



OPERATION, MAINTENANCE, AND INSTALLATION GUIDE

Zenith ZTG T-series

For ZTG(D)-series automatic transfer switches 1600-3000 A,
208-480 Vac



Receiving, handling and storage

Read these safety instructions carefully before using this produce

**Warning**

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

Avertissement

Le message suivant est utilisé pour signaler une situation dangereuse qui, si elle n'est pas évitée, peut entraîner la mort ou des blessures graves.

**Danger**

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

Danger

Le message suivant est utilisé pour signaler toute situation dangereuse qui, si elle n'est pas évitée, entraînera la mort ou des blessures graves.

HAZARD OF EQUIPMENT OVERTURNING

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

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

Receiving and handling

Upon receipt, carefully inspect the 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 packaging until ready to install the switch.

Storage

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

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment and follow safe electrical work practices.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Before performing visual inspections, tests, or maintenance on the equipment, disconnect all sources of electric power. 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.
- Disconnect all sources of electric power before removing or making source side or load side connections to the transfer switch.
- Always use a properly rated voltage sensing device at all line and load connections to confirm transfer switch is disconnected from all live electrical sources.
- Turn off power supplying transfer switch before doing any other work on or inside switch.

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

Operation, maintenance, and installation instruction

Automatic transfer
switches, Zenith
ZTG T-series ATS

OPERATION AND MAINTENANCE
INSTRUCTIONS, ZENITH
ZTG T-SERIES ATS,
CHAPTERS 1–8

INSTALLATION INSTRUCTIONS,
ZENITH ZTG T-SERIES ATS,
CHAPTERS 9–11

1

2

Operation and maintenance instruction

Automatic transfer switches, Zenith ZTG T-series ATS

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1 Introduction

This manual describes the installation, basic operation, and maintenance of the Zenith ZTG(D)-series 1600-3000 A, 208-480 Vac automatic transfer switches, manufactured by ABB.

Installation instructions for the transfer switch and available accessories can be found in Chapters 9 and 10.

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.



Danger

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

Danger

Le message suivant est utilisé pour signaler toute situation dangereuse qui, si elle n'est pas évitée, entraînera la mort ou des blessures graves.



Warning

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

Avertissement

Le message suivant est utilisé pour signaler une situation dangereuse qui, si elle n'est pas évitée, peut entraîner la mort ou des blessures graves.



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.

Attention

Le message suivant est utilisé pour signaler toute situation dangereuse qui, si elle n'est pas évitée, peut entraîner des blessures mineures ou modérées. Le non-respect de ces instructions peut entraîner des dommages au produit.



Notice

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

Avis

Il est utilisé pour faire part des pratiques non liées à des dommages corporels. Le non-respect de ces instructions peut entraîner des dommages au produit.

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 warranties of merchantability or fitness for purpose shall apply.

Contact your local sales office if further information is required concerning any aspect of the automatic transfer switch operation or maintenance.

Warranty Period

The Warranty Period for ZTG T-series transfer switch products is twenty-four (24) months from the date of shipment.

Notes: This warranty is valid only in the United States and for products sold and installed within seller-specified countries.

Replacement parts are warranted for a period of 90 days when installed by a factory or an authorized service station.

Contact Service team at: +1 800 637 1738 or epis.pqservice@abb.com for 24-hour support.

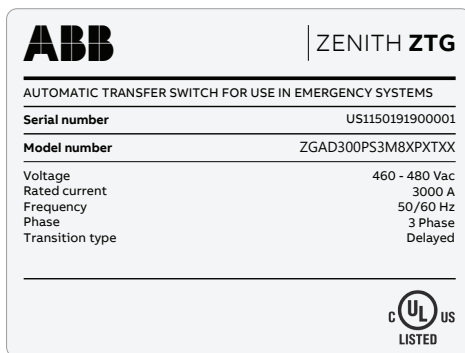


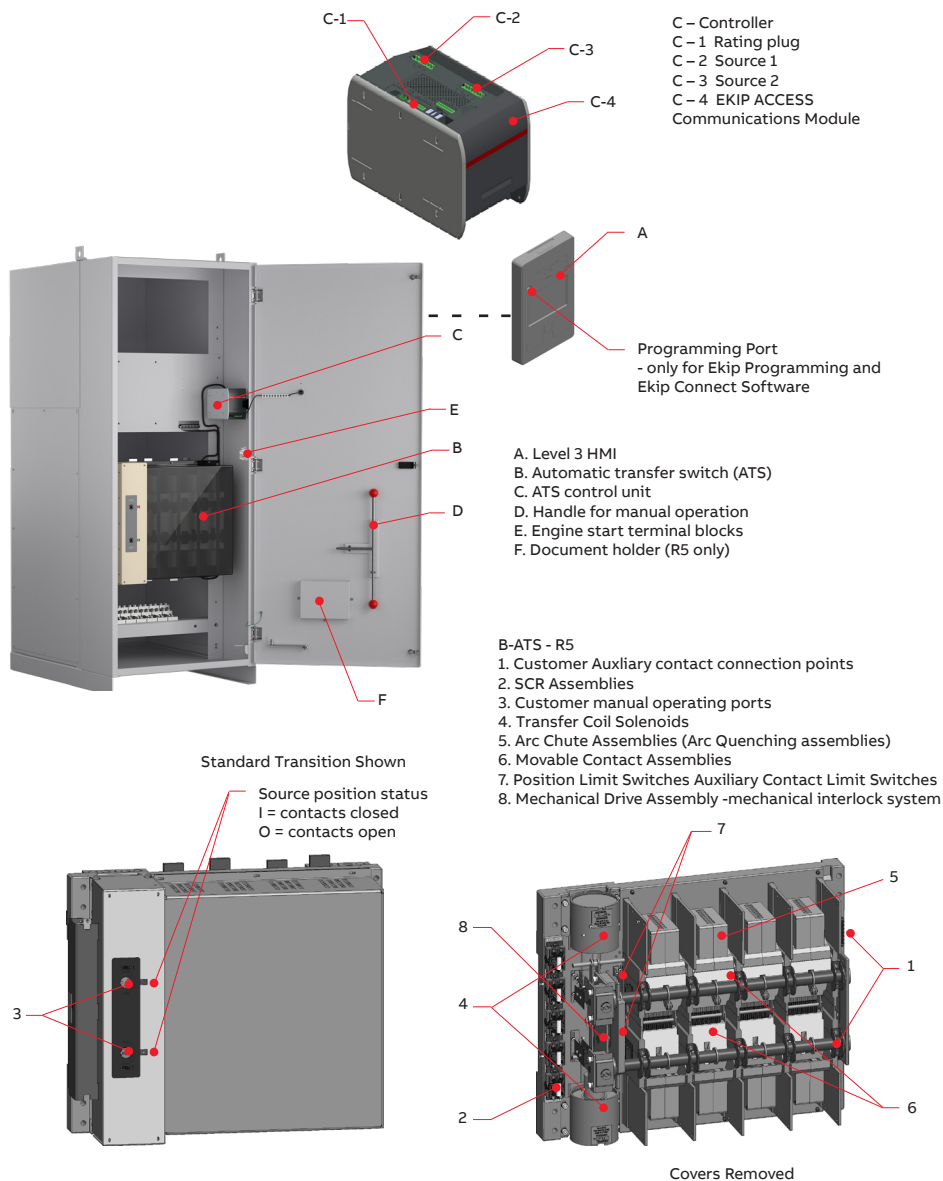
Fig. 1 Sample nameplate

Product Rating / Applicable Standards

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

2 Product overview

2.1 General overview



Operation types

In this table you can find the differences of the automatic transfer switch open and delayed transition operation types. Due to the different transition types, there are variances with HMI and on wiring of I/O contacts.

HMI

The HMI is the control interface (Human Machine Interface) of the ATS.

Zenith ZTG T-series has a LCD HMI with push buttons. The HMI is used for configuring parameters for automatic operation.





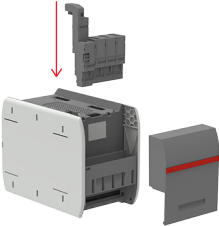
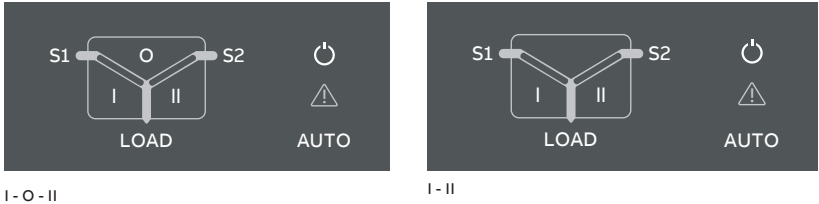
Operation types, ZTG T-series ATS		Ekip-modules suitable
Delayed transition, ZTGD	Open transition, ZTG	
S1 I O II S2  Load	S1 I II S2  Load	
ZTG T-series HMI (with LCD screen) and connections of control circuit		
		Suitable 

Table 1 The differences of level types / operation types and the suitability of Ekip-modules

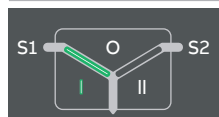
2.2 LED functionality in HMI

LED functionality is common to every HMI-type.



Fig, 2 On left: LEDs in OXB_, delayed transition, I - O - II. On right: LEDs in OXA_, open transition I - II.

