CTI Transfer Panel

Technical Instruction Manual

EN

EN

Summary

GENERAL SAFETY INSTRUCTIONS

- This leaflet provides CTI Automatic Transfer Switch range, safety, connection and operating instructions.
- This system must always be installed and commissioned by specialised and qualified persons.
- Check earth cable connected before powering the unit.
- Keep the cabinet clean using a dry cloth.
- It is recommended that this leaflet be kept in a place easily accessible to all of those who may need it.
- The maintenance operations must be carried out exclusively by authorised and appropriately trained personnel.
- This system complies with the community directives applicable to this product. Thus, it bears the CE mark.
- Compliance with IEC 60947-6-1 and IEC 614369-1.
- Information provided in this instruction manual is subject to change and not contractual.

INTRODUCTION

General introduction

The CTI enclosure integrates a 4-pole fast changeover switch including electronic control to meet the IEC 60947-6-1 standard. Thanks to the changeover switch technology, it is always possible to manually operate the system in order to guarantee the changeover panel operation under all circumstances.

This new development allows advantages brought using switch technology but keeps contactor control possible on request via programming (Refer to RETURN 0 Function).

The electronic module includes:

- Source supply monitoring
- Metering display (voltage and frequency as standard)
- Test operations and Sequences programming using keypad.

Manual & padlocking operations, as well as electronic module programming and use are directly accessible from the front panel.

CTI transfer panel range

CTI range is available from 63 A to 160 A in two different voltage configurations :

400 Vac P-P*	230 Vac P-P*
CTI 63 A	CTI_1 63 A
CTI 100 A	CTI_1 100A
CTI 125 A	CTI_1 125A
CTI 160 A	CTI_1 160A

Refer to Network configurations chapter to select correct model and configuration

Bottom cable entry is provided as standard.

* : Phase to phase

Two types of products for two voltage configurations
CTI : for 230/400 Vac
CTI_1 : for 127/230 Vac

New changeover panel

The fast changeover solution contains four main integrated elements:

① 2 switches mechanically interlocked including electronic control and accessories.

② A fast electrical operation unit allowing electrical and manual operation of the system.

③ A dedicated enclosure

④ Bridging bar

> Features and benefits:

1 - SWITCH :

A **fully integrated** & **interlocked transfer system** with **high electrical characteristics** and a **fully programmable microprocessor control module** & **display**.

2 - OPERATION :

A **flexible** operating mechanism enables **fast automatic** or local/**emergency manual** operation with **padlocking** facility.

3 - ENCLOSURE :

A **steel enclosure designed specifically to allow an easy fixing and wiring of the changeover and its accessories** (IP54, Lightning protection...), as well as an ergonomic use thanks to a flush mounting **allowing a direct access to the means of visualization, configuration and control** (Auto & Manu).

Voltage options

CTI power supply can carry from 230-30% Vac to 230+30% Vac under frequency 50Hz or 60Hz.

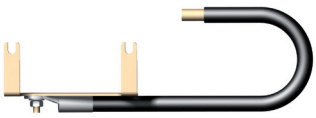
Two CTI versions have been developed to meet all of voltage configurations required.

Accessories

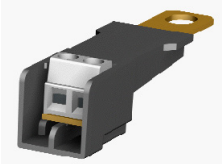
> The following accessories are available as customer fitted options

- **Auxiliary contacts module** for switch position information (Main, Gen, zero position). One module includes the 3 positions information. 1 module maximum is the standard CTI enclosure. Option code is TAUX.

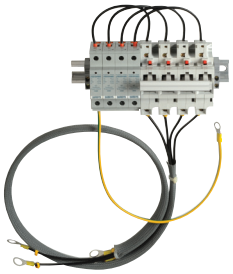
- **Solid neutral** link is available as an accessory, when switching of the neutral cable is not desired. Option code is TLNK.



- **Voltage Sensing** tap accessory allows for each pole voltage sensing or supply (on two 1.5mm^2 terminals) directly taken from power terminals via a dedicated plug.

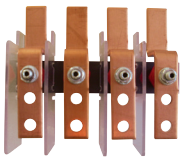


- **Lightning protection**. It is available as an accessory to avoid ATS damage in case of a strike on the power cables. This option is highly recommended in stormy areas.



- **IP 54**. An IP54 accessory kit is available to protect the product against dust and water infiltrations. The kit includes : 1 windows to fix on the door cut-out and 1 protection screen kit to avoid direct contacts during manual operation when the door has to be opened.

- **Terminal extensions.** This accessory allow to convert the CTI plugs to terminal bars. 1 kit includes 3 terminal extensions pieces with their phase screen protection.



Environment

> The complete enclosure meets following environmental requirements:

- Ingress protection:
  - standard Enclosed product = IP4x (possible IP54 with option)
  - Loose product = IP21
- Operating conditions:
  - Temperature :
    From -10°C to +40°C without de-rating
    From +40°C to +65°C without de-rating
  - Humidity: 95% non condensing at +40°C
- Storage conditions :
  - Duration: 1 year maximum
  - Temperature: <+55°C
  - Humidity: 80% non condensing at 55°C
- Maximum operating altitude without switch de-rating is 2000 m above sea level.

