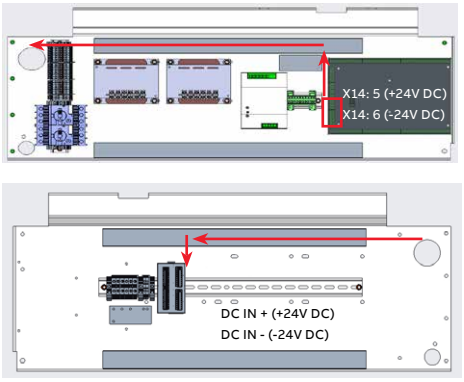


Fig. 9.6 The power supply for Ekip Signalling 10K module can be taken directly from PCBA terminals X14: 5 (+24V DC) and X14: 6 (-24V DC) located on the control plate (back side), see upper picture. The red lines are wiring rotes. The lower picture is the front side of the control plate, where Ekip Signalling 10K module will be installed. The power supply taken from PCBA will be connected to the terminals DC IN + and DC IN - of Ekip Signalling 10K module

9.3.2 Outputs, inputs and signals

The outputs and the inputs are accessible on the connectors positioned on the front of the module. Table 9.1 illustrates the pins of these connectors. Table 9.2 illustrates the signals related to the outputs, and their meaning. Table 9.3 illustrates the signals related to the inputs, and their meaning.

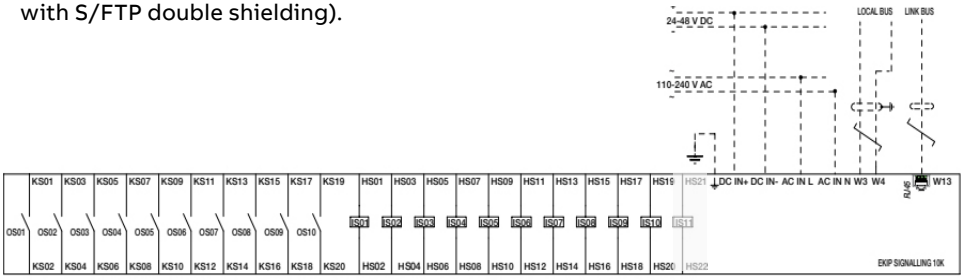
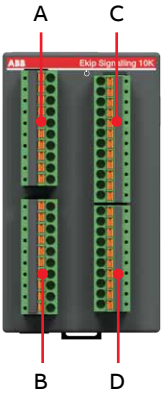
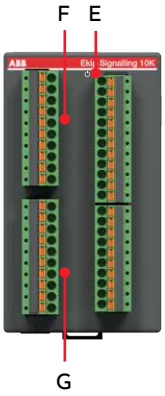


Fig. 9.7 Ekip Signalling 10K module, connection diagram



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

Table 9.1 Outputs and inputs



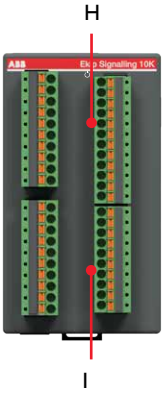
[1] The LED Alive option with communication via Local Bus is the one set on the trip unit, with communication via Link Bus it's the one set on the module.

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

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

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

Table 9.2 Output signals



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

Table 9.3 Input signals

9.3.3 Communication Connectors

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

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

Table 9.4 Communication connectors

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

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

Table 9.5 Signals on connector W13

9.3.4 Power Supply Connectors

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

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

Table 9.6 Power supply connectors

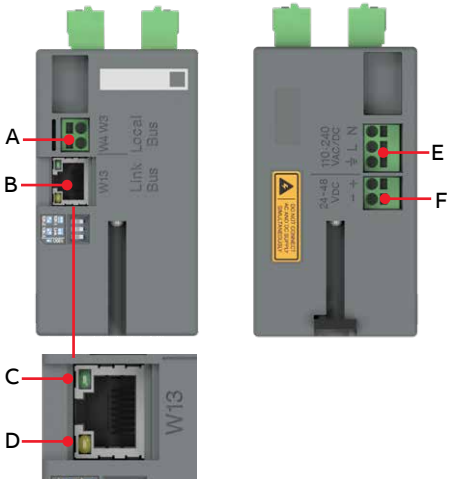


Fig. 9.8 Ekip Signalling 10K module, Communication connectors on left, Power supply connectors on right

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

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

[1] Data related to a resistive load.