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

I, II and O leds

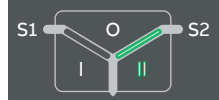
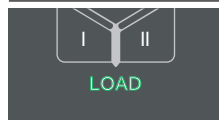
ON, fixed light

Switch position is indicated with fixed light in I, O or II led. Only one can be illuminated



Flash/1 s, 50 %/50 %

Indicating running time delay

**Load led**

ON

Supply ok and connected to load

OFF

Connected supply to load not ok or load disconnected (switch in O position)

Auto led

ON, fixed light

Switch is in automatic mode

Flash/1 s, 50 %/50 %

Test on load

Flash/1 s, 90 %/10 %

Test off load

Flash/1 s, 10 %/90 %

If blinks simultaneously with Alarm led then 'Remote control to S1', 'Remote control to S2', 'Remote control to OFF' or 'Inhibit transfer' digital input is activated.

5 flashes/1 s, 50 %/50 %

Autoconfig completed

Alarm led

OFF

No alarms

ON, fixed light

Handle attached, locked, other alarm

2 quick flashes/1 s

Control Alarm

5 flashes/1 s, 50 %/50 %

Auto configuration ongoing

Flash/1 s, 50 %/50 %

Control Retry

Flash/1 s, 10 %/90 %

Auto mode off

Flash/1 s, 10 %/90 %

If blinks simultaneously with 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 2 LED functionality, common to every HMI-type

2.3 Zenith ZTG(D)-series features

Feature comparison	ZTG(D) (LCD screen) controls
Ampere sizes available	1600-3000A (open, delayed, & closed transition)
Rated voltage	208-480 Vac
Rated frequency	50 / 60 Hz
Phase system	Single and Three
Number of poles	2, 3, and 4
Neutral configuration	
Switched	Yes
Product type	
Open transition (I - II)	Yes
Delayed transition (I - O - II or II - O - I)	Yes
Voltage and frequency settings	
Pick up SOURCE 1 Voltage	71-99 %, 101-119 %
Drop out SOURCE 1 Voltage	70-98 %, 102-120 %
Pick up SOURCE 2 Voltage	71-99 %, 101-119 %
Drop out SOURCE 2 Voltage	70-98 %, 102-120 %
Pick up SOURCE 1 Frequency	80.5-99.5 %, 100.5-119.5 %
Drop out SOURCE 1 Frequency	80-99 %, 101-120 %
Pick up SOURCE 2 Frequency	80.5-99.5 %, 100.5-119.5 %
Drop out SOURCE 2 Frequency	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
Override momentary SOURCE 2 Outage, sec	0-60
Transfer from SOURCE 2 to SOURCE 1, min	0-120

Continued on next page

Feature comparison (continued)		ZTG(D) (LCD screen) controls
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 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
Open transition - Standard digital inputs/outputs		2 / 1
Delayed transition - Standard digital inputs/outputs		3 / 1
Programmable digital inputs/outputs		Yes
Auto config (voltage, frequency, phase system)		Yes
Auto config (voltage frequency, phase system)		Yes

Continued on next page

Feature comparison (continued)		ZTG(D) (LCD screen) controls
Source priority		SOURCE 1/2, No priority
Manual re-transfer		Yes
In-phase monitor		Yes
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		Yes
Communication modules		Yes
Connectivity		
Modbus RS485		Yes
Modbus/TCP		Yes
Profibus DP		Yes
ProfiNet		Yes
DeviceNet		Yes
Ethernet IP		Yes
Ekip Com Hub (monitoring via ABB Ability™: EDCS)		Yes
Enclosures		
Type 1, 3R, 4, 12, and 4X		Yes
For applications		
Mains - Mains		Yes
Mains - Generator ¹⁾		Yes

¹⁾ Contact ABB for applications with smaller than 20 KVA gensets.

Table 3 ATS features not limited to what is in the table above

2.4 Operation

Switching sequence / Automatic (Open / Delayed transition)

SOURCE 1 Priority (SOURCE 2 = Generator)

The switching sequence can be summarized in the following steps:

1. An anomaly occurs on SOURCE 1
2. Override momentary S1 outage delay
3. Generator start
4. SOURCE 2 OK
5. Transfer from S1 to S2 delay
6. Pre-transfer signal on
7. Load shed signal on
8. Pre-transfer S1 to S2 delay
9. Load shed delay
10. Transfer switch (SOURCE 1) to position O
11. Center-off delay (only with Delayed transition I - O - II type)
12. Transfer switch (SOURCE 2) to position II
13. Post-transfer S1 to S2 delay
14. Pre-transfer signal off

The re-transfer sequence can be summarized in the following steps:

1. SOURCE 1 is restored
2. Transfer from S2 to S1 delay
3. Pre-transfer signal on
4. Pre-transfer S2 to S1 delay
5. Transfer switch (SOURCE 2) to position O
6. Center-off delay (only with Delayed transition I - O - II type)
7. Transfer switch (SOURCE 1) to position I
8. Load shed signal off
9. Generator stop delay
10. Post-transfer S2 to S1 delay
11. Pre-transfer signal off
12. Generator stop
13. SOURCE 2 off

SOURCE 2 Priority (No generator)

The switching sequence can be summarized in the following steps:

1. An anomaly occurs on SOURCE 2
2. Override momentary S2 outage delay
3. Transfer from S2 to S1 delay
4. Pre-transfer signal on
5. Load shed signal on
6. Pre-transfer S2 to S1 delay
7. Load shed delay
8. Transfer switch (SOURCE 2) to position O
9. Center-off delay (only with Delayed transition I - O - II type)
10. Transfer switch (SOURCE 1) to position I
11. Post-transfer S2 to S1 delay
12. Pre-transfer signal off

The re-transfer sequence can be summarized in the following steps:

1. SOURCE 2 is restored
2. Transfer from S1 to S2 delay
3. Pre-transfer signal on
4. Pre-transfer S1 to S2 delay
5. Transfer switch (SOURCE 1) to position O
6. Center-off delay (only with Delayed transition I - O - II type)
7. Transfer switch (SOURCE 2) to position I
8. Load shed signal off
9. Post-transfer S1 to S2 delay
10. Pre-transfer signal off

No Source Priority (Generator and load shed usage disabled)

The switching to available source can be summarized in the following steps:

1. An anomaly occurs on SOURCE 1
2. Override momentary S1 outage delay
3. Pre-transfer signal on
4. Pre-transfer S1 to S2 delay
5. Transfer switch (SOURCE 1) to position O
6. Center-off delay (only with Delayed transition I - O - II type)
7. Transfer switch (SOURCE 2) to position II
8. Post-transfer S1 to S2 delay
9. Pre-transfer signal off

When an anomaly occurs in the source in-use, the re-transfer to available source can be summarized in the following steps:

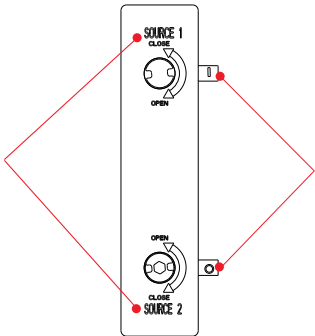
1. SOURCE 1 is restored
2. An anomaly occurs on the SOURCE 2
3. Pre-transfer signal on
4. Pre-transfer S2 to S1 delay
5. Transfer switch (SOURCE 2) to position O
6. Center-off delay (only with Delayed transition I - O - II type)
7. Transfer switch (SOURCE 1) to position I
8. Post-transfer S2 to S1 delay
9. Pre-transfer signal off

3 Operation of Automatic Transfer Switch Equipment

3.1 Position indication

3.1.1 Position Indication - R5

Source Indication with manual operating direction of handle for respective source.



Contact position status
I = Contact closed
O = Contact open

Fig. 3 View of Automatic Transfer Switch (Standalone) Panel Highlighting Customer Points of Interest. Applicable for Standard and Delay Transition Type Automatic Transfer Switch Equipment.

3.2 Operation of Automatic Transfer Switch Equipment



Danger Hazardous Voltage May Cause Severe Injury or Death

Manual opening and closing of the contacts shall only be performed with no power available.

Failure to comply with these instructions may result in death or serious injury.

Danger
Une tension dangereuse peut causer des blessures graves ou la mort
L'ouverture et la fermeture manuelles des contacts ne doivent être effectuées qu'en l'absence d'alimentation électrique.
Le non-respect de ces instructions peut entraîner la mort ou des blessures graves.



Warning Improper Installation Operation and Maintenance

Ensure only qualified personnel install, operate, service and maintain all electrical equipment. DISCONNECT all power sources prior to installation, operation, service, and maintenance of all electrical equipment. These activities shall be performed only by certified ABB Zenith technicians or qualified electricians. Only use the charging handle to perform manual operation of the transfer switch. No motorized device shall be used as a substitute. Failure to comply with these instructions may result in death or serious injury.

Avertissement Installation, utilisation et maintenance inappropriées

Veillez à ce que seul un personnel qualifié installe, utilise, révisé et entretienne tous les équipements électriques. DÉBRANCHEZ toutes les sources d'alimentation avant l'installation, l'utilisation, l'entretien et la maintenance de tous les équipements électriques. Ces opérations doivent être réalisées uniquement par des techniciens ABB Zenith agréés ou des électriciens qualifiés. Utilisez uniquement la poignée de charge pour faire fonctionner manuellement le commutateur de transfert. Aucun dispositif motorisé ne peut être utilisé comme appareil de substitution. Le non-respect de ces instructions peut entraîner la mort ou des blessures graves.