TECHNICAL CHARACTERISTICS

	63A	100A	125A	160A
Frequencies	50 Hz & 60 Hz	50 Hz & 60 Hz	50 Hz & 60 Hz	50 Hz & 60 Hz
Thermal current Ithe 40 °C (A)	63	100	125	160
Thermal current Ithe 50°C (A)	63	100	110	125
Thermal current Ithe 60°C (A)	50	80	100	100
Assigned insulation voltage Ui (V) (power circuit):	600	600	600	600
Assigned impulse voltage Uimp (kV) (power circuit):	6	6	6	6
Assigned insulation voltage Ui (V) (auxiliary circuit):	300	300	300	300
Assigned impulse voltage Uimp (kV) (auxiliary circuit):	2.5	2.5	2.5	2.5
Other characteristic at 40°C:				
Rated operational currents Ie (A)				
IEC 60947-3 characteristics 415 Vac				
AC 21A / 21 B	63/63	100/100	125/125	160/160
AC 22A / 22 B	63/63	100/100	125/125	125/160
AC 23A / 23 B	63/63	100/100	125/125	125/160
IEC 60947-6-1 characteristics 415 Vac				
AC 31B	63	100	125	160
AC 32B	63	100	125	160
Operating class				
Material class (according to 60947-6-1)	PC	PC	PC	PC
Maximum short circuit current using gG DIN fuse:				
Max short circuit (kA eff)	50	50	50	50
Associated fuse size (gG)	63	100	125	160
Peak current value: withstand and closing operation (kA peak)	7.5	11	13.5	16.5
Short circuit operation:				
Rated short time withstand current (kA eff) / 30 ms	5	5	10	10
Transfer time				
I-O / O-I / II-O / O-II (ms)	50	50	50	50
I-II or II-I (ms)	180	180	180	180
Blackout time during comutation under Un (ms)	120	120	120	120
Power input				
Peak current during operation (A)	20	20	20	20
Continuous power consumption (VA)	6	6	6	6
Mechanical characteristics				
Number of mechanical operations (according to 60947-6-3)	10000	10000	10000	10000
Cables connection				
Minimum cable size (Cu mm^2)	25	35	50	50
Maximum cable size (Cu mm^2)	50	50	70	70

Single phase configuration :

Table available for single phase configuration using a 4 pole switch and connecting 2 poles in parallel (Max ambiant temperature = 40°C)

Nominal rating 3 phase configuration (A)	Nominal rating 1 phase configuration (2 poles in //) (A)
63	100
80	125
100	160
125	200
160	250

First operation

- The system is delivered in position 0 and in auto mode with the generator start contact closed.

Wall mounting installation and dimensions

The enclosure must be fixed on a wall using solid fixing screws (not supplied).

Recommended size : M6 50 mm (minimum).

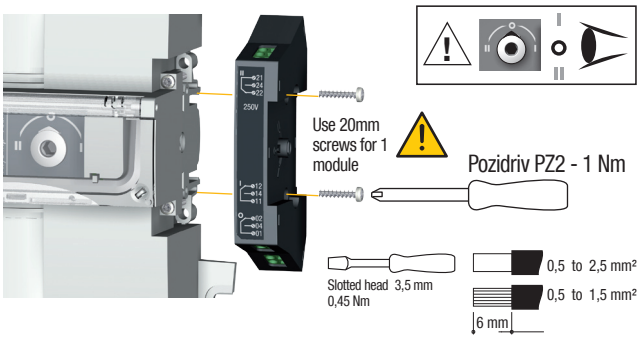
Drilling template for the gland plate are provided in the appendix.

For a correct use in hard environmental conditions, it is essential to use the cable gland plate, in order to protect the product.

Height (mm)	600
Width (mm)	400
Depth (mm)	200
Weight (kg)	From 20 to 25 including accessories

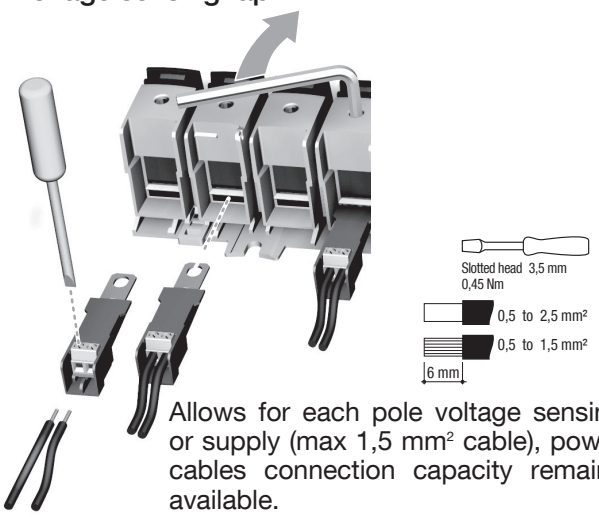
Accessories mounting

> Auxilary contacts



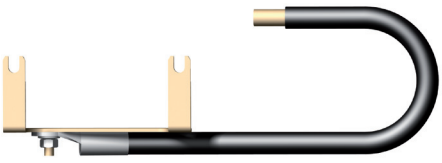
1 auxiliary contact normally open and normally closed for each position I, O, II. Use dedicated screws delivered with the accessory.

> Voltage sensing tap



Allows for each pole voltage sensing or supply (max 1,5 mm² cable), power cables connection capacity remains available.

