PacT Series

TransferPacT UC Controller
From 32–6300 A

User Guide

PacT series offers world class breakers and switches.

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www.se.com

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Table of Contents

Safety Information

Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result** in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

About the Document

Document Scope

Use this guide to:

- Familiarize yourself with the mechanical and electrical characteristics of the components of TransferPacT™ UC controller.
- Assemble and wire the UC controller.

Validity Note

This user guide is valid for 3 and 4–pole TransferPacT UC controller connecting with below circuit breakers in AC applications:

- ComPacT NSX 32-100 A
- ComPacT NSX 100-250 A
- ComPacT NSX 320-630 A
- ComPacT NS 800-1600 A
- MasterPacT MTZ1 400-1600 A
- MasterPacT MTZ2 800-4000 A
- MasterPacT MTZ3 4000-6300 A

The availability of some functions described in this guide depends on physical modules installed on the TransferPacT UC.

General Cybersecurity Information

In recent years, the growing number of networked machines and production plants has seen a corresponding increase in the potential for cyber threats, such as unauthorized access, data breaches, and operational disruptions. You must, therefore, consider all possible cybersecurity measures to help protect assets and systems against such threats.

To help keep your Schneider Electric products secure and protected, it is in your best interest to implement the cybersecurity best practices as described in the Cybersecurity Best Practices document.

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- Subscribe to the Schneider Electric security newsletter.
- Visit the Cybersecurity Support Portal web page to:
  - Find Security Notifications.
  - Report vulnerabilities and incidents.
- Visit the Schneider Electric Cybersecurity and Data Protection Posture web page to:
  - Access the cybersecurity posture.
  - Learn more about cybersecurity in the cybersecurity academy.
  - Explore the cybersecurity services from Schneider Electric.

Environmental Data

For product compliance and environmental information, refer to the Schneider Electric Environmental Data Program.

Online Information

The information contained in this document is likely to be updated at any time. Schneider Electric strongly recommends that you have the most recent and up-to-date version available on www.se.com/ww/en/download.

The technical characteristics of the devices described in the present document also appear online. To access the information online, go to the Schneider Electric home page www.se.com.

The technical characteristics presented in this guide should be the same as those that appear online. If you see a difference between the information contained in this guide and online information, use the online information.

Available Languages of the Document

- English (DOCA0428EN)
- French (DOCA0428FR)
- Chinese (DOCA0428ZH)
- Spanish (DOCA0428ES)

Related Documentation

Document title	Document reference number
TransferPacT UC Controller Instruction Sheet	JPS70293

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Introduction to TransferPacT UC Controller

What's in This Chapter

PacT Series Master Range

Future-proof your installation with Schneider Electric's low-voltage and medium-voltage Pact Series. Built on legendary Schneider Electric innovation, the Pact Series comprises world-class circuit breakers, switches, residual current devices and fuses, for all standard and specific applications. Experience robust performance with Pact Series within the EcoStruxure-ready switchgear, from 16 to 6300 A in low-voltage and up to 40.5 kV in medium-voltage.

Overview

TransferPacT UC is a high speed, compact, modular design intelligent automatic controller that provides scalability and robust performance. It provides:

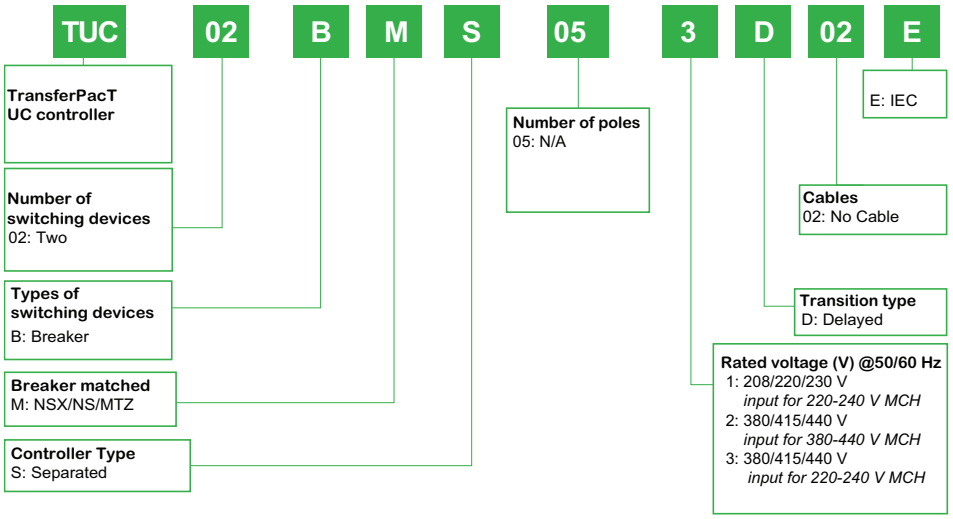
- quick settings and easy view interface,
- comprehensive functions with extended modules (optional) and an LCD display,
- support to third party control system.

TransferPacT UC is an universal controller used together with air circuit breakers (ACB) and molded case circuit breakers (MCCB) to build CB type Automatic Transfer Switching Equipment (ATSE) conforming to IEC 60947-6-1 standard. An ATSE is an equipment containing a switching device for transferring the load circuits from one supply to another. It includes necessary sensing inputs, monitoring, and control logic for transferring operations.

TransferPacT UC is available from 32 to 6300 A in 3 and 4 poles with rated operating voltage from 208-440 V (line to line).

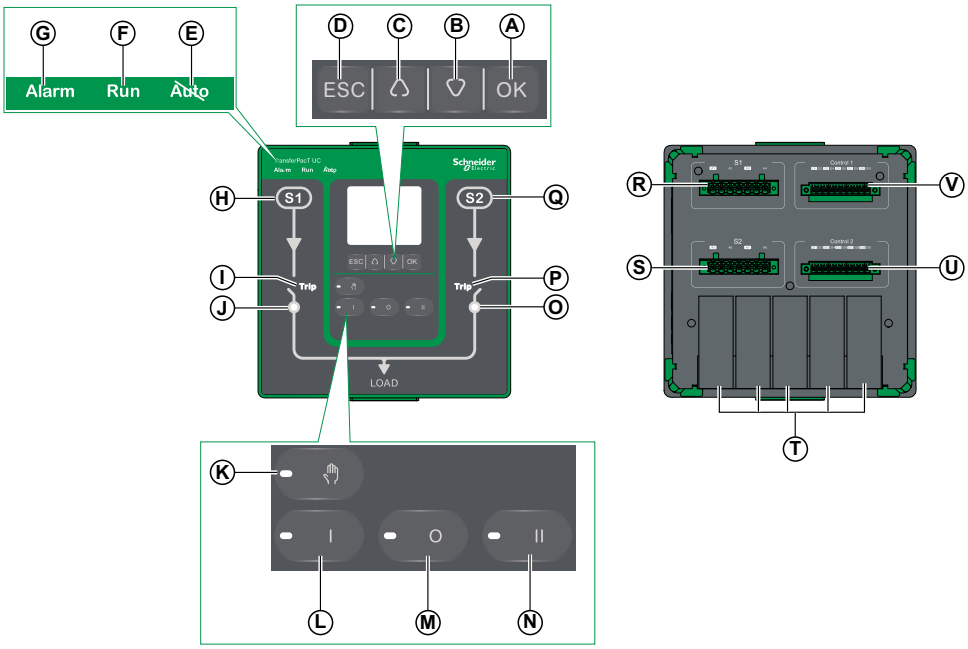
Coding Principle

The commercial references of TransferPacT UC are coded with significant features to explain the transition type, controller type, rated voltage, rated current, and number of poles.



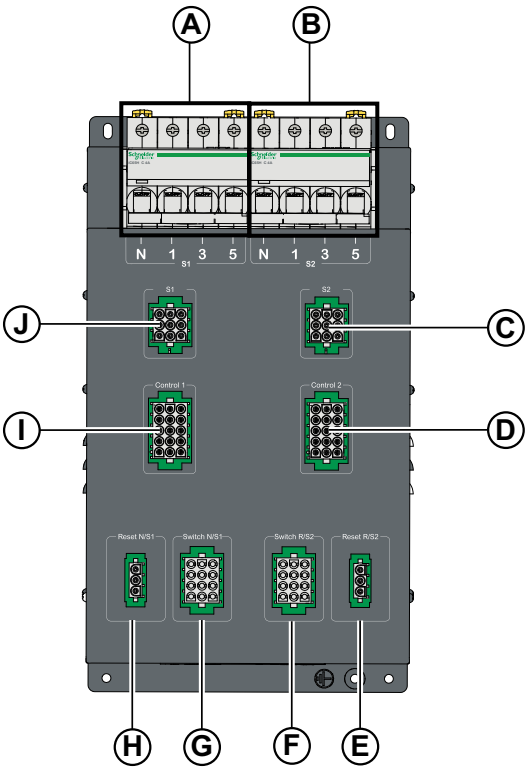
Hardware Description

Universal Controller



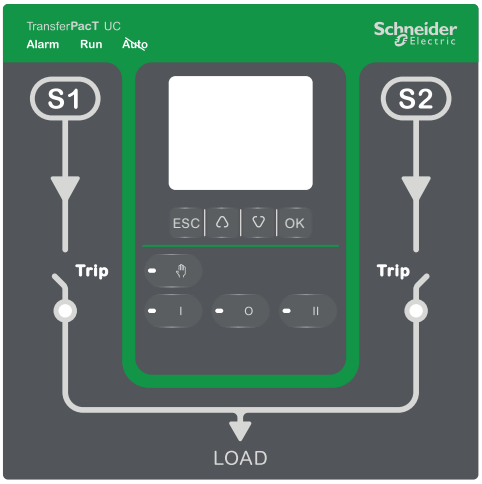
Label	Description
A	OK button to confirm any status
B	Navigation button for scrolling down
C	Navigation button for scrolling up
D	Navigation button for previous page
E	"Not in Auto" status indicator
F	Run indicator
G	Alarm indicator
H	S1 power status indicator
I	S1 trip indication LED
J	Contact position of S1
K	Local mode button
L	Transfer to S1 button
M	Transfer to OFF button
N	Transfer to S2 button
O	Contact position of S2
P	S2 trip indication LED
Q	S2 power status indicator
R	S1 voltage sensing cable connector
S	S2 voltage sensing cable connector
T	Function modules
U	S2 control cable connector
V	S1 control cable connector

Adapter



Label	Description
A	Breaker for S1 sensing protection
B	Breaker for S2 sensing protection
C	S2 voltage sensing cable connector
D	S2 control cable connector
E	S2 reset function connector
F	Connector for S2 circuit breaker
G	Connector for S1 circuit breaker
H	S1 reset function connector
I	S1 control cable connector
J	S1 voltage sensing cable connector

LED Indicators



LED indication	Status	Description
Run		No energy, ATSE power off
		ATSE updating in process or in Test mode
		ATSE is running in normal operation, ready to transfer
Auto		The ATSE is running in Auto mode
		ATSE not in Automatic mode, and will not automatically transfer in case of source failure.
Alarm		No alarm
		Alarm is active
S1		No Source I
		Source I out of range
		Source I present and in the range
S2		No Source II
		Source II out of range
		Source II present and in the range
S1		Source I is open (Not connected)
		Time delay is running for transferring
		Source I is closed (Connected)
S2		Source II is opened (Not connected)
		Time delay is running for transferring
		Source II is closed (Connected)
Trip S1 S2		No trip
		Source I/II Circuit breaker tripped
		Local mode disabled.
		Local mode enabled.
I		ATSE not connected to Source I
		ATSE connected to Source I
O		ATSE not in "O" position (both Source I and II are disconnected)
		ATSE in "O" position (both Source I and II are disconnected)
II		ATSE not connected to Source II
		ATSE connected to Source II

Accessories

Controller Function Modules

Function modules are as below:

- Load shedding and availability warning (TPCDIO05)
- Genset start and alarm (TPCDIO06)
- Transfer inhibit and remote testing (TPCDIO07)
- Voluntary remote control (TPCDIO08)
- 24 V DC auxiliary supply (TPCDIO15)
- Source indication (TPCDIO19)
- Modbus RTU (TPCCOM76)

Other Accessories

- Rubber ring (TPCOTH74)
- Surface cover (TPCOTH75)
- Bracket (TPCOTH77)
- Cables connecting controller and adapter- 0.5 m (TPCOTH78)
- Cables connecting controller and adapter - 2 m (TPCOTH79)
- Cables connecting power source and adapter for NSX100–250 (TPCOTH87)
- Cables connecting power source and adapter for NSX400–630 / NS / MTZ (TPCOTH88)
- Clip (TPCOTH86)

Technical Characteristics

What’s in This Chapter

Weights

This section describes the weights of the TransferPacT UC controller.

Parts	Weights
Universal controller	0.7 kg
Adapter	4.5 kg

Functions and Characteristics

Functions and characteristics		TransferPacT universal controller
Rated operating voltage (V)		Ue(1): 208/220/230
		Ue(2): 380/400/415/440
Rated operating frequency (Hz)		50/60
Rated insulation voltage (V)		500
Impulse withstand voltage (kV)		6
Operating temperature (°C)		-25 – +70
Operating voltage range (V)		80 - 115% Ue (208-415 V) 80 - 110% Ue (440 V)
Humidity		5 - 95%
Overvoltage category		III
Controller power (W)		5
Indoor use		-
Operating altitude (m)		≤ 2000
Protection degree	Front	IP 55
	Side	IP 30
	Connectors	IP 20
Pollution degree		3
Accuracy (for power deviation)	Voltage	1 %
	Frequency	0.1 %
Electrostatic discharge		Level 4
Radio-frequency electromagnetic field		Level 3
Fast transient bursts		Level 4
Surges		Level 4
Harmonic wave		Class 3
Voltage dips and short-time interruptions		Class 3
Vibration		IEC 60068-2-6
Shock		IEC 60068-2-27
Display of controller	Display mode	LCD + LED indicator
	System Languages	English/Chinese/French/Russian/Spanish/Italian/German/Portuguese
HMI operation method		Button
Control mode	Auto	• Auto return • Non return • Manual return
	Non-Auto	• Local

Functions and characteristics		**TransferPacT universal controller**
		• Inhibit • Force to off • Test • Communication • Voluntary
Auto control	Sampling	Three Phase for both normal and alternate
	Voltage loss	< 30 V
	Phase loss	L1, L2, L3
	Under voltage	70– 95%
	Over voltage	105– 135%
	Under frequency	80– 98%
	Over frequency	101– 120%
	Unbalance of three phase voltage	2– 30%
	Phase rotation	Yes
Time delay	Transfer delay (s)	0– 1800
	Re-transfer delay (s)	0– 3600
	Center-off delay (s)	0– 30
	Genset cool down delay (s)	0– 3600
	Genset ready alarm delay (s)	15– 300
	Test delay (s): on load	1– 1800
	Test delay (s): off load	1– 1800
Other Functions		Calender time
		Position feedback
		Event log
		Source priority
		Communication: Modbus RTU
		Transfer Inhibit
		Pincode protection
		Gen start-stop
		Test
		Load shedding
		Failure lock
		Alarm indication
		External power supply port
		Wrong connection of neutral alarm
		Trip lock

TransferPacT UC Function Modules

What's in This Chapter

Overview

Function modules are used to extend the interactive function of the TransferPacT UC.

TransferPacT UC provides source changeover solution with function modules to upgrade without interruption of power.

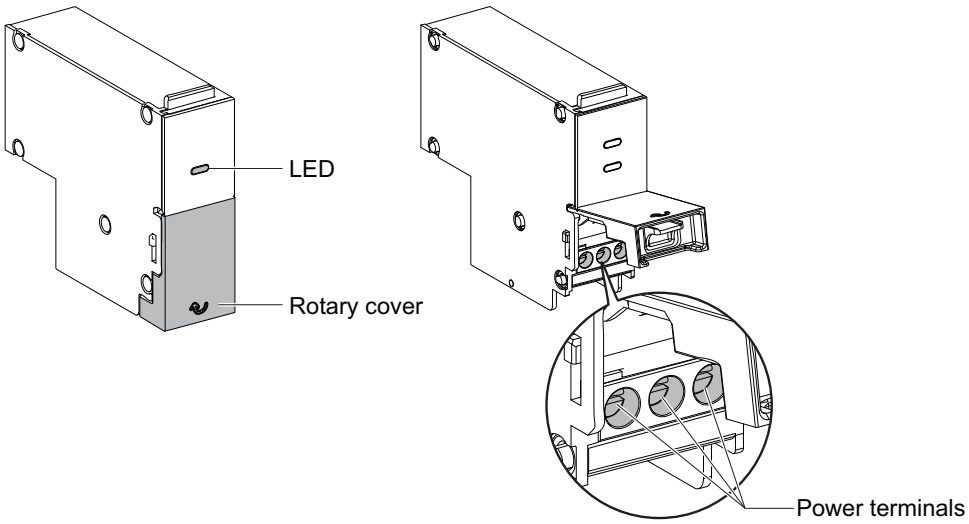
There are seven types of function modules:

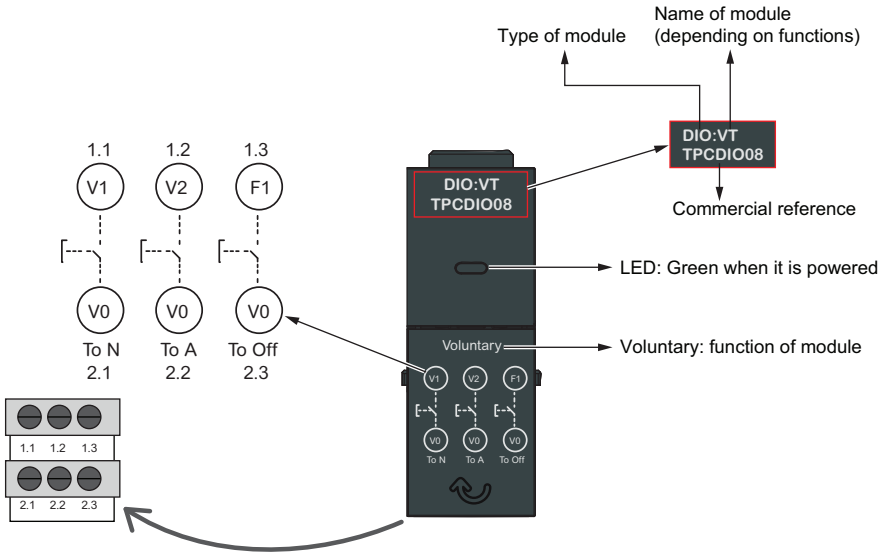
- Load shedding and availability warning (TPCDIO05)
- Genset start and alarm (TPCDIO06)
- Transfer inhibit and remote testing (TPCDIO07)
- Voluntary remote control (TPCDIO08)
- 24 VDC auxiliary supply (TPCDIO15)
- Source indication(TPCDIO19)
- Modbus RTU (Serial Port) (TPCCOM76)

Function Modules Description

The function module has three core parts:

- **Rotary cover**: Open to access power terminals.
- **LED**: Indicates the power status and connection of the accessories.
  - Green: Indicates that the accessories are powered and properly connected.
  - OFF: Indicates that the accessories are not live except for 24 VDC auxiliary supply module (TPCDIO15).
  - ON: Indicates there is an external 24 VDC power supply.
- **Power terminals**: Used for wiring.





The details of the terminals of function modules are shown below:

Function modules	Wiring terminals						Notes
Load shedding and availability warning	1.1	1.2	1.3	2.1	2.2	2.3	
	LS2	LS1	LS4	AW1		AW2	LS: load shedding AW: available warning
Genset start and alarm	1.1	1.2	1.3	2.1	2.2	2.3	
	G4	G1	G2	A1		A2	G: Genset control A: alarm

Function modules	Wiring terminals						Notes
Transfer inhibit and remote testing	1.1	1.2	1.3	2.1	2.2	2.3	
	TI1		RT1	TI2		RT2	TI: transfer inhibit RT: remote testing
Voluntary remote control	1.1	1.2	1.3	2.1	2.2	2.3	
	V1	V2	F1	V0	V0	V0	V: voluntary remote control
24 VDC auxiliary supply	1.1	1.2	1.3	2.1	2.2	2.3	
	24 V+		24 V-				24V+ / 24V-: external power
Source indication	1.1	1.2	1.3	2.1	2.2	2.3	
	S12	S11	S14	S22	S21	S24	S: Source
Modbus RTU (Serial Port)	1.1	1.2	1.3	2.1	2.2	2.3	
	D1	D0	0V	Shield			Modbus communication

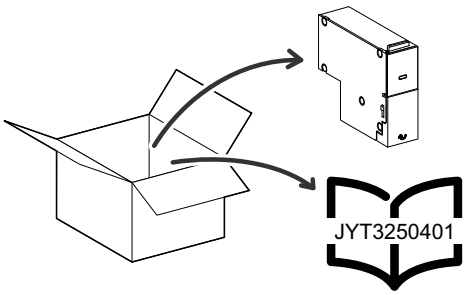
For information on installation of function modules, consult the instruction sheets on Schneider Electric website: JSP70293

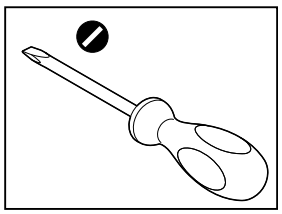
Limitation of Accessories

Function modules	Type	Max quantity
Load shedding and availability warning	DO	1
Genset start and alarm	DO	1
Transfer inhibit and remote testing	DI	1
Voluntary remote control	DI	1
24 Vdc auxiliary supply	power	1
Source indication	DO	1
Modbus RTU	Modbus	1

Function Module Package Details

In the packaging box, the function module and light instruction are provided.





Load Shedding and Availability Warning

Application Load Shedding

The alternate power (genset) sometimes may not afford all loads. A signal from controller will shed some non-critical loads.

Load shedding will send the signal after enabling this function.

Application Availability Warning

When the transfer switching equipment is not in auto position, or power lost on two sources, a dry contact will give the signal.

After back to auto status or power recovery, the signal will be stopped.

Terminals

Load shedding: 1 NO + 1 NC

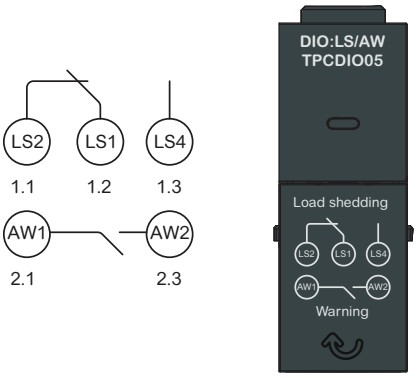
- NO: LS1-LS4
- NC: LS1-LS2

When load shedding initiates, NC terminal will open, and NO terminal will close.

For status output: 1 NO

- NO: AW1-AW2

When availability warning initiates, NO terminal will close.



Signal Type

Digital output.

Performance

Electrical characteristics	Ratings
Ui	300 V
Maximum output voltage	250 VAC, 50 / 60 Hz or 30 VDC
Maximum output current	5 A
Over voltage category	III

Electrical characteristics	Ratings
Pollution degree	3
Altitude	2000 m

Cable Capacity for Terminals

The cable capacity for the terminals are 0.05 – 2.6 mm^2 (AWG 30 ~ 13).

Genset Start and Alarm

Application Genset Start Output

When the utility source is lost, a dry contact will start the Genset irrespective of external 24 VDC.

NOTE: When the genset start signal is sent out, the genset is considered as out of range before it gets ready.

When the utility source has recovered and ATSE has transferred back to utility, the Genset signal will remain until the end of the Genset cooldown timer.

Alarm

When there is an alarm, a dry contact will give the signal.

The alarm signal is irrelevant to Genset start or stop. It is relevant to transfer errors and phase rotations errors listed in Alarm, page 139.

Refer to Alarm, page 139 and follow the procedures to acknowledge the alarm.

NOTE: Contact field service first to record the alarm. Then try the procedures above in case of emergency.

Terminals

For Genset start: 1 NO + 1 NC:

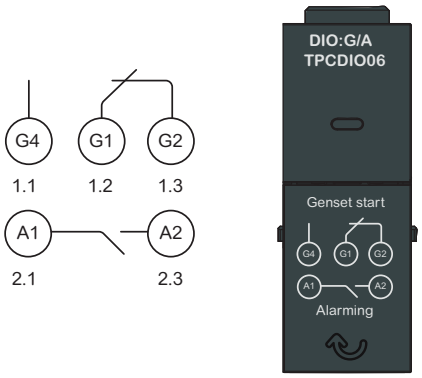
- NO: G1-G4
- NC: G1-G2

When Genset start initiates,G1-G4 will close,and G1-G2 will open.

Alarm: 1 NO

- NO : A1-A2

When alarm initiates, NO terminal will close.



Signal Type

Digital output.

Performance

Electrical characteristics	Ratings
Ui	300 V
Maximum output voltage	250 VAC, 50 / 60 Hz or 30 VDC
Maximum output current	5 A
Over voltage category	III
Pollution degree	3
Altitude	2000 m

Cable Capacity for Terminals

The cable capacity for the terminals are 0.05 – 2.6 mm^2 (AWG 30 ~ 13).

Transfer Inhibit and Remote Testing

Application Transfer Inhibit

- Transfer Inhibit when there is power interruption because of short circuit.
- This function can be used to lock the controller by customized signals.
- This function can be used for cooperation with different ATSE.
- Remove transfer inhibit signal to exit this mode.

Application Remote Testing

- Remote testing is an input signal to start test procedure.
- The remote test can only be started at Auto mode.
- On load test, off load test and time duration can be selected.

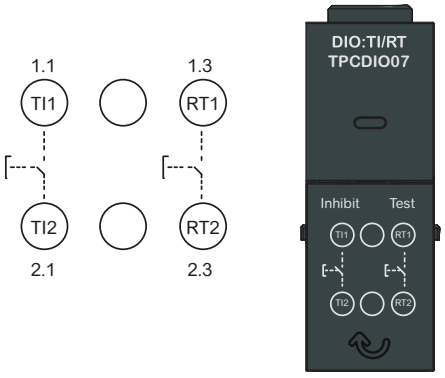
Terminals

For transfer inhibit: 1 input

- Inputs : TI1-TI2

For remote testing: 1 input

- Inputs : RT1-RT2



Signal Type

- Digital input with dry contact
- Need over 200 ms input to start transfer inhibit and remote test

Performance

Electrical characteristics	Ratings
Ui	30 V DC
Maximum Input current	5 mA
Altitude	2000 m

Cable Capacity for Terminals

The cable capacity for the terminals are 0.05 – 2.6 mm^2 (AWG 30 ~ 13).

Voluntary Remote Control

Application Voluntary to Normal (N) or Alternate (A)

Voluntary transfer is an active input which can transfer the ATSE to N or A source according to requirements (such as energy saving).

Voluntary transfer will still keep the power continuity as much as possible. The function will be bypassed, if target source lost the power. For example, after voluntary to A while source A source failed, ATSE will transfer back to N if source N is available.

Exit the voluntary mode after signal disappeared.

Force to Off

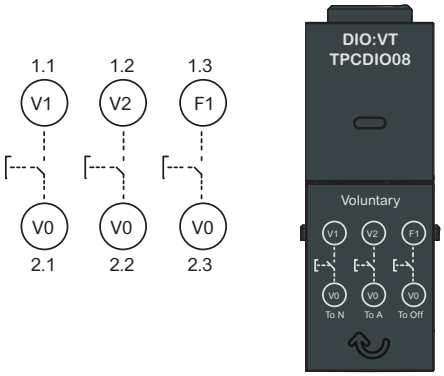
Force to off is an emergency stop order, to transfer the ATSE to off position. All the other transfer mode will be canceled except handle control.

Exit Force to off after signal disappeared.

Terminals

There are three terminals of the voluntary remote controller modules as below:

- V1-V0: voluntary to N
- V2-V0: voluntary to A
- F1-V0: force to off



Signal Type

- Digital input with dry contact.
- Need over 200 ms input to start voluntary remote control.

Performance

Electrical characteristics	Ratings
Ui	30 Vdc
Minimum input current	5 mA
Altitude	2000 m

Cable Capacity for Terminals

The cable capacity for the terminals are 0.05 – 2.6 mm^2 (AWG 30 ~ 13).

24 Vdc Auxiliary Supply

Application with DC 24 V

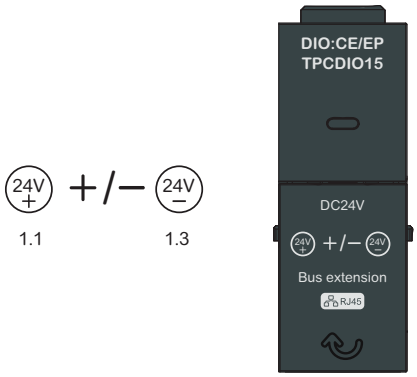
- External power for controller when both source failure.
- External power to keep power for Modbus communication when both source failure.

NOTE: Bus extension feature is not available for UC controller.

Terminals

DC 24 V

- 24 V+, 24 V-



Signal Type

Power supply.

Performance

Electrical characteristics	Ratings
Ui	30 V DC
Maximum Input voltage	28.8 V DC
Minimum input voltage	19.2 V DC
Maximum input current	1 A
Pollution degree	3
Altitude	2000 m

Cable Capacity for Terminals

The cable capacity for the terminals is 0.05 – 2.6 mm^2 (AWG 30 ~ 13).

Source Indication

Source Availability Output

The function is used for checking source I and source II status. User can wire indicators to this function module to check source availability without opening the panel.

It provides two types of output for each source:

- Source I/II in range output
- Source I/II out of range output

NOTE: In U-G application, the output doesn't indicate any error in genset.

Terminals

For source I indication: 1 NO + 1 NC:

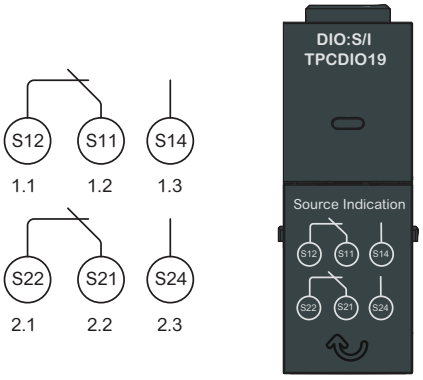
- NO: S11-S14
- NC: S11-S12

For source II indication: 1 NO + 1 NC:

- NO: S21-S24
- NC: S21-S22

When the source is in range, NC terminal will close, and NO terminal will open.

When the source is out of range, or there is no voltage, NC terminal will open, and NO terminal will close.



Signal Type

Digital output/ dry contact

Performance

Electrical characteristics	Ratings
Ui	300 V
Maximum output voltage	250 Vac, 50 / 60 Hz or 30 Vdc
Maximum output current	5 A
Over voltage category	III

Electrical characteristics	Ratings
Pollution degree	3
Altitude	2000 m

Modbus RTU (Serial Port)

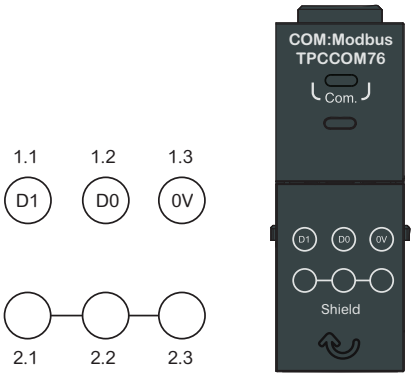
Application Modbus

Modbus can be used to connect with other system. It require external 24 V or at least one main source to keep the communication with protocol Modbus RTU.

For a cable length up to 300 m (1.000 ft), it is mandatory to use a shielded twisted cable. The shield of cable is connected to the shield terminal.

Terminals Modbus

- Modbus:
  - D1, D0, 0V, Shield



Signal Type

Serial port.

Performance

Electrical Characteristics	Ratings
Ui	30 V DC
Baud Rate (KBS)	4.8 / 9.6 / 19.2
Over voltage category	III
Pollution degree	3
Altitude	2000 m

Cable Capacity for Terminals

The cable capacity for the terminals are 0.05 – 2.6 mm^2 (AWG 30 ~ 13).

Wiring

What's in This Chapter

Wiring Precautions

Read and understand the following precautions before performing any procedures in this guide.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462,NOM 029-STPS or local equivalent.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on this equipment.
- Use only the specified voltage when operating this equipment and any associated products.
- Power line circuits must be wired and protected in compliance with local and national regulatory requirements.
- Beware of potential hazards, and carefully inspect the work area for tools and objects that may have been left inside the equipment.