NOTE: Prior to operating the ATS in manual mode, the HMI settings must be changed from Automatic transfer mode to Manual transfer mode (see Section 4.3).

- See Section 3.2.1 for R5 ATS manual operation procedure

3.2.1 Operation of Automatic Transfer Switch Equipment - R5

Stand-alone ABB Zenith automatic transfer switches are not designed to be operated manually under load. In the event the automatic transfer switch has to be operated manually, with no power available, please follow these steps:

1. Verify all voltage input sources to the automatic transfer switch have been removed with proper LOTO procedures followed. Consider stored energy sources as well.
2. Verify all load connections have been removed with proper LOTO procedures followed. Consider stored energy for load equipment as well.
3. Insert the manual handle into the desired port of the automatic transfer switch (Fig. 5).

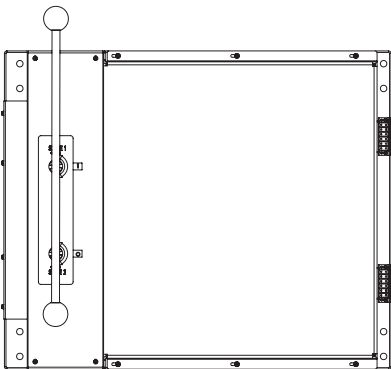


Fig. 4 Operating Handle Inserted for Manual Operation.

4. Rotate handle with two hands, in the direction as shown on the markings, to achieve the proper contact state (Fig. 5).

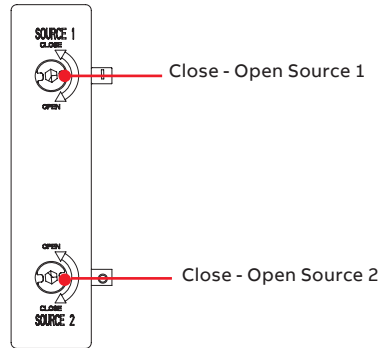


Fig. 5 Source Ha1- Source 2 Direction of Handle Rotation for Contact Closure

5. Verify that the rotation of the handle has come to full rest with markings clearly visible in the status window. Be sure to rotate the handle until no further travel is permissible, but DO NOT over-rotate. Over-rotation of handle may lead to equipment damage. Remove the manual operating handle and return it to the proper storage location before conducting any electrical transfers.
6. To return to Automatic transfer mode, return both source contacts to Open position and return the HMI Transfer Settings to Automatic transfer mode (see Section 4.3).

4 Navigating menu

4.1 Level 3 (LCD) control interface, menu tree

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

By pressing the Enter-key (3) you can:

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

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

- move in the menu
- choose the parameter value

By pressing Esc-key (1) you can:

- go back in the menu

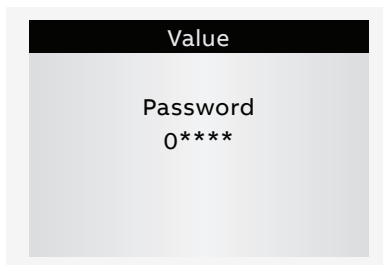


Fig. 6 Enter the password when asked, choose the right number by Up and Down -keys (2) and confirm by Enter-key (3), go forward setting number after number

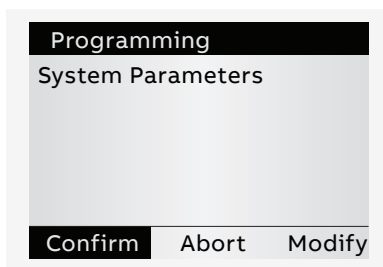


Fig. 7 After you have changed the parameter, always go back in the menu by pressing Esc-key and when prompted confirm changes with Enter-key

Description of the icons

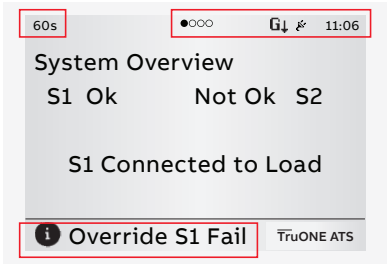


Fig. 8 Location of the small icons and the alarms

Alarm List

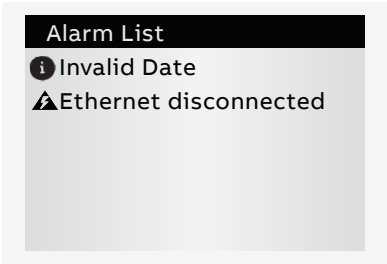



Fig. 9 When pressed Esc-key (1) in System Overview -pages, the alarm list is shown.


The small icons in System Overview -pages are:


On upper right corner

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

 Auxiliary voltage connected

11:06 Time

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

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

On upper left corner

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

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



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

4.1.1 Start screens

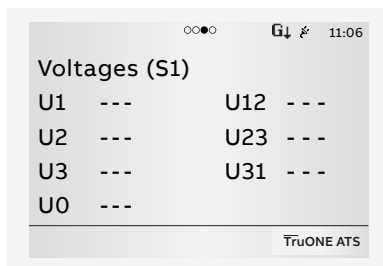
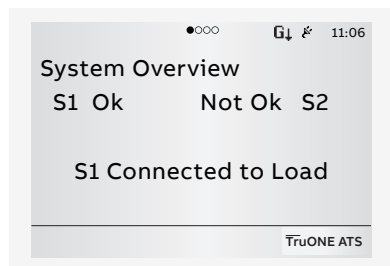


Fig. 10 From System Overview screen you will find Switch status and Supply info views, and by pressing Up and Down -keys (2), you can go forward to see Voltages and Synchronization view, see the table below.

Start screens

System Overview (Switch status)

Shows voltages and frequencies of both supplies and the switch position.

Supply info view

Shows Phase to Phase voltages of both supplies and the frequencies.

Voltages (S1)

S1 phase voltages

S1 line voltage

Voltages (S2)

S2 phase voltages

S2 line voltage

Synchronization view

Enabled only when In-phase monitor is on.

Show the time to next sync, sync period

Current view

Enabled only when current measurement module is connected.

Phase currents

Neutral current

Residual current

Active Power view

Enabled only when current measurement module is connected.

Active power by phase

Total active power

Reactive Power view

Enabled only when current measurement module is connected.

Reactive power by phase

Total reactive power

Apparent Power view

Enabled only when current measurement module is connected.

Apparent power by phase

Total apparent power

Energy Counters view

Enabled only when current measurement module is connected.

Active energy by source

Reactive energy by source

Apparent energy by phase

Total active energy

Total reactive energy

Total apparent energy

4.1.2 Enter key, main menu

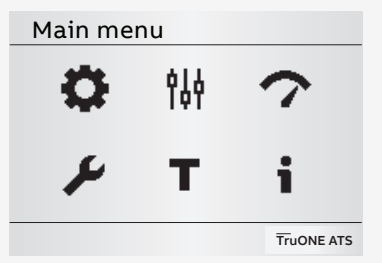


Fig. 11

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




Information

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


Information

Lorsque vous avez modifié le paramètre, retournez toujours dans le menu en appuyant sur la touche Esc et, lorsque vous y êtes invité, confirmez les modifications à l'aide de la touche Entrée.

Operation		*Default
	Bypass Time Delay	
	Bypass any currently running time delay.	
	HMI Control Keys ¹⁾	
	Enabled*	
	Disabled	
Energy Counters	Reset	
Operation mode		
	AUTO*	Automatic switch control mode. ²⁾
	MAN momentary	Manual operation mode but warning that device is in manual mode will be shown by HMI. ATS will automatically send and remove the generator start signal but user intervention is required to initiate transfer and retransfer.
	MAN permanent	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 retransfer	Same as AUTO but automatic retransfer sequence is disabled. Load will be kept on non-priority source until operator manually (by HMI or manual handle) or remotely operates the load back to priority source.