Table 9.7 The electrical specifications of the module power supplies and outputs

9.3.5 DIP switch configuration when installing Ekip Signalling 10K module

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

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

DIP Switch	Termination resistor	
	No	Yes
1	OFF	ON

Table 9.8 Inserting the termination resistor ON

The Ekip Signalling 10K module configured for a basic module 10K-1 is already done in the factory; configuration is done with the DIP switches 2 and 3, both are in OFF-position, see the Fig. 4.14. The DIP switches are positioned on the upper side of the module. The following tables describe the possible configurations, 10K-2 and 10K-3 configurations are not available for Bypass-Isolation automatic transfer switch:

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

Table 9.9 Configurations

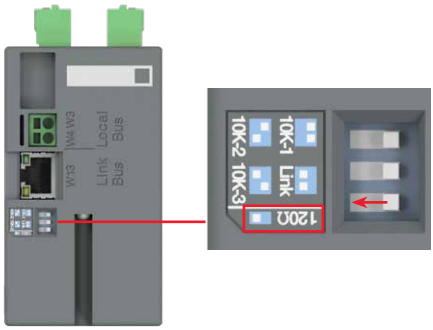


Fig. 9.9 Ekip Signaling 10K module; When using a local bus, the 120 Ω termination resistor must be switched to the ON position with DIP switch 1. By default, the Ekip Signaling 10K module type is already 10K-1 position (= DIP switches 2 and 3 are on OFF-position)

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

9.4 Auxiliary Contact Blocks

In Bypass-Isolation automatic transfer switches include in both ATS and Bypass switches auxiliary contact blocks as followed:

- 2 pcs NO contacts (2 x OA1G10)
- 1 pcs NC contact (OA3G01)

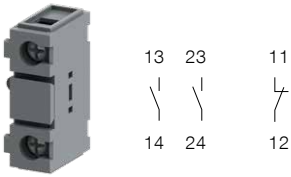


Fig. 9.10 Auxiliary contact blocks, 2 NO and 1 NC, in both ATS and Bypass switches, labels for contact numbering

The auxiliary contact blocks are installed at the factory on both ATS and Bypass switches and wired upto the terminal blocks on the Control Plate (front side), see Fig. 4.16.

The auxiliary contact blocks in both switches ATS and Bypass are situated:

- Source 1: 1NO
- Source 2: 1NO and 1NC

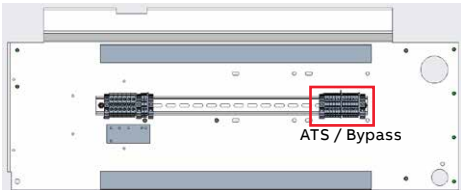


Fig. 9.11 Auxiliary contact blocks are wired to the terminal blocks (two terminals/one contact) on the Control Plate (front side)

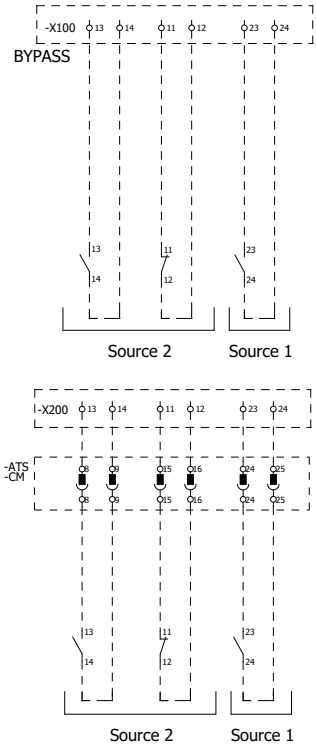


Fig. 9.12 Connection diagrams, upper picture is for fixed Bypass, lower picture is for the draw-out switch. Terminal numbers according to the auxiliary contact blocks. Terminals located on the Control Plate

9.5 Heater

Heater is used for prevention of condensation, corrosion and leakage currents in Bypass-Isolation Automatic Transfer Switch cabinet.

Heater and thermostat package are available as accessory. When ordered, it is installed in working order at the factory. The thermostat is set to 10 °C (50 °F).

Operation: When temperature in cabinet drops below thermostat setpoint, heater is turned "ON". When temperature is above set point, heater turns "OFF". Thermostat is factory set at 10°C (50°F) unless otherwise specified.

All the specified Heater documents are delivered with the cabinet. See drawing 70R-2010.