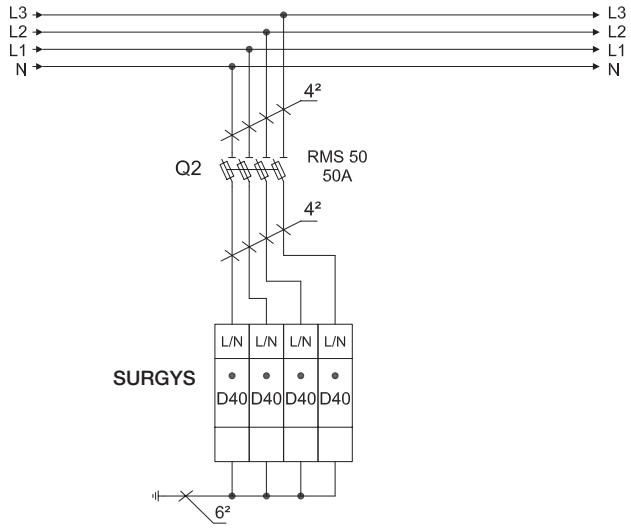
> Solid neutral kit



Allows neutral cables from Main, Gen and Load to be connected together. In case of 400 Vac applications, 2 neutral control cables are required to power supply the switch (230 Vac) from Main and Gen.

Accessories mounting (cont.)

> Lightning protection

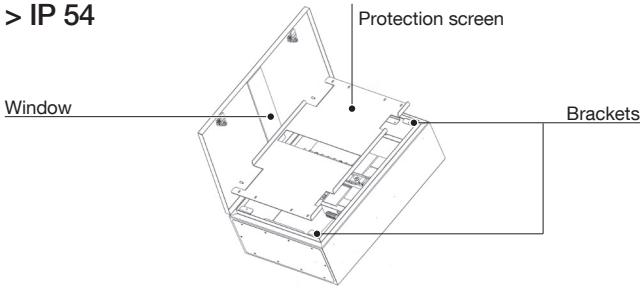


The lightning protection system is hardly recommended to ensure changeover safety.

This option is provided mounted on a din rail which can be fixed with the 2 screws available on the enclosure back plate (on the top or bottom).

The phases and neutral lines can be connected on the upstream side of the source which presents more risks.

> IP 54



Move the CTI support to reduce the height.

Then position the window on the door cut-out.

Finally, position the protection screen, screwing it.

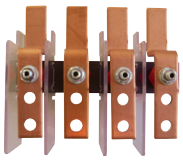
> Terminal extensions

These terminals can be connected in the CTI plugs, then they provide connections on terminals directly.

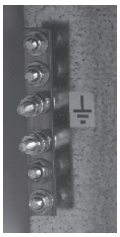
1 piece for the main side

1 piece for the genset side

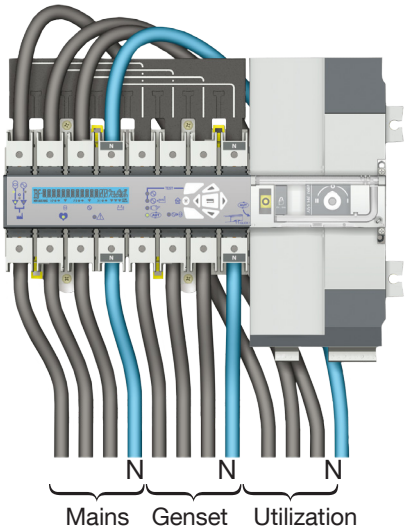
1 piece for the load side.



Power cables connection



Maximun cable size 50 mm²

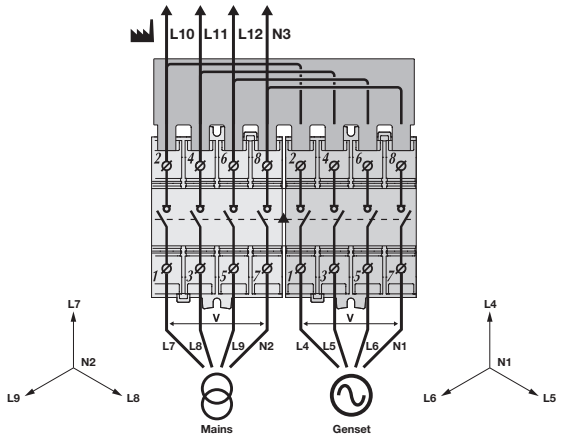
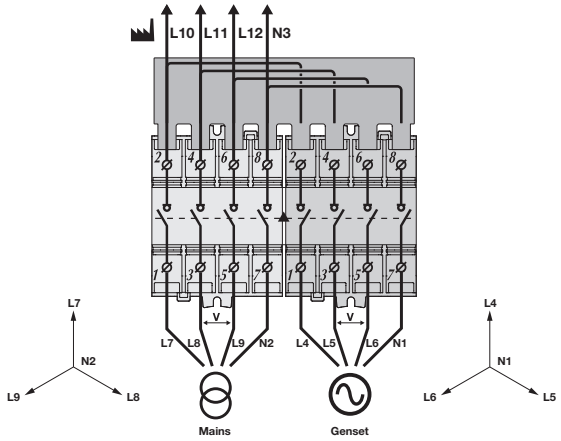
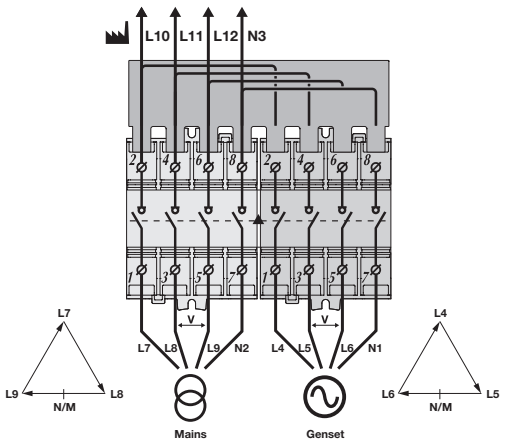