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

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


Parameters		*Default
	System parameters	
	Start Automatic Configuration	
	Power distribution systems (see Fig. 2.2)	
	Source 1	1 Phase, 2 Wire
		1 Phase, 3 Wire (Split-Phase)
		3 Phases, no Neutral (3ph3w)
		3 Phase with Neutral (3ph4w)*
		3 Phase, High-Leg Delta
	Source 2	1 Phase, 2 Wire
		1 Phase, 3 Wire (Split-Phase)
		3 Phases, no Neutral (3ph3w)
		3 Phase with Neutral (3ph4w)*
		3 Phase, High-Leg Delta
	Rated Voltage	
	200 V (3ph), 208 V (3ph), 220 V (3ph), 230 V (3ph), 240 V (3ph), 277 V (3ph), 347 V (3ph), 380 V (3ph), 400 V (3ph)* , 415 V (3ph), 440 V (3ph), 460 V (3ph), 480 V (3ph), 200 V (1ph), 220 V (1ph), 230 V (1ph), 240 V (1ph), 254 V (1ph), 265 V (1ph), 277 V (1ph), 318 V (1ph), 333 V (1ph), 347 V (1ph), 380 V (1ph), 400 V (1ph), 415 V (1ph), 440 V (1ph), 460 V (1ph), 480 V (1ph)	
	Rated Frequency	
	50 Hz*	
	60 Hz	
	Neutral Pole Location	
	Pole 4* ¹⁾	
	Pole 1	
	Phase Sequence	
	ABC*	
	ACB	
	Not Enabled	

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


Continued on next page

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


Continued on next page

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


Continued on next page


Parameters (continued)					*Default
	Device Parameters (continued)				
	Voltage & Frequency Setpoints		Defines the voltage and frequency limits for source being acceptable. Source has an anomaly when measured voltage/frequency goes out of range drop-out lower/drop-out Upper. Source becomes acceptable when measured voltage/frequency goes back in range pick-up lower/pick-up higher.		
S1 Setpoints					
		S1 Drop-out Voltage	Upper Threshold	102...120 % Un (115* % Un)	
			Lower Threshold	70...98 % Un (85* % Un)	
		S1 Pick-up Voltage	Upper Threshold	101...119 % Un (114* % Un)	
			Lower Threshold	71...99 % Un (86* % Un)	
		S1 Drop-out Frequency	Upper Threshold	101...120 % fn (115* % fn)	
			Lower Threshold	80...99 % fn (85* % fn)	
		S1 Pick-up Frequency	Upper Threshold	100.5...119.5 % fn (114* % fn)	
			Lower Threshold	80.5...99.5 % fn (86* % fn)	
S2 Setpoints					
		S2 Drop-out Voltage	Upper Threshold	102...120 % Un (115* % Un)	
			Lower Threshold	70...98 % Un (85* % Un)	
		S2 Pick-up Voltage	Upper Threshold	101...119 % Un (114* % Un)	
			Lower Threshold	71...99 % Un (86* % Un)	
		S2 Drop-out Frequency	Upper Threshold	101...120 % fn (115* % fn)	
			Lower Threshold	80...99 % fn (85* % fn)	
		S2 Pick-up Frequency	Upper Threshold	100.5...119.5 % fn (114* % fn)	
			Lower Threshold	80.5...99.5 % fn (86* % fn)	


Continued on next page

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


Continued on next page

Parameters (continued)		*Default
	Device Parameters (continued)	
	Hight current alarm	
	Status	
	Enabled	If measured current is higher than ten times the nominal value device will prevent all operations and show high current alarm on-screen. After high current status is over, device will start operating normally.
	Disabled*	
	Alarm reset required	
	Yes	User confirmation is required before re-entering normal operation after high current status.
	No*	Normal operation is started automatically after high current status.
	Transfer to Dead Source	
	On*	User can transfer to an unavailable source by using HMI keys I/II or by a remote command.
	Off	Transfer to an unavailable source is disabled.
	Source Loss Center-Off Delay	
	On*	User can select whether to always run the 'center-off' timer or skip it if there is no voltage on any of the phases on the source from where the ATS is transferring from.
	Off	
	Source Loss Pre-Signal Delay	
	On*	User can select whether to always run the pre-signal delays 'elevator pre-signal S1-S2', 'elevator pre-signal S2-S1', 'pre-transfer S1 to S2', 'pre-transfer S2 to S1' timers or skip these if there is no voltage on any of the phases on the source from where the ATS is transferring from.
	Off	

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

Settings		*Default	
	Standard I/O Settings		
	I 01 / I 02 / I 03		
	Function	No function	Input disabled.
		Emergency Stop* (default in I 01)	Transfers to O position in delayed transition I-O-II type switches. Disables automatic control mode in both delayed and open transition types.
		Remote Test On Load* (default in I 02)	Start/stop test on load sequence in rising (NO) or falling (NC) edge of the input signal.
		Remote Test Off Load* (default in I 03)	Start/stop test off load sequence in rising (NO) or falling (NC) edge of the input signal.
		Inhibit ATS	Prevent switch control operations, configuration, test sequences and generator start in case of priority source failure.
		Manual Retransfer	Disables automatic transfer back to priority source.
		Source Priority S1	Sets priority for source 1 in transformer-transformer application.
		Source Priority S2	Sets priority for source 2 in transformer-transformer application.
		Inhibit Transfer	Disables automatic transfer from priority source to non-priority source.
		Bypass Running Time Delays	Bypass any currently running time delay
		Remote Control to S1	Transfer to S1 when active. Overridden by activated 'Remote Control to OFF' signal.
		Remote Control to OFF	Transfer to O position when active.
		Remote Control to S2	Transfer to S2 when active. Overridden by activated 'Remote Control to OFF' or 'Remote Control to S1' signals.
		Reset Alarm	Reset any active switch control alarms (open I failure, close I failure, open II failure, close II failure)
		Manual-Auto Mode	Toggle automatic/HMI control mode, input is active only in rising/falling edge according to contact type.
Contact type	NC	Active open.	
	NO*	Active closed.	

Continued on next page

Settings (continued)		*Default
 Standard I/O Settings (continued)		
O 01		
Function	No Function	Output disabled.
	Alarm / Product availability*	Signals any active alarms or ATS being disabled for automatic transfer operations.
	Load Connected to S1	Switch in position I.
	Load Disconnected	Switch in position O.
	Load Connected to S2	Switch in position II.
	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 1	Used for shedding non-essential loads before transferring to non-priority source. Signal is activated before transferring to non-priority source according to load shed delay and kept activated until load is transferred back to priority source.

Continued on next page

Settings (continued)***Default****Standard I/O Settings (continued)**

	Elevator pre-transfer Signal 1	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
	Elevator pre-transfer Signal 2	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
	Elevator pre-transfer Signal 3	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
	Elevator pre-transfer Signal 4	Signal is activated and transfer is delayed according to Elevator pre-signal delay. Signal is kept activated according to Elevator post-signal delay after transfer.
Contact type	NC	Active open.
	NO*	Active closed.

Modules (See Chapter 5, Electronic accessories)**System**

RESET to Factory Setting	Restore default parameter values.
Date ¹⁾	Month day, year
Time ¹⁾	Hours:Minutes
Language	English*
	Italian
	French
	German
	Spanish
	Russian
	Chinese
New Password	Five digits
Temperature Unit	Celsius*
	Fahrenheit
Clock Format	24 h*
	12 h
Display Contrast	10...100 % (30 %*)

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

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

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

4.1.3 Esc key

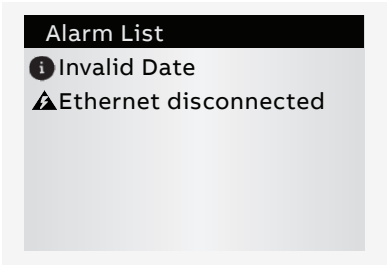


Fig. 12
By pressing Esc-key (1) in System Overview
-pages, the alarm list is shown.

Alarm list
More information, see chapter 6, Troubleshooting

5 Electronic accessories



Warning

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

Avertissement

Une tension dangereuse peut être présente à l'intérieur du panneau lors de la connexion d'accessoires électroniques. Coupez toutes les sources d'alimentation du panneau ATS avant de connecter les modules Ekip.

Ekip Connect Software and Bluetooth and Programming-modules are suitable for all ZTG(D) 1600-3000 A, 208-480 Vac automatic transfer switches, refer to Chapters 5.1-5.3. in O&M Manual for more details on:

- Ekip Connect -software
- Ekip Programming -module

Ekip Signalling and Com modules are suitable for all ZTG(D) 1600-3000 A, 208-480 Vac automatic transfer switches. These modules are mounted with auxiliary power supply module, OXEA1 (refer to Chapter 10.1 for further details).

Ekip-modules mounted with auxiliary power supply module are (see in O&M Manual):

- Ekip Signalling 2K_
- Ekip Com modules
- Ekip Com Modbus RTU
- Ekip Com Profibus DP
- Ekip Com DeviceNet
- Ekip Com Modbus TCP
- Ekip Com Profinet
- Ekip Com EtherNet/IP
- Ekip Link

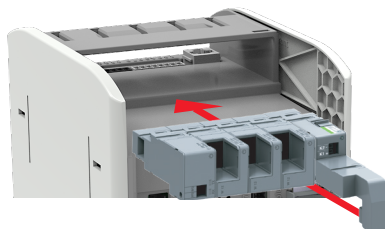


Fig. 13 Ekip Signalling, Com and Link -modules are mounted to automatic transfer switch OX_ with a auxiliary power supply module, OXEA1

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

Avertissement

Tout dépannage doit être effectué uniquement par un personnel formé et autorisé. Un équipement de protection individuelle (EPI) approprié doit être utilisé lors du dépannage du panneau ATS. Une tension dangereuse peut être présente. Coupez toutes les sources d'alimentation avant d'effectuer des travaux à l'intérieur du panneau ATS. Le non-respect de cette consigne peut entraîner des blessures graves ou la mort.