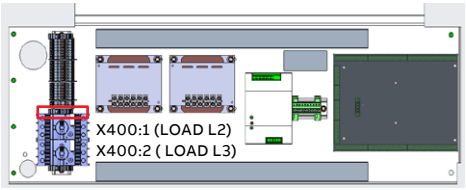


Fig. 9.13 Power supply for heater is taken from terminals X400:1 (LOAD L2) and X400:2 (LOAD L3) on the back side of the Control Plate.

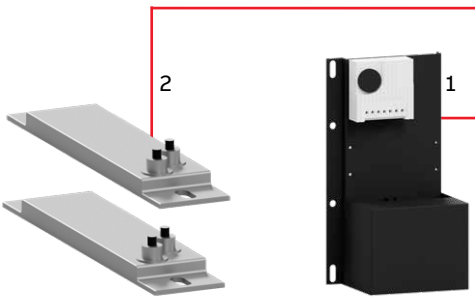


Fig. 9.14 Place of the heater thermostat package on the front side of the Control Plate and heater strips behind the Control Plate in top of the compartment

9.6 Meter

The multifunction power meter is an accessory, it is designed to be used in electrical substations, panel boards and as a power meter for OEM equipment. The unit provides multifunction measurement of electrical parameters. When ordered, it is installed in working order at the factory.

Fig. 9.15 Meter

Features:

- 0.2% class revenue certifiable energy and demand metering
- Meets ANSI C12.20 (0.2%) and IEC 687 (0.2%) classes
- Multifunction measurement including voltage, current, power, frequency, energy
- Percentage of load bar for analog meter perception
- Easy-to-use faceplate programming
- IrDA port for PDA remote read
- RS485 Modbus communications

All the specified Meter documents are delivered with the cabinet. See drawing 70R-2012.

9.7 Protection Devices

There are a few suitable protection devices for the Bypass-Isolation automatic transfer switch that can be added as an option. If you select the OVR surge protection device, it is recommended to use it together with fuse disconnector. The surge protection device integrated in the ATS switch (type TPME_) can be used independently. When ordered, either option is installed in working order at the factory.

9.7.1 Surge Protection Device OVR

OVR range is designed to prevent electrical systems and equipment against transitory surges and impulses caused by lightning and operations on the electrical grid. Suitable also for UL installations.

OVR type 2 is designed to protect electric installations and sensitive equipment against indirect surges with ensuring a low protection level (Up). Take a closer look to phases, max voltage and UL edition.

For example recommended type:

- OVRT23N40550PTSU.

Replacement Cartridges:

- Phase OVRT240550CU
- Neutral OVRT270NCU

9.7.2 Fuse Disconnector

Fuse Disconnector is needed for OVR Surge Protection Device. The recommended type is:

- ABB Fuse Disconnector E93/50
  - 2CSM277962R1801 E93/50
  - 2CSM256333R1801 E9F14GG50

Fig. 9.17 Fuse Disconnector

Fig. 9.16 Surge protection device OVR

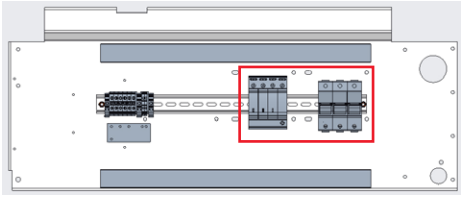


Fig. 9.18 Suitable place for the Surge Protection Device and for the Fuse Disconnector

9.7.3 Integrated SPD, Type TPME_

Surge Protective Devices (SPD) have become a standard component in today's data centers, office buildings and manufacturing facilities because they improve equipment uptime and reduce expensive facility equipment repairs. SPD have always been regarded as best in class.

This important component is available as accessory factory-mounted inside Zenith Bypass-Isolation automatic transfer switch for optimal facility equipment protection.

Integral SPD is factory wired to the load-side of the ATS to minimize lead lengths and provide the highest possible surge protection for the connected critical loads. The integral mounting conserves wall space and reduces installation costs.