> Cable size according to the ratings

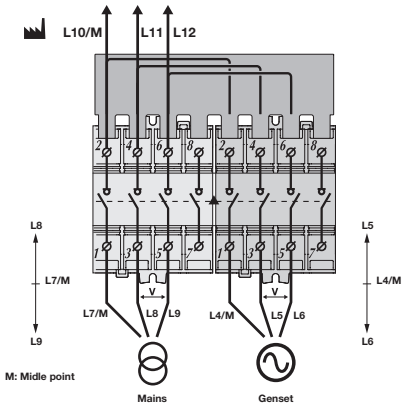
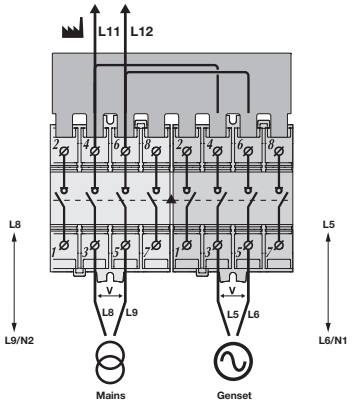
	63A	100A	125A	160A
Minimum cable size (mm²)	25	35	50	50
Maximum cable size (mm²)	50	50	70	70

Network configurations

VOLTAGE CONFIGURATIONS

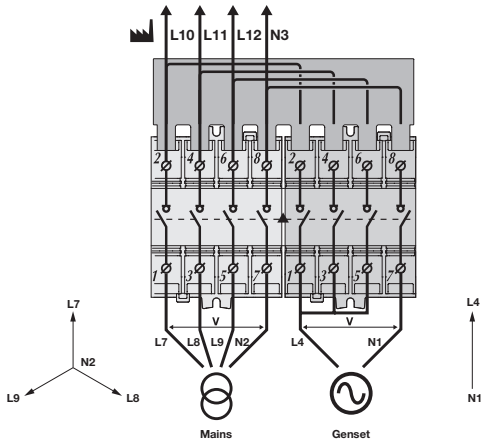
Network type		FG Wilson option code	Voltage	Frequency	Electrical drawing
Phase to Phase voltage 380 -> 480V **4NBL**	CTI		415 V / 240 V	50 Hz	 220 Vac < V < 254 Vac
			400 V / 230 V		
			380 V / 220 V		
			480 V / 277 V	60 Hz	
			440 V / 254 V		
			380 V / 200 V		
		Measurements: [Main: V1-V2-V3-U12-U23-U31] / [Genset: V1-V2-V3-U12-U23-U31]			
Phase to Phase voltage 200 -> 240V **4NBL**	CTI_1		220 V / 127 V	50 Hz	 200 Vac < V < 240 Vac
			200 V / 115 V		
			220 V / 127 V	60 Hz	
			208 V / 120 V		
			240 V / 139 V		
		Measurements: [Main: V1-V2-V3-U12-U23-U31] / [Genset: V1-V2-V3-U12-U23-U31]			
Phase to Phase voltage 220 -> 240V **3NBL**	CTI_1		230 V / 115 V	50 Hz	 220 Vac < V < 240 Vac
			220 V / 110 V		
			240 V / 120 V	60 Hz	
			230 V / 115 V		
			220 V / 110 V		
		Measurements: [Main: U12-U23-U31] / [Genset: U12-U23-U31]			

VOLTAGE CONFIGURATIONS

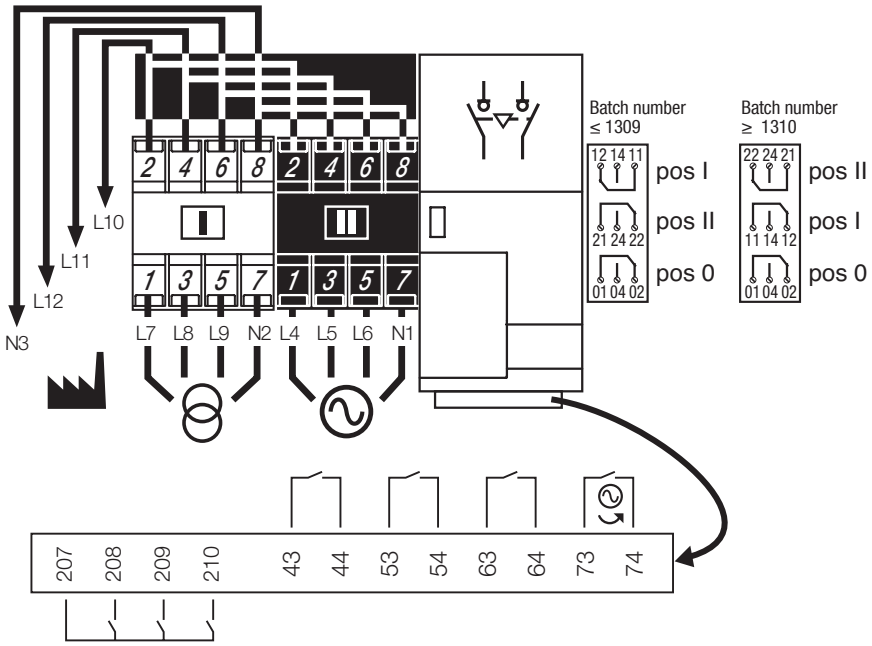
Network type	FG Wilson option code	Voltage	Frequency	Electrical drawing
Phase to Phase voltage 220 -> 240V 1 phase 3 wires 2NBL	CTI_1	240 V / 120 V	50 Hz	 220 Vac < V < 240 Vac
		230 V / 115 V		
		220 V / 110 V		
		240 V / 120 V	60 Hz	
		230 V / 115 V		
		220 V / 110 V		
Measurements: [Main: U12-U23-U31] / [Genset: U12-U23-U31]				
Phase to Phase voltage 220 -> 240V 1 phase 2 wires 2BL	CTI_1	240 V	50 Hz	 220 Vac < V < 240 Vac
		230 V		
		220 V		
		240 V	60 Hz	
		230 V		
		220 V		
Measurements: [Main: V1] / [Genset: V1]				