LCD



Touch

6.1 Alarms

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

Continued on next page

Message (continued)		Fault	Action
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
Frequency Difference	Frequency difference of voltage sources is greater than 3 Hz while in-phase monitor is on	Alarm is active and transfer operations disabled as long as the frequency difference is above the accepted level	
High current alarm	Measured current is higher than ten times the nominal value	Alarm is active and transfer operations disabled as long as the high current status remains	
Open I failure, Alarm LED blinking	Switch transfer from position I to O or II failed	Reset alarm by pressing Auto button or via menu page Operation / Alarm Reset	
Close I failure, Alarm LED blinking	Switch transfer to position I failed	Reset alarm by pressing Auto button or via menu page Operation / Alarm Reset	
Open II failure, Alarm LED blinking	Switch transfer from position II to O or I failed	Reset alarm by pressing Auto button or via menu page Operation / Alarm Reset	
Close II failure, Alarm LED blinking	Switch transfer to position II failed	Reset alarm by pressing Auto button or via menu page Operation / Alarm Reset	
Switch position alarm, Alarm LED on	More than one switch position indication inputs are activated		Switch service needed
Pole temperature alarm	Measured pole temperature is too high		Switch service needed
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
Local bus	Communication between HMI and switch controller is off		Check connection
Ethernet disconnected	Ethernet module not connected		Check connection
Fire Fighting	Fire fighting input activated	Alarm is active and disables transfer operations as long as the input is active	
Control Voltage Failure	Control voltage dropped during switch control		Check power source
Control Voltage Low	Switch control voltage is below the minimum		Check power source
Configuration Error	Invalid configuration		Check parameter values
IEC 61850 Error	IEC 61850 failure		Check configuration file
Ekip Com Hub Alarm	Ekip Com Hub failure		Check configuration
HMI Not Compatible	Firmware versions of HMI and device are not compatible to be used together		Check current versions and update compatible versions

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

6.2 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	

Table 5 Warnings-list in level 3 and 4, LCD and touch control interfaces

6.3 Information



LCD



Touch


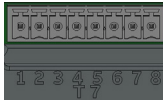

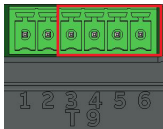
Message	Description
Invalid Date	Date not set
Test on Load	Test on load sequence active
Test off Load	Test off load sequence active
Alarm/Product Availability	Digital output function activated
In Position I	Digital output function activated
In Position O	Digital output function activated
In Position II	Digital output function activated
Pre-transfer Signal 1	Digital output function activated
Pre-transfer Signal 2	Digital output function activated
Pre-transfer Signal 3	Digital output function activated
Pre-transfer Signal 4	Digital output function activated
Source 1 Available	Digital output function activated
Source 2 Available	Digital output function activated
Load Shed	Digital output function activated
Emergency Stop	Digital input function activated
Remote Test on Load	Digital input function activated
Remote Test off Load	Digital input function activated
Inhibit 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 Info statements in level 3 and 4, LCD and touch control interfaces

7 Technical data

7.1 General technical data

Automatic transfer switch, power circuit	Value	Remark
Rated operational voltage	200-480 Vac	
Rated frequency	50 / 60 Hz	
Rated impulse withstand voltage	12 / 8 kV	
Operating times	See Table 7.3	
Automatic transfer switch, control circuit	Value	Remark
Voltage supply	200-480 Vac	
Operating voltage range	±20 %	
Voltage measurement accuracy	1 %	
Rated frequency	50 / 60 Hz	
Operating frequency range	±20 %	
Frequency measurement accuracy	0.5 %	
Rated impulse withstand voltage	6 kV	

Automatic transfer switch, I/O contacts		Cabling	Rating / Remark
Generator start/stop size:	² Cable	".08...1.5 mm ² 28...16 AWG"	Stripping length; 6,5 mm, 0,255"
	Generator 1 start/stop NC	T8 - 1	
	Common 1, voltage supply	T8 - 2	5 A@250 Vac (AC-1), 5 A@30 Vdc
	Generator 1 start/stop NO	T8 - 3	
	Generator 2 start/stop NC	T8 - 4	
	Common 2, voltage supply	T8 - 5	5 A@250 Vac (AC-1), 5 A@30 Vdc
	Generator 2 start/stop NO	T8 - 6	
Output relay features	Cable size:	".08...1.5 mm ² 28...16 AWG"	
	Common, voltage supply 1	T7 - 1	5 A@250 Vac (AC-1), 5 A@30 Vdc
	Programmable output 1	T7 - 2	
	Common, voltage supply 2	T7 - 3	5 A@250 Vac (AC-1), 5 A@30 Vdc
	Programmable output 2	T7 - 4	
	Common, voltage supply 3	T7 - 5	5 A@250 Vac (AC-1), 5 A@30 Vdc
	Programmable output 3	T7 - 6	
	Common, voltage supply 4	T7 - 7	5 A@250 Vac (AC-1), 5 A@30 Vdc
	Programmable output 4	T7 - 8	
¹ Refer to programming/I/O packages for terminal usage			
Fire Fighting applications	Cable size:	".08...1.5 mm ² 28...16 AWG"	Only in ZTGD-types, delayed transition, I-O-II or II-O-I
	Fire fighting input 24 Vdc (+)	T9 - 1	
	Fire fighting input 24 Vdc (-)	T9 - 2	
Input contact features	Cable size:	".08...1.5 mm ² 28...16 AWG"	"Do not connect to any power supply"
Common input		T9 - 3	24 Vdc 5 mA
	Level 3		Level 3 = HMI LCD with push buttons
	Programmable input 1 (default, Emergency stop)	T9 - 4	
	Programmable input 2 (default, Remote test on load)	T9 - 5	
	Programmable input 3 (default, Remote test off load)	T9 - 6	Only in ZTGD-types, delayed transition, I-O-II or II-O-I

¹Refer to programming/I/O packages for terminal usage²Cable size recommended between Generator start/stop terminal block and ATS is 2.1...3.3 mm² (14...12 AWG)

Table 7 Automatic transfer switch I/O contacts

AC15		AC12			AC13	
Ue/[V]	Ie/[A]	Ue/[V]	Ie/[A]	P/[W]	Ie/[A]	P/[W]
230	6	24	10	240	2	50
400	4	72	4	290	0.8	60
415	4	125	2	250	0.55	70
690	2	250	0.55	140	0.27	
		440	0.1	44		

Table 8 Technical data for auxiliary contacts according to IEC 60947-5-1, for OA1G_, OA3G_

Recommended Operating / Storage Temperature

Do not store the automatic transfer switch in corrosive environments above LC1 (sea salt mist) and G1 as per ANSI/ISA-S71.04-1985. Failure to comply with

these instructions may result in product damage. Store the automatic transfer switch and related accessories in a clean, dry location in their original packaging.

Environmental	Value
Operating temperature	-20... +65 °C
Transportation and storage temperature	-20... +75 °C
Altitude	Up to 2000 m

Table 9 General technical data of automatic transfer switch

Type	Voltage [Vac]	Nominal current* [A]	Contact transfer time ¹ I-II or II-I [ms]
ZTG 1600-3000 A	208 - 480	40-45	<75
ZTGD 1600-3000A	208 - 480	65	<75

¹Under nominal conditions

²All times consider that all timers are set to "0"