Technical Specifications	
Operating Frequency:	50/60 Hz
Connection:	#10 Conductors, Parallel Connected (40-600 Amp ATS)
	#6 Conductors, Parallel Connnected (800-4000 Amp ATS)
Operating Temperature:	-4°F to 104°F (-20°C to 40°C)
Operating Humidity:	0% to 95% Non-Condensing
Weight:	ME: 13 lbs. (5.9 kg)

—
Table 9.10 Technical Data, Integrated SPD for ATS, type TPME_

9.7.3.1 Other Features of TPME_

- Meets and/or exceeds the requirements of UL 1449 3rd Edition, cUL, NEMA LS-1 and NEC Article 285
- Thermally protected MOVs eliminate the need for additional upstream overcurrent protection
- Factory wired, no field connections (except remote alarm contacts)

All specified documents of Integrated SPD are delivered with the cabinet. See drawing 71R-2097.

—
Fig. 9.19 Integrated SPD, type TPME_

Dimension drawings

Bypass-isolation automatic transfer switches Zenith ZBTS T-series 100-1200A

10. Dimension drawings

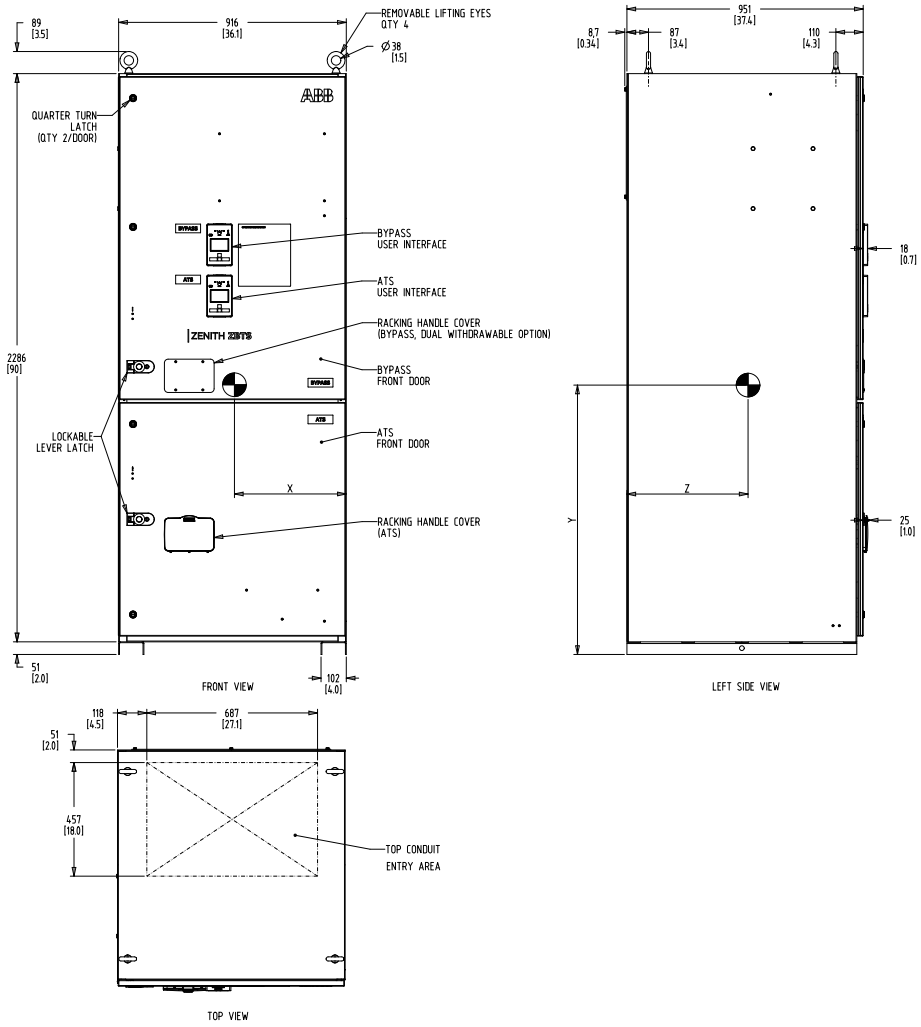
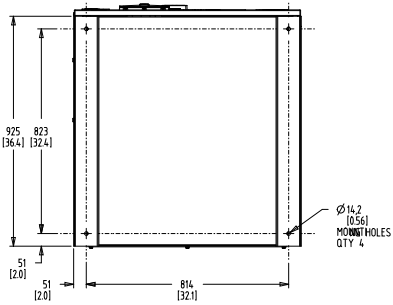
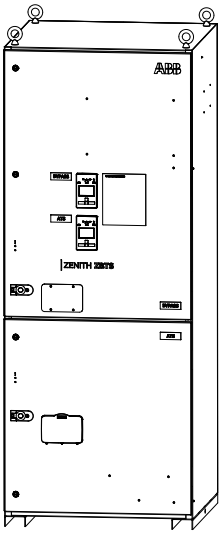