Network configurations

VOLTAGE CONFIGURATIONS

Network type		Description	Electrical drawing
41NBL (400 Vac) **42NBL** (230 Vac)	CTI	3 phases network - single phase GEN	 220 Vac < V < 240 Vac
		Measurements: [Main: V1-V2-V3] / [Genset: V1]	

Control terminals connections



Denomination	Terminal	Description	Characteristics	Recommended cable section
Input	207 208 209 210	Terminal common 208 to 210 Programmable input Programmable input Programmable input	dry contact	0,5 to 2,5mm²
Output	43/44 53/54 63/64 73/74	Programmable output Programmable output Programmable output Generator start /stop signal	Resistive load: Max. switched power: 60 W or 115 VA Max. switched current: 2A Max. switched voltage: 30 VDC or 23 0 VAC	0,5 to 2,5mm²
Auxiliary contact accessory	pos I pos II pos 0	Mains switch state (open or closed) Generator switch state (open or closed) Open position state (open or closed)	250 Vac 5A AC1	0,5 to 2,5mm²

In manual mode, after a loss of the main voltage and the genset voltage, the start order can't be given.

General introduction

The product provides:
- Manual operation
- Automatic transfer operation
- Test operations and mimic
- Sources & power availability mimic
- Voltage and frequency metering
- Fault information

It is possible to set up a return to zero position action after source failure (main or gen). 2nd TRIP variable must be activated to allow this feature.

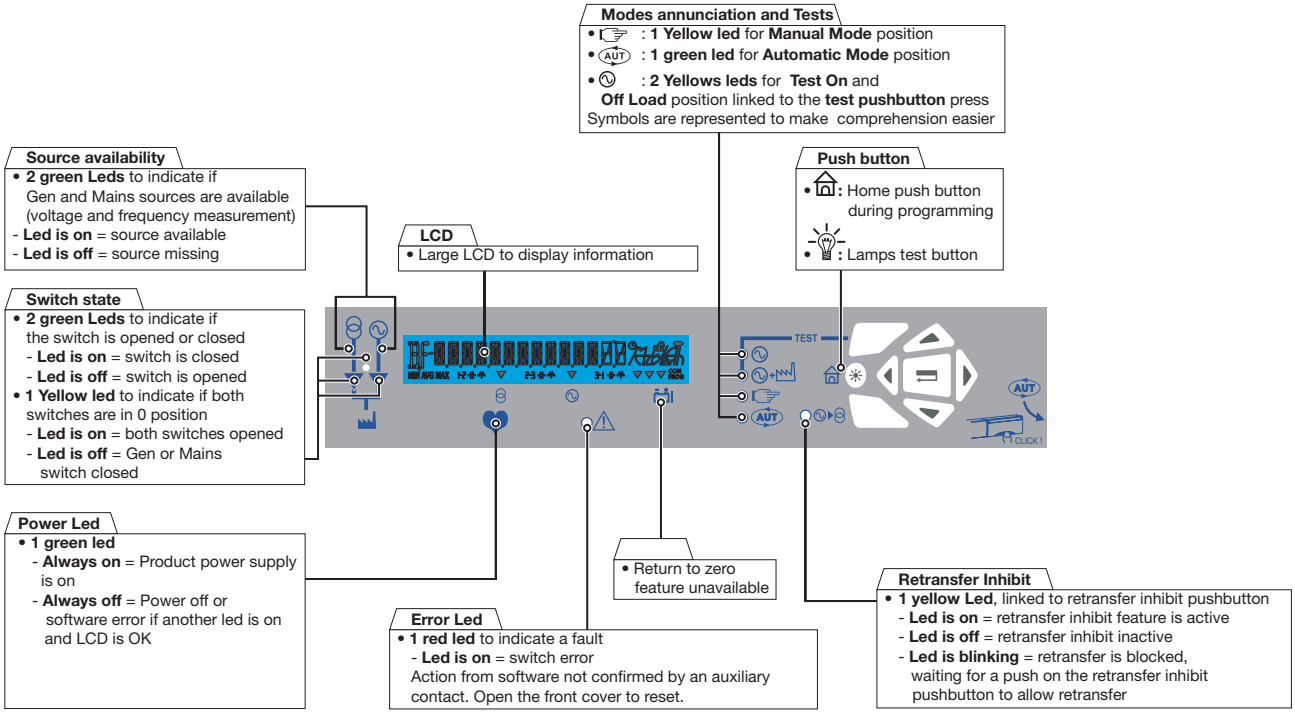
The product requires at least one type of network configuration and a network nominal voltage configuration to be input via the keypad by the user.