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

⚠WARNING

FIRE HAZARD

- Use only the specified wiring gauge range with the equipment and comply with the specified wire termination requirements.
- Tighten the power line connections to the specified torque values.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

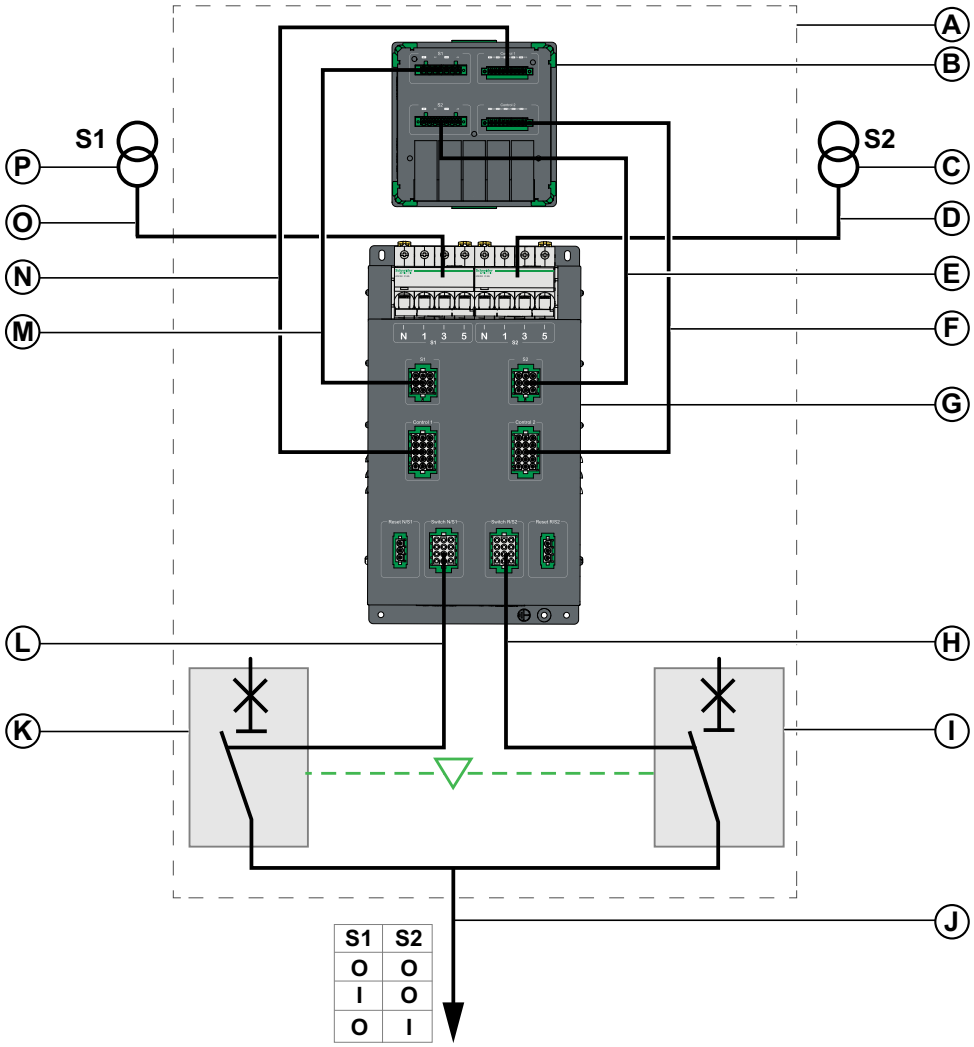
⚠WARNING

UNINTENDED EQUIPMENT OPERATION

Always route communication wiring and power wiring separately.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Wiring Diagrams for TransferPacT UC



Label	Description
A	Automatic Transfer Switch Equipment (ATSE)
B	Universal controller (UC)
C	S2 power source
D	Cable from S2 power source to adapter
E	S2 voltage sensing cable
F	S2 control cable
G	Adapter
H	Cable from adapter to S2 circuit breaker
I	S2 circuit breaker: • ComPacT NSX100-630 • ComPacT NS630b-1600 • MasterPacT MTZ
J	Connection to load
K	S1 circuit breaker: • ComPacT NSX100-630 • ComPacT NS630b-1600 • MasterPacT MTZ
L	Cable from adapter to S1 circuit breaker
M	S1 voltage sensing cable

Label	Description
N	S1 control cable
O	Cable from S1 power source to adapter
P	S1 power source

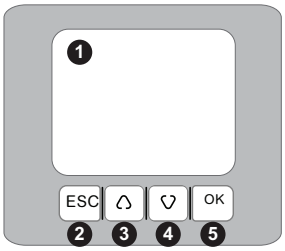
For information on wiring the device, consult the instruction sheets on Schneider Electric website: JSP70293

HMI

What’s in This Chapter

Overview

TransferPacT UC HMI with LCD display can display all logs and settings with password protection. It can also be extended to support more advanced functions, such as communications with extension plus 24 V DC.



Label	Description	Function
1	LCD screen	LCD screen for display.
2	ESC button	Button to cancel the selected option or return to the previous menu.
3	Up button	Navigation button for scrolling up.
4	Down button	Navigation button for scrolling down.
5	OK button	Button to confirm the selected option.

Wizard Setup

A Wizard should be configured once the TransferPacT UC is power on for the first time. The control and transfer function of TransferPacT UC is available only after wizard setup.

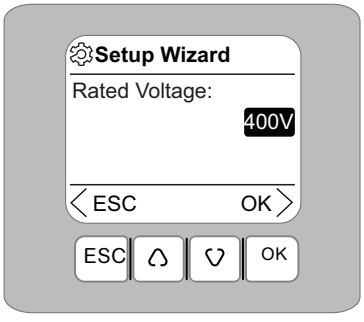
Perform the following procedure to complete the wizard setup:

1. Select the language.
   - English
   - Chinese
   - French
   - Italian
   - Spanish
   - German
   - Portuguese
   - Russian

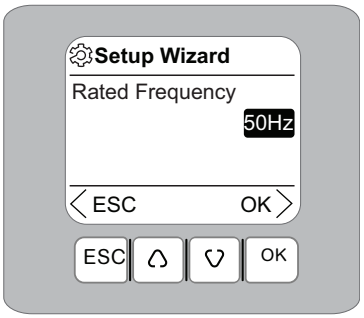
2. Select the number of poles.
   - 3P
   - 4P

3. Select the rated voltage:
   – For Ue(1): 208V, 220V, 230V
   – For Ue(2): 380V, 400V, 415V, 440V

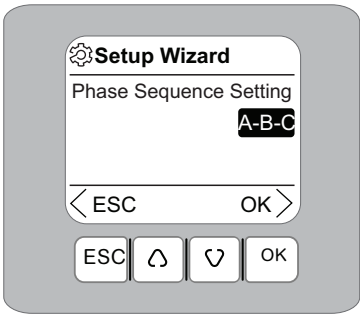
   NOTE: The power supply of TransferPacT UC is required to be 80-115% Ue (208-415V) /80-110%Ue (440V) at a frequency of 50/60 Hz.



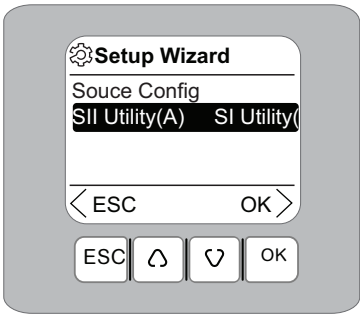
4. Select the rated frequency.
   - 50 Hz
   - 60 Hz



5. Select the phase sequency.
   - A-B-C
   - C-B-A

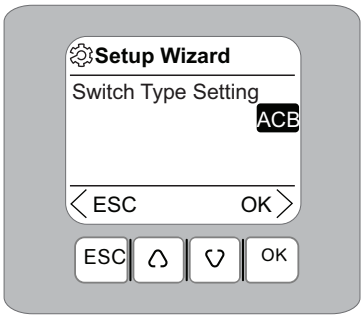


6. Select the source configuration.
   - SI-Utility(N)/SII-Utility(A)
   - SI-Utility(N)/SII-Genset(A)
   - SI-Genset(A)/SII-Utility(N)
   - SI-Utility(A)/SII-Utility(N)

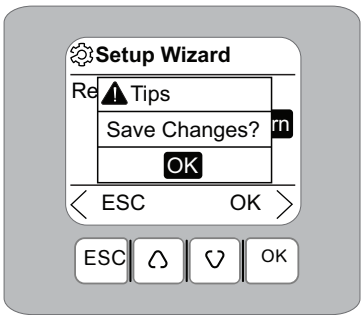


7. Select return modes.
   - Auto Return
   - Manual Return
   - Non Return

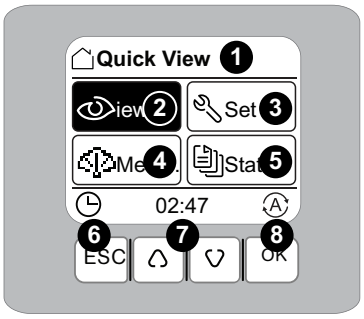
8. Select the switch type.
   - ACB
   - MCCB



9. Press **OK** to save the changes.

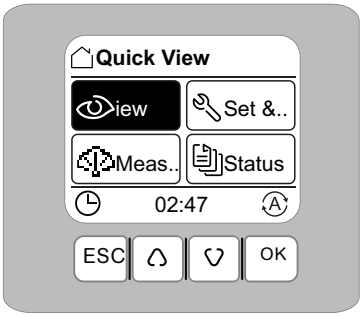


Home Page



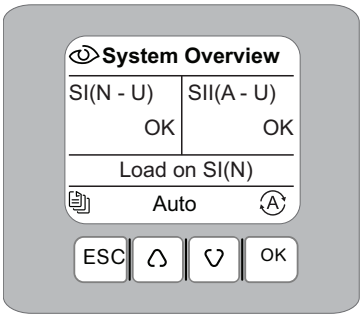
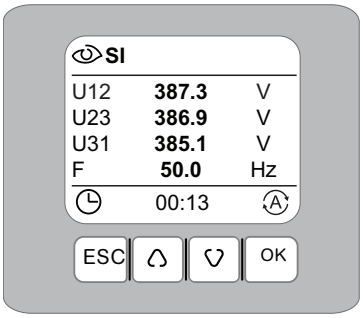
Label	Description	Explanation
1	Name for current page	The name of the menu which is selected.
2	Quick View menu	General information of TransferPacT UC.
3	Set & Operate menu	Menu for commissioning and settings.
4	Measure menu	Details of power status.
5	Status menu	Status of TransferPacT UC including event logs.
6	Icon for system time, or icon for warnings	: icon for system time. : icon for warnings, indicating there are active warnings.
7	System time, or warning messages	This field displays the system time. It needs to be reset after power contingency. When there is an active warning, the warning message displays here.
8	icon for control mode, or icon for alarms	Seven control modes: • : Auto mode (AT) • : Test mode • : Comm mode • : Voluntary transfer mode • : Local control mode • : Transfer Inhibit mode • : Force to off mode : icon for alarms

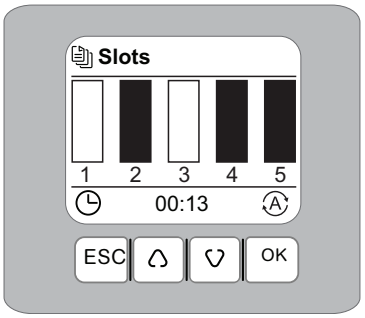
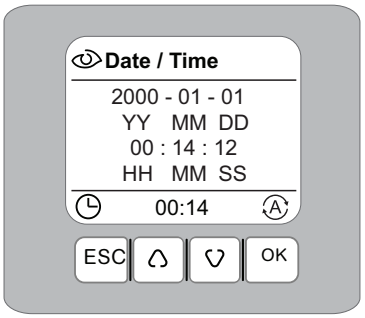
Quick View Menu



1. Select **Quick View** and press **OK** button to open its sub-pages.
2. Press up and down buttons to navigate to each sub-page.

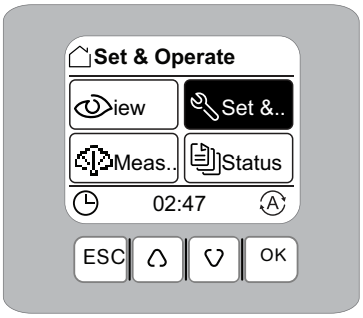
The below table provides the details of the **Quick View** sub-pages:

Menu	Description	Display
System Overview	To show the system overview: • SI and SII status • Contact position	
SI/SII	To show the SI/SII status: • Real time line voltage • Real time frequency	

Menu	Description	Display
Slots	To show the slot status: • Black boxes indicate that the accessories are properly inserted. • Empty boxes indicate that the accessories are not inserted or not properly inserted.	
Date / Time	To show the timer in controller. **NOTE:** Calibrate the timer after long terms of power interruption. Use DC 24 V to keep the accuracy of the timer.	

Set & Operate Menu

Set & Operate page navigates to more maintenance checking.



1. Select **Set & Operate** and press **OK** button to open its sub-pages.
2. Press up and down buttons to navigate to each sub-page.

Quick Menu Tour

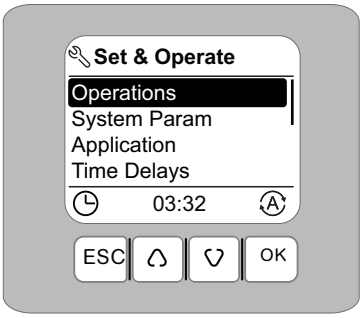
The path of some frequently used menus and settings are listed in the following table.

Menu	Sub-menu 1	Sub-menu 2	Range	Default
System Param	Number of poles	-	3P 4P	4P
	Rated Voltage	-	Refer to System Parameters Sub-menu, page 51	Ue(1): 230V Ue(2): 380V
	Rated Frequency	-	50 Hz; 60 Hz	50 Hz
	Phase Sequence Setting	-	A-B-C C-B-A	A-B-C
	Switch Type Setting	-	ACB MCCB	ACB
Application	Source Config	-	S1 Utility(N) - SII Genset (A) S1 Utility(A) - SII Utility (N) S1 Utility(N) - SII Utility (A) S1 Genset(A) - SII Utility (N)	S1 Utility(N) - SII Genset (A)
	Transfer Conditions	Phase SEQ Warning	ON; OFF	ON
		Volt UNB Warning	ON; OFF	OFF
		N Wrong Warning	ON; OFF	ON
		U > Ue Transfer	ON; OFF	OFF
		Abnormal FRQ Trans	ON; OFF	OFF
		Gen Start Fail Warning	ON; OFF	OFF
		Neutral Loss Transfer	ON; OFF	OFF
	Return Modes	-	Auto Return Non Return Manual Return	Auto Return
	SI setpoints	UV dropout	Refer to Application Sub-menu, page 53	85 %

Menu	Sub-menu 1	Sub-menu 2	Range	Default
		UV pickup		90 %
		OV dropout		110 %
		OV pickup		105 %
		UF dropout		96 %
		UF pickup		97 %
		OF dropout		102 %
		OF pickup		101 %
		Unbalance rate	2 - 30 %	5 %
	SII setpoints	UV dropout	Refer to Application Sub-menu, page 53	85 %
		UV pickup		90 %
		OV dropout		110 %
		OV pickup		105 %
		UF dropout		96 %
		UF pickup		97 %
		OF dropout		102 %
		OF pickup		101 %
		Unbalance rate	2 - 30%	5 %
Time Delays	Transfer Delay	-	0-1800 s	3 s
	Re-Transfer Delay	-	0-3600 s	60 s
	Center-off Delay	-	0-30 s	0 s
	Gen Cool Delay	-	0-3600 s	60 s
	Gen Fail Delay	-	15-300 s	300 s
Settings	Accessories	DI Test (if supported)	ON Load Test Off Load Test	ON Load Test
		Modbus (if supported)	Address Baudrate Parity Stop bit	Address = 001 Baudrate = 19200 Parity = Even Stop bit = 1
	Quick View Auto Scroll	-	ON (1-300 s); OFF	OFF
Language	-	-	8 languages	English
Date/Time	-	-	YYYY-MM-DD-HH-MM-SS	2000-01-01 00:00:00

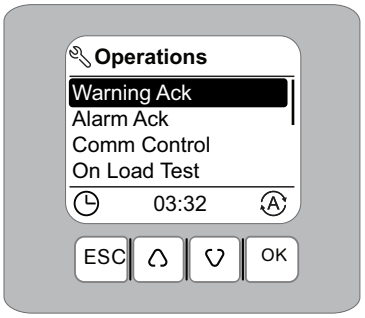
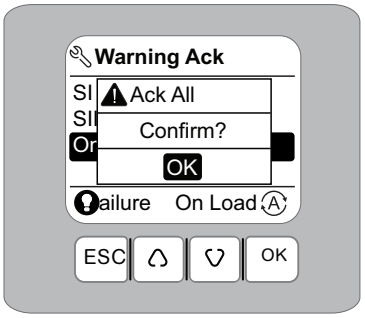
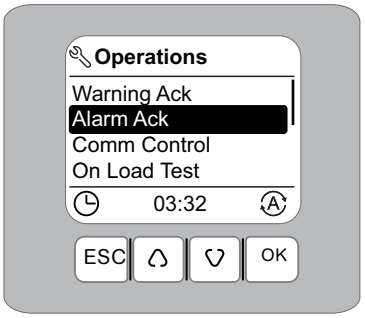
Operations Sub-menu

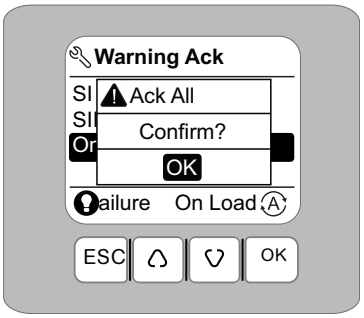
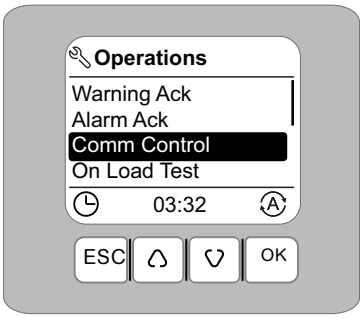
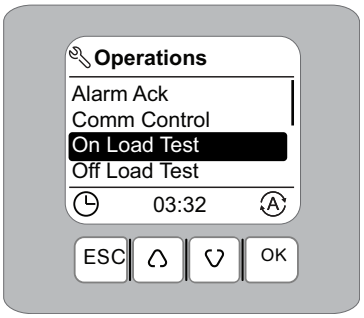
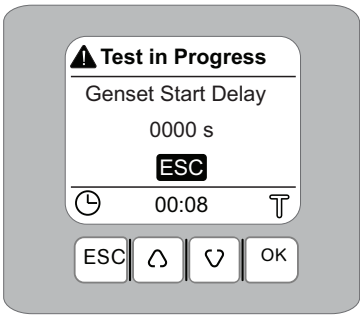
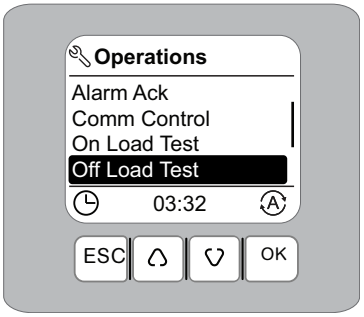
NOTE: When the TransferPacT UC is powered on for the first time, a pincode must be set.

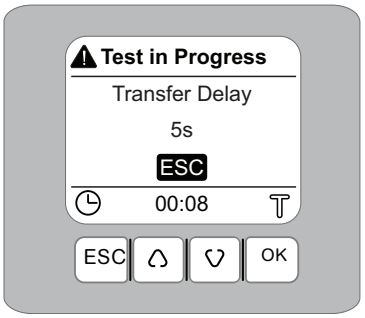
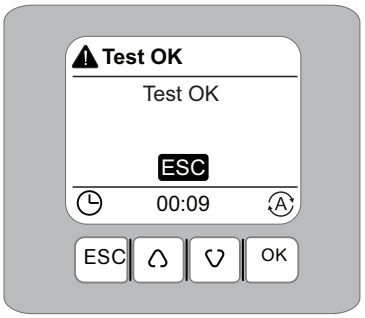


Select **Operations** to control the TransferPacT UC or acknowledge the alarm.

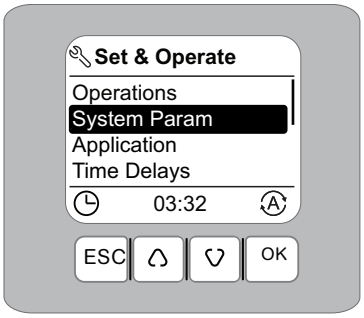
The below table provides the details of the **Operations** sub-pages:

Menu	Description	Display
Warning Acknowledge	Select **Warning Ack** to clear the warning.	
	Select each warning message, and press **OK**. Press **OK** on **Acknowledge All** window to confirm.	
Alarm Acknowledge	Select **Alarm Ack** to clear the alarm.	

Menu	Description	Display
	Select each alarm message, and press **OK**. Press **OK** on **Acknowledge All** window to confirm.	
Comm Control	Select **Comm Control** to enter communication control mode. It contains the following submenus: • Transfer by Comm ◦ **ON**: enable transfer by com function. ◦ **OFF**: disable transfer by com function. • Test by Comm ◦ **ON**: enable test by com function. ◦ **OFF**: disable test by com function. **NOTE:** The function is disabled by default.	
On Load Test	Select **On Load Test** to enter test mode. Press **OK** on the pop-up window to confirm.	
	The  icon at the bottom right corner indicates that the test is started. Test can be interrupted during the process. Press **ESC** > **OK** in **Test in Progress** screen to stop the test. TransferPacT UC will return to Auto mode.	
Off Load Test	Select **Off Load Test** to enter test mode. Press **OK** on the pop-up window to confirm.	

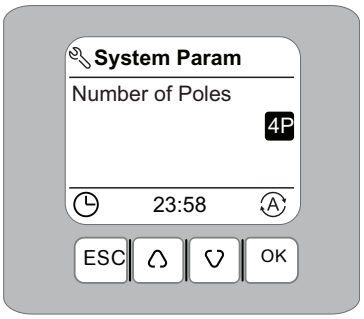
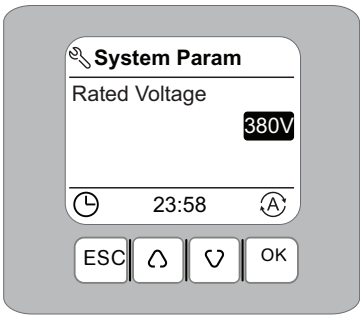
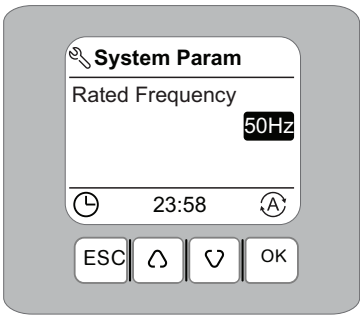
Menu	Description	Display
	The icon at the bottom right corner indicates that the test is started. Test can be interrupted during the process. Press **ESC** > **OK** in **Test in Progress** screen to stop the test. TransferPacT UC will return to Auto mode.	
	When test completes, press **ESC** to exit.	

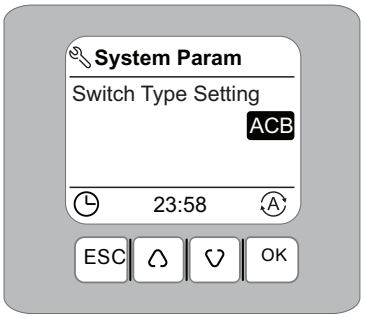
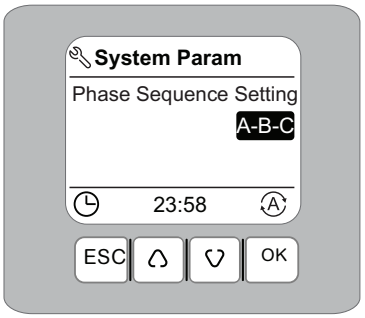
System Parameters Sub-menu



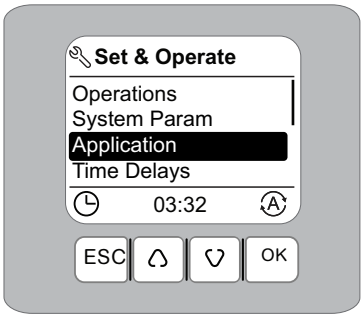
Select **System Parameters** to navigate to more parameter options

The below table provides the details of the **System Parameters** sub-pages:

Menu	Description	Display
Number of Poles	Select number of poles. The options are: • 3P • 4P	
Rated Voltage	Set nominal values of voltage. The settings are: • 208 V • 220 V • 230 V • 380 V • 400 V • 415 V • 440 V **NOTE:** Settings are available depending on the model of UC controller.	
Rated Frequency	Set nominal values of frequency. The settings are: • 50 Hz • 60 Hz	

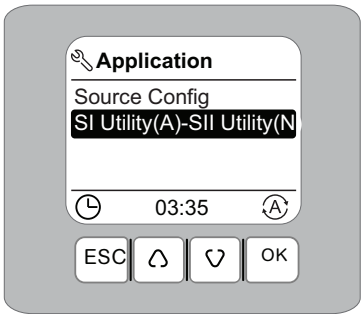
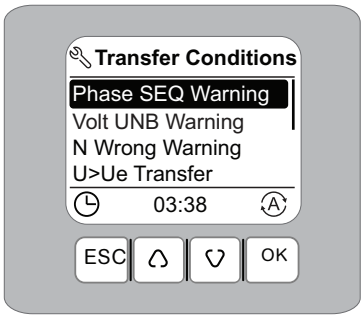
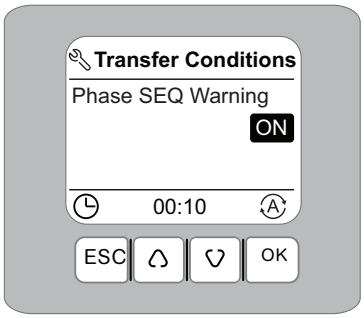
Menu	Description	Display
Switch Type Setting	Set the type of switches. The settings are: • ACB • MCCB	
Phase Sequence Setting	Set the phase sequence. The settings are: • A-B-C • C-B-A	

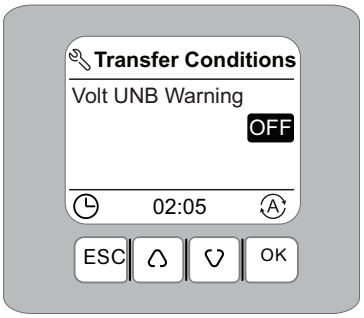
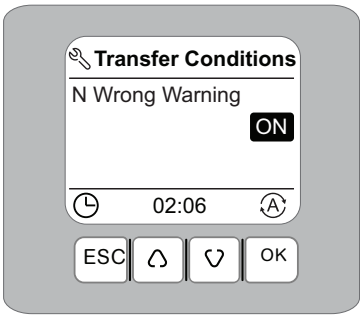
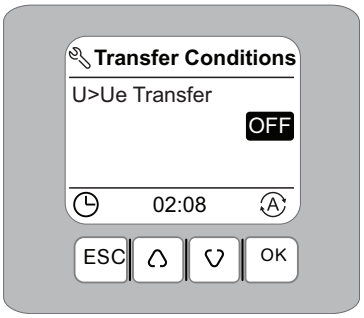
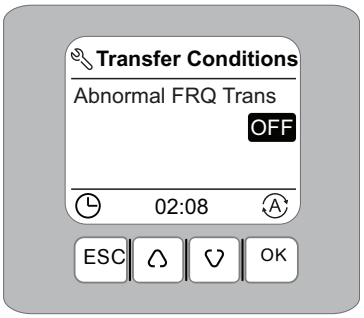
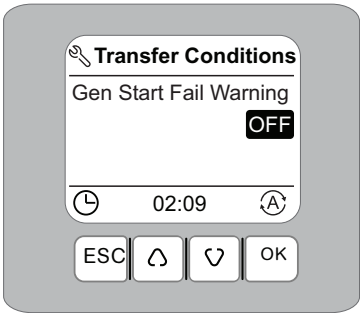
Application Sub-menu

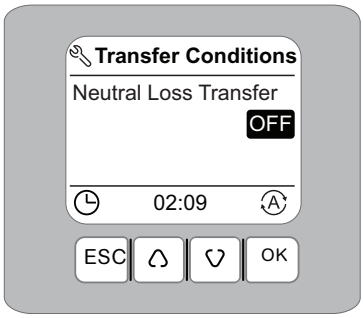
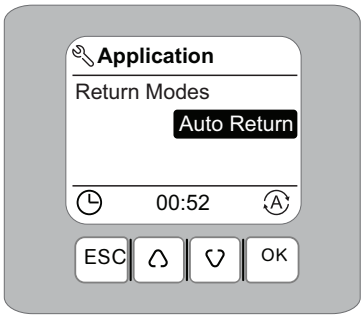
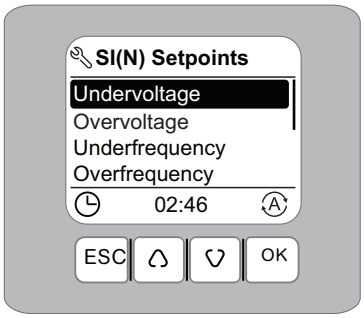
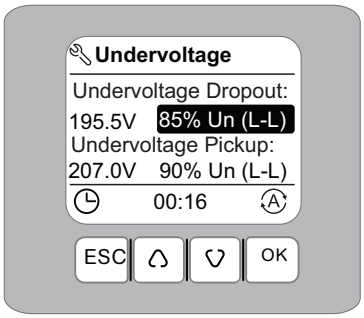
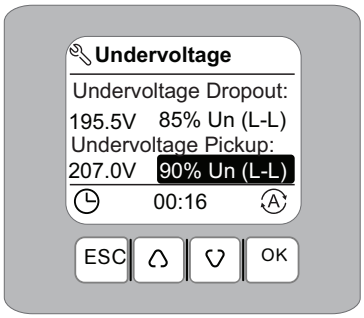


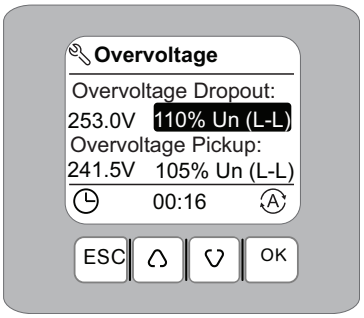
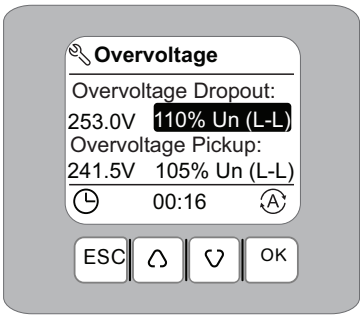
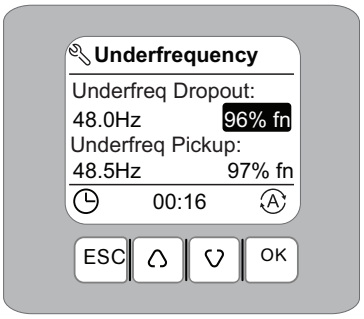
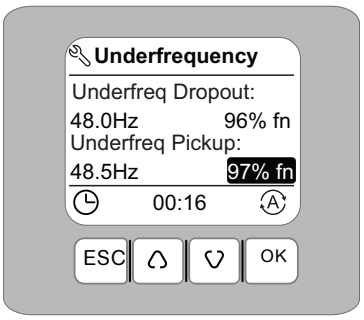
Select **Application** to set the type of source, threshold, time delays and transfer conditions.

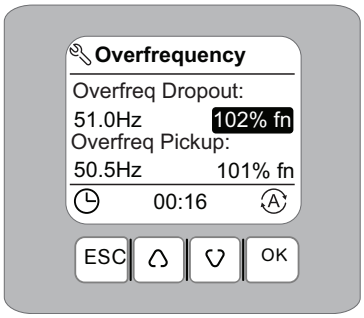
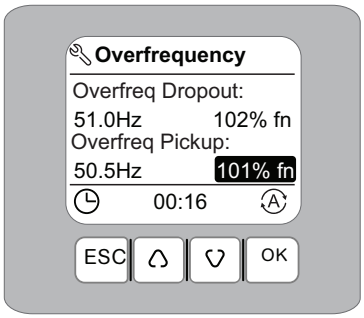
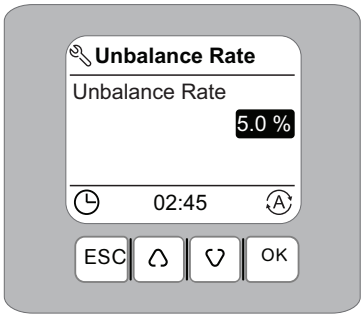
The below table provide the details of the **Application** sub-pages:

Menu	Description	Display
Source Config	Select **Source Config** to set the source type and priorities. The options are: • SI Utility (N)-SII Utility (A) • SI-Utility (N) / SII-Genset (A) • SI-Genset (A) / SII-Utility (N) • SII Utility (N)-SI Utility (A)	
Transfer Conditions	Select **Transfer Conditions** to set the transfer conditions. It contains the following submenus: • Phase SEQ Warning • Volt UNB Warning • N Wrong Warning • U > UeTransfer • Abnormal FRQ Trans • Gen Start Fail Warning • Neutral Loss Transfer	
	Phase SEQ Warning • **ON (Default)**: phase sequence detection enabled. • **OFF**: phase sequence detection disabled.	