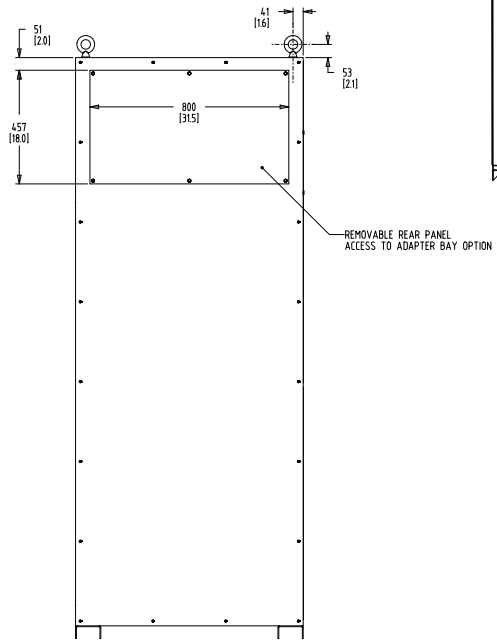
Fig. 10.1 ZS 30-1200, dimension drawings



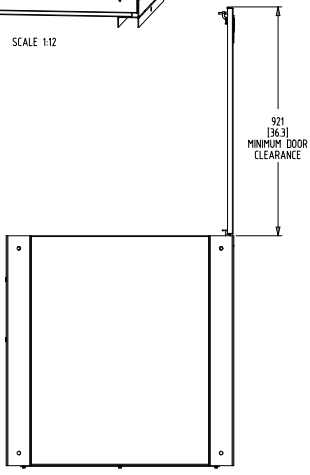
BOTTOM VIEW



SCALE 1:12



REAR VIEW

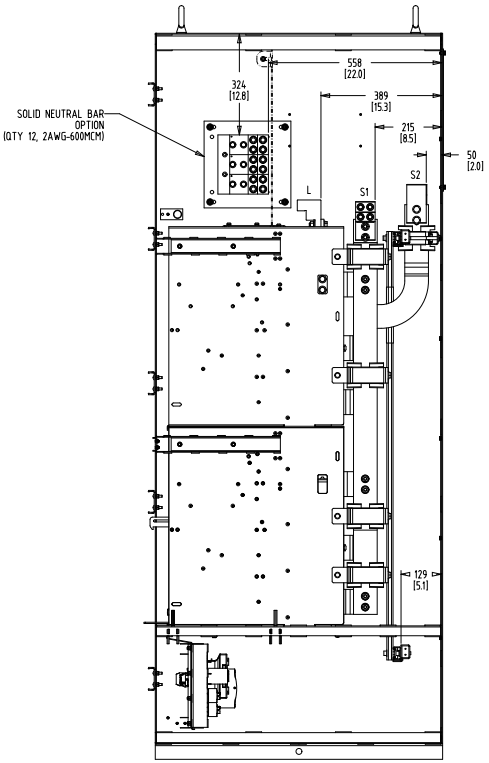


BOTTOM VIEW DOOR OPEN
ENCLOSURE SHOWN ONLY

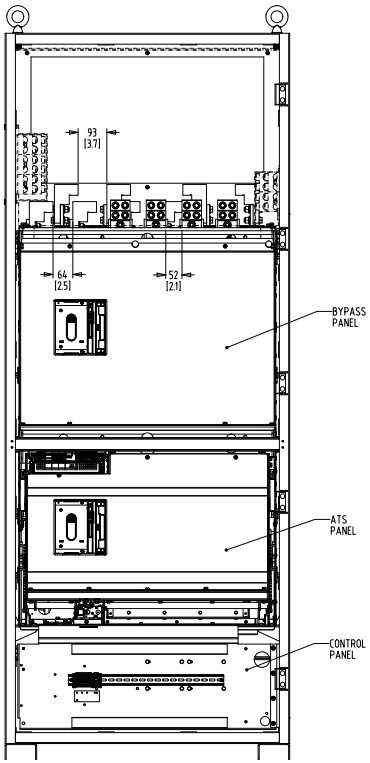
APPLICATION	TRANSITION TYPE	POLE	WEIGHT kg (lb)	CENTER OF GRAVITY mm (in)		
				X	Y	Z
STANDARD BYPASS	OPEN DELAYED	3	705 (1554)	472 (18.6)	1079 (42.5)	495 (19.5)
		4	775 (1709)	448 (17.6)	1082 (42.6)	490 (19.3)
DUAL WITHDRAWABLE		3	733 (1616)	473 (18.6)	1090 (42.9)	503 (19.8)
		4	803 (1770)	450 (17.7)	1092 (43.0)	497 (19.6)