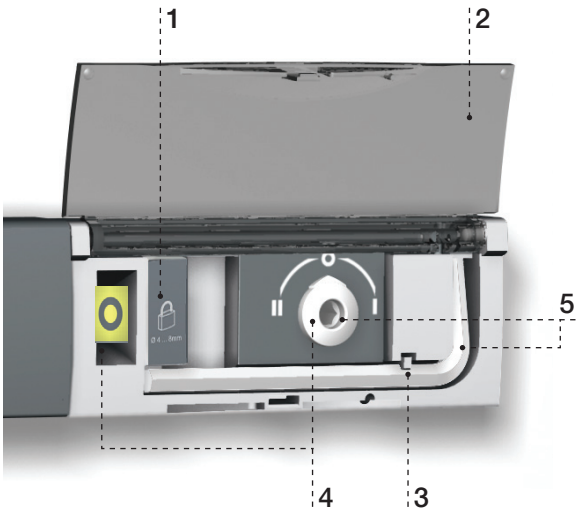
Other default values can be stored or modified according to hereafter programming guidelines.

Electronic module introduction

Front panel introduction :

Leds indications are only active once the product is powered (power led activated).





1. Locking
- Option to padlock using a 1 x 8 mm max. padlock.

2. AUT/MAN cover
- Open the cover to switch to manual mode.
- Close the cover to return to automatic (remote control) mode.
- Open and close the cover to clear faults.

3. Auto/Manual mode sensor

4. Switch position indicators
- Display of position I, 0, II.

5. Manual switching
- Insert the Allen key (5.0 mm) provided and turn to switch manually.
- Manual operation is not possible when padlocked.

Programming

> Software version

Software version is displayed on the unit after reset (powering up action after minimum 3 minutes power off to discharge the unit).

> Product programming

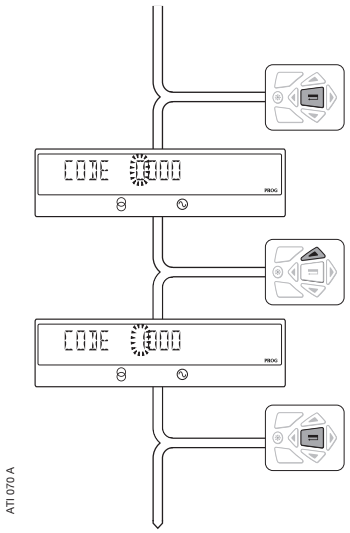
Product Programming is possible in automatic mode in position I when the mains source is available, or in manual mode.

It is not accessible when a test or an automatic sequence is activated.

Before first product use, access programming mode and verify product programming parameters.

PROGRAMMING ACCESS

Programming mode is accessible by pressing and holding the validation pushbutton for 3 seconds and then entering the code (default code = 1000):



Press for 3 seconds

Press once to display 1

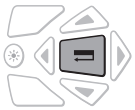
Validate

Access to programming Menus

PROGRAMMING EXIT

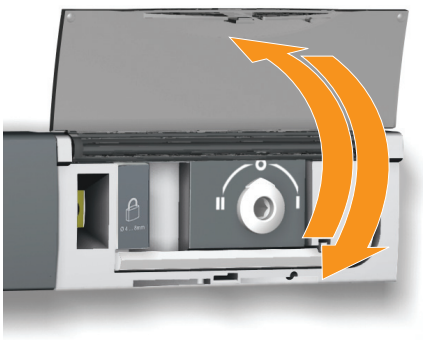
To exit the Programming and come back to visualisation mode, hold the validation pushbutton for 3 seconds.

Parameters saved permanently after exit.



PRODUCT RESET

- Software reset -> open and reclose the front cover



Programming

PROGRAMMING MENUS

> Architecture and navigation

The programming mode integrates 4 Menus:
Setup: Network parameters
Volt levels: Voltage detection levels
Freq. levels: Frequency detection levels
Timers: Automatic timer settings
Setup parameters must always be verified / modified in accordance to the application.

> ⚠ The default values are loaded standard

1 SETUP	
NETWORK	4NBL
NEUTRAL	AUTO
ROT PH.	---
NOM. VOLT	230 V
NOM. FREQ	50 Hz
PRIO TON	NO
RETRANS	NO
RETURN 0	NO
2ND TRIP	NO
MODE AUT	NO
CNT RST	NO
BACKLGHT	INT
CODE P	1000
CODE E	0000

2 VOLT. LEVELS		
OV. U	I	115%
OV. U HYS	I	110%
UND. U	I	085%
UND. U HYS	I	095%
UNB. U	I	00%
UNB. U HYS	I	00%
OV. U	II	115%
OV. U HYS	II	110%
UND. U	II	085%
UND. U HYS	II	095%
UNB. U	II	00%
UNB. U HYS	II	00%

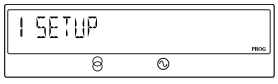
3 FREQ. LEVELS		
OV. F	I	105%
OV. F HYS	I	103%
UND. F	I	095%
UND. F HYS	I	097%
OV. F	II	105%
OV. F HYS	II	103%
UND. F	II	095%
UND. F HYS	II	097%

4 TIMERS VALUE	
1FT	0003 SEC
1RT	0180 SEC
10T	0002 SEC
2AT	0005 SEC
2CT	0180 SEC
20T	0010 SEC
2ST	0030 SEC
ODT	0003 SEC
TOT	UNL
TFT	UNL

5 I - O	
IN 1	- - -
IN 1	NO
IN 2	- - -
IN 2	NO
IN 3	- - -
IN 3	NO
OUT 1	
OUT 2	
OUT 3	

> ⚠ Beware when the AUTO mode is forced by software, the manual mode is completely inhibited. Therefore, any manually operated switch can be followed by a cons-operation of the automatic return to the normal position considered automation.