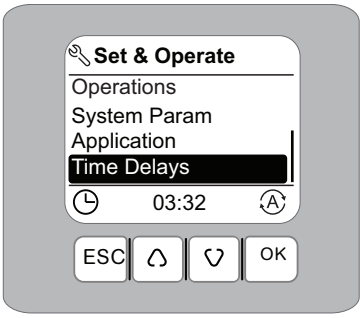
Menu	Description	Display
	Volt UNB Warning • **ON**: voltage unbalance detection enabled. • **OFF (Default)**: voltage unbalance detection disabled.	
	N Wrong Warning • **ON (Default)**: neutral wrong detection enabled. • **OFF**: neutral wrong detection disabled.	
	U > Ue Transfer • **ON**: over voltage detection enabled. • **OFF (Default)**: over voltage detection disabled.	
	Abnormal FRQ Trans • **ON**: abnormal frequency detection enabled. • **OFF (Default)**: abnormal frequency detection disabled.	
	Gen Start Fail Warning • **ON**: gen start fail warning detection enabled. • **OFF (Default)**: gen start fail warning detection disabled.	

Menu	Description	Display
	Neutral Loss Transfer • **ON**: neutral loss transfer detection enabled. • **OFF (Default)**: neutral loss transfer detection disabled.	
Return Modes	Select **Return Modes** to set the transfer modes. • Auto Return • Manual Return • Non Return	
SI(N) Setpoints	Select **SI(N) Setpoints** to set the threshold. It contains the following submenus: • Undervoltage • Overvoltage • Underfrequency • Overfrequency	
	Undervoltage navigates to more set point options in the display for under voltage threshold. **Undervoltage Dropout** • The % and real value will be displayed together. • % can be set while the real value changed dynamically. • The range of under voltage dropout can be 70% - 95% of rated voltage with step of 1%. • Default value is 85% • 3P/4P: 85% Un (L-L) After completing the dropout value setting, press **OK** button to navigate to the pickup value setting. **Undervoltage Pickup** • The % and real value will be displayed together. • % can be set while the real value changed dynamically. • The range of under voltage pickup can be 85% - 100% of rated voltage with step of 1%. • Default value is 90%. • The pickup value must be at least 2% higher than the dropout value.	 

Menu	Description	Display
	Overvoltage navigates to more set point options in the display for over voltage dropout threshold. **Overvoltage Dropout** • The % and real value will be displayed together. • % can be set while the real value changed dynamically. • The range of over voltage dropout can be 105% - 135% of rated voltage with step of 1%. • Default value is 110%. After completing the dropout value setting, press **OK** button to navigate to the pickup value setting. **Overvoltage Pickup** • The % and real value will be displayed together. • % can be set while the real value changed dynamically. • The range of over voltage pickup can be 100% - 115% of rated voltage with step of 1%. • Default value is 105%. • The pickup value must be at least 2% lower than the dropout value.	 
	Underfrequency navigates to more set point options in the display for under frequency dropout threshold **Underfrequency Dropout** • The % and real value will be displayed together. • % can be set while the real value changed dynamically. • The range of under frequency dropout can be 80%-98% of rated frequency with step of 0.5%. • Default value is 96%. After completing the dropout value setting, press **OK** button to navigate to the pickup value setting. **Underfrequency Pickup** • The % and real value will be displayed together. • % can be set while the real value changed dynamically. • The range of under frequency pickup can be 85%-100% of rated frequency with step of 0.5%. • Default value is 97%. • The pickup value must be at least 0.5% higher than the dropout value.	 

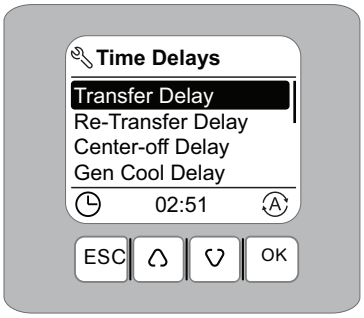
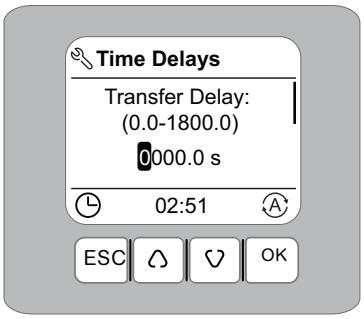
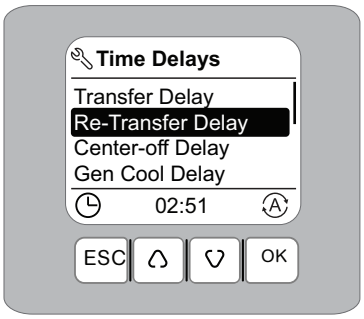
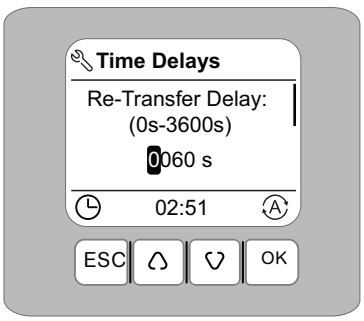
Menu	Description	Display
	Overfrequency navigates to more set point options in the display for over frequency dropout threshold. **Overfrequency Dropout** • The % and real value will be displayed together. • % can be set while the real value changed dynamically. • The range of over frequency dropout can be 101% - 120% of rated voltage with step of 0.5%. • Default value is 102%. After completing the dropout value setting, press **OK** button to navigate to the pickup value setting. **Overfrequency Pickup** • The % and real value will be displayed together. • % can be set while the real value changed dynamically. • The range of over frequency pickup can be 100% - 115% of rated voltage with step of 0.5%. • Default value is 101%. • The pickup value must be at least 0.5% lower than the dropout value.	 
	Unbalance Rate navigates to more set point options in the display for unbalance rate. • The % and real value will be displayed together. • % can be set while the real value changed dynamically. • The range of unbalanced rate from 2% to 30%. • Default value is Disabled.	

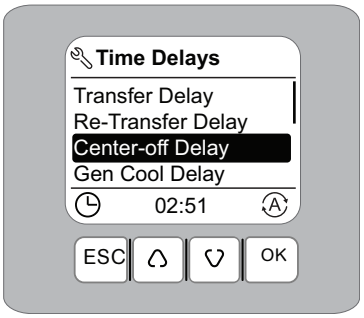
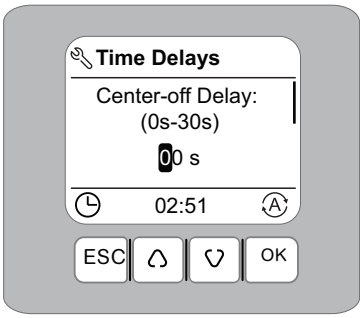
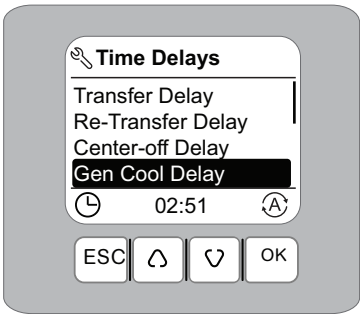
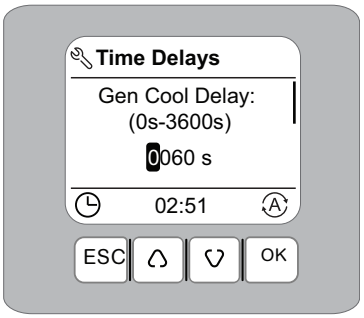
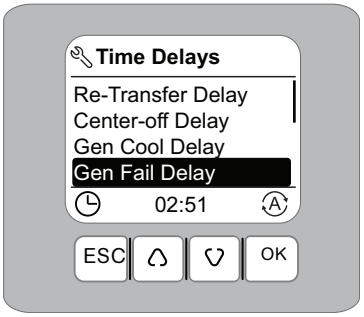
Time Delays Sub-menu

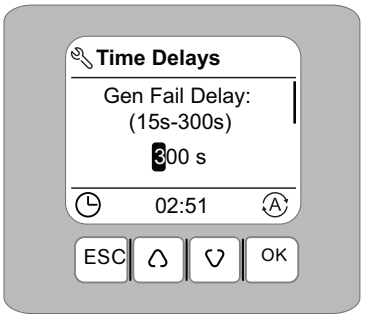


Select **Time Delays** to set transfer times delay for different application.

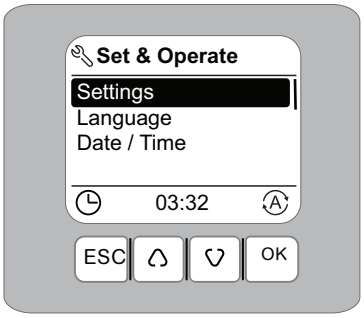
The below table provides the details of the **Time Delays** sub-pages:

Menu	Description	Display
Transfer Delay	To set transfer delay.	
	Use up or down button to set the value digit by digit from the most to the least significant digit. Press **OK** button to move to the next digit. When you finish setting the least significant digit, press **OK** on the pop up window to confirm the change. The range is from 0-1800 s. Default value is 3 s.	
Re-Transfer Delay	To set re-transfer delay.	
	Use up or down button to set the value digit by digit from the most to the least significant digit. Press **OK** button to move to the next digit. When you finish setting the least significant digit, press **OK** on the pop up window to confirm the change. The range of re-transfer time is from 0-3600 s with step of 1 s. Default value is 60 s.	

Menu	Description	Display
Center-off Delay	To set center-off delay.	
	Use up or down button to set the value digit by digit from the most to the least significant digit. Press **OK** button to move to the next digit. When you finish setting the least significant digit, press **OK** on the pop up window to confirm the change. The range of centre off delay is from 0-30 s. Default value is 0 s.	
Gen Cool Delay	To set genset cooling down delay.	
	Use up or down button to set the value digit by digit from the most to the least significant digit. Press **OK** button to move to the next digit. When you finish setting the least significant digit, press **OK** on the pop up window to confirm the change. The range of genset cooling down delay is from 0 to 3600 s. Default value is 60 s.	
Gen Fail Delay	To set genset ready alarm delay.	

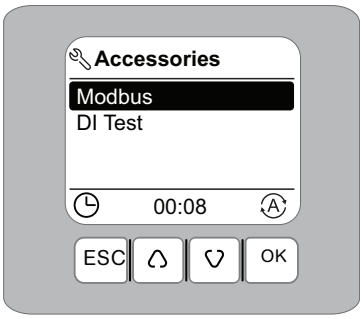
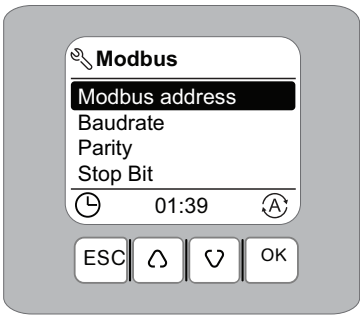
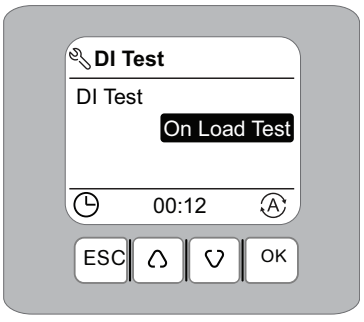
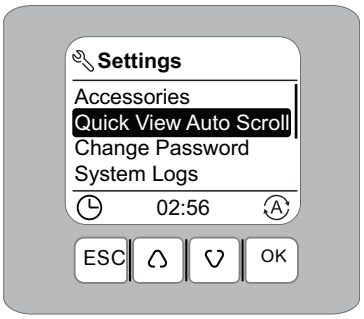
Menu	Description	Display
	Use up or down button to set the value digit by digit from the most to the least significant digit. Press **OK** button to move to the next digit. When you finish setting the least significant digit, press **OK** on the pop up window to confirm the change. Genset failure delay is from 15 ~300 s. Default value is 300 s.	

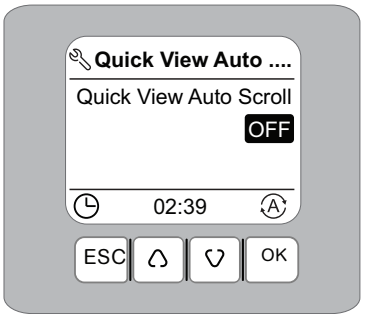
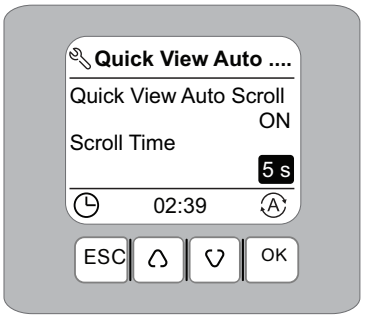
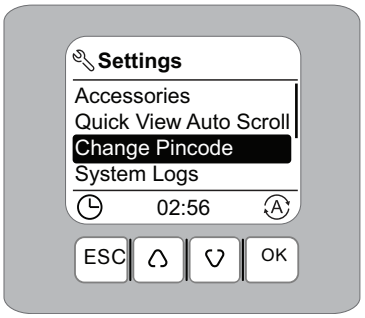
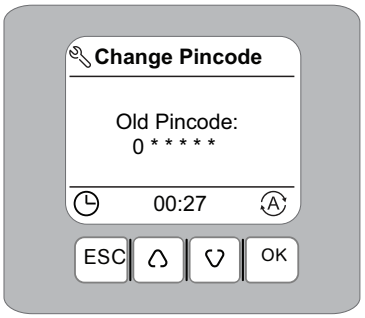
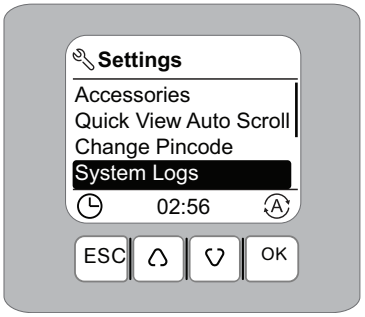
Settings Sub-menu

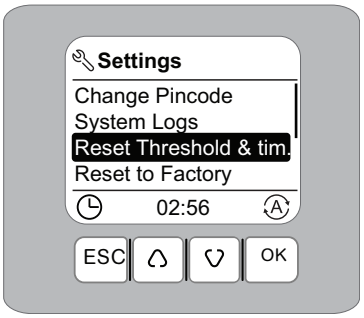
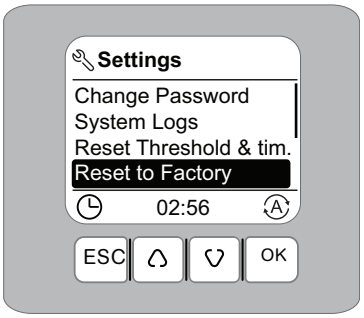


Select **Settings** for accessories commissioning, reset and password settings.

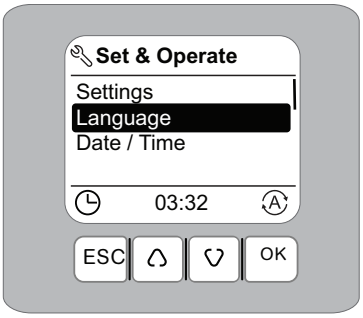
The below table provide the details of the **Settings** sub-pages:

Menu	Description	Display
Accessories	**Accessories** page navigates to more accessories setting options in the display. It contains the following settings: • Modbus • DI Test	
	Select **Modbus** for commissioning. It contains the following settings: • Addresss • Baudrate • Parity • Stop bit **NOTE:** If the Modbus module is not inserted, the option will be empty.	
	Select **DI Test** for commissioning. The settings are: • On Load Test • Off Load Test **NOTE:** If the module of remote test is not inserted, the option will be empty.	
Quick View Auto Scroll	**Quick View Auto Scroll** page navigates to more settings option in the display. **NOTE:** If the module of **Quick View Auto Scroll** test is not inserted, the option will be empty. • **ON**: Quick View Auto Scroll detection enabled. • **OFF (Default)**: Quick View Auto Scroll detection disabled.	

Menu	Description	Display
		
	Select **Scroll Time** and use up or down button to set it. The range of quick view auto scroll time is from 0 ~300 s with step of 1 s. Default value is 5 s.	
Change Pincode	Select **Change Pincode** to change pincode.	
	Input 6 digital code to create new pincode. Press **OK** and **ESC** button for 10 seconds to change or reset the pincode.	
System Logs	Select **System Logs** and use up or down button to set it.	

Menu	Description	Display
Reset Threshold & tim.	Select **Reset Threshold & tim.** to reset the controller. List of values that can be reset: • Under Voltage • Over Voltage • Under Frequency • Over Frequency • Unbalance Rate • Transfer Delay (T2) • Center-Off Delay (T4) • Re-Transfer Delay (T6) • Genset Cool Delay (T9) • Genset Fail Delay (T10) • On Load Test Delay (T13) • Off Load Test Delay (T14)	
Reset to Factory	Select this option to clear all user data, including Event logs, Sysem logs, Pin code, System Parameters, etc. After the user data is successfully cleared, the controller will automatically reset.	

Language Sub-menu

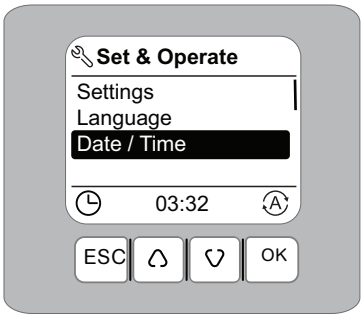


Select **Language** to select the preferred language.

The below table provide the details of the **Language** sub-menus:

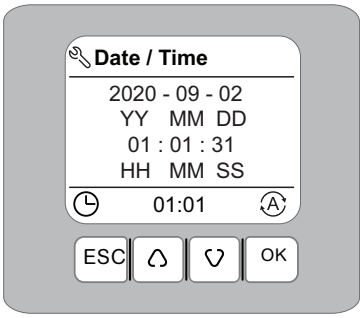
Menu	Sub-page function	Display
Language	To select the display language.	

Date and Time Sub-menu

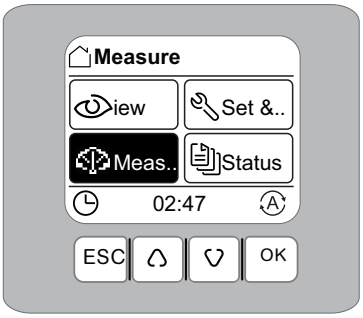


Select **Date / Time** to set the time.

The below table provide the details of the **Date / Time** sub-menus:

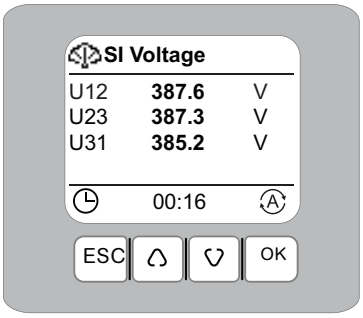
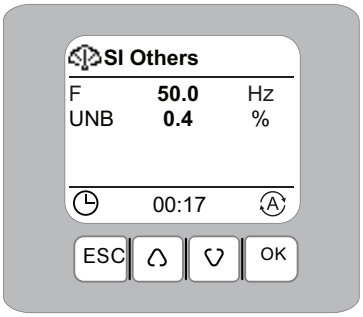
Menu	Description	Display
Date / Time	To set system data and time. • Set date by year/month/day. • Set time by hour/minutes/seconds.	

Measure Menu

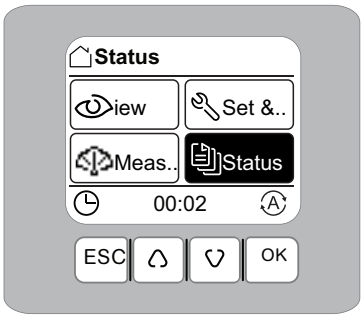


1. Select **Measure** and press **OK** button to open its sub-pages.
2. Press up and down buttons to navigate to each sub-page.

The below table provide the details of the **Measure** sub-pages:

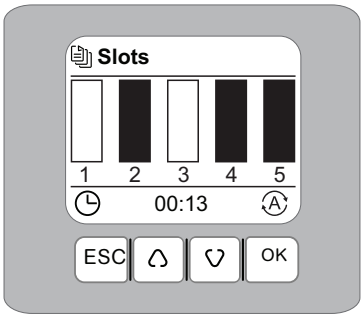
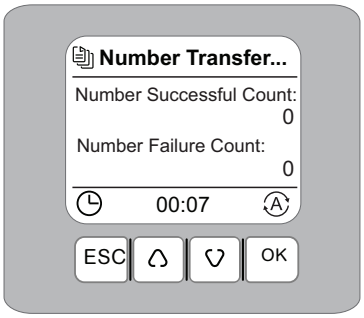
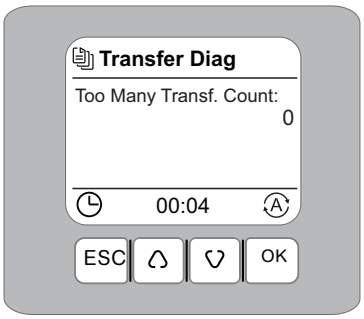
Menu	Description	Display
SI/SII Voltage	To show the SI or SII voltage status: • Real time line voltage of SI or SII. • Real time frequency of SI or SII.	
SI/SII Others	To show the SI or SII other status: • Real time frequency of SI or SII. • Real time unbalance rate of SI or SII.	

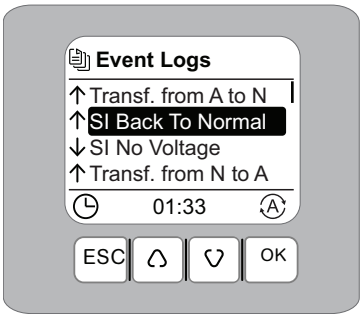
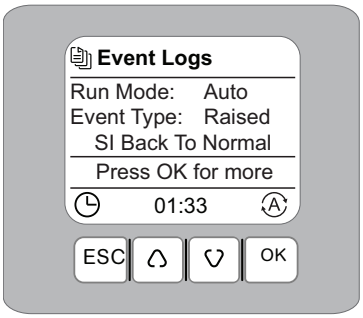
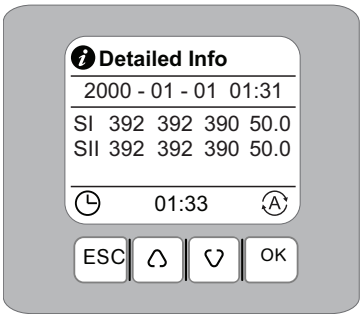
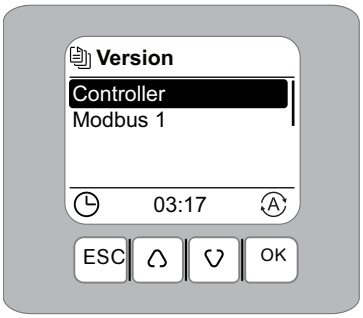
Status Menu



1. Select **Status** and press **OK** button to open its sub-pages.
2. Press Up and Down buttons to navigate to each sub-page.

The below table provide the details of the **Status** sub-pages:

Menu	Description	Display
Slots	Select **Slots** to show slots status. • Black boxes indicate that the accessories are properly inserted. • Empty boxes indicate that the accessories are not inserted or not properly inserted.	
Transfer Count Description	Select **Transfer Count** sub-page to show the transfer times: • Successful transfer counts • Failed transfer counts	
Transfer Diagnostic	Select **Transfer Diag** sub-page to show the transfer times: • Too many transfer counts	

Menu	Description	Display
Event Logs	**Event Logs** sub-page navigates to event logs.	
	Use up and down button to select each event log to show the information. • Time of events. • Source status during events. For more information on Event Code, refer to Event Logs.	
	Detailed Info page shows the cause of events: • Transfer mode during events. • Type of events.	
Version	Select **Version** sub-page to show the list of hardware components: Use up and down button for navigation. Click different components to check their information.	

Operations on TransferPacT UC

What's in This Chapter

Overview

ATSE is an equipment containing one or more switching devices for disconnecting load circuits from one supply and connecting to another supply.

The two types of transition are:

- Open transition
- Delayed transition

Open transition is a process to break before the transfer operation. It is done intentionally to break the load current from one source prior to making it to the other source, such that the load is not supplied for a period of time.

When the delay transition is activated, the switch will stay in an open circuit (main contact will stay in off position for a period of time). This delay allows the residual voltage of the load to decay within the allowable range.

The delayed transition is recommended when motors are located on the load side. Indeed, in the case of voltage loss on motors, the following may happen:

- When the inductive load loses power, it will generate self excitation voltage due to inertia.
- The self excitation voltage needs a certain time constant to attenuate.
- When the self-excited voltage is 180° different from the voltage of another power supply and superimposed, it will cause about twice the voltage impact.
- When the resistance of the motor is fixed, the current will also be increased to 2 times. In addition, the starting current of the motor is large (6-8 times rated current), so the current shock of 12-16 times may occur.

The setting time of the delay shall ensure that the time length of the motor disconnected from the power supply is equal to or greater than 1.5 open circuit AC time constants of the motor; generally 0.5-1 s.

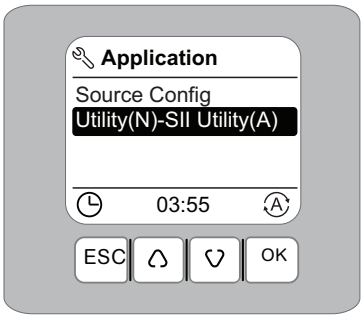
Preferable Source Selection

TransferPacT UC provide an easy way to select the preferred source as normal (N) source.

To select the preferred source, go to **Set & Operate** > **Application** > **Source Configuration** page to make the selection.

The options are as follows:

- SI Utility (N)-SII Utility (A) ， Select this option when both SI and SII are connected to utility. Utility connected to SI is set as normal (N) source. Utility connected to SII is set as alternate (A) source.
- SI-Utility (N) / SII-Genset (A), Select this option when SI is connected to utility, and SII is connected to genset. Utility is set as normal (N) source. Genset is set as alternate (A) source.
- SI-Genset (A) / SII-Utility (N) Select this option when SI is connected to genset, and SII is connected to utility. Utility is set as normal (N) source. Genset is set as alternate (A) source.
- SII Utility (N)-SI Utility (A), Select this option when both SI and SII are connected utility. Utility connected to SII is set as normal (N) source. Utility connected to SI is set as alternate (A) source.



Utility-Utility (U-U) Application

1. Detect the normal source contingency.
2. Transfer the load to alternate source when normal source is out of tolerance.
3. Re-transfer to normal source when it is recovered if auto return mode is set.

Utility-Generator (U-G) Application

1. Detect the normal source contingency (Utility).
2. Send out Genset start signal when normal source is out of tolerance.
3. Transfer the load to alternate source (generator) when generator is ready.
4. Re-transfer to normal alternate source when it is recovered if auto return mode is set.
5. Send the Genset cool down signal after re-transfer to normal source.

Transfer Condition

The following are the auto-transfer conditions:

- **Voltage deviation**: Controller monitors two sources, and uses over-voltages and under-voltages thresholds as conditions of source transfer.
- **Frequency deviation**: Controller monitors two sources, and uses over-frequency and under-frequency thresholds as conditions of source transfer.
- **Phase rotation**: Controller detect two sources phase sequence as the condition of source transfer.

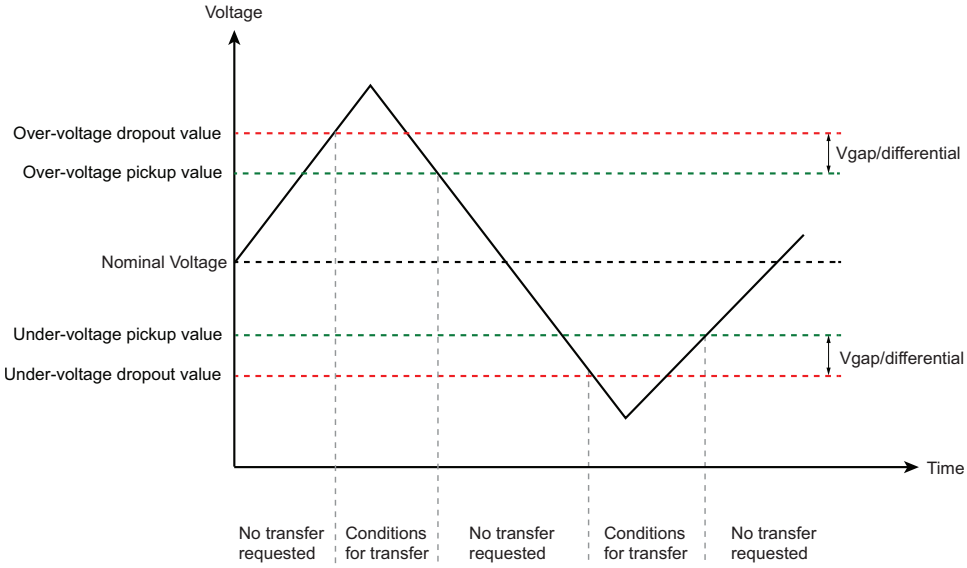
Threshold

Description	Settings	Default setting (% of nominal)	Range	Adjustment
Normal/Alternate source voltage	Under voltage Dropout	85%	70%-95%	Step of 1%
	Under voltage Pickup	90%	85%-100%	Step of 1%
	Over voltage Dropout	110%	105%-135%	Step of 1%
	Over voltage Pickup	105%	100%-115%	Step of 1%
	Minimum differential between Dropout and pickup	2%	--	
Normal/Alternate source frequency	Under Frequency Dropout	96%	80%-98%	Step of 0.5%
	Under Frequency Pickup	97%	85%-100%	Step of 0.5%
	Over Frequency Dropout	102%	101%-120%	Step of 0.5%
	Over Frequency Pickup	101%	100%-115%	Step of 0.5%
	Minimum differential between Dropout and pickup	0.50%	--	
Voltage unbalance		Disabled	2%-30%	
Phase rotation		Enabled		
Neutral wrong connection		Enabled		
Neutral lost		Disabled		unbalance rate

The accuracy of voltage sensing is 1%.

The accuracy of frequency sensing is 0.1%.

Voltage Dropout and Pickup

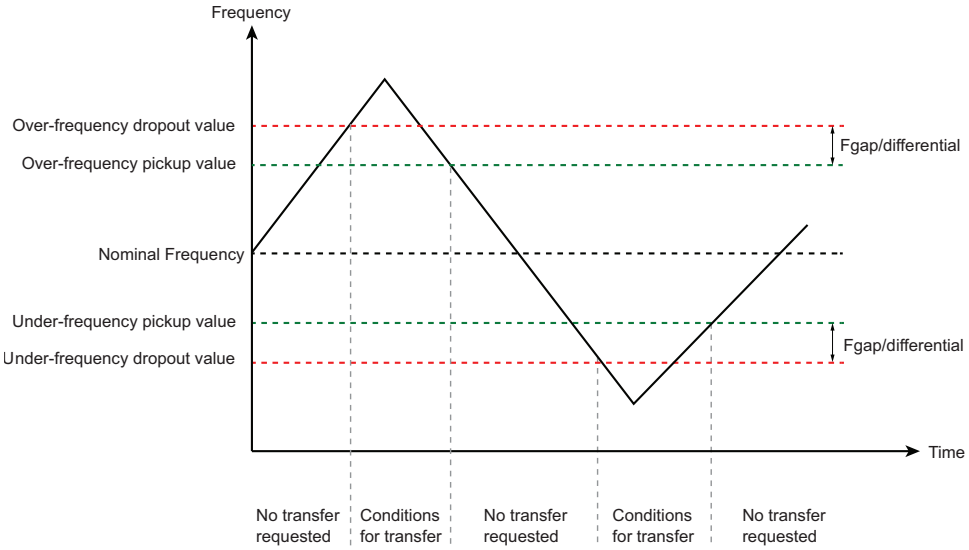


- Over-voltage dropout value: Above this value, the voltage is out of range and transfer is initiated.
- Over-voltage pickup value: When voltage goes back from over voltage, it is a condition to go back to normal situation.
- The Vgap/differential between Over-voltage dropout and pickup is 2% of rated voltage in minimum.