Table 10 Specified technical data of operating times

7.2 Circuit diagrams

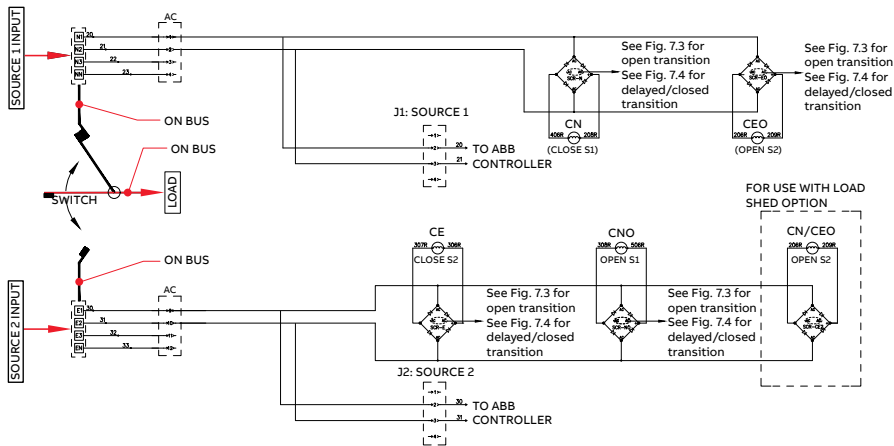


Fig. 14 ZTG, Single phase circuit diagram

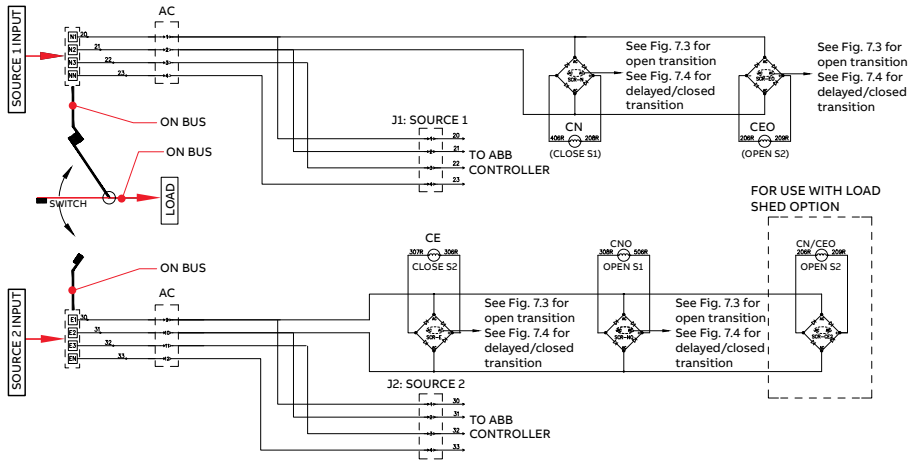


Fig. 15 ZTG, 3 phase circuit diagram

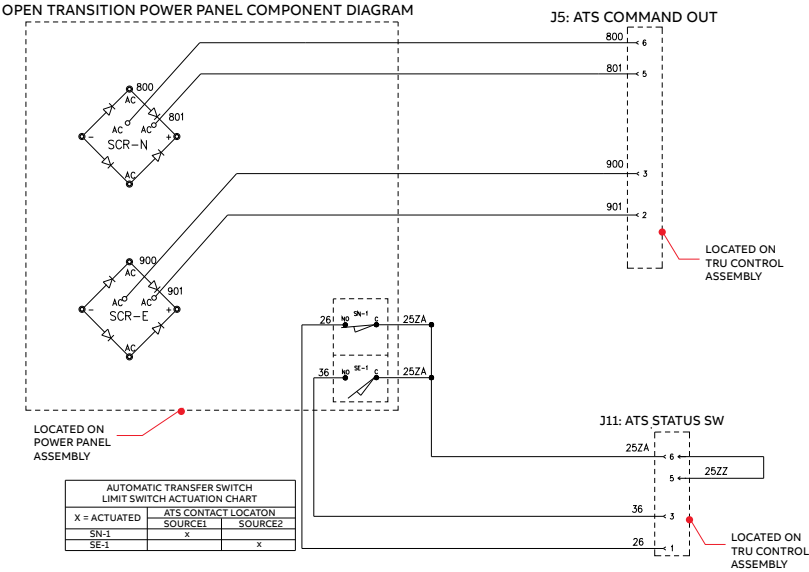


Fig. 16 ZTG, Open transition system diagram

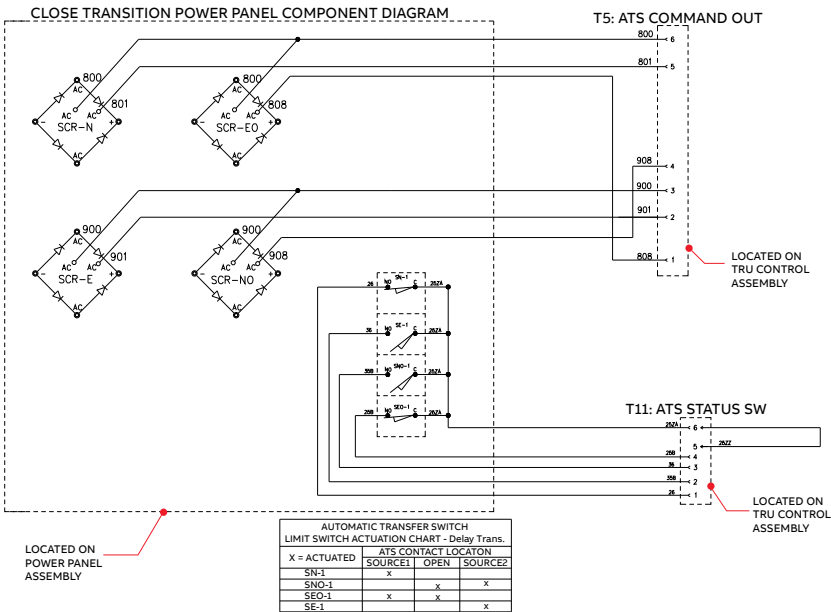


Fig. 17 ZTG, Delayed transition system diagram

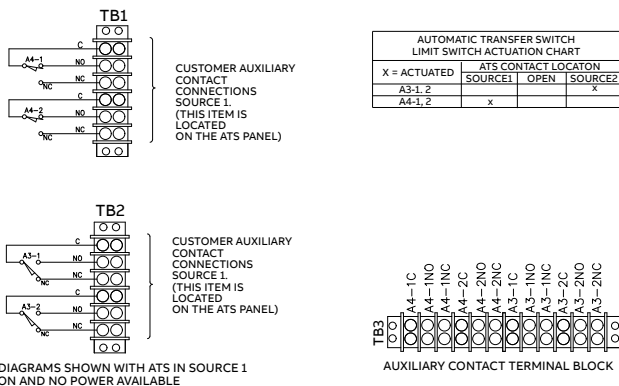


Fig. 18 ZTG, R5, Customer auxiliary contact connections

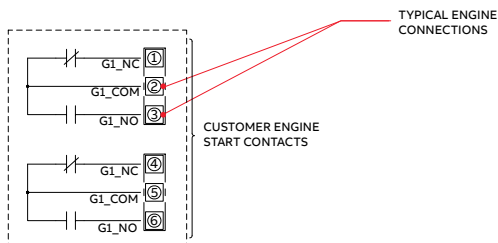


Fig. 19 ZTG, Engine start contact connections

7.3 Overall Dimensions

ZTG series dimensions and weights, UL Type 1 Enclosure

Model	ATS Rating (A)	Poles	Ref. Figure	Weight ¹ lb (kg)	Dimensions ² in (mm)		
					Width (A)	Height (B)	Depth (C)
ZTS, ZTSD	1600-3000	3	B	1375 (624)	35.5 (902)	90 (2286)	47.8 (1214)
		4	B	1480 (671)	35.5 (902)	90 (2286)	47.8 (1214)

¹Enclosures Type 3R, 12, 4, and 4X weights are up to 22 % greater than Type 1 Enclosures.

²Enclosures Type 3R, 12, 4, and 4X dimensions differ. Consult Tech Support for details.

Table 11 Overall dimensions

8 Maintenance



Warning

Any maintenance should be conducted by trained and authorized personnel only. Appropriate personal protective equipment (PPE) shall be used when performing maintenance on the ATS panel. Hazardous voltage may be present. Disconnect all power sources before performing work inside the ATS panel. Failure to do so may result in serious injury or death.

Avertissement

Toute maintenance doit être effectuée uniquement par un personnel formé et autorisé.
Un équipement de protection individuelle (EPI) approprié doit être utilisé lors du dépannage du panneau ATS.
Une tension dangereuse peut être présente. Coupez toutes les sources d'alimentation avant d'effectuer des travaux à l'intérieur du panneau ATS.
Le non-respect de cette consigne peut entraîner des blessures graves ou la mort.

Maintenance Principle

The Zenith ZTG(D)-series 1600-3000 A, 208-480 Vac automatic transfer switches 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. Some components are replaceable. Refer to Chapter 11 for replacement parts.

On the other hand, when the contacts have seen an event, or have met the end of their lifetime, the whole switch should be replaced – which can be done easily by replacing the complete power panel within the enclosure.

In the case you suspect a failure may be due to manufacturer defect and covered under warranty, see Chapter 1.3.

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, # of operations, etc. to ensure everything is in proper working order.

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 Panel installation

Before mounting the product, please, check the product identification from the product identification label.

This label indicates the product model (type number), some important technical data information, minimum enclosure size, suitable wire information, etc.



Notice

Final inspection of the equipment should be performed prior to energizing the automatic transfer switch.

Remove any dirt or debris that may have collected during shipment or installation. NEVER use compressed air. Doing so could drive dirt or other foreign objects into electrical or mechanical components, which could cause damage. Use an industrial-quality vacuum cleaner to remove any dirt or foreign objects.

Be certain all cable connections are correct and that the phase rotation of both sources match.

Inspect the engine start connections and verify the correct connection of all control wires.

Check all programmable set points and adjust as necessary. In addition, adjust any optional accessories as required.

Be certain that the actual lug torque values are within the requirements outlined in the instruction book to ensure the integrity of power connections.

Check to be sure that all covers and barriers are properly installed and fastened.

If any damage is found or suspected, file a claim as soon as possible with the carrier, and notify the nearest ABB Zenith representative, or call 1-800-637-1738.

9.1 Basic Tools for Installation and Maintenance

Tool	Task
1/4" to 1/2" Allen head socket driver	Power cable connection
Torque wrench	Torqueing of the lugs and other hardware as required. Range of device to be 50 - 500 in-lbs (5-57 N-m)
Torque screwdriver	Torqueing of control wire terminations, auxiliary contact input terminals. 5 - 25 in-lbs (0.5 - 2.8 N-m)
Wire cutters/wire crimpers	Auxiliary contacts wire installation, Options installation
Voltmeter	Trouble shooting tool for measuring incoming voltage, frequency, continuity and control signal transmission.
Controller default password 00001	Changing parameters within the controller

Table 12 Required tools for common installation and maintenance tasks

9.2 Equipment Inspection and Storage



Warning
When performing a hi-pot or dielectric test on the power section of the ATS panel, DISCONNECT the complete electronics and controller section of the ATS from the power section to avoid potential damage to the electronics.

Avertissement
Lors de la réalisation d'un test hipot ou diélectrique sur la section d'alimentation du panneau ATS, DÉBRANCHEZ toute la section électronique, le contrôleur et le mécanisme de l'ATS de la section d'alimentation pour éviter tout dommage potentiel à l'électronique.

Once you have received the transfer switch, inspect it for any damage. This includes damage to the enclosure, power panel, control panel and wiring harness. If any damage is found or suspected, file a claim as soon as possible with the carrier and notify the nearest ABB Zenith representative.

Before installation, if it is necessary, store the transfer switch in a clean dry place, protected from dirt and water. Provide ample air circulation and heat, if necessary, to prevent condensation.