> The first menu to access is the Setup menu



Programming

1 SETUP

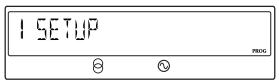
> Parameter Display

For example, the setup menu integrates 10 parameters described in the table hereunder.

The table explains parameters' definition, settings possibilities, and default values.

Press  Down pushbutton to access parameter required.

Press  Up pushbutton to come back to previous value

or  Home pushbutton to come back to 

.

Programming

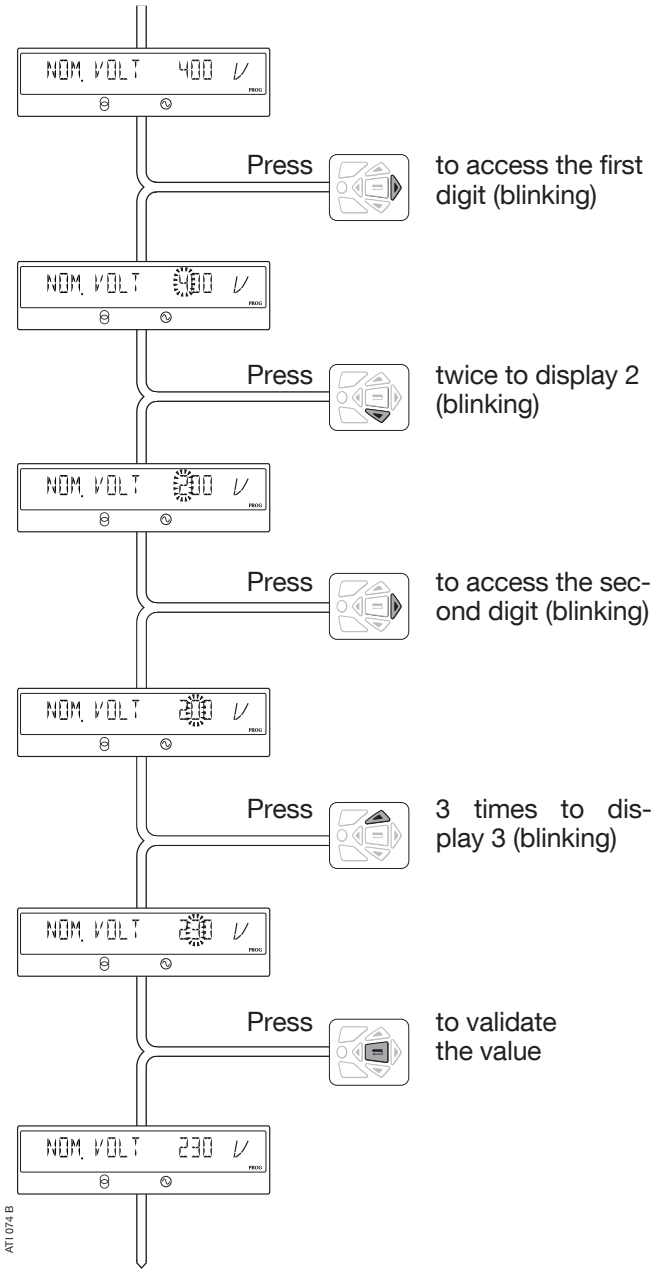
1 SETUP

> Parameter modification

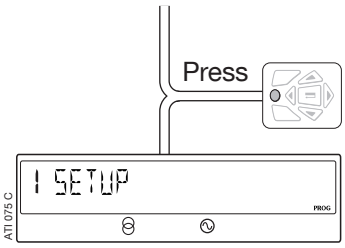
Display the required parameter for modification.

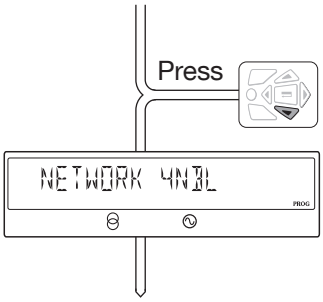
Apply the same procedure described hereunder for network voltage modification, to all other parameters. Possible settings are described in the next table.

Example: We want to modify network voltage from 400 V to 230 V.



> To return to Setup menu press home pushbutton or press down to continue.