  NOTE: If the minimum 2% differential of rated voltage rule is broken during Over-voltage dropout setting, the pickup value will be modified dynamically (pickup = dropout – 2% Ue) to keep the rule.
- Under-voltage dropout value: Below this value, the voltage is out of range and transfer is initiated.
- Under-voltage pickup value: When voltage goes back from under voltage, it is a condition to go back to normal situation.
- The Vgap/differential between Under-voltage dropout and pickup is 2% of rated voltage in minimum.

  NOTE: If the minimum 2% differential of rated voltage rule is broken during Under-voltage dropout setting, the pickup value will be modified dynamically (pickup = dropout + 2% Ue) to keep the rule.

Frequency Dropout and Pickup



- Over-frequency dropout value: Above this value, the frequency is out of range and transfer is initiated.
- Over-frequency pickup value: When frequency goes back from over frequency, it is a condition to go back to normal situation.
- The Fgap/differential between Over-frequency dropout and pickup is 0.5% of rated frequency in minimum.

  NOTE: If the minimum 0.5% differential of rated frequency rule is broken during Over-frequency dropout setting, the pickup value will be modified dynamically (pickup = dropout – 0.5% of rated frequency) to keep the rule.
- Under-frequency dropout value: Below this value, the frequency is out of range and transfer is initiated.
- Under-frequency pickup value: When frequency goes back from under frequency, it is a condition to go back to normal situation.
- The Fgap/differential between Under-frequency dropout and pickup is 0.5% of rated frequency in minimum.

  NOTE: If the minimum 0.5% differential of rated frequency rule is broken during Under-frequency dropout setting, the pickup value will be modified dynamically (pickup = dropout + 0.5% of rated frequency) to keep the rule.

Voltage Unbalance

The single-phase loading causes a voltage unbalance. When the maximum deviation from average voltage is greater than a user-specific value of the average voltage, the sensor indicates a failure. An alarm will be raised.

The voltage unbalance feature can be enabled or disabled. By default, it is disabled. The adjustment range for voltage unbalance is between 2%–30%.

Phase Rotation

This feature monitors the phase rotation of the source opposite from the connected source. In order to check phase rotation, both voltage sources must be applied.

It protects against equipment damage by preventing transfer to a source that is out of phase. This occurs during new installations or after storm damage or generator rewiring (U-G).

This feature can be enabled or disabled. By default, it is enabled.

When the power source is normal, phase angle differences (PhaseA – PhaseB/ PhaseB – Phase A) should be 120°/240°±5°.

Neutral Wrong Connections Detections

This function can be enabled to prevent wrong connection of neutral cable. When neutral wrong is detected, an alarm will be shown on HMI.

This feature could be enabled or disabled. By default, it is enabled.

Neutral Loss

A warning is raised when this function is enabled to prevent wrong connection, miss connection or disconnection caused by interior or exterior impacts of neutral cable. The LED of source will blink to indicate there is neutral loss.

This feature could be enabled or disabled. By default, it is disabled.

Time Delay

Symbol	Display	Definition	Range	Default Setting	Adjustment
T2	Transfer Delay	Confirmation delay on source power failure	0-1800 s	3 s	0.1 s from 0-1 s. 1 s when >1 s.
T4	Center-off Delay	OFF position delay	0-30 s	0 s	1 s
T6	Re-transfer Delay	Confirmation delay to re-transfer on normal source	0-3600 s	60 s	1 s
T9	Genset cool delay	Genset cooling down delay	0-3600 s	60 s	1 s
T10	Genset fail delay	Genset alarming failure detection time	15–300 s	300 s	1 s
T13	On load test delay	Time duration to run for test process on load.	Unlimited: 0 s Limited: 1-1800 s	Unlimited: 0 s Limited: 30 s	1 s
T14	Off load test delay	Time duration to run for test process off load.	Unlimited: 0 s Limited: 1-1800 s	Unlimited: 0 s Limited: 30 s	1 s

T2: Transfer Delay

Field	Description
Applications	• Confirm connected source has failure. • Measure the target source power (for example voltage and frequency) during the time delay. • The delay shall detect both sources, the stop condition will be N recovered, or A source failed.
Default values	3 s
Range	0–1800 s
Adjust	Step of 0.1 s from 0-1 s. 1 s when >1 s.

T4: Center-Off Delay

Field	Description
Applications	• Time delay applied to the center-off position O when Position I and Position II are transferring, it stops at Position O to protect inductive load. • The delay is used for both process of transfer to N and A.
Default values	0 s
Range	0–30 s
Adjust	Step of 1 s

T6: Re-Transfer Delay

Field	Description
Applications	• Time delay applied when transferring from A to N in the Auto-Return mode. This delay is intended to measure the N and A during the delay. • If N is abnormal, the timer will stop and the re-transfer is cancelled. • If R is abnormal but Source N is normal, the switch will transfer immediately.
Default values	60 s

Field	Description
Range	0–3600 s
Adjust	Step of 1 s

T9: Genset Cool Delay

Field	Description
Applications	• Delay between closing of N source and send the signal to stop the Genset. • The propose is to keep the generator running at no load for some time before shutting / cooling down. • When controller restarts, this time delay will be running also at U-G mode. **NOTE:** To prevent any risk of Genset damage due to Genset stopping before the end of its starting process: Genset cooling time delay can only start after the end of Genset start time delay or after SII is within tolerances since source return time delay.
Default values	60 s
Range	0–3600 s
Adjust	Step of 1 s

T10: Genset Fail Delay

Field	Description
Applications	• After sending the Genset start signal, controller will wait a time duration T10 until Genset is ready. • The ATSE shall rise the Genset alarm, if genset is not started while T10 timer is ended (if enabled). • The ATSE shall reset the Genset alarm, when the R source is in Range or when the N source is in Range. • The time delay is only available when there is external power.
Default values	• The default value is 300 s. • The alarm can be enabled or disabled. Default as disabled.
Range	15–300 s
Adjust	Step of 1 s

T13: On Load Test Delay

Field	Description
Applications	Time duration for On load test process. It will rise the alarm if test is not finished in the time duration.
Default values	• Default as unlimited(0 s), has to manual stop test procedure. • If select limited, default as 30 s.
Range	1–1800 s
Adjust	Step of 1 s

T14: Off Load Test Delay

Field	Description
Applications	Time duration for off load test process. It will rise the Alarm if test is not finished in the time duration.
Default values	• Default as unlimited(0 s), has to manual stop test procedure. • If select limited, default as 30 s.

Field	Description
Range	1–1800 s
Adjust	Step of 1 s

Control Mode

What's in This Chapter

Overview

The control mode is used to operate TSE in different applications. The TransferPacT Active ATSE contains every function needed with seven control modes:

- Auto mode
- Test mode
- Communication transfer mode
- Voluntary transfer mode
- Local control mode
- Transfer inhibit mode
- Force to off mode

Priority of Control Mode

Fault (Trip, Transfer Failed, etc.)

> Force to off mode

> Transfer inhibit mode

> Local control mode (local manual button transfer)

> Voluntary transfer mode (Voluntary to N/Voluntary to A transfer)

> Communication transfer mode (Comm to N/Comm to A/Comm to OFF transfer)

> Test mode (On load test/Off load test)

> Auto mode (Auto Return/Non Return/Manual Return)

Auto Mode

Auto control mode is the standard operating mode. The controller monitors the real time power parameter of both sources and controls the switching devices as per preconfigured logic of both the sources.

Auto mode supports U-G (Untility - Generator) or U-U (Untility - Untility) applications.

There are three types of auto control mode:

- Auto-return
- Non-return
- Manual-return

Power sources condition	N available A available	N available A unavailable
Auto-return	Switch to N	Stay at A
Non-return	Switch to N	Switch to N
Manual-return*	Stay at A	Manually switch to N

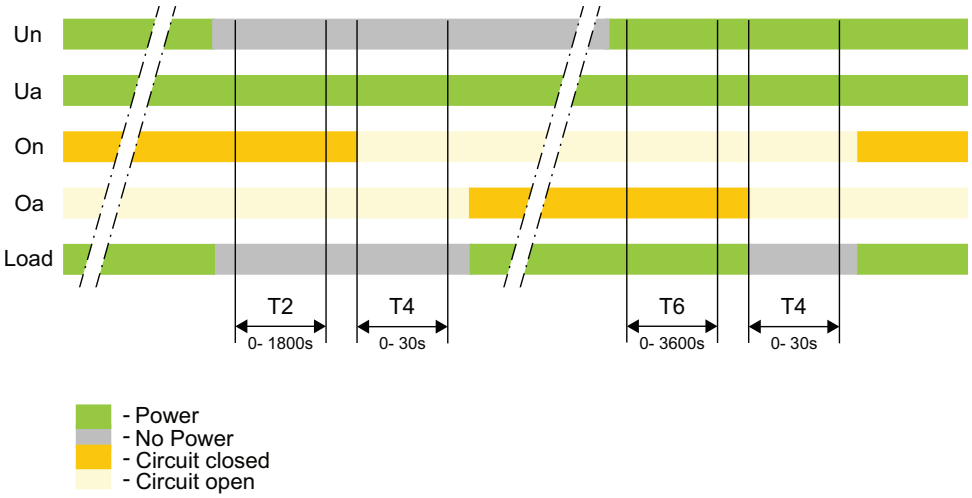
NOTE: The transfer switch cannot return automatically until manually operating.

Auto-Return

- When the voltage on the N(Normal)source exceeds the threshold (over voltage, under voltage, over frequency, under frequency) or does not exist, the ATSE will be transferred to the A (Alternatel) source.
- When the voltage on the N(Normal) source is within the threshold range, the ATSE will be transferred to N (Normal) source. The process of transfer can be controlled by time delay.

The process of transfer can be controlled by time delay.

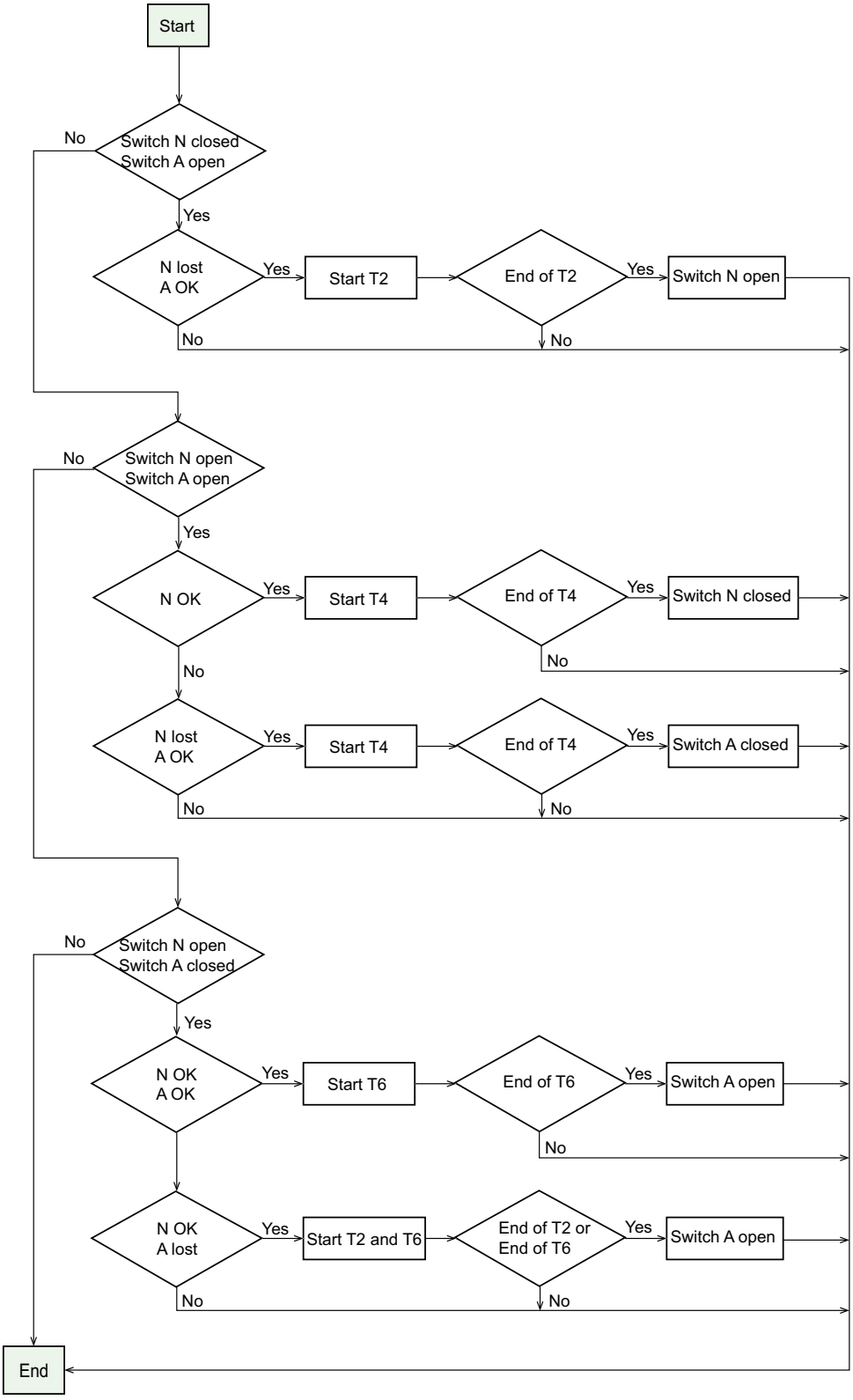
Transfer Process of Auto-Return for U-U Application



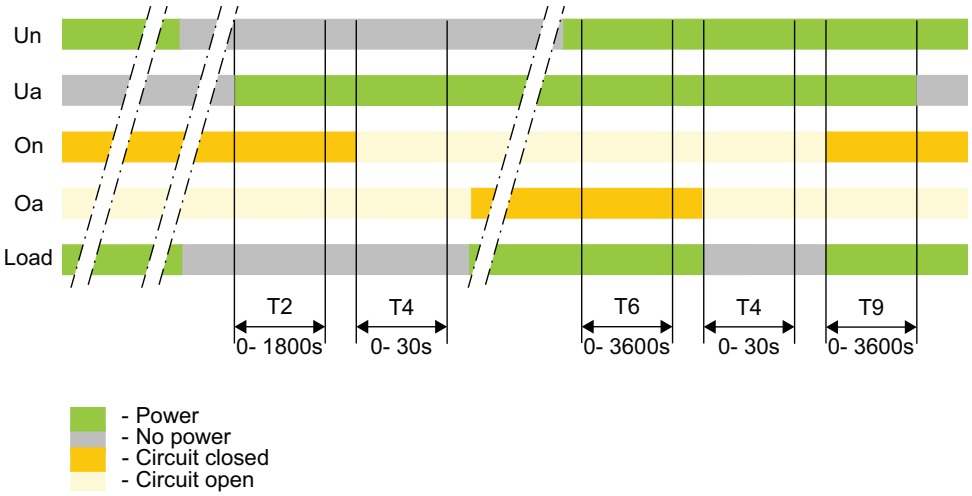
Symbols	Description
Un	Source N
Ua	Source A
On	Contact close at source N

Symbols	Description
Oa	Contact close at source A
Load	Load status
T2	Transfer delay
T4	Center-off delay
T6	Re-Transfer delay

Transfer Logic of Auto-Return for U-U Application

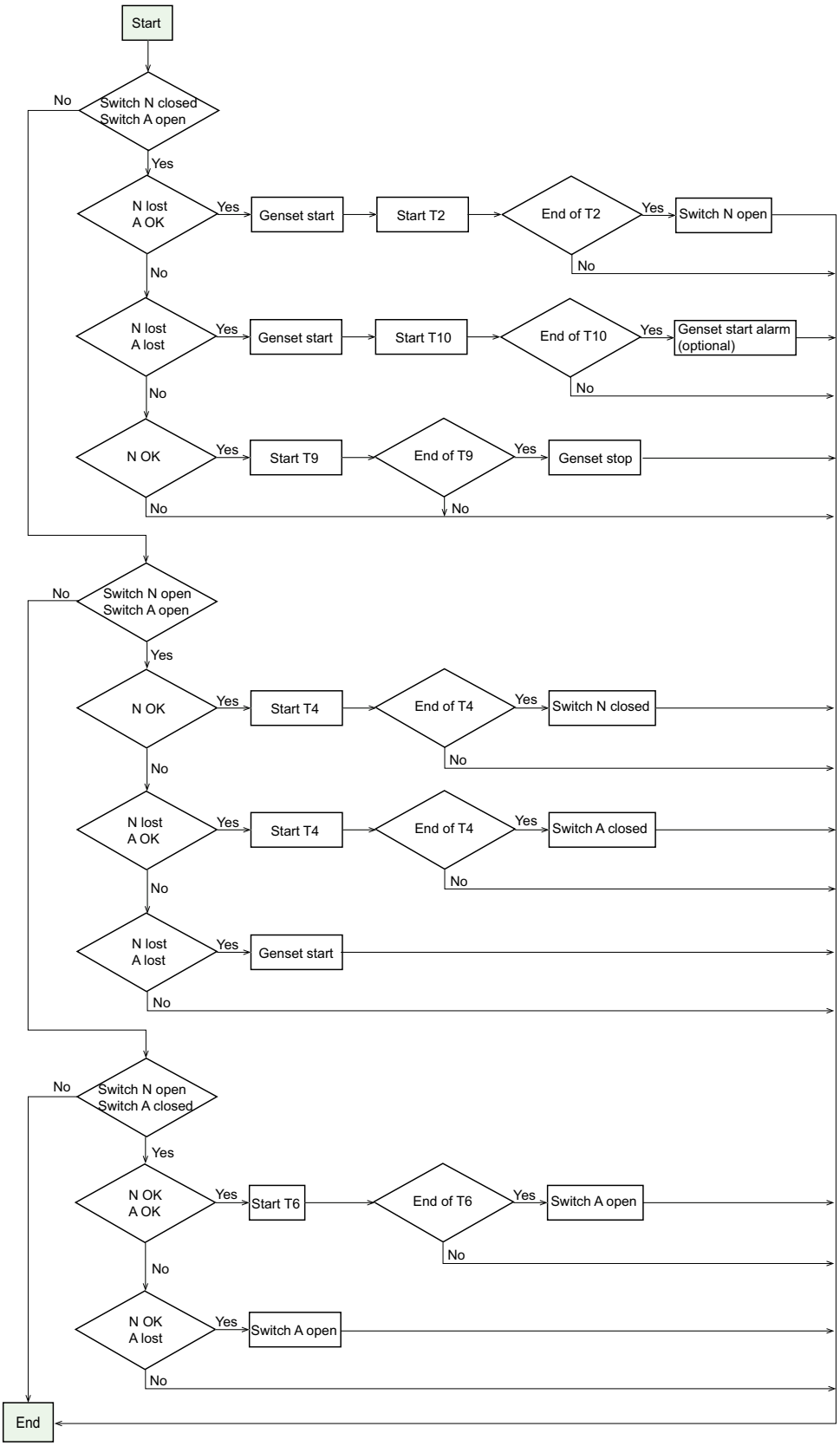


Transfer Process of Auto-Return for U-G Application



Symbols	Description
Un	Source N
Ua	Source A
On	Contact close at source N
Oa	Contact close at source A
Load	Load status
T2	Transfer delay
T4	Center-off delay
T6	Re-Transfer delay
T9	Genset cool delay

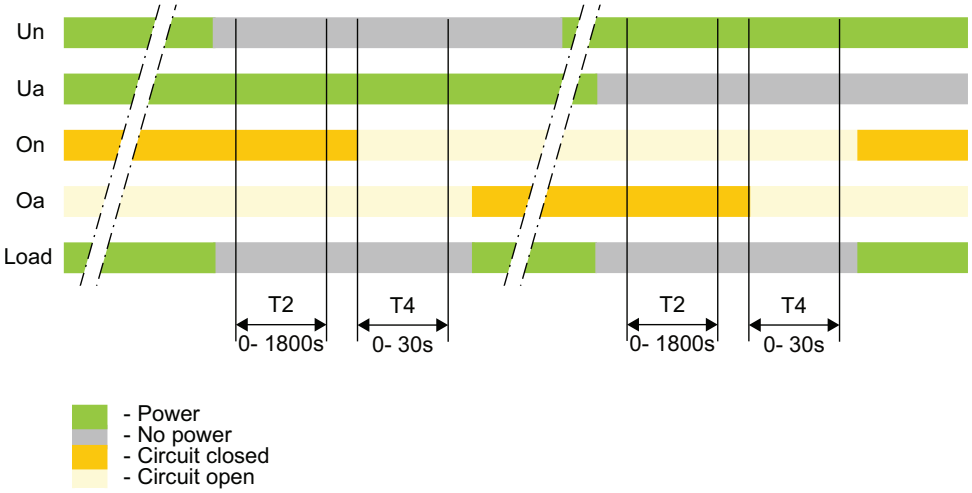
Transfer Logic of Auto-Return for U-G Application



Non-Return

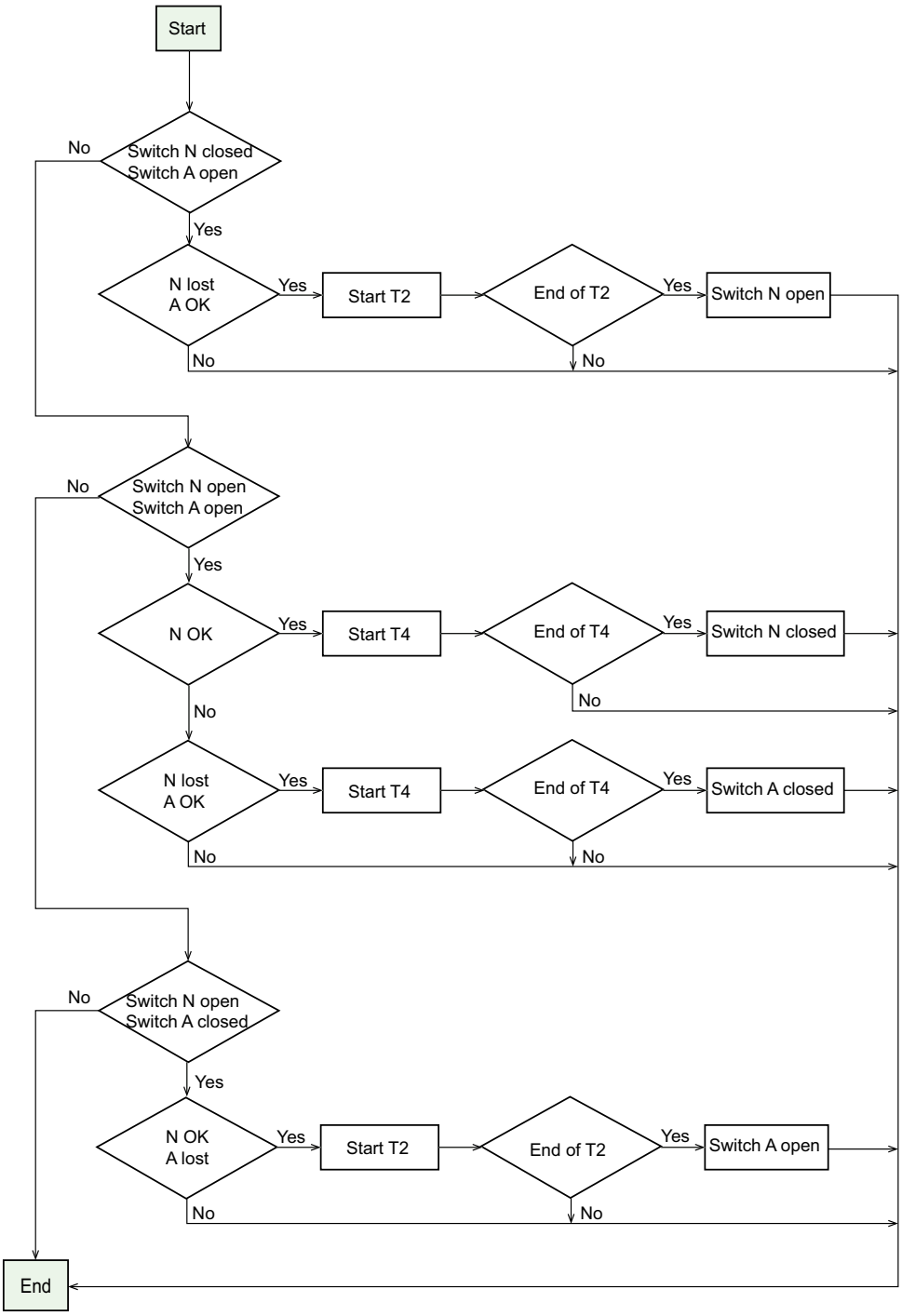
- When the voltage on the N (Normal) source exceeds the threshold (overvoltage, undervoltage, over frequency, underfrequency) or does not exist, ATSE will be transferred to the A (Alternate) source.
- ATSE will remain on the A (Alternate) source, which will exist and be within the threshold range (overvoltage, undervoltage, over frequency, underfrequency). When the voltage on the A (Alternate) source exceeds the threshold range and the voltage on the N (Normal) source is within the threshold range, ATSE will transferred the N (Normal) source.
- The Auto-Non return has the same transfer sequence with self-return in terms of Auto-transfer.

Transfer Process of Non-return for U-U Application

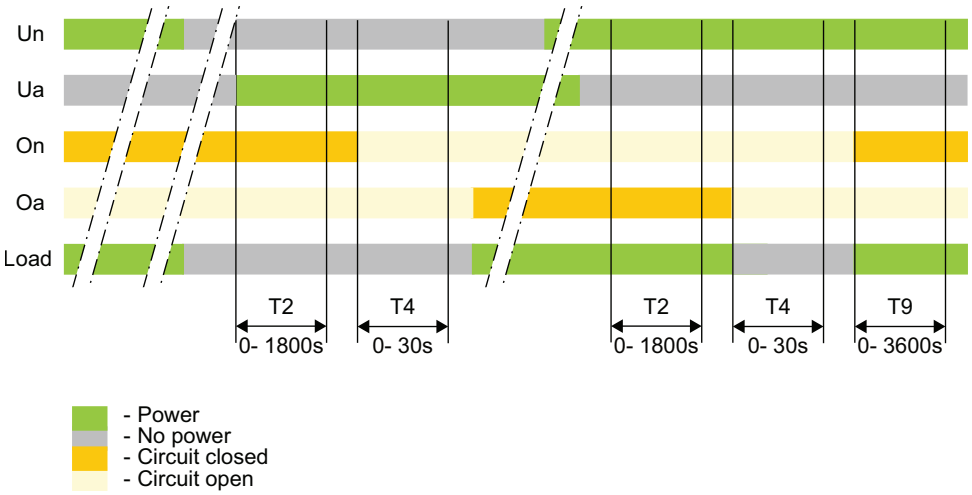


Symbols	Description
Un	Source N
Ua	Source A
On	Contact close at source N
Oa	Contact close at source A
Load	Load status
T2	Transfer delay
T4	Center-off delay

Transfer Logic of Non-return for U-U Application

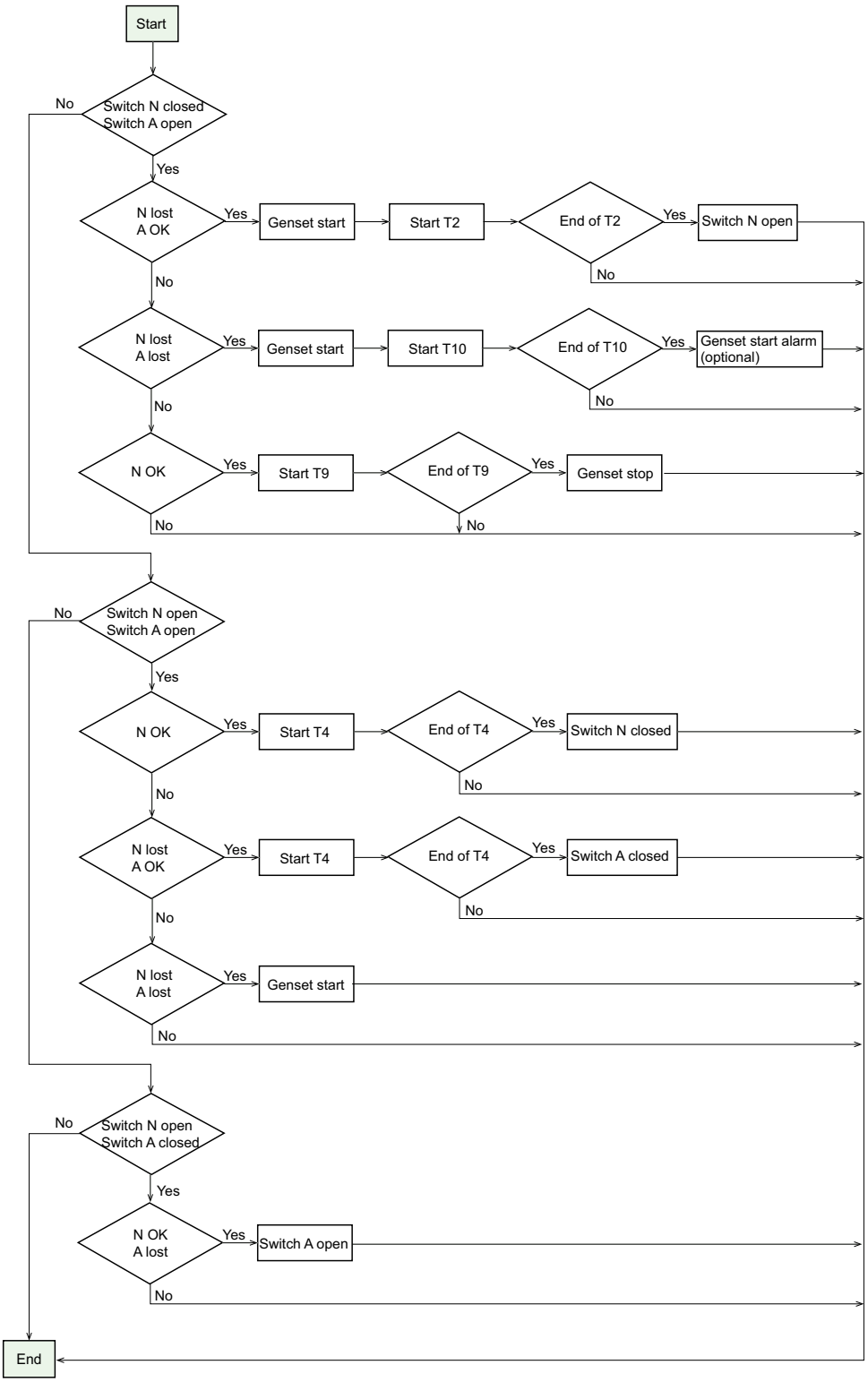


Transfer Process of Non-return for U-G Application



Symbols	Description
Un	Source N
Ua	Source A
On	Contact close at source N
Oa	Contact close at source A
Load	Load status
T2	Transfer delay
T4	Center-off delay
T9	Genset cool delay

Transfer Logic of Non-return for U-G Application



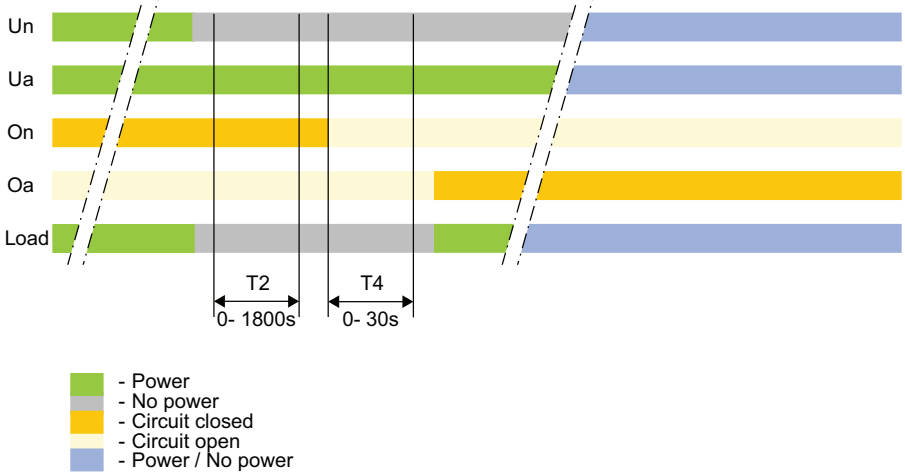
NOTE: T10 is the Genset fail delay.