See table 8 for recommended storage and ambient operating temperatures.

9.3 Lifting and Mounting the Panel

Lifting guidelines

Adequate lifting means must be used to mount the transfer switch into place. The recommended method for moving the ATS, up to 3000 A, is with lifting strap and lifting equipment rated for the equipment weight.

Lifting, Mounting and Installation

The safe operation of your switch at all times is paramount to ABB. Please recognize that hazardous voltages and currents can exist during normal operation, and any maintenance on the transfer switch must be performed utilizing appropriate safety measures. Installation, adjustment, maintenance or removal of the switch must only be carried out by qualified personnel and with all power to the switch turned off. It is recommended that only qualified electricians be allowed to install or provide maintenance on the switch.

Prior to installation, store the transfer switch in a clean dry location, protected from dirt and water. Provide ample air circulation and heat if necessary to prevent condensation. See table 7.2 for recommended storage and ambient operating temperatures.

ABB Zenith automatic transfer switches are packaged as per the standard packaging regulatory standards requirement suitable for domestic and international shipment through all modes of transportation (air, sea and road). Once you unpack the units, please make sure all the components are received as per the BOM. For any missing items, contact your local ABB Zenith service representative.



Danger

Hazardous Voltage can Cause Severe Injury or Death

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

Danger

Une tension dangereuse peut causer des blessures graves ou la mort
Coupez l'alimentation avant d'installer, de régler ou de retirer le commutateur de transfert ou l'un de ses composants.



Warning

Due to hazardous voltages and currents, ABB recommends that an ABB Certified technician or a qualified electrician perform the installation & maintenance of the switch.

Avertissement

En raison des tensions et courants dangereux, ABB recommande que l'installation et la maintenance du commutateur soient effectuées par un technicien certifié ABB ou un électricien qualifié.



Danger

Hazardous Voltage can Cause Severe Injury or Death

Automatic Transfer Switch Equipment must be electrically grounded. Failure to do so may result in malfunction of the switch and possible damage to surrounding equipment.

Danger

Une tension dangereuse peut causer des blessures graves ou la mort.
L'équipement du commutateur de transfert automatique doit être mis à la terre. Le non-respect de cette consigne peut entraîner un dysfonctionnement du commutateur et des dommages éventuels aux équipements environnants.



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.

Avertissement

Avant de percer des trous d'entrée des conduits ou des trous de montage des accessoires, couvrez et protégez le commutateur et le panneau de commande pour éviter que des saletés et des fragments métalliques ne pénètrent dans les composants mécaniques et électriques.



Warning

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

Avertissement

Le non-respect des directives de levage d'ABB peut entraîner des blessures graves ou la mort.

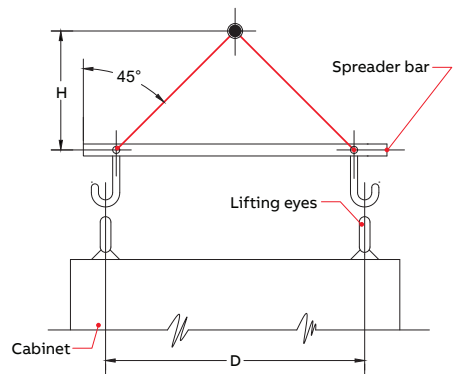
Lifting Guidelines for Enclosed Automatic Transfer Switches

1. ABB Zenith automatic transfer switches are mounted onto a wooden pallet using bolts and nuts. Please remove the bolts and nuts prior to lifting.
2. ABB Zenith Automatic Transfer Switch enclosures have the provisions for lifting through the standard overhead lifting device.
3. Position the lifting device across the top of the enclosure. Engage the lifting hooks and adjust lifting positions such that the hooks are pointing outward.
4. Refer to Table 11 for the weight information, or the dimensional drawing for the center of gravity dimensional drawing for the center of gravity (denoted as CG), weight information, lifting provision, and anchoring hole pattern on lower mount C-channels.
5. While lifting the unit using lifting chains, it is recommended to maintain a 45° angle as shown in Fig. 26.
6. Refer to Fig. 25 for lifting provisions on the enclosure top.
7. ABB Zenith Automatic Transfer Switch units should be lifted using properly-rated lifting devices.

Lifting eyelets



Fig. 20 Automatic Transfer Switch Enclosed Assembly Lifting locations



Note: When lifting the switch using a spreader bar, height H must be equal to half of distance D

Fig. 21 Recommended Lifting Angle

Lifting Guidelines for Open Style Automatic Transfer Switch

1. ABB Zenith Open style ATS units are mounted onto a wooden pallet using required brackets.
2. Electrical Panel and Auxiliary Panels are mounted onto the wooden pallet using separate brackets.
3. Controller and other electronic components are mounted inside a separate cardboard box on the wooden pallet.
4. Refer to Table 11 for the weight information, or the dimensional drawing for the center of gravity dimensional drawing for the CG, weight information, and lifting provisions to select the properly-rated lifting devices.
5. While lifting the unit using lifting chains, it is recommended to maintain a minimum of a 45° angle as shown in Fig. 26.
6. ABB Zenith Automatic Transfer Switch units should be lifted using properly-rated lifting devices.

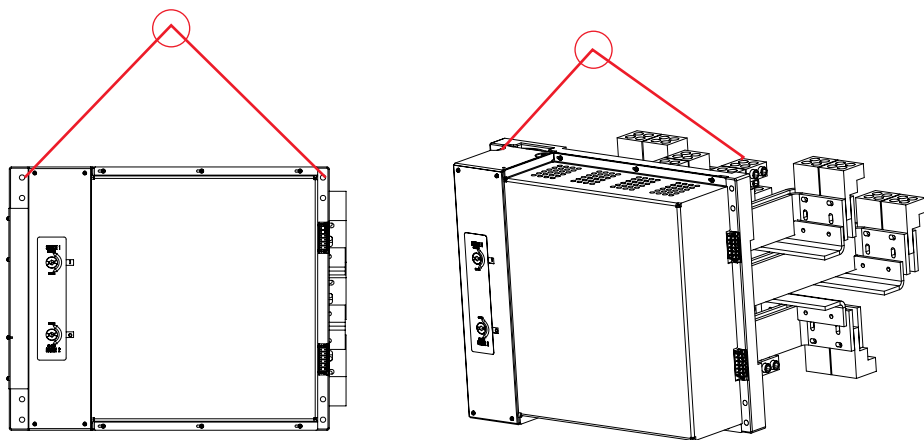


Fig. 22 & 23 R5 Lifting points

9.4 Mounting the automatic transfer switch

9.4.1 Mounting hole dimensions

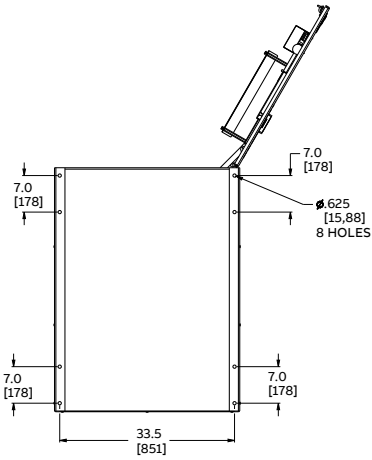


Fig. 24 Automatic transfer switches, Floor mounting hole dimensions for R5 1600-3000 A.

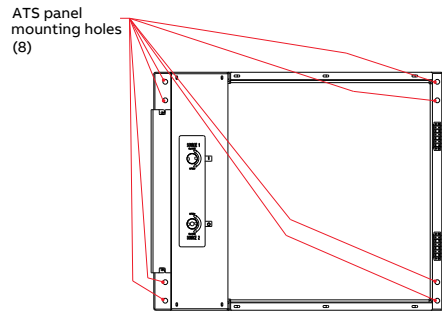
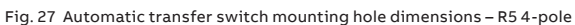
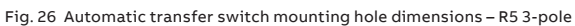


Fig. 25 Automatic transfer switch mounting hole locations - R5

2



9.5 Wire Connection



Notice
Lugs come pre-installed and torqued

AL/CU UL Listed Solderless Screw-Type Terminals for External Power Connections

Model	ATS Rating (A)	Source/Load	Lug Type	Wire Range	Cables per pole	Cables - Tightening Torque ¹ , lb-in (N-m)
ZTG	1600-	Source 1 / Source 2 / Load	S-1399R	2 AWG - 600 MCM	8	500/56.5
ZTGD	3000	Source 1 / Source 2 / Load	S-1399R	2 AWG - 600 MCM	8	500/56.5

¹Do not exceed this value - may cause damage to switch, voiding warranty

Table 13 Power Cable Torque Requirements

Refer to product catalog for other lug options.

9.6 Final Equipment Inspection

Prior to energizing the transfer switch:

1. Remove any debris incurred, with a vacuum, due to shipment or installation.
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 connection of all control wires.
5. Check settings of all timers and adjust as necessary.
6. Adjust any optional accessories as required.
7. Check the lug torque values of the power connections.
8. Make sure that all covers and barriers are installed and properly fastened.

Each ABB Zenith 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.
- Power panel connection diagram and schematic.
- Description and identification of all customer field connections.

Installation of ABB Zenith transfer switches includes:

- Mounting the transfer switch cabinet.
- Connection of Source 1, Source 2, and Load cables or bus bars.
- Connection of external control circuits as required.