AMP	LUG RANGE
100 - 200 A	QTY 1 6 AWG - 300 MCM (13-152mm^2)
260 - 400 A	QTY 2 1/0 AWG - 250 MCM (53-127mm^2) (OR) QTY 1 4 AWG - 600 MCM (21-304mm^2)
600 A	QTY 2 2 AWG - 600 MCM (34-304mm^2)
800 - 1200 A	QTY 4 2 AWG - 600 MCM (34-304mm^2)

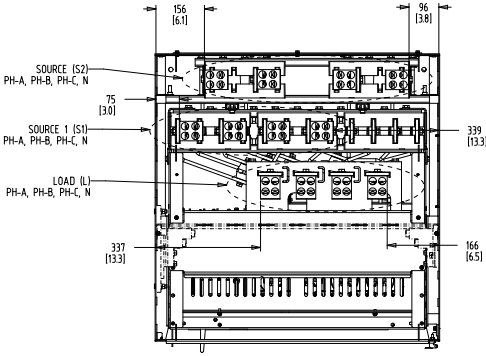
NOTES
1. ENCLOSURE: NEMA TYPE 1, FREE STANDING, FLOOR MOUNT.
2. MATERIAL: 12 GA (105) HRS REF.
3. FINISH: ANSI 61 GRAY.
4. CONSTRUCTION PER UL 1008 STANDARD.
5. FRONT ACCESSIBLE UNIT. SIDE OR REAR ACCESS REQUIRED FOR BOTTOM CABLE ENTRY.
6. SUITABLE WIRE BENDING SPACE PROVIDED PER UL 1008.
7. UL AND CSA RECOGNIZED/CERTIFIED MECHANICAL LUGS ARE STANDARD.
8. EQUIPMENT GROUND LUG IS PROVIDED IN ALL UNITS. REFER TO SHEET #2 FOR DETAILS.
9. ALL DIMENSIONS ARE FOR REFERENCE ONLY AND SHOWN IN MILLIMETERS (INCHES).
10. 100% RATED SOLID/SWITCHED NEUTRAL PROVIDED PER THE SWITCH CONFIGURATION.
11. SUITABLE FOR TOP CABLE ENTRY.
12. ADAPTER BAY DETAILS SHOWN ON SHEET #3 FOR BOTTOM CABLE ENTRY.
13. REMOVABLE REAR PANEL FOR CABLE CONNECTIONS.
14. COMPRESSION LUGS ARE AVAILABLE AS AN OPTION. REFER TO PRODUCT CATALOG.
15. CENTER OF GRAVITY DIMENSIONS ARE FOR REFERENCE ONLY.
16. BYPASS STATUS INDICATION IS DISPLAYED ON HMIs.