Manual-Return

- When the voltage on the N (Normal) source exceeds the threshold (overvoltage, undervoltage, over frequency, underfrequency) or does not exist, ATSE will be transferred to the A (Alternate) source.
- ATSE will remain on the A (Alternate) source, which will exist and be within the threshold range (overvoltage, undervoltage, over frequency, underfrequency). When the voltage on the A (Alternate) source exceeds the threshold range and the voltage on the N(Normal) source is within the threshold range, ATSE remains on the A (Alternate) source until manual recovery.

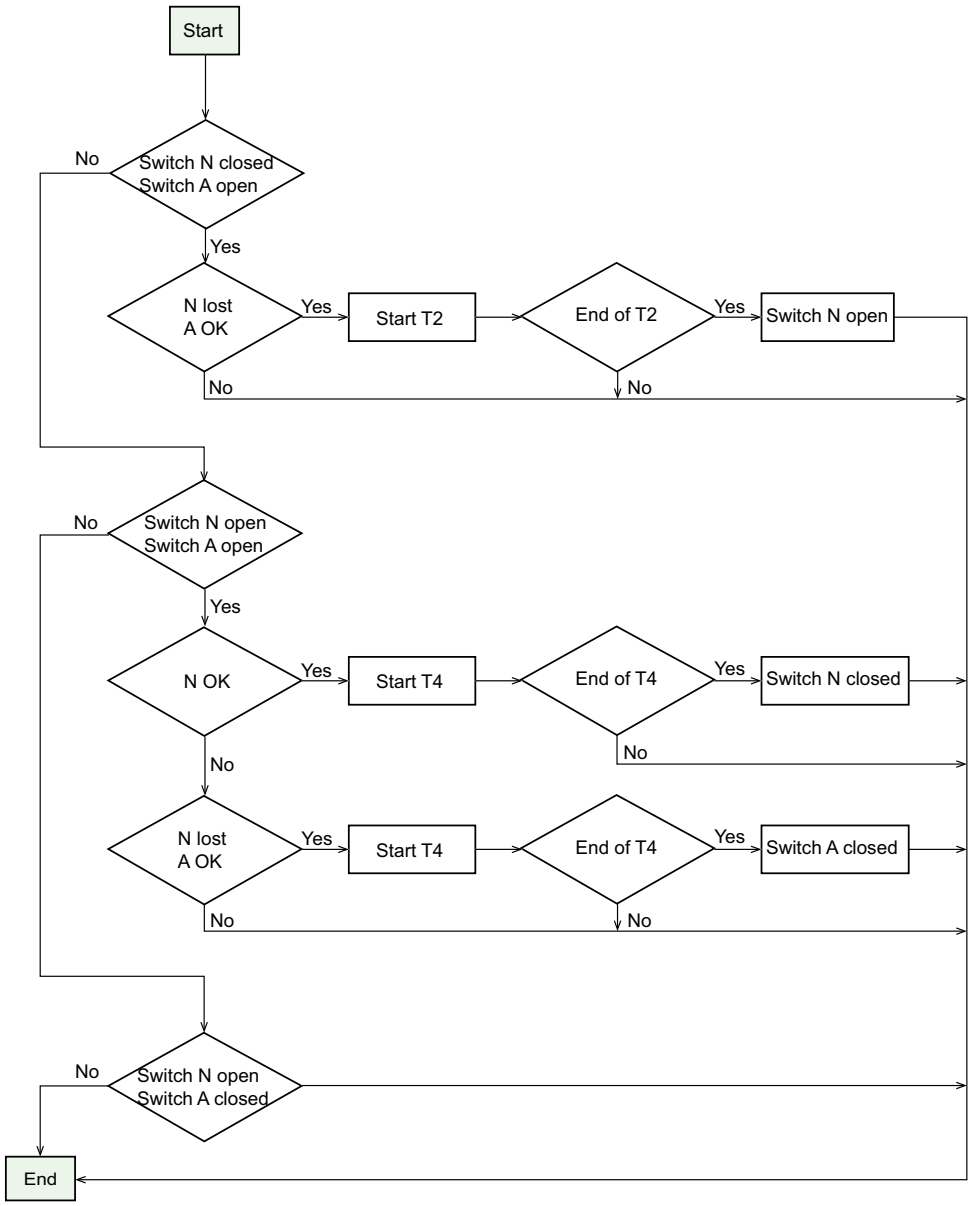
  NOTE: The transfer switch cannot return automatically until manually operating.

Transfer Process of Manual-return for U-U Application



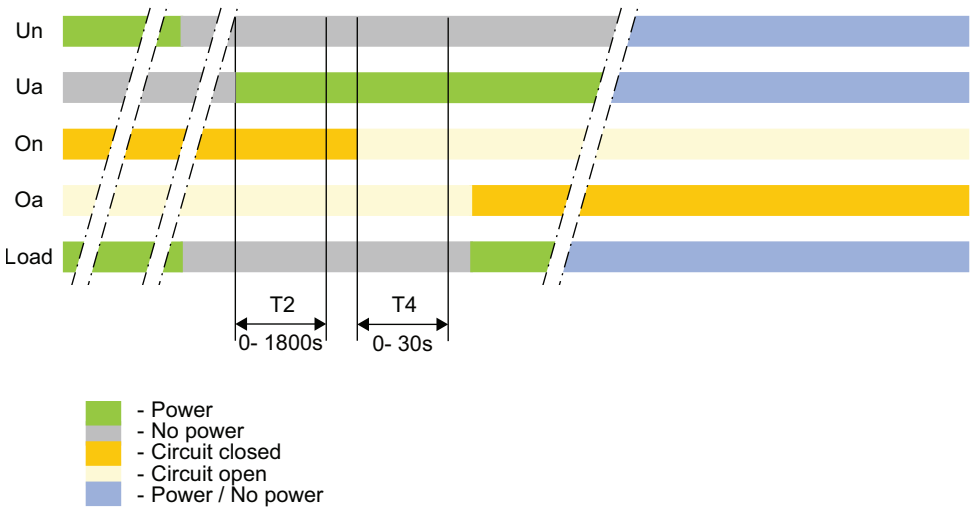
Symbols	Description
Un	Source N
Ua	Source A
On	Contact close at source N
Oa	Contact close at source A
Load	Load status
T2	Transfer delay
T4	Center-off delay

Transfer Logic of Manual-return for U-U Application



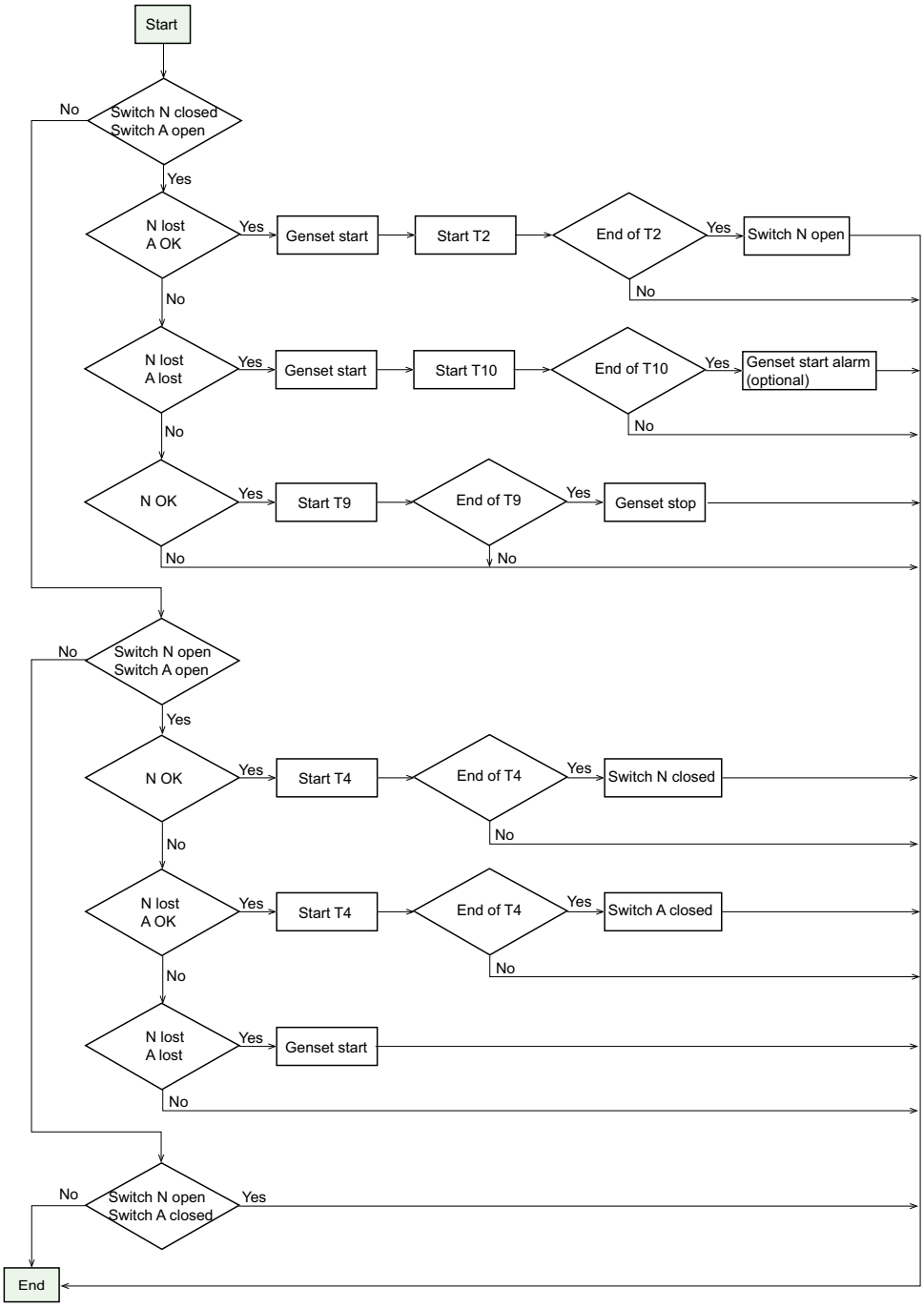
NOTE: T2 will reset if N becomes unavailable.

Transfer Process of Manual-return for U-G Application



Symbols	Description
Un	Source N
Ua	Source A
On	Contact close at source N
Oa	Contact close at source A
Load	Load status
T7	Genset start delay
T2	Transfer delay
T4	Center-off delay

Transfer Logic of Manual-return for U-G Application



NOTE: T9 is the Genset cool delay. T10 is the Genset fail delay.

Test Mode

The test mode is a procedure to simulate the transfer process with following purpose:

- Test normal transfer actions for ATSE-On load test
- Test Genset-Off load test
- Test Genset-Transfer functions-On load test

Ways to Start Test

There are three ways to start the test:

- Through TransferPacT UC HMI
- Through DI using TPCDIO07 module
- Through Modbus communication using TPCCOM76 module

There is no priority among the test command from HMI, DI (Digital Input) and Modbus. ATSE will act upon receiving the command from any way.

Command to exit test should be sent through the same way used to start the test. Otherwise ATSE will not respond. For example, if you start the test through DI (Digital Input) module, you have to stop the test through DI(Digital Input) module as well.

Default Time for Test

- Default as unlimited test (no time duration, has to stop the test manually).
- If select limited test, the default time duration is 30 s.

Time Range for Test

- 1–1800 s with steps of 1 s.
- Time delay can be bypassed by pressing **ESC** key in Active Automatic HMI.

Pre-Condition to Start Test Mode

The following conditions are mandatory for the test:

- ATSE is in auto mode.
- ATSE is in normal position while in U to U application.
- ATSE is in alternate position while in U to U application.
- ATSE is in normal position while in U to G application.
- For U-U application, A source shall be available before test. Otherwise, there will be a Warning, page 142.

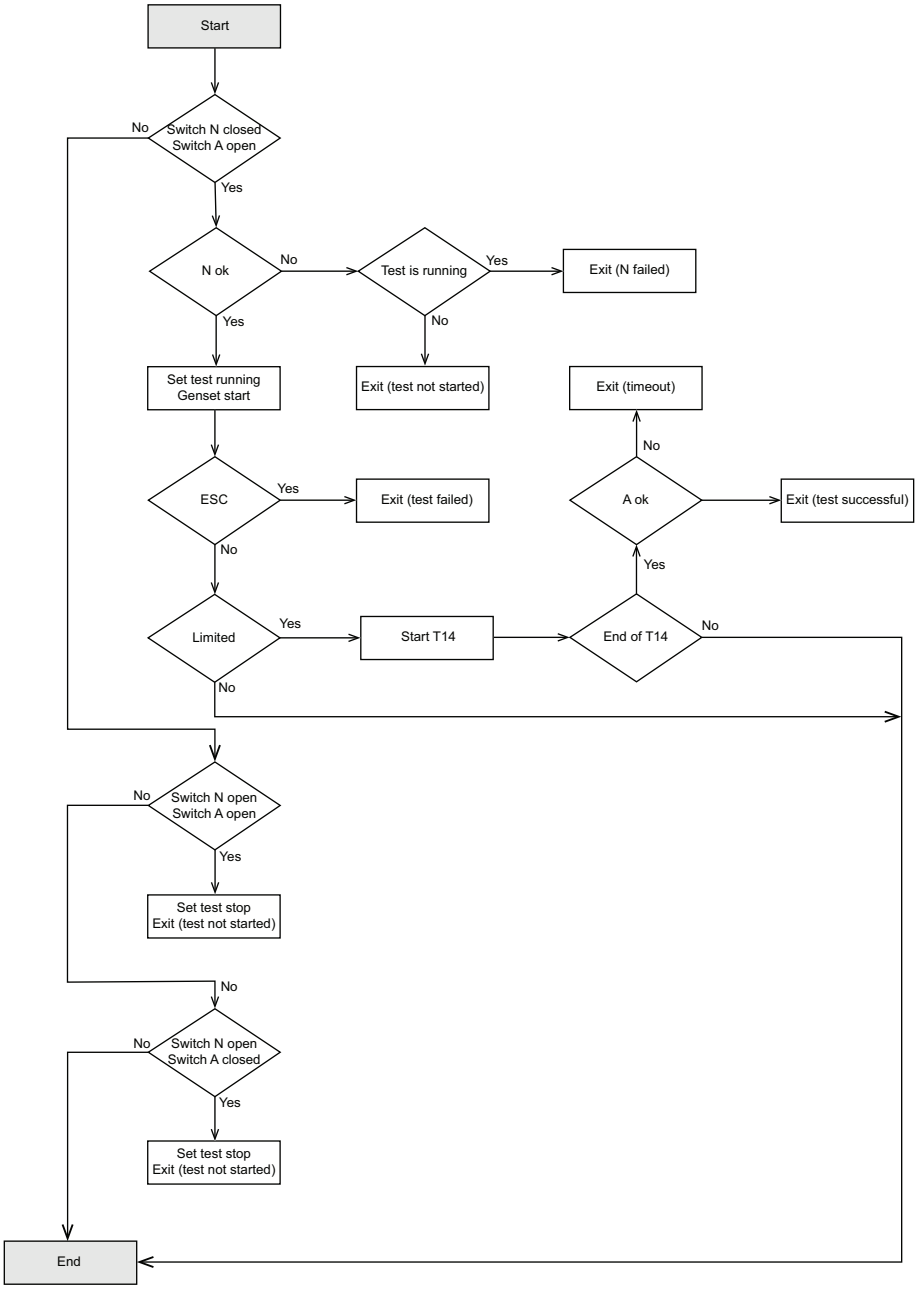
Genset Off-Load Test

- The purpose of this function is to check the genset can start without power interruption.

  NOTE:

  - This test does not check if the switch is able to make the transfer.
  - The test is only available with U-G configuration.
- The off load test is not available, when the ATSE doesn’t have Genset output feature.
- The orders with higher priority will interrupt the test procedure.
- The orders from higher priority will interrupt the test procedure. The off load test will not energize transfer process.

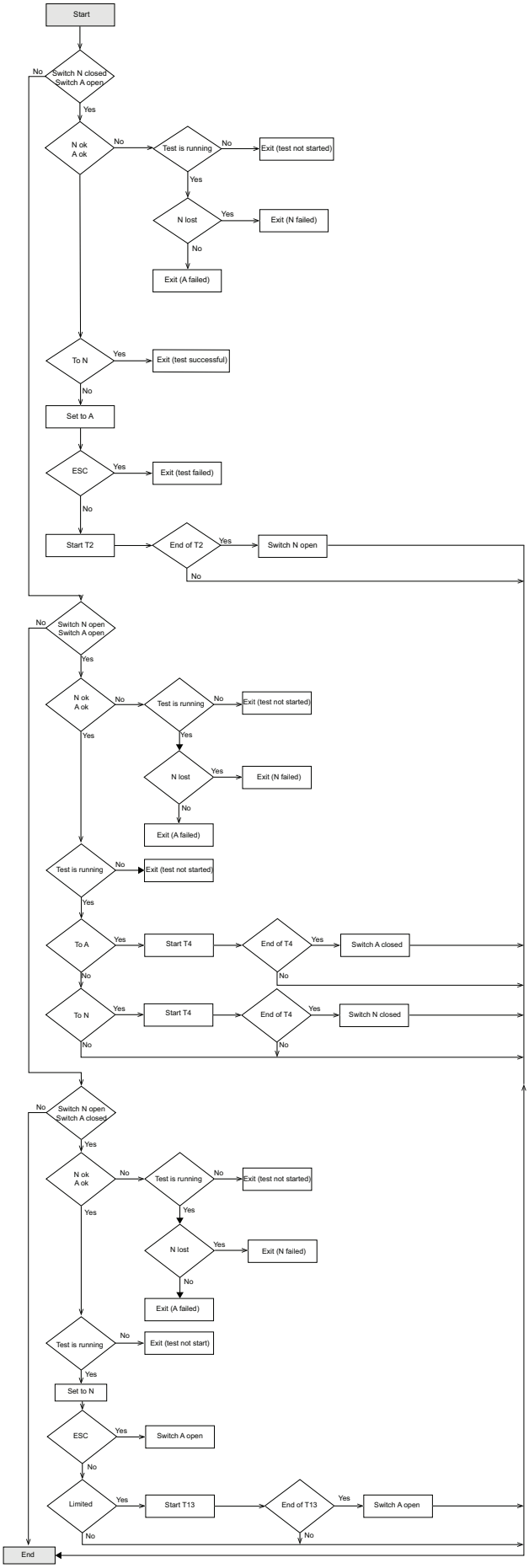
Logic of Genset off Load Test U-G



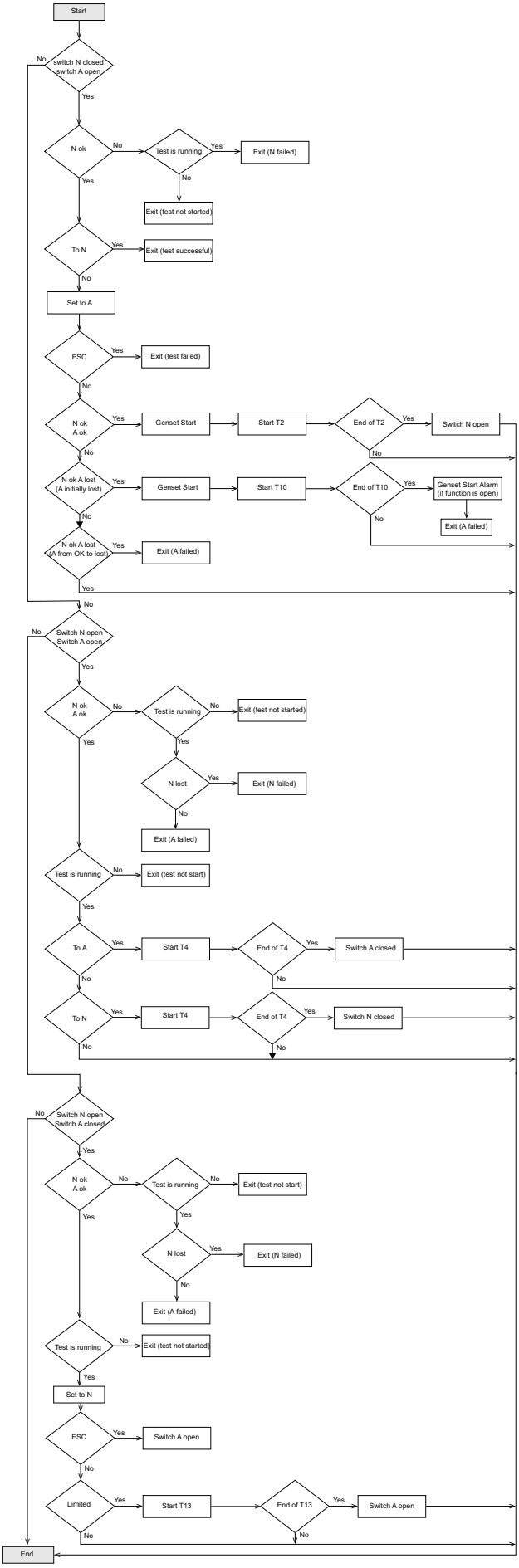
On Load Test

- This function will only be accessible for product with HMI, as the Test mode default value is On load.
- The orders with higher priority will interrupt the test procedure.
- The on load test will energize transfer process.

Logic of On Load Test U-U



Logic of On Load Test U-G



Communication Control

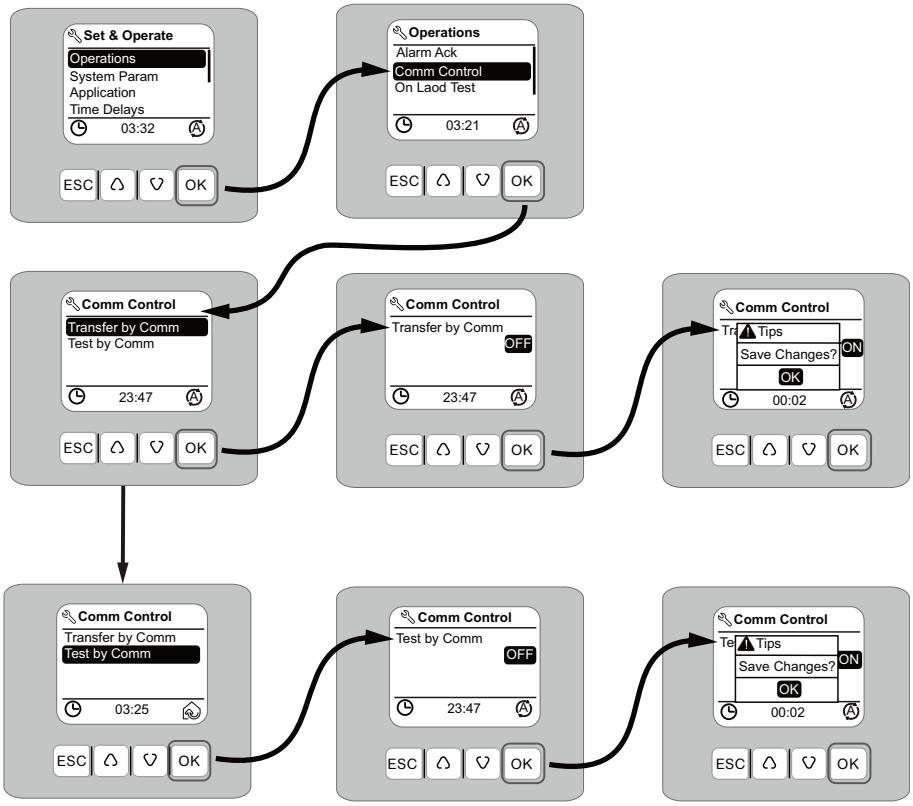
Overview

The communication control function allows TSE to transfer or test through Modbus communication.

The communication control function can be enabled/disabled through TransferPacT UC HMI.

To use the communication control successfully, at least one Modbus module should be installed and activated.

NOTE: Communication control is OFF by default. Follow the instructions below to enable communication control.



Transfer by Communication

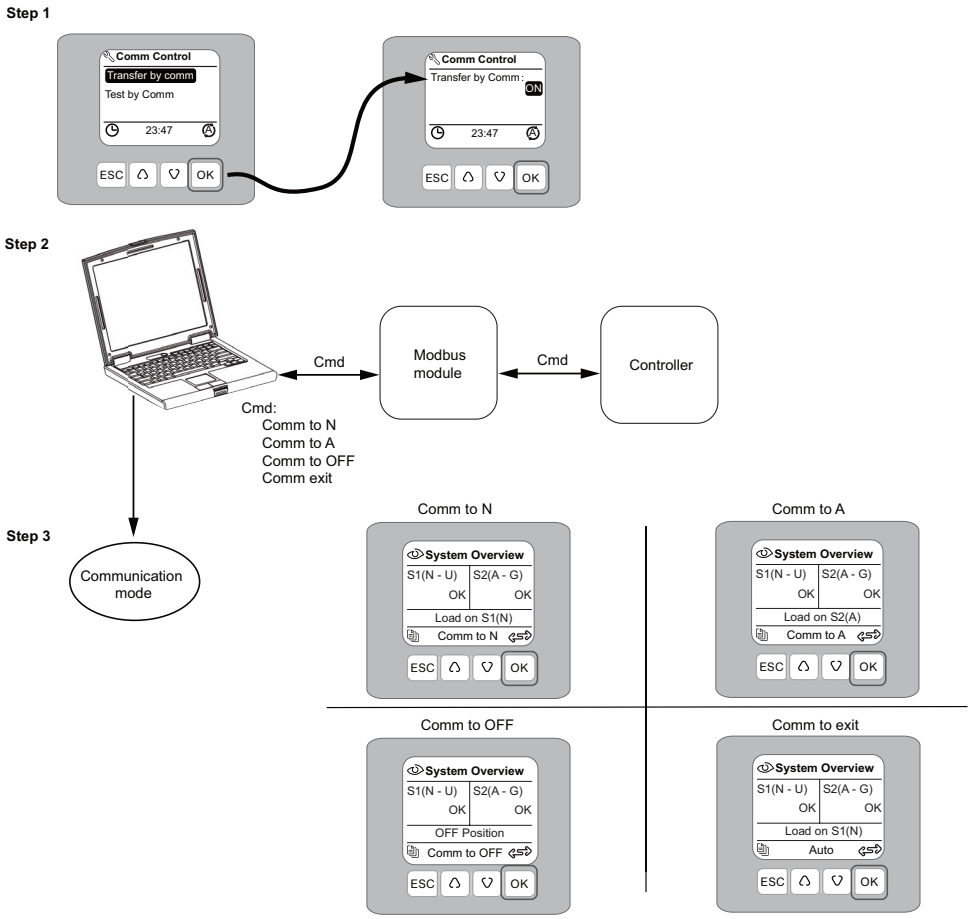
Transfer Logic Overview

Transfer by communication support the following four commands:

- Comm to Normal Source
- Comm to Alternate Source
- Comm to OFF
- Comm Exit

The command is sent through PC - Modbus. Comm to Normal/Alternate source is equivalent to the voluntary transfer mode. Comm to OFF is equivalent to local control to Off only, not equivalent to force to Off.

The ATSE will transfer to OFF after receiving the command without any time delay.

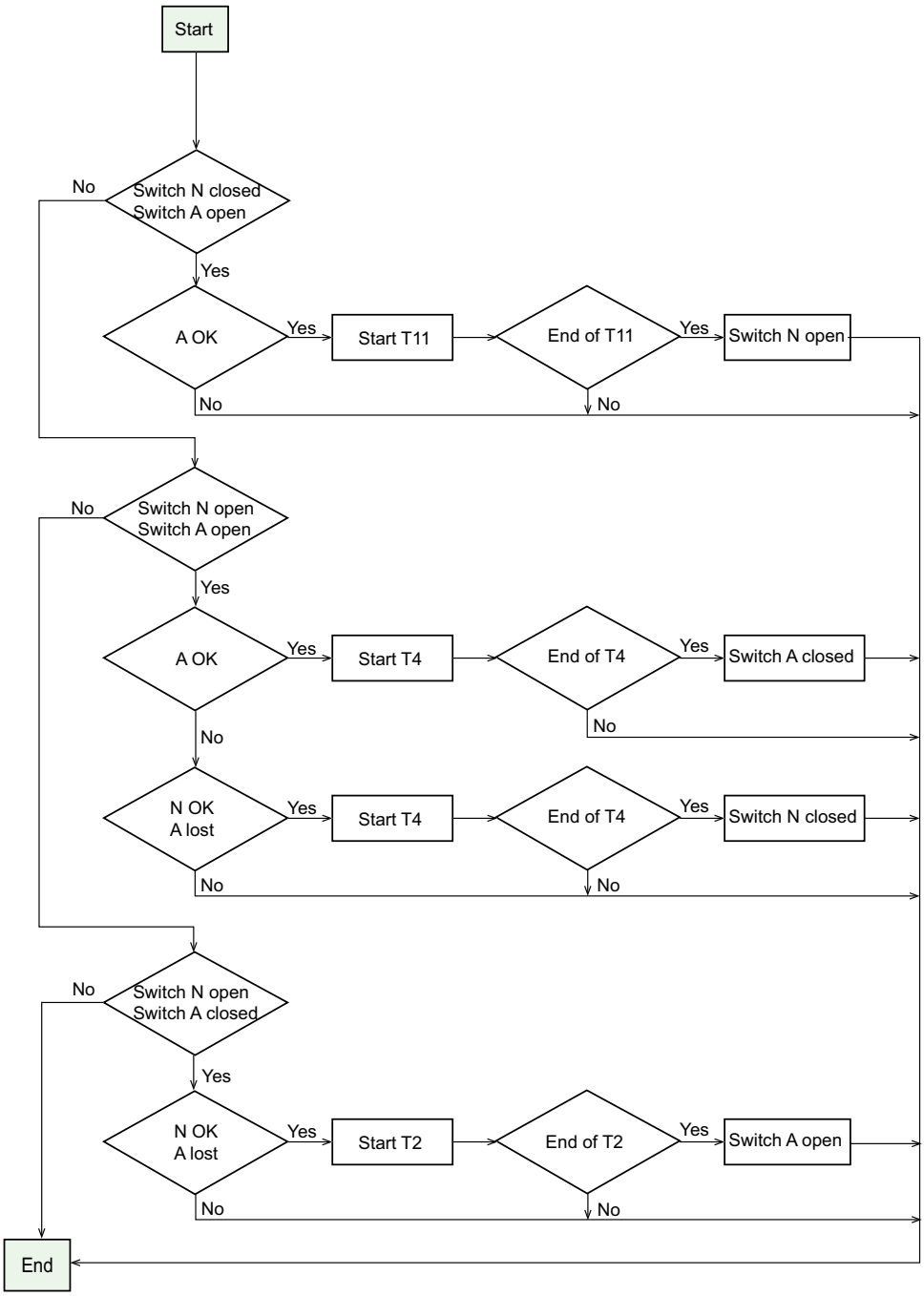


Exit Communication Control Mode

There are three ways to exit communication control mode:

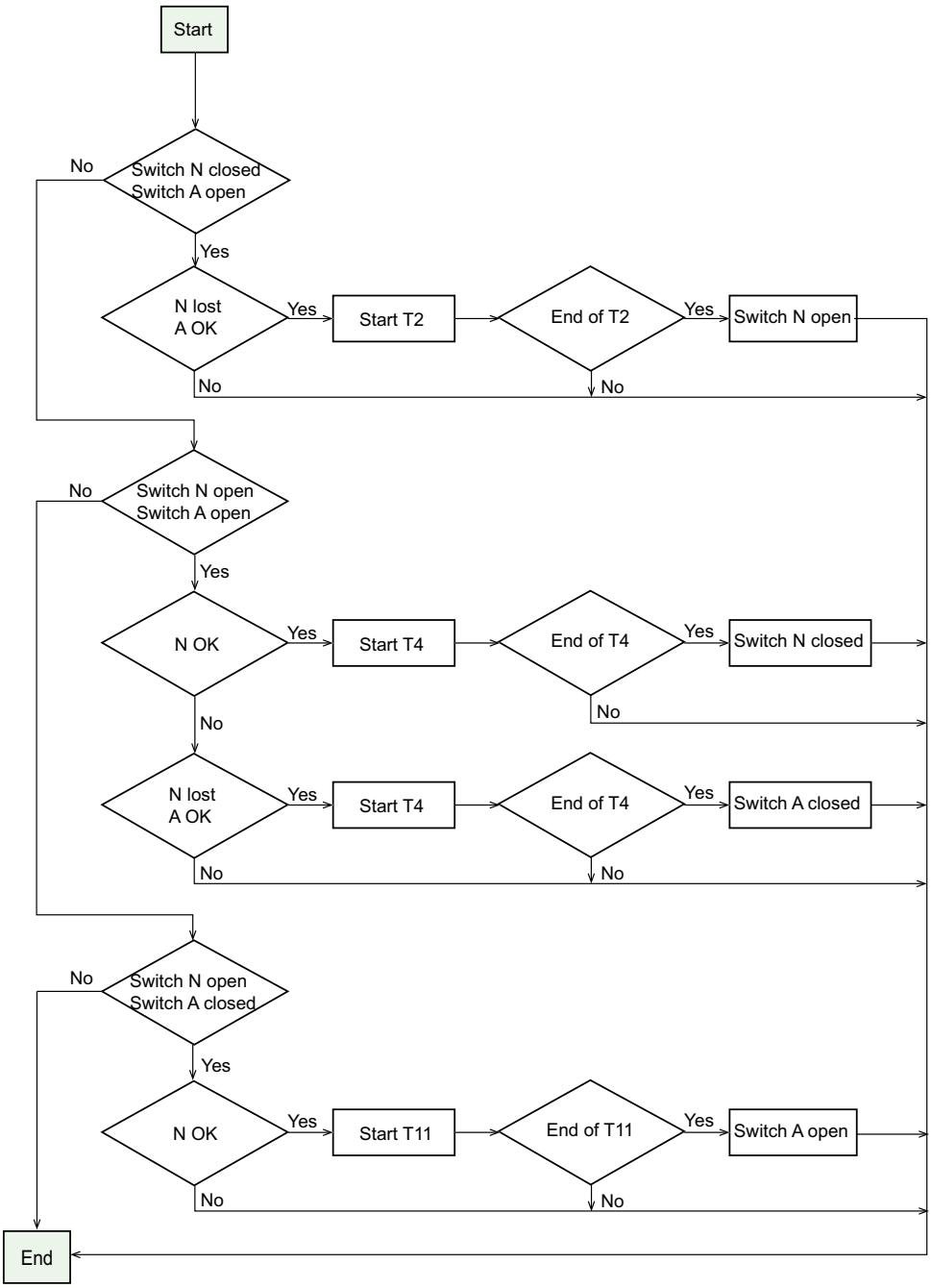
- The Modbus client device send exit command to the active Modbus module installed on TransferPacT UC.
- Turn off Transfer by Comm from TransferPacT UC.
- The active Modbus module is offline.