9.7 Initial Energizing

Before proceeding, refer to the information package supplied with the ATS and read and understand the information on all accessories provided, including this complete document.

Before energizing the panel

1. Confirm that installation has been performed by a qualified person and in accordance with NFPA 70 (NEC).



Notice

This installation should be properly operated and maintained in accordance with the safety practices of NFPA 70E.

2. Confirm rating label matches the installed application. Rating label is located inside the panel enclosure.
3. Confirm that cables are connected properly and torqued according to the ATS labeling.
4. Verify that the enclosure ground connection is properly terminated.
5. Confirm that control wiring for engine start is properly terminated to the engine start contact (located in Fig. 2.1, number 8). Additionally, connect all applicable digital I/O, communications, and auxiliary contact wiring.
6. Ensure that all objects and debris are removed from enclosure, and enclosure is closed and latched.

Energizing the panel

1. Close Source 1 circuit breaker.

NOTE: The HMI should illuminate if line voltage is present and S1 LED should light up.

2. Verify the phase to phase voltages at the Source 1 terminals.
3. Initiate auto configure from HMI default screen: Main Menu > Parameters > System Parameters > Start Automatic Configuration and allow a few seconds for system parameters to set"

4. Close the Source 2 circuit breaker.

5. Start the generator engine.

NOTE: If generator voltage is present at Source 2 terminals, S2 LED should light up.

6. Verify phase rotation of S1 matches that of S2.

NOTE: The ATS will not allow transfer if phase rotation does not match.

7. Shut down the generator engine.

10 Accessories



Warning

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

Hazardous voltage may be present. Disconnect all power sources before performing work inside the ATS panel.

Failure to do so may result in serious injury or death.

Avertissement

Tout dépannage doit être effectué uniquement par un personnel formé et autorisé. Un équipement de protection individuelle (EPI) approprié doit être utilisé lors du dépannage du panneau ATS.

Une tension dangereuse peut être présente. Coupez toutes les sources d'alimentation avant d'effectuer des travaux à l'intérieur du panneau ATS. Le non-respect de cette consigne peut entraîner des blessures graves ou la mort.

10.1 Auxiliary power supply and Ekip -modules

ZTG(D)-series 1600-3000 A, 208-480 Vac Automatic transfer switches can be equipped with Ekip-modules.

Ekip-modules are mounted with a auxiliary power supply module, OXEA1.

Suitable Ekip-modules are: Ekip link, signalling and connectivity modules. For more information, see Chapter 5, Electronic accessories.

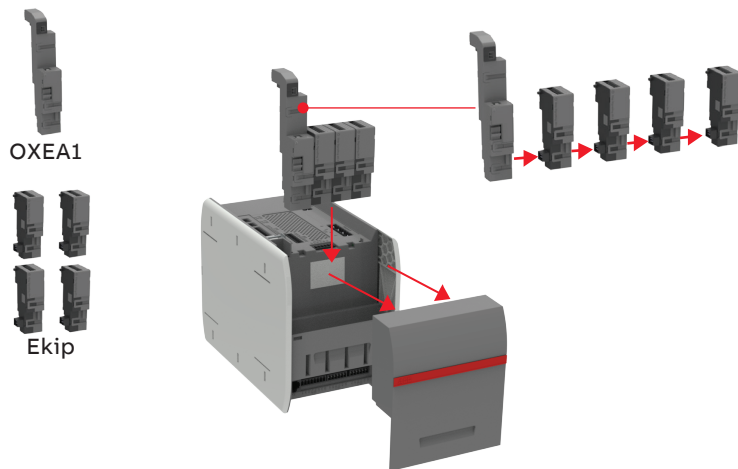


Fig. 28
Mounting of the auxiliary power supply module OXEA1 and Ekip –modules

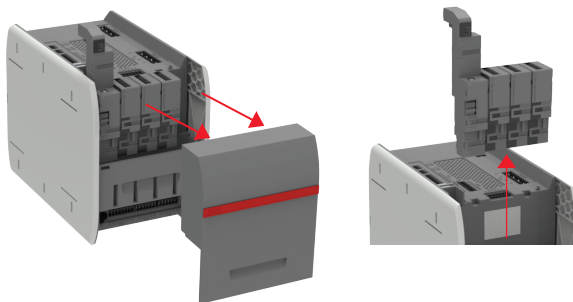


Fig. 29
Removing the auxiliary power supply module OXEA1 and
Ekip –modules from the automatic transfer switch

11 Replacement Parts

ZTS/G T-series replacement parts

Category	Application/Description	Order code
HMI	Open transition (ZTS 600-3000 A, 208-480 Vac)	OXAMI1-L4
	Open transition (ZTG 1600-3000 A, 208-480 Vac)	OXAMI1-L3
	Delayed/closed transition (ZTSD/CT 600-3000 A, 208-480 Vac)	OXBMI1-L4
	Delayed/closed transition (ZTGD/CT 1600-3000 A, 208-480 Vac)	OXBMI1-L3
	ETHERNET - CAT 5e CABLE - 7FT	OXCAT5E-7FT (PS-9862)
Manual Handle	DIN rail end stop	1SNK900001R0000
	Hande - Closed transition (ZTSCT 600-1200 A, 208-480 Vac)"	E-3402
	Hande grip - Closed transition (ZTSCT 600-1200 A, 208-480 Vac)"	PS-3496
	Operating rotary handle - Open/delayed/closed transition (ZTS(D) & ZTG(D) 1600-3000 A, 208-480 Vac)"	7004629208A
	OPER W/KNOB FURN BJS1A ZTS DS	L-4009
Disconnect Switch	BLOCK DS CONT FURNAS BJJ ZTS	L-1020
	Window Kit NEMA 4/4X/12 - No Meter	OXWINDOWKIT-MTR (PS-9930)
	Window Kit NEMA 4/4X/12 - With Meter	OXWINDOWKIT (PS-9931)
Window Kit	HMI protective cover, IP54	OEXEC21
	Rogowski 600-3000 A, 4P	1SDA083373R1
	Rogowski 600-3000 A, 2/3P	1SDA083372R1
	Rogowski coil mounting support (ZTSCT 600-1200 A, 208-480 Vac)	PS-3372
	Rogowski coil mounting support (ZTG(D) & ZTS(D) 1600-3000 A, 208-480 Vac)	PS-3353
Rogowski Coils		
Temperature Sensor	Temperature Sensor	1SDA085695R1
COM & I/O	Ekip Com Modbus RTU-OX	ZEAMOD485
	Ekip Com Modbus TCP-OX	ZEAMODTCP
	Ekip Com Profibus	ZEAPRFIBUS
	Ekip Com Profinet	ZEAPRFINET
	Ekip Com EtherNet/IP	ZEAETHRNT
	Ekip Com Hub	ZEAEKIPHUB
	Ekip Com DeviceNet	ZEADEVICNET
	Ekip Programming	ZEAEKPPGM
	Ekip signalling - 2 I, 2 O	RE3568801
	Ekip signalling - 2 I, 2 O	RE3568802
	Ekip signalling - 2 I, 2 O	RE3568803

Continued on next page

ZTS/G T-series replacement parts (continued)		
Category	Application/Description	Order code
AUX Contacts	S2 Position Contact	23P-1390
	S1 Position Contact	23P-1394
SCR	SCR 75 A 600 Vac	PS-8903
	208 V/240 V standard solenoid	70010259508A
	380 V/400 V/415 V Standard 3P solenoid	70010425427A
	440 V/480 V Standard 3P solenoid	70010425470A
Solenoid	380 V/400 V/415 V Standard 4P solenoid	7006019398A
	440 V/480 V Standard 4P solenoid	70010259489A
	208 V/240 V Delay/Close solenoid	70010270854A
	380 V/400 V/415 V Delay/Close solenoid	7008561306A
	440 V/480 V Standard 4P solenoid	70010276342A
	Solenoid (DC) 240/208 VAC ZTSD	K-2147
	Solenoid (DC) 380 VAC ZTSD81/121	K-2168
	Solenoid (DC) 480 VAC ZTSD81/121	K-2157
Ground Lug	Ground lug	PS-1815
Wire Harness	Adaptor harness, 600 - 1200 amp ATS	23W-3065
	Adaptor harness, 600 - 1200 amp ATS 1 PH	23W-3066
	Adaptor harness, 1600 - 3000 amp STR	77W-1005
	Adaptor harness, 1600 - 3000 amp STR - 1PH	77W-1006
Lugs	Lug, Comp. Copper 2-H, Cable 1/0, LB	PS-8414LB
	Lug, Comp. Copper 2-H, Cable 3/0, SB	PS-8416
	Lug, Comp. Copper 2-H, Cable 250, SB	PS-8417
	Lug, Comp. Copper 2-H, Cable 350, SB	PS-8418
	Lug, Comp. Copper 2-H, Cable 500, SB	PS-8419
	Bus Adapter	S-1299
	2-Port 600 MCM Lug	S-1393F
	4-Port 600 MCM Lug	S-1392F
	500 MCM Lug	S-1422
	500 MCM Compression Lug	PS-8419
	750 MCM Compression Lug	PS-8420
	750 MCM Mechanical Lug	S-1399R

Table 14 Replacement parts, available in Empower

Consult factory for lug application.

For other accessories refer to the manual

1SXU523001C0201.

Contact us

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