RIGHT SIDE VIEW
PANEL REMOVED

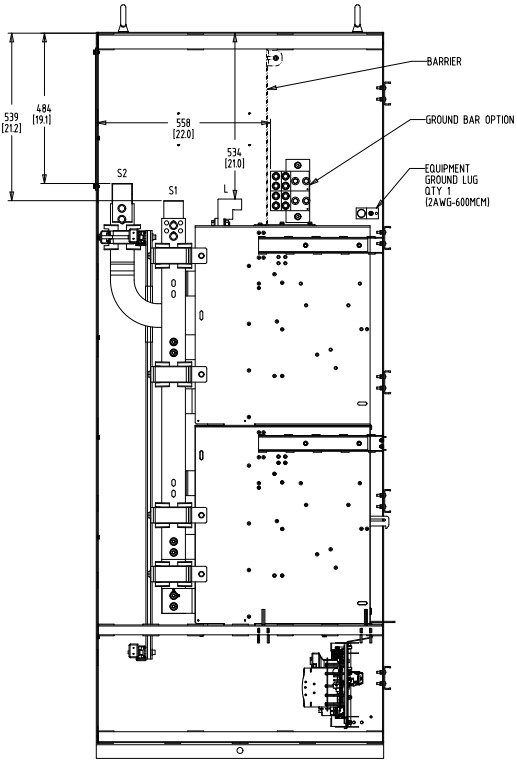


FRONT VIEW
DOORS REMOVED

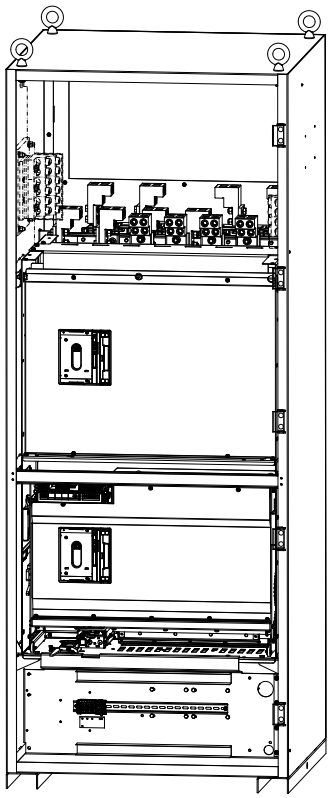


TOP VIEW
PANEL REMOVED

Fig. 10.2 ZS 30-1200, dimension drawings, cabin inside



LEFT SIDE VIEW
PANEL REMOVED



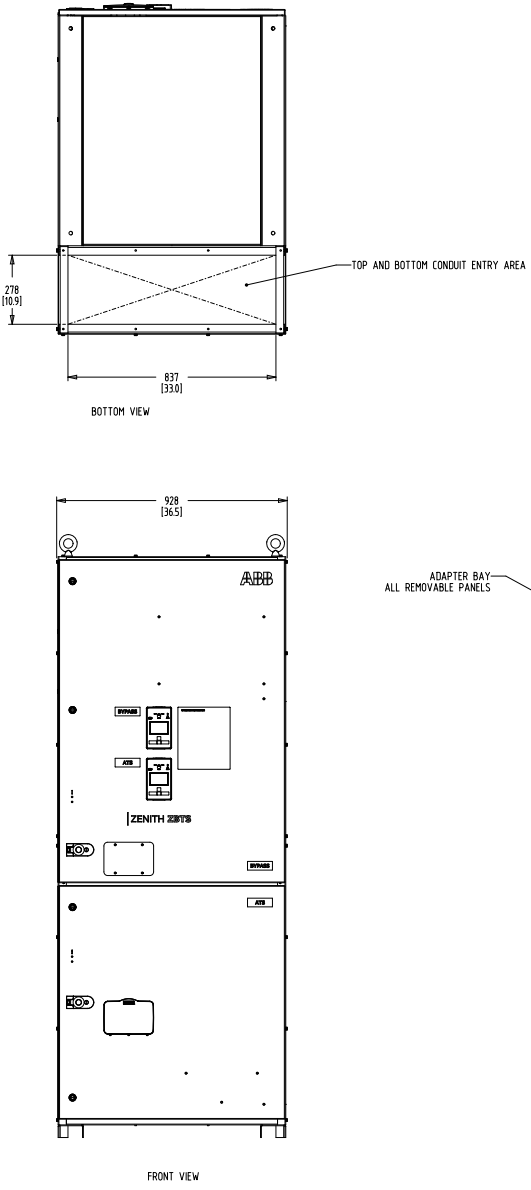
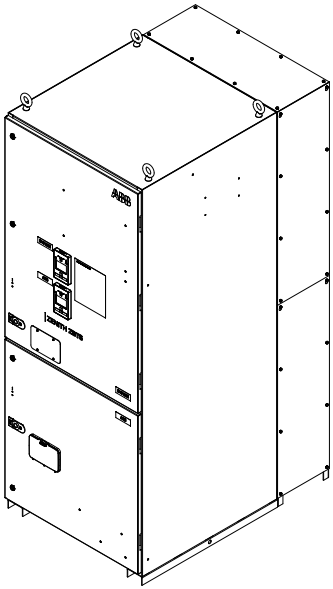
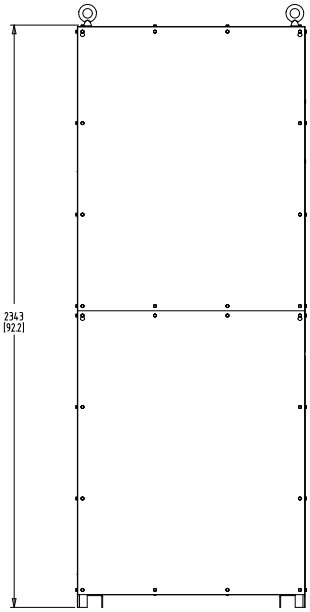