Transfer Logic of Communication to A (U-U Application)

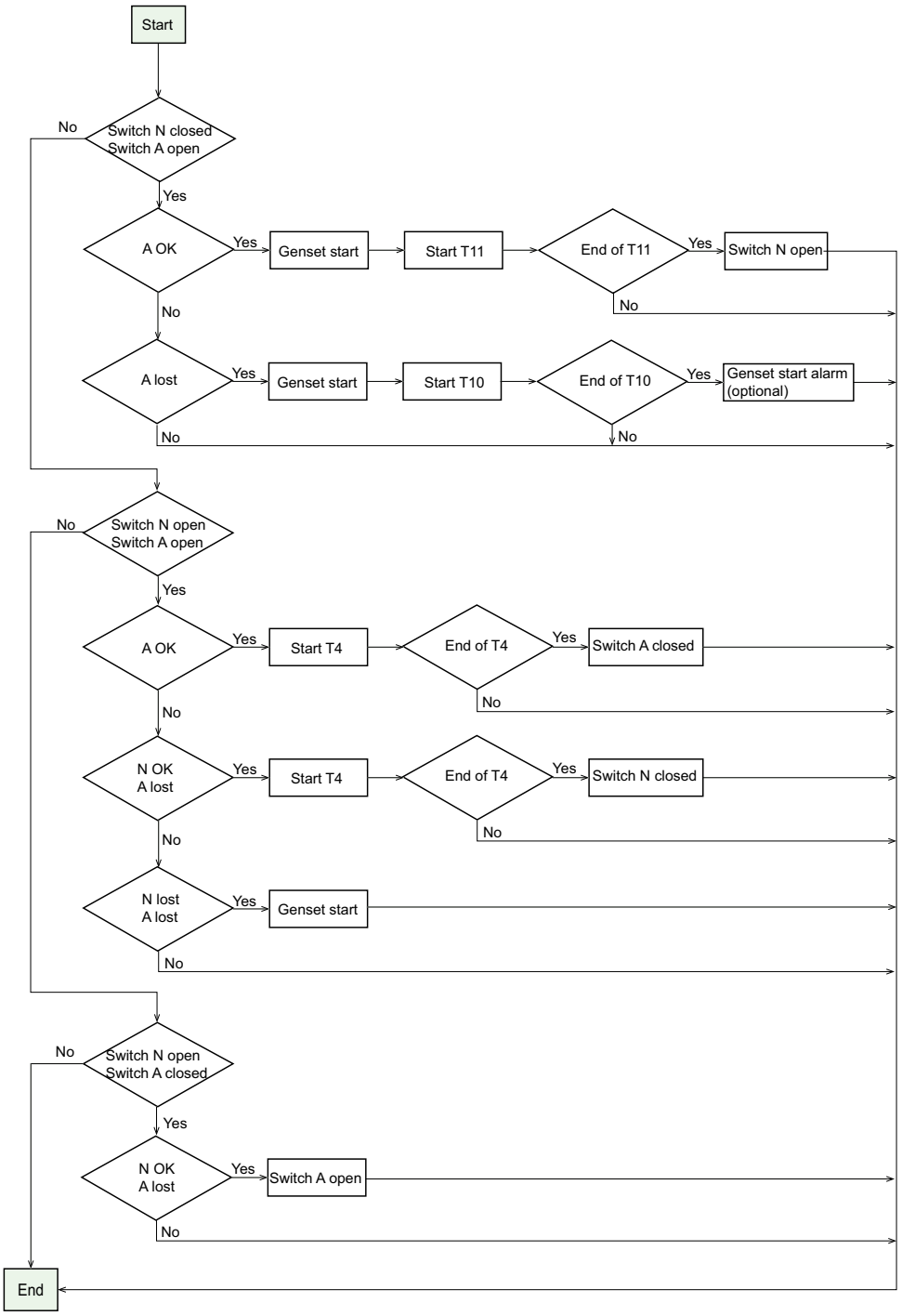


NOTE: T11 is internal fixed time delay of 1s.

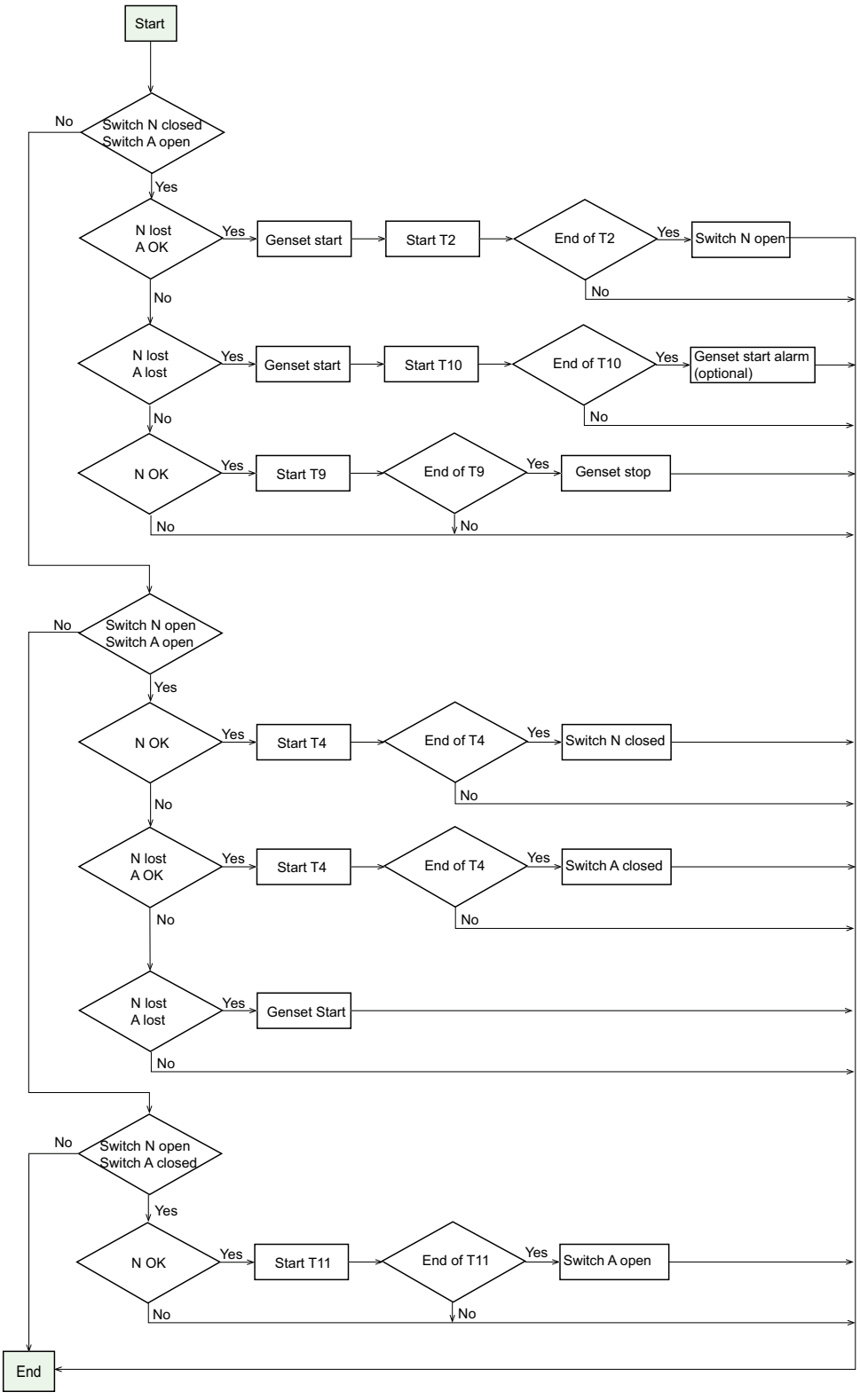
Transfer Logic of Communication to N (U-U Application)



Transfer Logic of Communication to A (U-G Application)

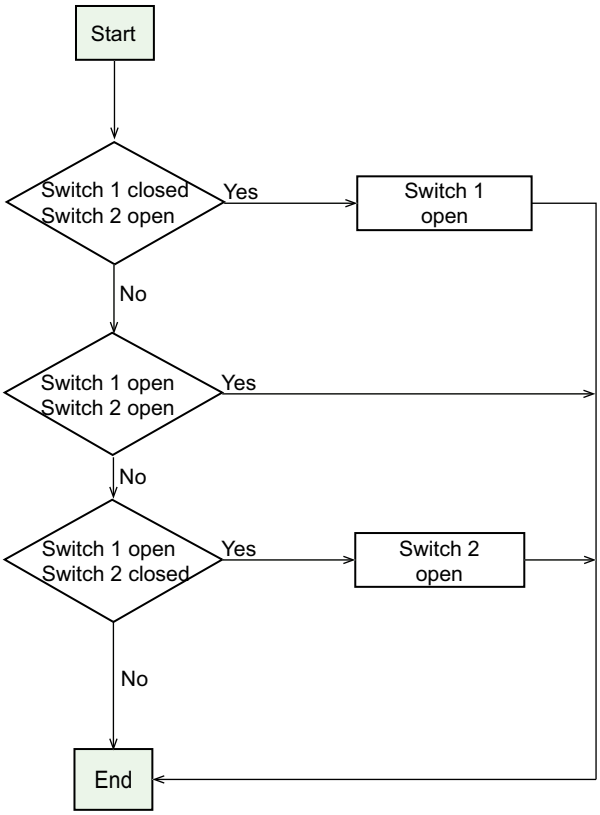


Transfer Logic of Communication to N (U-G Application)



Transfer Logic of Communication to OFF

Comm to OFF is equivalent to local control to off in Local Control Mode. The ATSE will transfer to off after receiving the command without any time delay.


Start
Switch 1 closed
Switch 2 open
Yes
Switch 1
open
No
Switch 1 open
Switch 2 open
Yes
No
Switch 1 open
Switch 2 closed
Yes
Switch 2
open
No
End

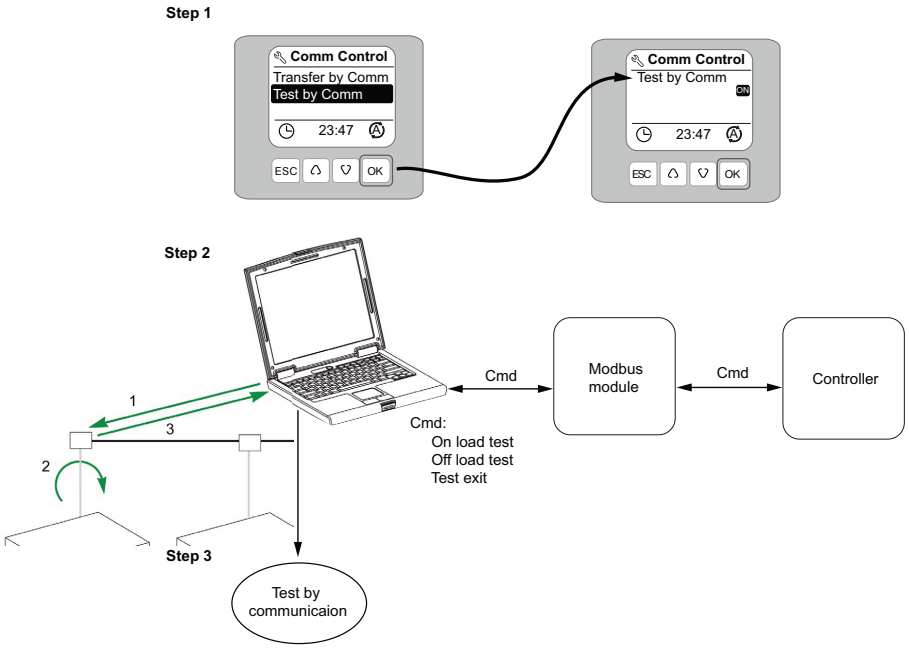
Test by Communication

Test by communication support the following three commands:

- On Load Test
- Off Load Test
- Test Exit

When the test is ongoing, ATSE ignores any other signal from TransferPacT UC HMI or DI module (TPCDIO07).

The operation of Test by communication is equivalent to Test mode.



Stop Test by Communication

There are two ways to stop the test:

- The Modbus client device send Test Exit command to the active Modbus module installed on ATSE.
- Turn off Test by Comm from TransferPacT UC HMI.

Voluntary Transfer Mode

The voluntary transfer mode is equivalent to auto-priority mode on one source, with forced priority to the SI or SII source. It is activated when associated input is closed (The commercial reference number for the voluntary remote control module is TPCDIO08). It takes over 200 ms to active the voluntary mode. The signal for voluntary transfer should be constant.

Voluntary transfer is normally used for special tariffs. Once the mode is set from voluntary to N or A, ATSE is still remains in auto mode. When there is power contingency on target source, transfer switch can re-transfer to available source automatically.

The following are the voluntary transfer mode use cases:

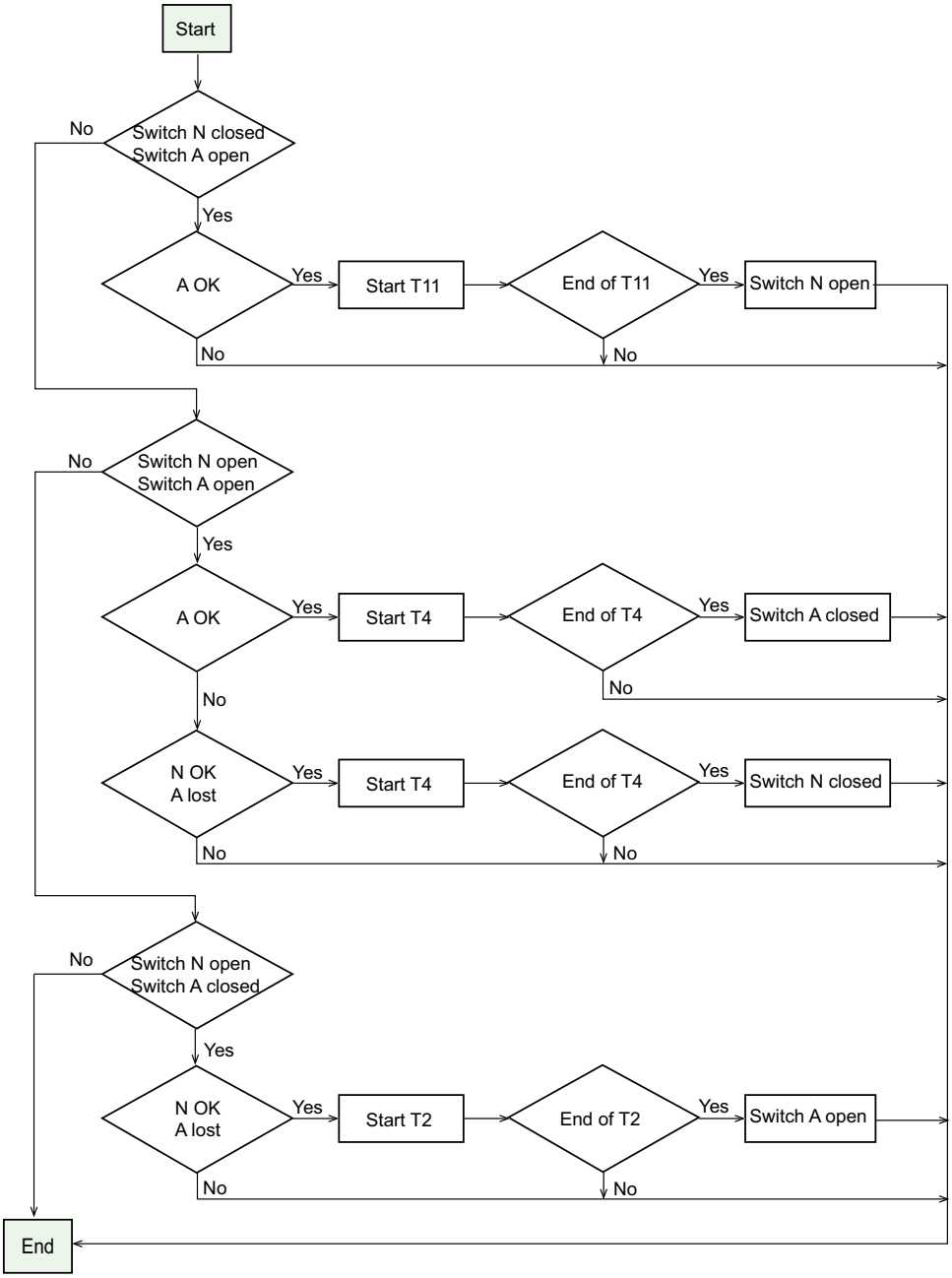
Use Case 1: Typhon Mode

During typhoon or earthquake, the Genset will be more stable than utility. The user for this case has installed a typhoon mode switch on his control panel. The user will activate the typhoon mode switch. It is connected to the input voluntary transfer mode which will transfer to alternate source. The ATSE will now activate the Genset output and will transfer to Genset once ready. If Genset fails, the ATSE still being in auto mode, it will try to retransfer to Normal source. The ATSE will still be in auto mode. It detects alternate source failure. The configuration needed is a ATSE along with voluntary transfer module.

Use Case 2: Peak Tariff (Align with TransferPacT UC)

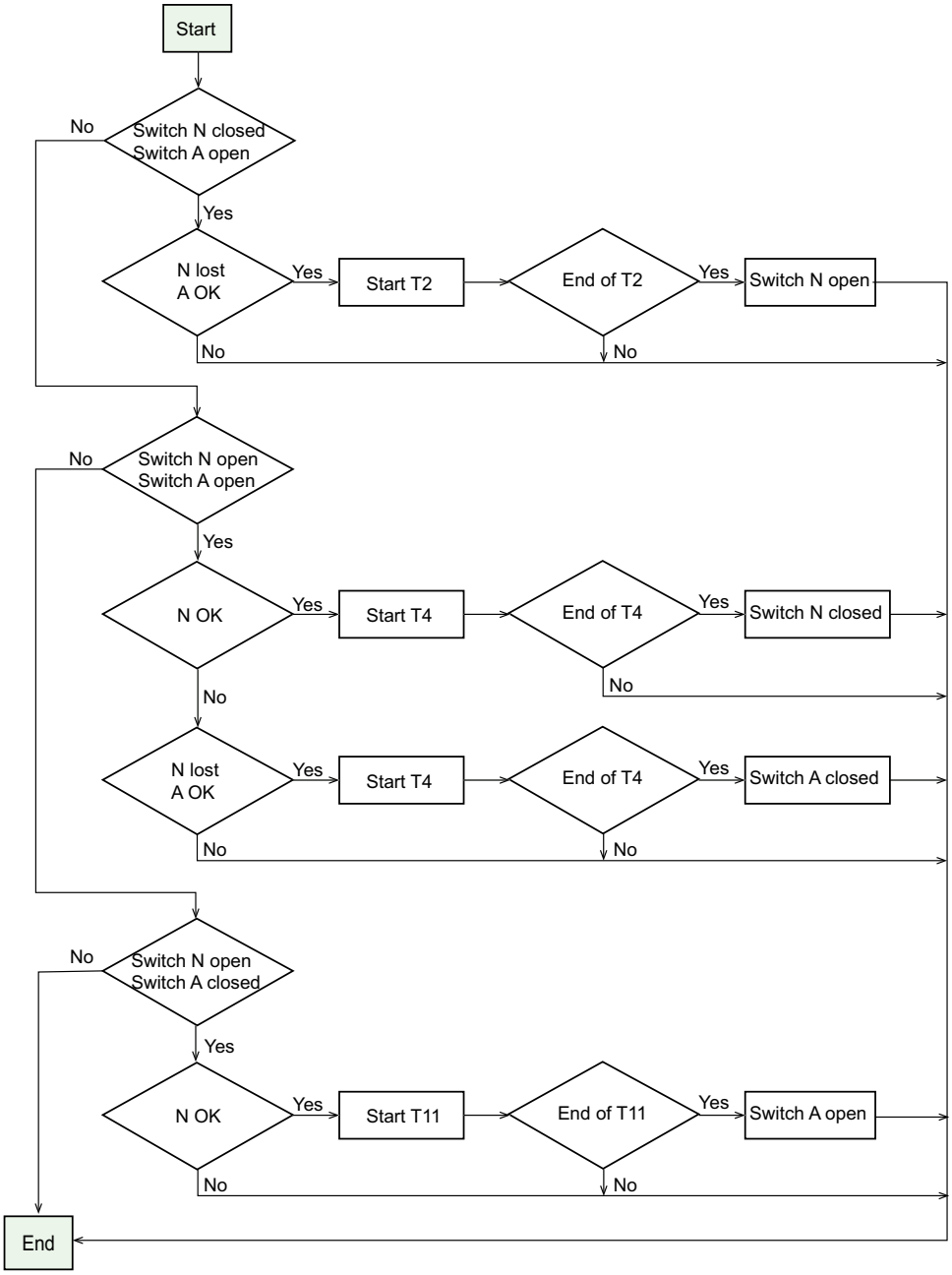
This feature is designed for utility peak shaving (special tariff). The user might want to disconnect from the network when energy price are high. Usually utility provides a signal that can be directly connected to the voluntary transfer input. In this case the ATS will automatically transfer to alternate source when the signal is present. This process helps shedding the peaks on the network.

Transfer Logic of Voluntary to A (U-U Application)

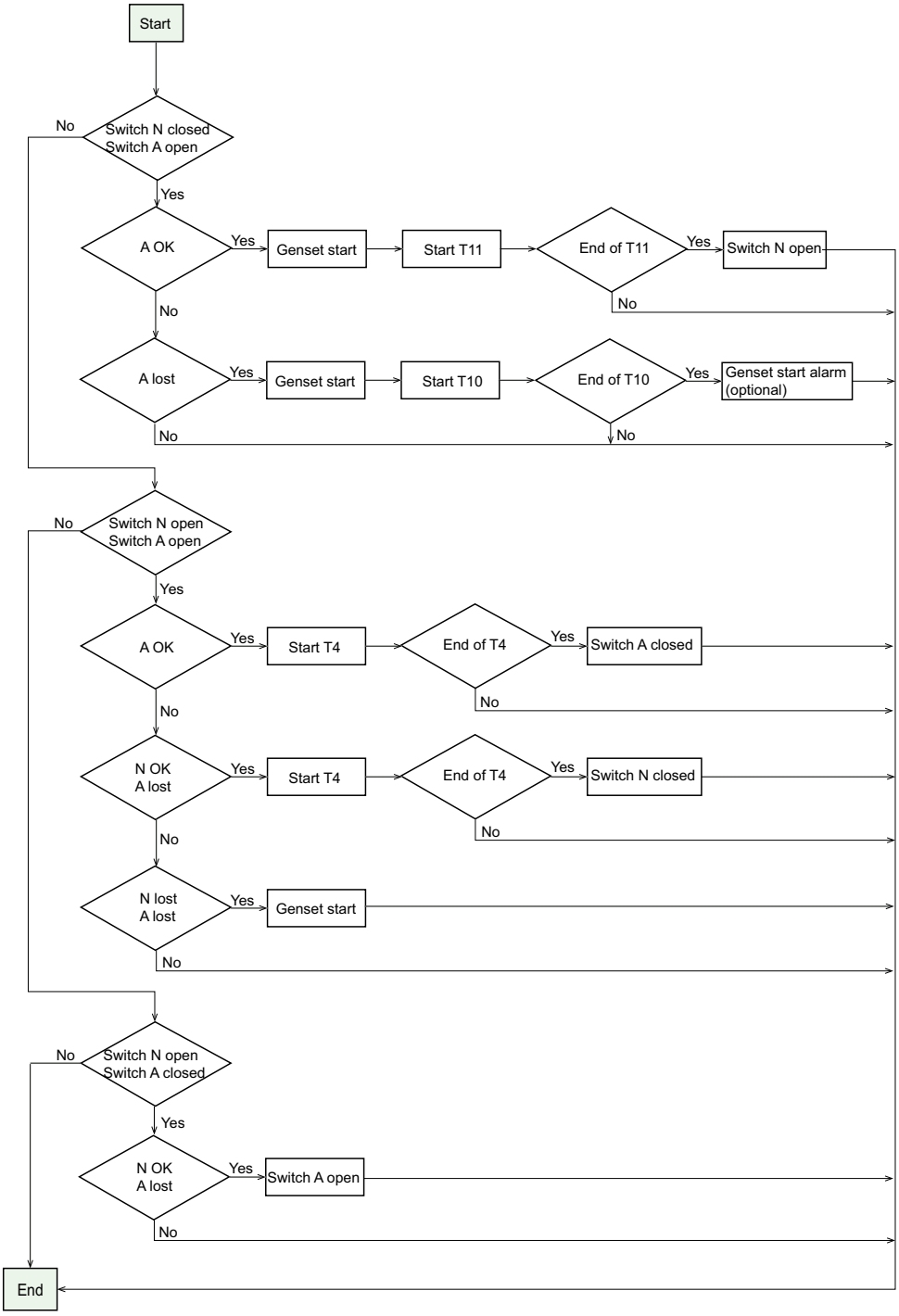


NOTE: T11 is internal fixed time delay of 1s.

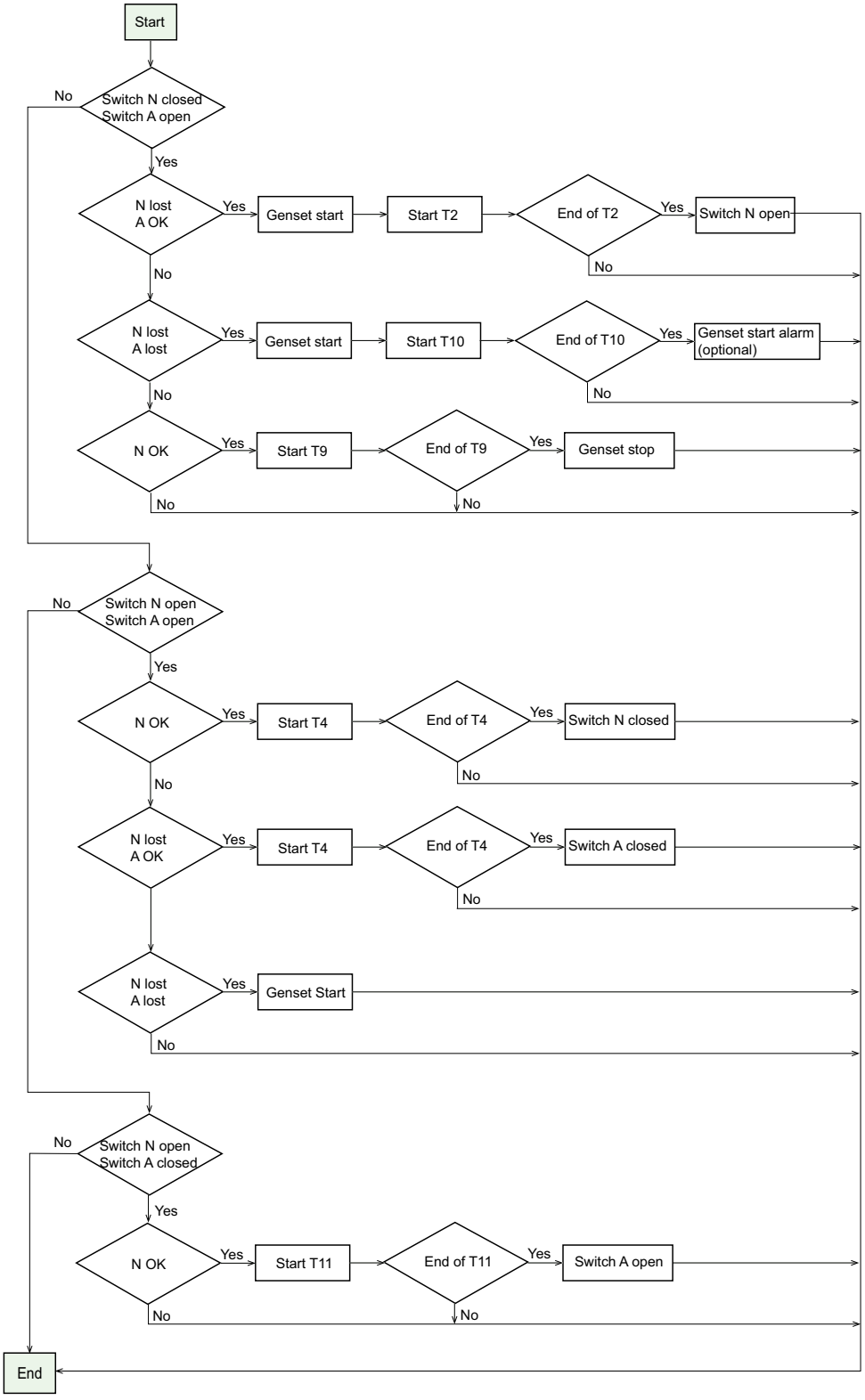
Transfer Logic of Voluntary to N (U-U Application)



Transfer Logic of Voluntary to A (U-G Application)



Transfer Logic of Voluntary to N (U-G Application)



Local Control Mode

⚠CAUTION

HAZARD OF EQUIPMENT DAMAGE

Ensure the LED on local mode button is on before manually operating with transfer buttons.

Failure to follow these instructions can result in injury or equipment damage.

The local mode allows to change the logical position of the TSE locally. The switch will refuse to act if the action will damage the driving system (for example, both sources are out of range) or both sources are out of operating voltage of auxiliaries. It cannot transfer to unavailable source.

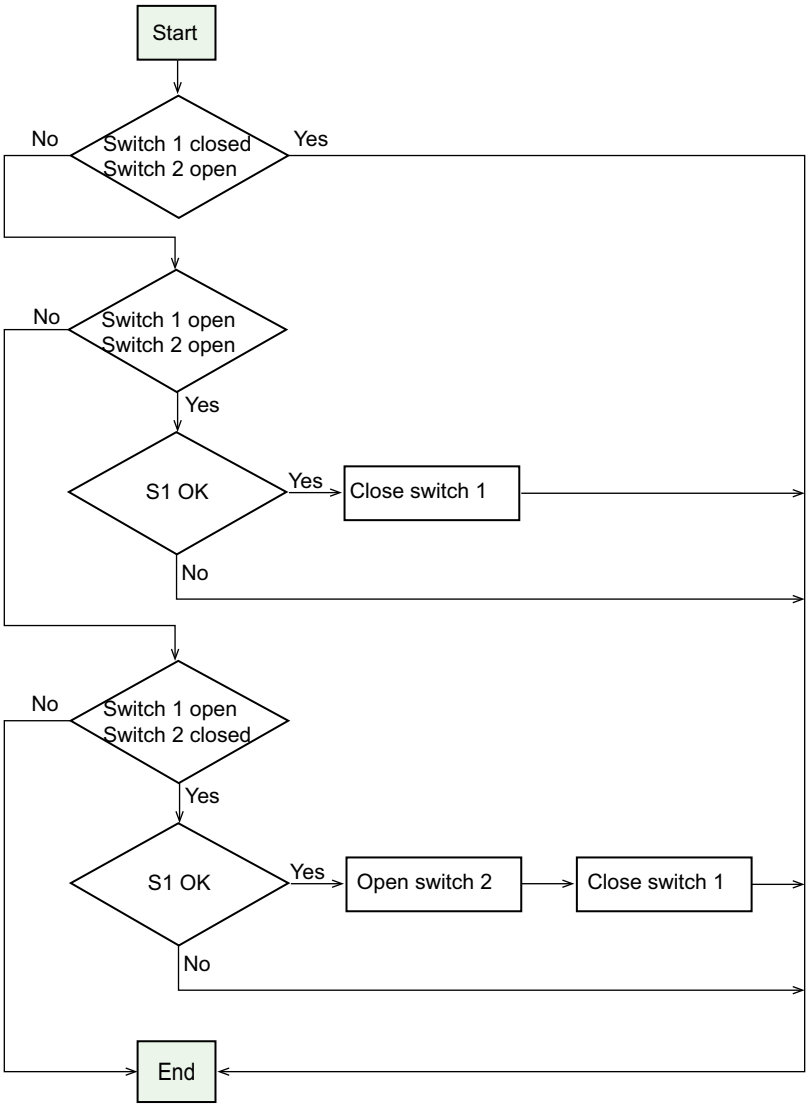
Auto genset start signal, load shedding signal and alarm relay output are not available for this mode. In this case, the target source conformity is verified before transfer and time delays are not considered.

When in auto mode, press the local mode button () to exit auto mode and enable local mode. The LED on the local mode button is on in auto mode. To exit local mode, press the local mode button again.

Local Control to S1

The command is sent by pressing the button I ().

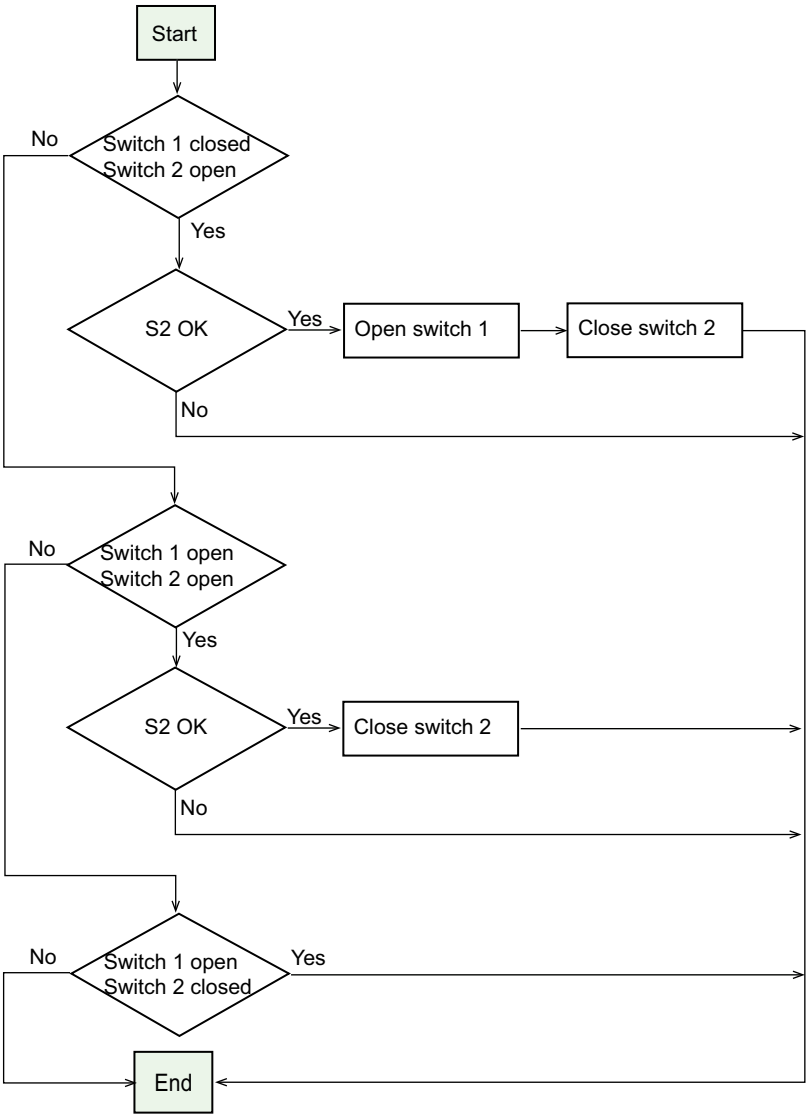
The switch will transfer to S1 after pressing the button if S1 voltage is within operating range.



Local Control to S2

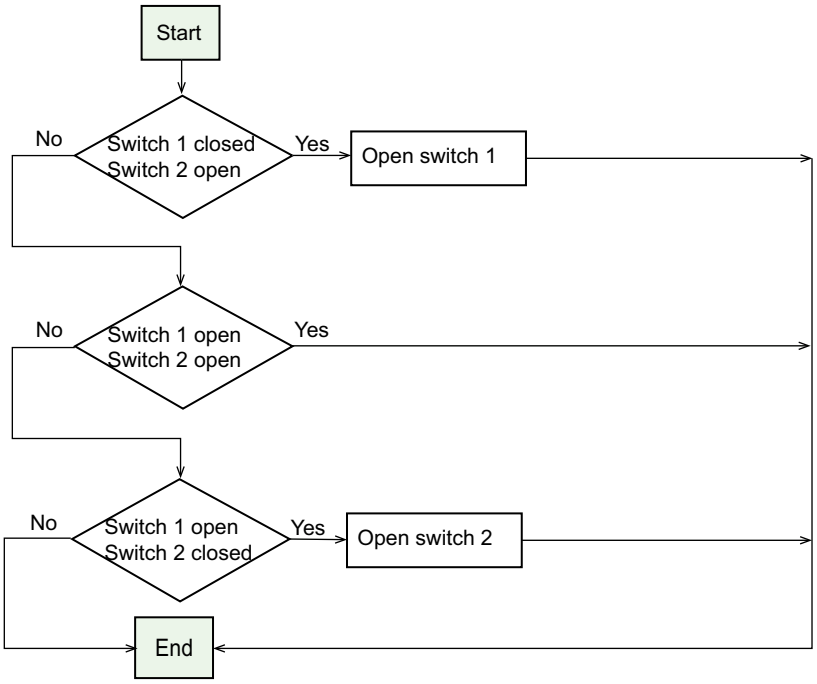
The command is sent by pressing the button II ( ). There is no time delay.

The switch will transfer to S2 after pressing the button if S2 voltage is within operating range.



Local Control to Off

The command is send by pressing the button O ( ). There is no time delay. The switch will transfer to OFF after receiving the order.



Transfer Inhibit Mode

When the transfer inhibition input is active, the controller can not send any order to TSE. Front face selection buttons are locked and the HMI only display transfer inhibit.

Use this mode only when inhibit signal (from DI) is active and no higher operation mode is running. When ATS transfer is ongoing, wait until transfer completed.

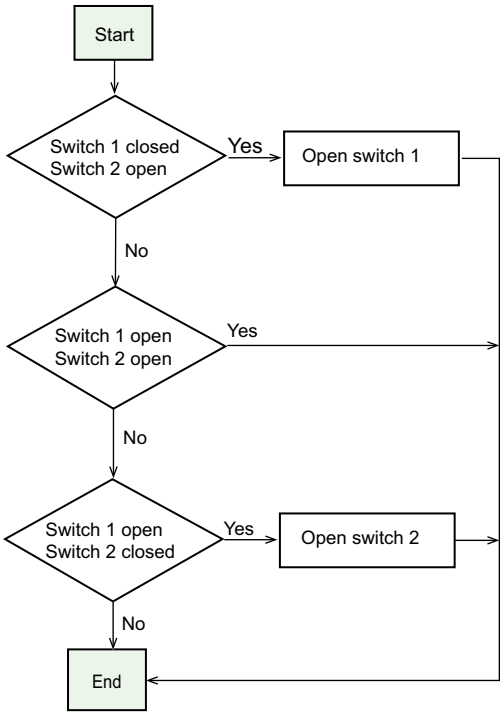
Accessories are required using TPCDIO07 to extend this function of the TSE.

Application

- Transfer inhibit occurs when there is power interruption because of short circuit.
- This function can be used to lock the controller by customized signals.
- This function can be used for cooperation with different ATSE.

Force to Off Mode

- In this mode, ATSE transfers to OFF position upon an emergency stop order. Other transfer modes will be canceled except button control. There should be no time delay.
- Exit Force to off mode after signal disappears.
- Accessories are required using TPCDIO07 to extend this function of TSE.


Start
Switch 1 closed
Switch 2 open
Yes
Open switch 1
No
Switch 1 open
Switch 2 open
Yes
No
Switch 1 open
Switch 2 closed
Yes
Open switch 2
No
End

Modbus Communication

What’s in This Chapter

Introduction

The Modbus communication option enables Schneider Electric low voltage switches to be connected to a supervisor or to any other device with a master Modbus communication channel.

Modbus Client-Server Principle

Overview

The Modbus protocol exchanges information using a request-reply mechanism between a client and a server. The Client-Server principle is a model for a communication protocol in which one device (the client) controls one or more other devices (the server). In a standard Modbus network, there is 1 client and up to 31 servers.

A detailed description of the Modbus protocol is available at www.modbus.org.

Characteristics of the Client-Server Principle

The client-server principle is characterized as follows:

- Only 1 client is connected to the network at a time.
- Only the client can initiate communication and send requests to the servers.
- The client can address each server individually using its specific address or all servers simultaneously using address 0.
- The servers can only send replies to the client.
- The servers cannot initiate communication, either to the client or to other servers.

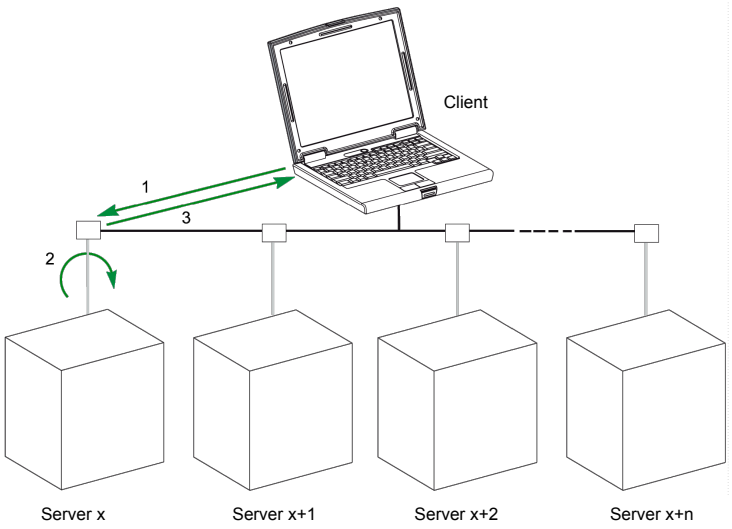
Client-Server Communication Modes

The Modbus protocol can exchange information using 2 communication modes:

- unicast mode
- broadcast mode

Unicast Mode

In unicast mode, the client addresses a server using the specific address of the server. The server processes the request then replies to the client.



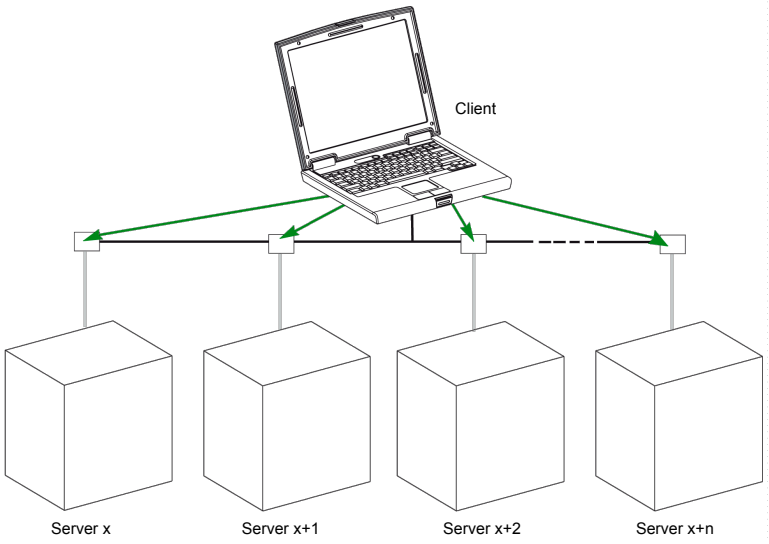
1 Request

2 Process

3 Reply

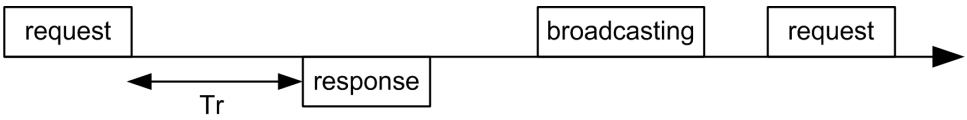
Broadcast Mode

The client can also address all servers using address 0. This type of exchange is called broadcasting. The servers do not reply to broadcasting messages.



Response Time

The response time Tr is the time needed by a server to respond to a request sent by the client:



Values with the Modbus protocol:

- Typical value < 10 ms for 90% of the exchanges
- To normal messages, Tr maximum value is around 700 ms, so it is recommended to implement a 1 second time out after sending a Modbus request.

Data Exchange

The Modbus protocol uses 2 types of data:

- Single bit
- Register (16 bits)

Each register has a register number. Each type of data (bit or register) has a 16-bit address.

The messages exchanged with the Modbus protocol contain the address of the data to be processed.

Registers and Addresses

The address of register number n is n-1. The tables detailed in the following parts of this document provide both register numbers (in decimal format) and corresponding addresses (in hexadecimal format). For example, the address of register number 12000 is 0x2EDF (11999).

Frames

All the frames exchanged with the Modbus RTU protocol have a maximum size of 256 bytes and are composed of 4 fields:

Field	Definition	Size	Description
1	server number	1 byte	Destination of the request • 1–247: unique destination
2	Function codes	Only 1 byte	Refer to Modbus Functions, page 120
3	Data	n registers	Request or reply data
4	Check	2 bytes	CRC16 (to check transmission errors)

Default Settings

Followings are the default settings of Modbus communication.

Item	Setting
Baud rate	19200 bps
Data	8 bits
Parity	Even
Stop	1 bit
Address	1

Modbus Functions

General Description

The Modbus protocol offers a number of functions that are used to read or write data over the Modbus network. The Modbus protocol also offers diagnostic and network-management functions.

Only the Modbus functions handled by the ATSE are described here.

Read Functions

The following read functions are available:

Function Code	Subfunction Code	Name	Description
3 (0x03)	–	Read holding registers	Read n output or internal registers
43 (0x2B)	14 (0x0E)	Read device identification	Read the identification data of the server
43 (0x2B)	15 (0x0F)	Get date and time	Read the date and time of the server

Read Register Example

The following table shows how to read the SI voltage in register 2000. The address of register 2000 is 2000-1=1999 = 0x07CF. The Modbus address of the Modbus server is 47 = 0x2F.

Client Request		Server Reply	
Field Name	**Example**	**Field Name**	**Example**
Modbus server address	0x2F	Modbus server address	0x2F
Function code	0x03	Function code	0x03
Address of the register to read (MSB)	0x07	Data length in bytes	0x02
Address of the register to read (LSB)	0xCF	Register value (MSB)	0x02
Number of registers (MSB)	0x00	Register value (LSB)	0x2B
Number of registers (LSB)	0x01	CRC (MSB)	0xXX
CRC (MSB)	0xXX	CRC (LSB)	0xXX
CRC (LSB)	0xXX	–	

Get Date and Time Example

The following table shows how to get the date and time of a Modbus server. The Modbus address of the Modbus server is 47 = 0x2F.

client Request		Server Reply	
Field Name	**Example**	**Field Name**	**Example**
Modbus server address	0x2F	Modbus server address	0x2F
Function code	0x2B	Function code	0x2B
Subfunction code	0x0F	Subfunction code	0x0F
Reserved	0x00	Reserved	0x00
–	–	Date and time	Refer to the DATETIME data type

Set Date and Time Example

The following table shows how to set date and time of a Modbus server. The Modbus address of the Modbus server is 47 = 0x2F, the new date is October 2, 2014, and the new time is 2:32:03:500 p.m.

NOTE: Use the broadcast mode (with Modbus server address = 0) to set the date and time of all Modbus servers.

client Request		**Server Reply**	
Field Name	**Example**	**Field Name**	**Example**
Modbus server address	0x2F	Modbus server address	0x2F
Function code	0x2B	Function code	0x2B
Subfunction code	0x10	Subfunction code	0x10
Reserved1	0x00	Reserved1	0x00
Not used	0x00	Not used	0x00
Year = 2014	0x0E	Year = 2014	0x0E
Month = October	0x0A	Month = October	0x0A
Day Of Month = 2	0x02	Day Of Month = 2	0x02
Hour = 14	0x0E	Hour = 14	0x0E
Minutes = 32	0x20	Minutes = 32	0x20
3 sec. 500 ms	0x0DAC	3 sec. 502 ms	0x0DAE

The normal response is an echo of the request, returned after the date-time has been updated in the remote device. If the date-time structure content is not consistent with a true date-time (that is, an invalid date-time), the value returned in the Date-Time field is set to 0 by the device.

In case of 24 VDC power loss, the date and time of the Modbus servers without battery is not refreshed anymore. It is therefore mandatory to set date and time for all Modbus servers after recovering the 24 VDC power supply.

Furthermore, due to the clock drift of each Modbus server, it is mandatory to set date and time for all Modbus servers periodically. Recommended period is at least every 15 minutes.

Scattered Holding Register Read Function

The scattered holding register read function is available:

Function	**Subfunction Code**	**Name**	**Description**
100 (0x64)	4 (0x04)	Read scattered holding register	Read n non-contiguous registers

The scattered holding register read function enables the user to:

- avoid reading a large block of contiguous registers when only few registers are needed
- avoid multiple use of functions 3 and 4 in order to read non-contiguous registers

Read Scattered Holding Register Example

The following table shows how to read the addresses of the register 1022 (address 0x03FD) and register 1100 (address 0x044B) of a Modbus server. The Modbus address of the Modbus server is 47 = 0x2F.

Client Request		**Server Reply**	
Field Name	**Example**	**Field Name**	**Example**
Modbus server address	0x2F	Modbus server address	0x2F
Function code	0x64	Function code	0x64
Data length in bytes	0x06	Data length in bytes	0x06
Subfunction code	0x04	Subfunction code	0x04
Transmission number(1)	0xXX	Transmission number(1)	0xXX
Address of first register to read (MSB)	0x03	Value of the first register read (MSB)	0x12
Address of first register to read (LSB)	0xFD	Value of the first register read (LSB)	0x0A
Address of second register to read (MSB)	0x04	Value of the second register read (MSB)	0x74
Address of second register to read (LSB)	0x4B	Value of the second register read (LSB)	0x0C
CRC (MSB)	0xXX	CRC (MSB)	0xXX
CRC (LSB)	0xXX	CRC (LSB)	0xXX
(1) The client gives the transmission number in the request. The server returns the same number in the reply.			

Write Functions

The following write functions are available:

Function Code	**Subfunction Code**	**Name**	**Description**
6 (0x06)	–	Preset single register	Write 1 register
16 (0x10)	–	Preset multiple registers	Write n registers
43 (0x2B)	16 (0x10)	Set date and time	Write the date and time of the server

Modbus Exception Codes

Exception Responses

Exception responses from either the client or a server can result from data processing errors. One of the following events can occur after a request from the client:

- If the server receives the request from the client without a communication error and can handle the request correctly, it returns a normal response.
- If the server does not receive the request from the client due to a communication error, it does not return a response. The client program eventually processes a timeout condition for the request.
- If the server receives the request from the client but detects a communication error, it does not return a response. The client program eventually processes a timeout condition for the request.
- If the server receives the request from the client without a communication error, but cannot handle it (for example, the request is to read a register that does not exist), the server returns an exception response to inform the client of the nature of the error.

Exception Frame

The server sends an exception frame to the client to report an exception response. An exception frame is composed of 4 fields:

Field	Definition	Size	Description
1	Server number	1 byte	Destination of the request • 1–247: unique destination
2	Exception function code	1 byte	Request function code + 128 (0x80)
3	Exception code	n bytes	See next paragraph
4	Check	2 bytes	CRC16 (to check transmission errors)

Exception Codes

The exception response frame has two fields that differentiate it from a normal response frame:

- The exception function code of the exception response is equal to the function code of the original request plus 128 (0x80).
- The exception code depends on the communication error that the server encounters.

The following table describes the exception codes handled by the ATSE:

Exception Code	Name	Description
01 (0x01)	Illegal function	The function code received in the request is not an authorized action for the server. The server may be in the wrong state to process a specific request.
02 (0x02)	Illegal data address	The data address received by the server is not an authorized address for the server.
03 (0x03)	Illegal data value	The value in the request data field is not an authorized value for the server.
04 (0x04)	Server device failure	The server fails to perform a requested action because of an unrecoverable error.

Modbus Registers

The main information needed for remote supervision of a TransferPacT Switching Equipment is contained in the table of common registers starting at register 1001.

One Modbus read request is limited to 125 registers maximum. Three Modbus read requests are necessary to read the entire table.

Use of these common registers is highly recommended to optimize response times and simplify the use of data.

Table Format

Register tables have the following columns:

Address	Register	Pole number	R/W	Unit	Type	Range	TA	Bit	Description

- **Address**: a 16-bit register address in hexadecimal. The address is the data used in the Modbus frame.
- **Register**: a 16-bit register number in decimal (register = address + 1).
- **Pole number**: number of poles that are applicable for that register.
- **R/W**: register read-write status
  - R: the register can be read by using Modbus functions
  - W: the register can be written by using Modbus functions
  - RW: the register can be read and written by using Modbus functions
  - RC: the register can be read by using the command interface
  - WC: the register can be written by using the command interface
- **Unit**: the unit the information is expressed in.
- **Type**: the encoding data type (see data type description below).
- **Range**: the permitted values for this variable, usually a subset of what the format allows.
- **TA**: type of TransferPacT switch for which the register is available.
- **Bit**: bit position applicable for that register.
- **Description**: provides information about the register and restrictions that apply.

TransferPacT Switching Equipment Register

Address	Register	Pole number	R/W	Unit	Type	Range	TA	Bit	Description
0x03E8	1001	ALL	R	ENUM	ENUM	–	TA	–	Switch position • 1 = at N position • 2 = at A position • 4 = at OFF position • others = error
0x03EA	1003	ALL	R	ENUM	ENUM	–	TA	–	Normal source state • 0 = Source in range • 1 = Source out of range • 2 = No voltage

Address	Register	Pole number	R/W	Unit	Type	Range	TA	Bit	Description
0x03EC	1005	ALL	R	ENUM	ENUM	–	TA	–	Alternate source state • 0 = Source in range • 1 = Source out of range • 2 = No voltage
0x03ED	1006	3P/4P	R	–	BOOL	–	TA	0	SI phase sequence error validity • 0 = Invalid • 1 = Valid
0x03ED	1006	4P	R	–	BOOL	–	TA	1	SI neutral position wrong validity • 0 = Invalid • 1 = Valid
0x03ED	1006	3P/4P	R	–	BOOL	–	TA	2	SI unbalance voltage validity • 0 = Invalid • 1 = Valid
0x03ED	1006	4P	R	–	BOOL	–	TA	3	SI neutral loss alarm validity • 0 = Invalid • 1 = Valid
0x03ED	1006	ALL	R	–	BOOL	–	TA	4	SI over voltage state validity • 0 = Invalid • 1 = Valid
0x03ED	1006	ALL	R	–	BOOL	–	TA	5	SI under voltage state validity • 0 = Invalid • 1 = Valid
0x03ED	1006	ALL	R	–	BOOL	–	TA	6	SI over frequency state validity • 0 = Invalid • 1 = Valid
0x03ED	1006	ALL	R	–	BOOL	–	TA	7	SI under frequency state validity • 0 = Invalid • 1 = Valid
0x03EE	1007	3P/4P	R	–	BOOL	–	TA	0	SI phase sequence error • 1 = Yes
0x03EE	1007	4P	R	–	BOOL	–	TA	1	SI neutral position wrong • 1 = Yes
0x03EE	1007	4P	R	–	BOOL	–	TA	2	SI unbalance voltage status • 1 = Yes
0x03EE	1007	3P/4P	R	–	BOOL	–	TA	3	SI neutral loss alarm • 1 = Yes
0x03EE	1007	ALL	R	–	BOOL	–	TA	4	SI over voltage state • 1 = Yes
0x03EE	1007	ALL	R	–	BOOL	–	TA	5	SI under voltage state • 1 = Yes
0x03EE	1007	ALL	R	–	BOOL	–	TA	6	SI over frequency state • 1 = Yes
0x03EE	1007	ALL	R	–	BOOL	–	TA	7	SI under frequency state • 1 = Yes
0x03EF	1008	3P/4P	R	–	BOOL	–	TA	0	SII phase sequence error validity • 0 = Invalid • 1 = Valid
0x03EF	1008	4P	R	–	BOOL	–	TA	1	SII neutral position wrong validity • 0 = Invalid • 1 = Valid
0x03EF	1008	3P/4P	R	–	BOOL	–	TA	2	SII unbalance voltage validity

Address	Register	Pole number	R/W	Unit	Type	Range	TA	Bit	Description
									• 0 = Invalid • 1 = Valid
0x03EF	1008	4P	R	–	BOOL	–	TA	3	SII neutral loss alarm validity • 0 = Invalid • 1 = Valid
0x03EF	1008	ALL	R	–	BOOL	–	TA	4	SII over voltage state validity • 0 = Invalid • 1 = Valid
0x03EF	1008	ALL	R	–	BOOL	–	TA	5	SII under voltage state validity • 0 = Invalid • 1 = Valid
0x03EF	1008	ALL	R	–	BOOL	–	TA	6	SII over frequency state validity • 0 = Invalid • 1 = Valid
0x03EF	1008	ALL	R	–	BOOL	–	TA	7	SII under frequency state validity • 0 = Invalid • 1 = Valid
0x03F0	1009	3P/4P	R	–	BOOL	–	TA	0	SII phase sequence error • 1 = Yes
0x03F0	1009	4P	R	–	BOOL	–	TA	1	SII neutral position wrong • 1 = Yes
0x03F0	1009	3P/4P	R	–	BOOL	–	TA	2	SII unbalance voltage status • 1 = Yes
0x03F0	1009	4P	R	–	BOOL	–	TA	3	SII neutral loss alarm • 1 = Yes
0x03F0	1009	ALL	R	–	BOOL	–	TA	4	SII over voltage state • 1 = Yes
0x03F0	1009	ALL	R	–	BOOL	–	TA	5	SII under voltage state • 1 = Yes
0x03F0	1009	ALL	R	–	BOOL	–	TA	6	SII over frequency state • 1 = Yes
0x03F0	1009	ALL	R	–	BOOL	–	TA	7	SII under frequency state • 1 = Yes
0x03F1	1010	ALL	R	–	BOOL	–	TA	0	Validity of S1 trip status • 1 = Validity
0x03F2	1011	ALL	R	–	BOOL	–	TA	0	S1 trip status • 1 = S1 tripped
0x03F3	1012	ALL	R	–	BOOL	–	TA	0	Validity of S2 trip status • 1 = Validity
0x03F4	1013	ALL	R	–	BOOL	–	TA	0	S2 trip status • 1 = S2 tripped
0x03FC	1021	ALL	R	ENUM	ENUM	–	TA	–	Load shedding function supported • 1 = Supported
0x03FD	1022	ALL	R	ENUM	ENUM	–	TA	–	Load shedding status • 0 = Inactive • 1 = Active
0x03FE	1023	ALL	R	ENUM	ENUM	–	TA	–	Genset control status supported • 1 = Supported
0x03FF	1024	ALL	R	ENUM	ENUM	–	TA	–	Genset control status • 0 = Inactive

Address	Register	Pole number	R/W	Unit	Type	Range	TA	Bit	Description
									• 1 = Active • 2 = Unable to control
0x044B	1100	ALL	R	ENUM	ENUM	–	TA	–	Runtime mode • 0 = Init • 1 = Auto • 2 = Test • 3 = Voluntary • 5 = Local • 6 = Inhibit • 8 = Force2off • 9 = Fatal • 11 = Comm
0x044F	1104	ALL	R/W	s	FLOAT32	–	TA	–	Generator Ready Alarm Delay T10 • 15 ~ 300
0x07CF	2000	3P/4P	R	V	FLOAT32	–	TA	–	SI VAB • 0 ~ 6553.5
0x07D1	2002	3P/4P	R	V	FLOAT32	–	TA	–	SI VCA • 0 ~ 6553.5
0x07D3	2004	3P/4P	R	V	FLOAT32	–	TA	–	SI VBC • 0 ~ 6553.5
0x07D5	2006	ALL	R	Hz	FLOAT32	–	TA	–	SI frequency • 0 ~ 6553.5
0x07D7	2008	2P/4P	R	V	FLOAT32	–	TA	–	SI VAN • 0 ~ 6553.5
0x07D9	2010	4P	R	V	FLOAT32	–	TA	–	SI VBN • 0 ~ 6553.5
0x07DB	2012	4P	R	V	FLOAT32	–	TA	–	SI VCN • 0 ~ 6553.5
0x07DD	2014	3P/4P	R	%	FLOAT32	–	TA	–	SI voltage unbalance rate • 0 ~ 100.0
0x0833	2100	3P/4P	R	V	FLOAT32	–	TA	–	SII VAB • 0 ~ 6553.5
0x0835	2102	3P/4P	R	V	FLOAT32	–	TA	–	SII VCA • 0 ~ 6553.5
0x0837	2104	3P/4P	R	V	FLOAT32	–	TA	–	SII VBC • 0 ~ 6553.5
0x0839	2106	ALL	R	Hz	FLOAT32	–	TA	–	SII frequency • 0 ~ 6553.5
0x083B	2108	2P/4P	R	V	FLOAT32	–	TA	–	SII VAN • 0 ~ 6553.5
0x083D	2110	4P	R	V	FLOAT32	–	TA	–	SII VBN • 0 ~ 6553.5
0x083F	2112	4P	R	V	FLOAT32	–	TA	–	SII VCN • 0 ~ 6553.5
0x0841	2114	3P/4P	R	%	FLOAT32	–	TA	–	SII voltage unbalance rate • 0 ~ 100.0
0x0BB9	3002	ALL	R/W	V	FLOAT32	–	TA	–	Source rated voltage

Address	Register	Pole number	R/W	Unit	Type	Range	TA	Bit	Description
									<table><tr><td>Product series</td><td>Pole number</td><td>Rated voltage</td><td>Rated voltage range in HMI</td></tr><tr><td>Ue (1)</td><td>3P/ 4P</td><td>230 V</td><td>208V/ 220V/ 230V</td></tr><tr><td>Ue (2)</td><td>3P/ 4P</td><td>380-V</td><td>380 V/ 400 V/ 415 V/ 440 V</td></tr></table>
0x0BBB	3004	ALL	R/W	Hz	FLOAT32	–	TA	–	Source rated frequency • 50 or 60
0x0BC1	3010	ALL	R/W	ENUM	ENUM	–	TA	–	Enable abnormal frequency transfer • 0 = Disable • 1 = Enable
0x0BC2	3011	ALL	R/W	numeral	FLOAT32	–	TA	–	SI under frequency start/Drop-out threshold percent • 80 ~ 98%
0x0BC4	3013	ALL	R/W	numeral	FLOAT32	–	TA	–	SI under frequency reset/Pick-up threshold percent • Max [85, dropout + Fgap] ~ 100%
0x0BC6	3015	ALL	R/W	numeral	FLOAT32	–	TA	–	SII under frequency start/Drop-out threshold percent • 80 ~ 98%
0x0BC8	3017	ALL	R/W	numeral	FLOAT32	–	TA	–	SII under frequency reset/pick-up threshold percent • Max [85, dropout + Fgap] ~ 100%
0x0BCA	3019	ALL	R/W	numeral	FLOAT32	–	TA	–	SI over frequency start/Drop-out threshold percent • 101 ~ 120%
0x0BCC	3021	ALL	R/W	numeral	FLOAT32	–	TA	–	SI over frequency reset/Pick-up threshold percent • 100 ~ min [115%, dropout - Fgap]
0x0BCE	3023	ALL	R/W	numeral	FLOAT32	–	TA	–	SII over frequency start/Drop-out threshold percent • 101 ~ 120%
0x0BD0	3025	ALL	R/W	numeral	FLOAT32	–	TA	–	SII over frequency reset/pick-up threshold percent • 100 ~ min [115%, dropout - Fgap]
0x0BD3	3028	ALL	R/W	numeral	FLOAT32	–	TA	–	SI under voltage start/Drop-out threshold percent • 70 ~ 95%
0x0BD5	3030	ALL	R/W	numeral	FLOAT32	–	TA	–	SI under voltage reset/Pick-up threshold percent • Max [85, dropout + Vgap] ~ 100%
0x0BD7	3032	ALL	R/W	numeral	FLOAT32	–	TA	–	SII under voltage start/Drop-out threshold percent • 70 ~ 95%
0x0BD9	3034	ALL	R/W	numeral	FLOAT32	–	TA	–	SII under voltage reset/pick-up threshold percent • Max [85, dropout + Vgap] ~ 100%
0x0BDB	3036	ALL	R/W	ENUM	ENUM	–	TA	–	Enable over voltage transfer • 0 = Disable • 1 = Enable