Fig. 10.3 ZS 30-1200, Adapter bay, cable entry from bottom



SCALE 1:12



REAR VIEW

Additional information
We reserve the right to make technical changes or modify the contents of this document without prior notice. With regard to purchase orders, the agreed particulars shall prevail. ABB does not accept any responsibility whatsoever for potential errors or possible lack of information in this document.

BG Внимание! Опасно напрежение! Да се монтира само от лице с електротехническа квалификация.
CN 警告！电压危险！只能由专业电工进行安装。
CZ Varování! Nebezpečné napětí! Montáž smí provádět výhradně elektrotechnik!
DA Advarsel! Farlig elektrisk spænding! Installation må kun foretages af personer med elektroteknisk ekspertise.
DE Warnung! Gefährliche Spannung! Installation nur durch elektrotechnische Fachkraft.
EL Προειδοποίηση! Υψηλή τάση! Η εγκατάσταση πρέπει να γίνεται μόνο από εξειδικευμένους ηλεκτροτεχνικούς.
EN Warning! Hazardous voltage! Installation by person with electrotechnical expertise only.
ES ¡Advertencia! ¡Tensión peligrosa! La instalación deberá ser realizada únicamente por electricistas especializados.
ET Hoiatus! Ohtlik pinge. Paigaldada võib ainult elektrotehnika-alane ekspert.
FI Varoitus! Vaarallinen jännite! Asennuksen voi tehdä vain sähköalan ammattihenkilö.
FR Avertissement! Tension électrique dangereuse! Installation uniquement par des personnes qualifiées en électrotechnique.
HR Upozorenje! Opasan napon! Postavljati smije samo elektrotehnički stručnjak.
HU Figyelmeztetés! Veszélyes feszültség! Csak elektrotechnikai tapasztalattal rendelkező szakember helyezheti üzembe.
IE Rabhadh! Voltas guaiseach! Ba chóir do dhuine ag a bhfuil saineolas leictriteicniúil, agus an té sin amháin, é seo a shuiteáil.
IT Avvertenza! Tensione pericolosa! Fare installare solo da un elettricista qualificato.
LT Dėmesio! Pavojinga įtampa! Dirbti leidžiama tik elektrotechniko patirties turintiems asmenims.
LV Uzmanību! Bīstami - elektrība! Montāžas darbus drīkst veikt tikai personas, kurām ir atbilstošas elektrotehniskās zināšanas.
MT Twissija! Vultaġġ perikoluż! Għandu jiġi installat biss minn persuna b'kompetenza elettroteknika.
NL Waarschuwing! Gevaarlijke spanning! Mag alleen geïnstalleerd worden door een deskundige elektrotechnicus.
NO Advarsel! Farlig spenning! Montering skal kun utføres av kvalifiserte personer med elektrokompetanse.
PL Ostrzeżenie! Niebezpieczne napięcie! Instalacji może dokonać wyłącznie osoba z fachową wiedzą w dziedzinie elektrotechniki.
PT Aviso! Tensão perigosa! A instalação só deve ser realizada por um eletricista especializado.
RO Avertizare! Tensiune periculoasă! Instalarea trebuie efectuată numai de către o persoană cu experienţă în electrotehnică.
RU Осторожно! Опасное напряжение! Монтаж должен выполняться только специалистом-электриком.
SE Varning! Farlig spänning! Installation får endast utföras av en elektriker.
SK Varovanie! Nebezpečné napätie! Montáž môže vykonávať iba skúsený elektrotechnik.
SL Opozorilo! Nevarna napetost! Vgradnjo lahko opravi le oseba z elektrotehničnim strokovnim znanjem.

Contact us

ABB Zenith Controls, Inc.
305 Gregson Drive
Cary, NC 27511

24-hour support:
ABB Technical Services
+1 (800) 637-1738
epis.pqservice@abb.com

abb.com/lowvoltage

www.abb.com/truone

34ZBTS_30-1200A rev.A / 1SCC303043M0201 # 04.04.2022