Address	Register	Pole number	R/W	Unit	Type	Range	TA	Bit	Description
0x0BDC	3037	ALL	R/W	numeral	FLOAT32	–	TA	–	SI over voltage start/Drop-out threshold percent • 105 ~ 135%
0x0BDE	3039	ALL	R/W	numeral	FLOAT32	–	TA	–	SI over voltage reset/Pick-up threshold percent • 100 ~ min [115%, dropout - Vgap]
0x0BE0	3041	ALL	R/W	numeral	FLOAT32	–	TA	–	SII over voltage start/Drop-out threshold percent • 105 ~ 135%
0x0BE2	3043	ALL	R/W	numeral	FLOAT32	–	TA	–	SII over voltage reset/Pick-up threshold percent • 100 ~ min [115%, dropout - Vgap]
0x0BE4	3045	3P/4P	R/W	ENUM	ENUM	–	TA	–	Enable voltage unbalance • 0 = Disable • 1 = Enable
0x0BE5	3046	3P/4P	R/W	numeral	FLOAT32	–	TA	–	SI unbalance threshold • 2 ~ 30%
0x0BE7	3048	3P/4P	R/W	numeral	FLOAT32	–	TA	–	SII unbalance threshold • 2 ~ 30%
0x0BE9	3050	3P/4P	R/W	ENUM	ENUM	–	TA	–	Enable phase sequence warning • 0 = Disable • 1 = Enable
0x0BEA	3051	3P/4P	R	ENUM	ENUM	–	TA	–	Source phase sequence • 0 = 1-2-3 (ro) • 1 = 3-2-1(ro)
0x0BEF	3056	ALL	R/W	ENUM	ENUM	–	TA	–	Source priority • 1 = Source I is N and Source II is A • 2 = Source I is A and Source II is N
0x0BF0	3057	ALL	R/W	ENUM	ENUM	–	TA	–	Source usage • 1 = U-U • 2 = U-G
0x0BF1	3058	ALL	R/W	ENUM	ENUM	–	TA	–	Auto transfer mode • 0 = auto return • 1 = non-return • 2 = manual return
0x0BF2	3059	ALL	R/W	s	FLOAT32	–	TA	–	N to A confirmation transfer delay T2 • 0 ~ 1800
0x0BF4	3061	ALL	R/W	s	FLOAT32	–	TA	–	A to N confirmation transfer delay T6 • 0 ~ 3600
0x0BF6	3063	ALL	R/W	s	FLOAT32	–	TA	–	Center-Off time delay T4 • 0 ~ 30
0x0BFA	3067	ALL	R/W	s	FLOAT32	–	TA	–	Generator stop delay T9 • 0 ~ 3600
0x0BFC	3069	ALL	R/W	ENUM	ENUM	–	TA	–	Enable genset start fail warning • 0 = Disable • 1 = Enable
0x0BFD	3070	4P	R/W	ENUM	ENUM	–	TA	–	Enable neutral position wrong warning • 0 = Disable • 1 = Enable
0x0BFE	3071	4P	R/W	ENUM	ENUM	–	TA	–	Enable neutral loss warning • 0 = Disable • 1 = Enable

Address	Register	Pole number	R/W	Unit	Type	Range	TA	Bit	Description
0x0BFF	3072	ALL	R/W	ENUM	ENUM	–	TA	–	Onload test timer T13 limited • 0 = Unlimited • 1 = Limited
0x0C00	3073	ALL	R/W	s	FLOAT32	–	TA	–	Onload test timer T13 time period • 1 ~ 1800
0x0C02	3075	ALL	R/W	ENUM	ENUM	–	TA	–	Offload test timer T14 limited • 0 = Unlimited • 1 = Limited
0x0C03	3076	ALL	R/W	s	FLOAT32	–	TA	–	Offload test timer T14 time period • 1 ~ 1800
0x0C05	3078	ALL	R/W	ENUM	ENUM	–	TA	–	Test type from DI Test module config • 0 = Onload test • 1 = Offload test
0x0C1B	3100	ALL	R	Hz	FLOAT32	–	TA	–	SI under frequency start/Drop-out threshold value • nominal freq * percent
0x0C1D	3102	ALL	R	Hz	FLOAT32	–	TA	–	SI under frequency reset/Pick-up threshold value • nominal freq * percent
0x0C1F	3104	ALL	R	Hz	FLOAT32	–	TA	–	SII under frequency start/Drop-out threshold value • nominal freq * percent
0x0C21	3106	ALL	R	Hz	FLOAT32	–	TA	–	SII under frequency reset/Pick-up threshold value • nominal freq * percent
0x0C23	3108	ALL	R	Hz	FLOAT32	–	TA	–	SI over frequency start/Drop-out threshold value • nominal freq * percent
0x0C25	3110	ALL	R	Hz	FLOAT32	–	TA	–	SI over frequency reset/Pick-up threshold value • nominal freq * percent
0x0C27	3112	ALL	R	Hz	FLOAT32	–	TA	–	SII over frequency start/Drop-out threshold value • nominal freq * percent
0x0C29	3114	ALL	R	Hz	FLOAT32	–	TA	–	SII over frequency reset/Pick-up threshold value • nominal freq * percent
0x0C2B	3116	ALL	R	V	FLOAT32	–	TA	–	SI under voltage start/Drop-out threshold value • nominal freq * percent
0x0C2D	3118	ALL	R	V	FLOAT32	–	TA	–	SI under voltage reset/Pick-up threshold value • nominal freq * percent
0x0C2F	3120	ALL	R	V	FLOAT32	–	TA	–	SII under voltage start/Drop-out threshold value • nominal freq * percent
0x0C31	3122	ALL	R	V	FLOAT32	–	TA	–	SII under voltage reset/Pick-up threshold value • nominal freq * percent
0x0C33	3124	ALL	R	V	FLOAT32	–	TA	–	SI over voltage start/Drop-out threshold value • nominal freq * percent
0x0C35	3126	ALL	R	V	FLOAT32	–	TA	–	SI over voltage reset/Pick-up threshold value

Address	Register	Pole number	R/W	Unit	Type	Range	TA	Bit	Description
									• nominal freq * percent
0x0C37	3128	ALL	R	V	FLOAT32	–	TA	–	SII over voltage start/Drop-out threshold value • nominal freq * percent
0x0C39	3130	ALL	R	V	FLOAT32	–	TA	–	SII over voltage reset/Pick-up threshold value • nominal freq * percent
0x0DAB	3500	ALL	R	–	BOOL	–	TA	0	Genset start failure alarm validity • 0 = Invalid • 1 = valid
0x0DAC	3501	ALL	R	–	BOOL	–	TA	0	Genset start failure alarm • 1 = Yes
0x0DAD	3502	ALL	R	–	BOOL	–	TA	0	External power supply presence validity • 0 = Invalid • 1 = valid
0x0DAE	3503	ALL	R	–	BOOL	–	TA	0	External power supply presence • 1 = Presence
0x0DAF	3504	ALL	R	–	BOOL	–	TA	0	Onload test failure alarm validity • 0 = Invalid • 1 = valid
0x0DAF	3504	ALL	R	–	BOOL	–	TA	1	Offload test failure alarm validity • 0 = Invalid • 1 = valid
0x0DB0	3505	ALL	R	–	BOOL	–	TA	0	Onload test failure alarm • 1 = Yes
0x0DB0	3505	ALL	R	–	BOOL	–	TA	1	Offload test failure alarm • 1 = Yes
0x0DB1	3506	ALL	R	ENUM	ENUM	–	TA	–	Unexpected position alarm • 0 = No alarm • 1 = When transferring to A position • 2 = When transferring to N position • 3 = When transferring to off position • 4 = When transferring to invalid position • 5 = When in non-handle mode
0x0FBD	4030	ALL	R	numeral	UINT32	–	TA	–	Total Transfer count (no handle count) • 0 ~ 65535
0x0FBF	4032	ALL	R	numeral	UINT32	–	TA	–	Total Transfer failure count • 0 ~ 65535
0x0FC1	4034	ALL	R	numeral	UINT32	–	TA	–	Too fast transfer counter • 0 ~ 65535
0x0FD1	4050	ALL	R	numeral	UINT32	–	TA	–	Configuration changed count • 0 ~ 4294967295
0x01389	5002	ALL	R	ENUM	ENUM	–	TA	–	Force to off function supported • 1 = Supported
0x0138A	5003	ALL	R	ENUM	ENUM	–	TA	–	Force to off status • 0 = Inactive • 1 = Active
0x0138B	5004	ALL	R	ENUM	ENUM	–	TA	–	Inhibit function supported • 1 = Supported

Address	Register	Pole number	R/W	Unit	Type	Range	TA	Bit	Description
0x0138C	5005	ALL	R	ENUM	ENUM	–	TA	–	Inhibit status • 0 = Inactive • 1 = Active
0x0138D	5006	ALL	R	ENUM	ENUM	–	TA	–	Voluntary remote control function supported • 1 = Supported
0x0138E	5007	ALL	R	ENUM	ENUM	–	TA	–	Voluntary remote control status • 0 = Inactice • 1 = to_N • 2 = to_A
0x01391	5010	ALL	R	ENUM	ENUM	–	TA	–	Test status function supported • 1 = Supported
0x01392	5011	ALL	R	ENUM	ENUM	–	TA	–	Test status • 0 = Inactive • 1 = Active
0x01393	5012	ALL	R	ENUM	ENUM	–	TA	–	HMI transfer function supported • 1 = Supported
0x01394	5013	ALL	R	ENUM	ENUM	–	TA	–	HMI transfer status (local control) • 0 =Inactive • 1 = Active
0x01395	5014	ALL	R	ENUM	ENUM	–	TA	–	Comm control function supported • 0 = unsupported • 1 = supported
0x01396	5015	ALL	R	ENUM	ENUM	–	TA	–	Transfer by comm status • 0 = Inactive • 1 = to_N • 2 = to_A • 3 = to_off
0x01397	5016	ALL	R	ENUM	ENUM	–	TA	–	Test result • 0 = last runtime result pass • 1 = last runtime result failure • 2 = onload testing • 3 = offload testing
0x0176F	6000	ALL	R/W	IEC87-0-5-4	DATETIME	–	TA	–	System time • datetime IEC870-5-4
0x01773	6004	ALL	R	ENUM	ENUM	–	TA	–	Pole number • 3 = 3P • 4 = 4P
0x01783	6020	ALL	R	numeral	UINT16	–	TA	–	Product identifier • 19753 for UC Controller
0x01784	6021	ALL	R	STRING	STRING	–	TA	–	Vendor name • Schneider Electric
0x0178E	6031	ALL	R	STRING	STRING	–	TA	–	Product family • Transfer Switch
0x01797	6040	ALL	R	STRING	STRING	–	TA	–	Product range • TransferPacT
0x017A1	6050	ALL	R	STRING	STRING	–	TA	–	Product model • Controller - Auto
0x017A9	6058	ALL	R	STRING	STRING	–	TA	–	Product code CR num

Address	Register	Pole number	R/W	Unit	Type	Range	TA	Bit	Description
0x017B1	6066	ALL	R	STRING	STRING	–	TA	–	Serial number PPYYWWDLLLNNNNN
0x017BB	6076	ALL	R/W	STRING	STRING	–	TA	–	User application name "User app name"
0x017DB	6108	ALL	R/W	STRING	STRING	–	TA	–	Product capability "Product Capability"
0x017E7	6120	ALL	R	STRING	STRING	–	TA	–	FW version xxx.yyy.zzz
0x017ED	6126	ALL	R	STRING	STRING	–	TA	–	Hardware version xxx.yyy.zzz
0x017F3	6132	ALL	R	ENUM	ENUM	–	TA	–	Current running image type • 0 = Exploit • 1 = Fct • 2 = Upgrader
0x017F4	6133	ALL	R	STRING	STRING	–	TA	–	Vendor URL www.se.com
0x02324	8997	ALL	R	ENUM	ENUM	–	TA	–	Enable transfer by comm • 0 = disable • 1= enable
0x02325	8998	ALL	R	ENUM	ENUM	–	TA	–	Check whether can do comm control • 0 = cannot do comm control • 1 = can do comm control
0x02326	8999	ALL	R	ENUM	ENUM	–	TA	–	Comm control method • 0 = simple control • 1 = advance control
0x02327	9000	ALL	W	ENUM	ENUM	–	TA	–	Transfer by comm request • 0 = exit • 1 = transfer to N • 2 = transfer to A • 3 = transfer to Off
0x02328	9001	ALL	R	ENUM	ENUM	–	TA	–	Enable test by comm • 0 = disable • 1 = enable
0x02329	9002	ALL	W	ENUM	ENUM	–	TA	–	Test by comm request • 0 = test inactive (exit) • 1 = onload test active • 2 = offload test active
0x0270F	10000	ALL	R	numeral	UINT16	–	TA	–	Event log version 0-65535
0x02710	10001	ALL	R	numeral	UINT16	–	TA	–	Event log type 0-65535
0x02711	10002	ALL	R	numeral	UINT16	–	TA	–	Event log queue size (log number) 0-1000
0x02712	10003	ALL	R	numeral	UINT16	–	TA	–	Event log current log number in queue 0-1000
0x02713	10004	ALL	R	numeral	UINT16	–	TA	–	Event log latest index 0-65535

Address	Register	Pole number	R/W	Unit	Type	Range	TA	Bit	Description
0x02714	10005	ALL	R	TI086	TI086	–	TA	–	Event log content
0x09C3F	40000	ALL	R	numeral	UINT16	–	TA	–	System log version 0-65535
0x09C40	40001	ALL	R	numeral	UINT16	–	TA	–	System log type 0-65535
0x09C41	40002	ALL	R	numeral	UINT16	–	TA	–	System log queue size (log number) 0-1000
0x09C42	40003	ALL	R	numeral	UINT16	–	TA	–	System log current log number in queue 0-1000
0x09C43	40004	ALL	R	numeral	UINT16	–	TA	–	System log latest index 0-65535
0x09C44	40005	ALL	R	TI086	TI086	–	TA	–	System log content

Event Logs

What's in This Chapter

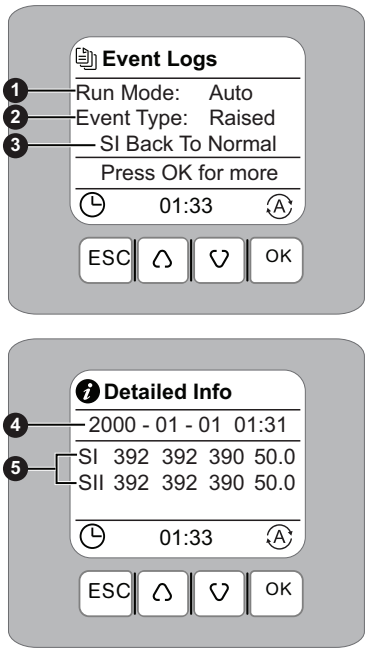
Overview

An event is a change in state of digital data, or any alarms and warnings detected by TransferPacT UC.

TransferPacT UC can log up to 100 events. If it exceeds the events limit, the latest log will overwrite the oldest one. The LCD can only display the latest 20 events. Modbus can display all events.

To check event logs on LCD, refer to Status Menu, page 67.

Event Logs Page Description



Label	Description
1	Run mode
2	Event type • Raised: Event starts • Released: Event ends
3	Event message
4	Time of events. **NOTE:** Without any time calibration or external DC 24 V, after long terms shut down of controller, the time may show wrong.
5	The source status during the event.

List of Event Logs

Event Code	LCD Display
1	Position alarm: Transfer to A Failed
2	Position alarm: Transfer to N Failed
3	Position alarm: Transfer to OFF Failed
4	Position alarm: Transfer to Invalid Position
5	Position Alarm: Internal Error
6	Position alarm: Unexpected position

Event Code	LCD Display
10	SI Phase Rotation Error
11	SII Phase Rotation Error
13	S1 Breaker Tripped Error
14	S2 Breaker Tripped Error
30	Genset Invalid
31	Genset Start Failure
40	On Load Test Failure
41	Off Load Test Failure
42	On Load Test Success
43	Off Load Test Success
50	SI Unbalance Warning
51	SII Unbalance Warning
52	SI Neutral Position Wrong Warning
53	SII Neutral Position Wrong Warning
54	SI Neutral Loss Warning
55	SII Neutral Loss Warning
70	SI Undervoltage
71	SII Undervoltage
72	SI Overvoltage
73	SII Overvoltage
74	SI No Voltage
75	SII No Voltage
76	SI Underfrequency
77	SII Underfrequency
78	SI Overfrequency
79	SII Overfrequency
80	SI All Recover
81	SII All Recover
100	SI Voltage over 500 V
101	SII Voltage over 500 V
122	Transfer from N to O
123	Transfer from A to O
124	Transfer from O to N
125	Transfer from O to A
140	Load Shedding Output
141	Genset Start
142	Genset Stop
143	Alarm Output Start
144	Alarm Output Stop
145	Force to OFF
148	Enter Inhibit Mode
149	On Load Test
150	Off Load Test
151	Voluntary to N

Event Code	LCD Display
152	Voluntary to A
153	Comm Transfer Exit
154	Comm Transfer to N
155	Comm Transfer to A
156	Comm Transfer to OFF
200	Operation Mode Changed

Alarm

An alarm Indicates the controller detects a critical error or mechanism error. Do not perform manual operation when there is an alarm. Contact field service first, and/or check the root cause to clear and acknowledge the alarm. The alarm is recorded in event logs.

When an alarm is triggered, it is indicated by the followings:

- The alarm LED shall always be ON until it is acknowledged.
- The HMI will pop-up an alarm screen.
- A ⚠ icon displayed at the bottom right corner.

Press **OK** button to close the alarm screen. Press **OK** button on the alarm screen for more than 3 s to acknowledge the alarm.

If the alarm screen is closed, go to **Set & Operate** page to check and acknowledge the alarm. Refer to Operations Sub-menu, page 48 for more information.

NOTE: A pin-code is required to open the Set & Operate page.

List of Alarm Messages

Alarm Code	Alarm Message	LCD display
1	Position alarm: transfer to A error	Transfer to A failed
2	Position alarm: transfer to N error	Transfer to N failed
3	Position alarm: transfer to OFF error	Transfer to OFF failed
4	Position alarm: transfer to invalid position	Invalid position
5	Position Alarm: Internal error	Internal error
6	Position alarm: unexpected position	Unexpected position
10	Source I phase rotation error	SI phase rotation
11	Source II phase rotation error	SII phase rotation
13	S1 breaker tripped error	S1 tripped
14	S2 breaker tripped error	S2 tripped

Position Alarm: Transfer to A Error

- Event code: 1
- Type of event: Alarm.
- Default: Always enabled.
- Description: When TSE cannot transfer to replacement, an alarm will be raised.
- Cause: Stack of mechanism or failure of electronic components.
- Diagnosis and repair: Contact field service.

Position Alarm: Transfer to N Error

- Event code: 2.
- Type of event: Alarm.
- Default: Always enabled.
- Description: When the TSE cannot transfer to normal, an alarm will be raised.

- Cause: Stack of mechanism or failure of electronic components.
- Diagnosis and repair: Contact field service.

Position Alarm: Transfer to Off Error

- Event code: 3.
- Type of event: Alarm.
- Default: Always enabled.
- Description: When the TSE cannot transfer to off position, an alarm will be raised.
- Cause: Stack of mechanism or failure of electronic components.
- Diagnosis and repair: Contact field service.

Position Alarm: Transfer to Invalid Position

- Event code: 4.
- Type of event: Alarm.
- Default: Always enabled.
- Description: If both micro-switches are closed, a short circuit of two sources will happen. An alarm will be raised.
- Cause: Welding issue of failure micro-switch.
- Diagnosis and repair: Contact field service.

Position Alarm: Internal Error

- Event code: 5
- Type of event: Alarm.
- Default: Always enabled.
- Description: When TSE cannot transfer to off position, an alarm will be raised.
- Cause: Stack of mechanism or failure of electronic components.
- Diagnosis and repair: Contact field service.

Position Alarm: Unexpected Position

- Event code: 6
- Type of event: Alarm.
- Default: Always enabled.
- Description: When operating the circuit breaker directly in automatic mode, an alarm will be raised.
- Cause: Unexpected operating or controller failure.
- Diagnosis and repair: Contact field service.

Source 1 or 2 Phase Rotation Failure

- Event code: 10,11.
- Type of event: Alarm.

- Default: Enabled.
- Description: When there is phase rotation such as from A-B-C move to C-B-A, an alarm will be raised if this function is enabled.
- Cause: Wrong installing when first connection of main circuit or reform the main connections.
- Diagnosis and repair: Double check the phase sequence of main circuit or contact field service.

S1 Breaker Tripped Error

- Event code: 13.
- Type of event: Alarm.
- Default: Always enabled.
- Description: When the circuit breaker or protective device on Source I (S1) trips due to over-current, short circuit, or other fault conditions, an alarm will be raised.
- Cause: Abnormal load condition, short circuit, ground fault, or malfunction of the S1 protective device.
- Diagnosis and repair: Verify the load and wiring on Source I, reset the circuit breaker if applicable, and inspect for fault conditions. If the issue persists, contact field service.

S2 Breaker Tripped Error

- Event code: 14.
- Type of event: Alarm.
- Default: Always enabled.
- Description: When the circuit breaker or protective device on Source II (S2) trips due to over-current, short circuit, or other fault conditions, an alarm will be raised.
- Cause: Abnormal load condition, short circuit, ground fault, or malfunction of the S2 protective device.
- Diagnosis and repair: Verify the load and wiring on Source II, reset the circuit breaker if applicable, and inspect for fault conditions. If the issue persists, contact field service.

Warning

When a warning is triggered, depending on the warning type, the LCD pops up an alarm screen or the source LED keeps blinking. The LCD will display the latest warning message at the bottom bar and the previous message will be overwritten. The warning is recorded in event logs.

The icon is displayed on the page to indicate an active warning.

The warning will not inhibit the transfer functions. To check and clear the warning, refer to Operations Sub-menu, page 48.

List of Warning Messages

Warning code	Warning message	LCD display method	LED display method
30	Genset invalid	Bottom bar	None
31	Genset start failure	Bottom bar	None
40	On load test failure	Bottom bar	None
41	Off load test failure	Bottom bar	None
42	On load test success	Bottom bar	None
43	Off load test success	Bottom bar	None
50	SI unbalance warning	Bottom bar	None
51	SII unbalance warning	Bottom bar	None
52	SI neutral position wrong warning	Bottom bar	None
53	SII neutral position wrong warning	Bottom bar	None
54	SI neutral loss warning	None	LED source state blinking
55	SII neutral loss warning	None	LED source state blinking
70	SI under voltage	None	LED source state blinking
71	SII under voltage	None	LED source state blinking
72	SI over voltage	None	LED source state blinking
73	SII over voltage	None	LED source state blinking
74	SI no voltage	None	LED source state off
75	SII no voltage	None	LED source state off
76	SI under frequency	None	LED source state blinking
77	SII under frequency	None	LED source state blinking
78	SI over frequency	None	LED source state blinking
79	SII over frequency	None	LED source state blinking
80	SI all recover	None	LED source state on
81	SII all recover	None	LED source state on

Generator Invalid

- Event code: 30.
- Type of event: Warning.
- Default: Always disabled.
- Description: The sudden loss of an alternate source will lead to a warning.
- Cause: Genset is not connected well or some failure on Genset started
- Diagnosis and repair: Contact field service.

Generator Start Failure

- Event code: 31.
- Type of event: Warning.
- Default: Disabled.
- Description: After sending the Genset start signal, controller will wait a time T10 duration until Genset is ready.
  - The ATSE will rise the Genset alarm, if Genset is not started within T10 timer is ended (if enabled).
  - The ATSE shall reset the Genset alarm, when the A source is in range or when the N source is in range.
  - The time delay is only available when there is external power.
- Cause: Genset is not connected well or some failure on Genset started.
- Diagnosis and repair: Contact field service.

On Load/Off Load Test Failure

- Event code: 40, 41
- Type of event: Warning.
- Default: Always enabled.
- Description: If on load or off load test is failed or interrupted, a warning will be raised.
- Cause: Product failure or external interruption
- Diagnosis and repair: Contact field service.

SI Unbalance Warning

- Event code: 50.
- Type of event: Warning.
- Default: Disabled.
- Description: If unbalance of voltage occurs over the drop-out rate of threshold (5% as default) when SI is connected, a warning will be raised.
- Cause: Too many single-phase loads or poor quality of power supply environment.
- Diagnosis and repair: Set the different value of imbalance rate or contact field service.

SII Unbalance Warning

- Event code: 51.
- Type of event: Warning.
- Default: Disabled.
- Description: If unbalance of voltage occurs over the drop-out rate of threshold (5% as default) when SII is connected, a warning will be raised.
- Cause: Too many single-phase loads or poor quality of power supply environment.
- Diagnosis and repair: Set the different value of imbalance rate or contact field service.

SI or SII Neutral Position Wrong Warning

- Event code: 52, 53
- Type of event: Warning.
- Default: Always enabled.
- Description: If sequence of neutral is not connected as set value, a warning will be raised.
- Cause: Wrong connection of neutral or wrong settings.
- Diagnosis and repair: Set the new neutral sequence or contact field service.

SI or SII Neutral Loss Warning

- Event code: 54, 55
- Type of event: Warning.
- Default: Disabled.
- Description: If unbalance rate of voltage occurs over 20% when source is connected, a warning will be raised.
- Cause: Miss connection or disconnection caused by interior or exterior impacts of neutral line.
- Diagnosis and repair: correct the connection or contact field service.

SI Under Voltage

- Event code: 70.
- Type of event: Event.
- Default: Always enabled.
- Description: When there is under voltage on SI, an event log will be recorded.

SII Under Voltage

- Event code: 71.
- Type of event: Event.
- Default: Always enabled.
- Description: When there is under voltage on SII, an event log will be recorded.

SI Over Voltage

- Event code: 72.
- Type of event: Event.
- Default: Disabled.
- Description: When there is over voltage on SI, an event log will be recorded.

SII Over Voltage

- Event code: 73.
- Type of event: Event.
- Default: Disabled.
- Description: When there is over voltage on SII, an event log will be recorded.

SI No Voltage

- Event code: 74.
- Type of event: Event.
- Default: Always enabled.
- Description: When there is source failure on SI, an event log will be recorded.

SII No Voltage

- Event code: 75.
- Type of event: Event.
- Default: Always enabled.
- Description: When there is source failure on SII, an event log will be recorded.

SI Under Frequency

- Event code: 76.
- Type of event: Event.
- Default: Disabled.
- Description: When there is Under frequency on SI, an event log will be recorded.

SII Under Frequency

- Event code: 77.
- Type of event: Event.
- Default: Disabled.
- Description: When there is Under frequency on SII, an event log will be recorded.

SI Over Frequency

- Event code: 78.
- Type of event: Event.
- Default: Disabled.
- Description: When there is Under frequency on SI, an event log will be recorded.

SII Over Frequency

- Event code: 79.
- Type of event: Event.
- Default: Disabled.
- Description: When there is Under frequency on SII, an event log will be recorded.

SI All Recover

- Event code: 80.
- Type of event: Event.
- Default: Always enabled.
- Description: When SI recover to normal, an event log will be recorded.

SII All Recover

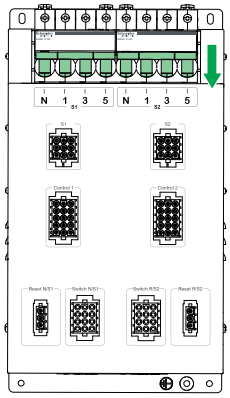
- Event code: 81.
- Type of event: Event.
- Default: Always enabled.
- Description: When SII recover to normal, an event log will be recorded.

Dielectric Test

NOTICE
HAZARD OF EQUIPMENT DAMAGE • Before performing the dielectric test of the TransferPacT UC controller with MCCBs or ACBs, put the breakers on the adaptor in OFF position. • After the dielectric test, turn on the breakers of adapter to power on the controller. **Failure to follow these instructions can result in equipment damage.**

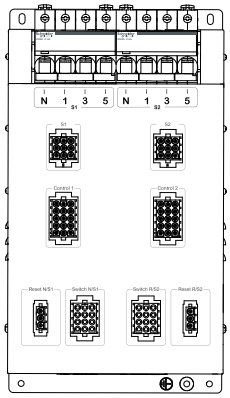
Perform the following procedure for dielectric test:

1. Push-down the circuit breaker switch manually to disconnected position.

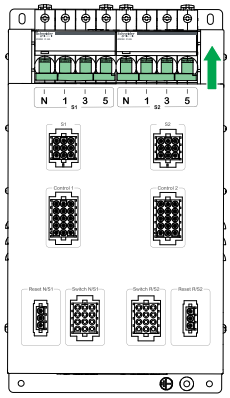


2. The circuit breaker is in disconnected position.

   NOTE: Ensure the controller is off before the dielectric test.



3. Push-up the circuit breaker switch manually to closed position after the dielectric test.



Cybersecurity

NOTICE
HAZARD OF EQUIPMENT DAMAGE • Keep side label intact. • Do not touch the product if side label is broken as it may defect the equipment. **Failure to follow these instructions can result in equipment damage.**

For more information on Cybersecurity, refer to Cybersecurity Guide.

Acronyms and Terminology

Short terms	Expansion	Description
TSE	Transfer Switching Equipment	Self-acting transfer switching equipment, including all necessary sensing inputs, monitoring, and control logic for transferring operations.
ATSE	Automatic Transfer Switching Equipment	
SI	Source I	SI supply
SII	Source II	SII supply
N	Normal	Normal supply
A	Alternate	Alternate supply
E	Emergency	
O	Off position	Two powers are disconnected
Specific TSE	Specific transfer switching equipment	2/3 position dedicated designed as IEC 60947-6-1 product requirement
Derived TSE	Derived transfer switching equipment	Fulfilling requirements of other IEC 60947 product standards
Open transition	Normal transfer	The basic transfer function
In phase transition	Sync transition	Open transition but detect phase angle when re-transfer
Delayed transition	Delay transition	A programmable time delay for neutral position
Close transition	Close transition	A load transfer by momentarily paralleling both sources
Neutral overlapping	Transfer with neutral overlapping	Making before breaking and N will never be lost
Under voltage sensor		Detect the Undervoltage of power source
Over voltage sensor		Detect the Overvoltage of power source
Frequency sensor		Detect the frequency of power source
Voltage unbalance sensor		Detect the balance of power source
Phase rotation sensor		Detect the phase angle of power source
Loss of single-phase sensor		Detect the phase of power source
T2	Transfer Delay	Transfer delay
T4	Center-off Delay	Center-off delay
T6	Re-Transfer Delay	Re-Transfer Delay
T9	Genset Cool Delay	Genset cool delay
T10	Genset Fail Delay	Genset fail delay
T13	On Load Test Delay	On load test delay
T14	Off Load Test Delay	Off load test delay
Power supply models		An additional power supply connection for controller
Auto-return		A working mode for ATSE controller
Non-return		A working mode for ATSE controller
Manual-return		A working mode for ATSE controller
Load shed		A signal from ATSE controller to shed the load
Transfer inhibit		Override transfer orders
Genset start		A Genset start signal from controller
Fire protection		Shed the ATSE when fire signal is received
Voluntary remote control		Transfer remotely
External 24 Vdc		External power for controller/communication

Schneider Electric
35 rue Joseph Monier
92500 Rueil Malmaison
France

+ 33 (0) 1 41 29 70 00

www.se.com

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