Programming

1 SETUP

1 SETUP					
	Default values	**Definition**	**Adjustment range**	**M-G**	**M-M**
NETWORK	4NBL	Type of network	4NBL/41NBL/42NBL/ 1BL/3NBL (230/400V version) 4NBL/3NBL/2NBL/ -2BL/42NBL (127/230V version)	•	•
NEUTRAL	AUTO	Neutral Position: visible if the makes sense with the seleted network type. Neutral fixed on the LEFT - (N, L3, L2, L1) Neutral fixed on the RIGHT - (L1, L2, L3, N) Auto Detection of Neutral LEFT or RIGHT	AUTO LEFT RIGHT	•	•
ROT PH.	---	The phase rotation can be selected as clockwise (ACB) or anti-clockwise (ABC). It is also possible to just check for consistency of direction of rotation between 2 sources (----). To do so the 2 sources must be simultaneously present, for example during the initial wiring. (see next page)	ABC ACB ----	•	•
NOM. VOLT	230 V	Nominal voltage	from 180 to 480 Vac (230/400V version) from 180 to 280 Vac (127/230V version)	•	•
NOM. FREQ	50 Hz	Rated frequency	50 Hz 60 Hz	•	•
PRIO TON	NO	In case of an On Load Test, if source II is no longer available you can - **NO**: exit the test and switch to source I - **YES**: stay in position II. The MSR input (see I-O Menu) has priority over this parameter	NO YES	•	
RETRANS	NO	Retransfer inhibit feature: press on RTI button (> 8) required to allow retransfer from gen to main.	NO YES	•	•
RETURN 0	NO	Transfer to 0 position after loss of mains & after 10T timers. (contactor logic)	NO YES	•	•
RETURN 0	NO	Transfer to 0 position after loss of genset & after 20T timers. (contactor logic)	NO YES	•	•
2ND TRIP	NO	This function makes it possible to wait for the power reserve to become available before leaving position 0 tripping . - **NO**: Return to the source without waiting for the reserve to be fully charged - **YES**: Wait for the reserve to be fully charged before returning to the source. A second trip will therefore be immediately available	NO YES	•	•
MODE AUT	NO	AUTO mode forced, in spite of cover not being closed.	NO YES	•	•
CNT RST	NO	Switchover counter reset (number of operations) Returns to NO after reset	NO YES	•	•

Programming

1 SETUP

1 SETUP					
	**Default values**	**Definition**	**Adjustment range**	**M-G**	**M-M**
BACKLGHT	INT	The screen backlighting can be set to: - **OFF**: always off - **ON**: always lit - **INT**: lit during operating sequences and then turned off after 30 seconds' inactivity on the keypad	OFF ON INT	•	•
CODE P	1000	Modifying input in Programming mode code Default value : 1000	0000 to 9999	•	•
CODE E	0000	Modifying input code in Operating mode. Default value : 0000	0000 to 9999	•	•

* M-G: Mains - genset application - M-M: Mains - Mains application
• = parameter present on M-G and/or M-M applications

The return to 0 function allows, after the loss of the main or the genset voltage, the changeover switch opening after a delay from I to 0 or from II to 0. So for example, this solution gives the possibility to open the switch after short-circuit. It also allows you to restart the genset after a shutdown without the load connected.

The 2nd trip parameter is associated with the return to 0 function as it requires some energy from an internal energy storage device.

So to achieve a 2nd opening on loss of voltage, you need to wait for the energy storage device to be recharged.

Programming

2 VOLT. LEVELS

To reach voltage menu from Setup menu press once 

> Parameter Display

The voltage menu integrates 12 parameters described in the table hereunder.

The table explains parameters' definition, settings possibilities, and default values.

Over and Under voltage conditions are verified on Mains and Generator side to allow operation as per the flow chart. Mains sensing and Generator sensing is 3 phases.

Over and under voltage detection levels + hysteresis are defined as percentage of nominal voltage.

Hysteresis levels allow under and over voltage conditions reset (voltage needs to pass hysteresis level to reset).

> Parameter Display

Display the required parameter for modification

Apply the same procedure as described in Setup Menu for network voltage modification. Possible settings are described in the previous table.

Note:

These values only need to be changed if a value is required other than the default.

2 VOLT. LEVELS						
		Default values	Definition	Adjustment range	M-G	M-M
OV. U	I	115%	Overvoltage threshold source [I]	102 – 130%	•	•
OV. U HYS	I	110%	Source [I] over-voltage hysteresis	101 – 129%	•	•
UND. U	I	085%	Undervoltage threshold source [I]	60 – 98%	•	•
UND. U HYS	I	095%	Source [I] under-voltage hysteresis	61 – 99%	•	•
UNB. U	I	00%	Phase unbalance threshold [I] (see next paragraph)	0 – 30%	•	•
UNB. U HYS	I	00%	Hysteresis unbalance detection [I] (see next paragraph)	0 – 29%	•	•
OV. U	II	115%	Overvoltage threshold source [II]	102 – 130%	•	•
OV. U HYS	II	110%	Source [II] over-voltage hysteresis	101 – 129%	•	•
UND. U	II	085%	Undervoltage thresholds source [II]	60 – 98%	•	•
UND. U HYS	II	095%	Source [II] under-voltage hysteresis	61 – 99%	•	•
UNB. U	II	00%	Phase unbalance threshold [II] (see next paragraph)	0 – 30%	•	•
UNB. U HYS	II	00%	Hysteresis unbalance detection [II] (see next paragraph)	0 – 29%	•	•

Programming

3 FREQ. LEVELS

To reach frequency menu from voltage menu press once . 

> Parameter Display

The frequency menu integrates 8 parameters described in the table hereunder.

The table explains parameters' definition, settings possibilities, and default values.

Over and Under frequency conditions are verified on Mains and Generator side to allow operation following operational flow chart.

Over and under frequency detection levels + hysterisis are defined as percentage of nominal frequency.

Hysteresis levels allow under and over frequency conditions reset (frequency needs to pass hysteresis level to reset).

> Parameter modification

Display the required parameter for modification.

Apply the same procedure as described in Setup Menu for network voltage modification. Possible settings are described in the previous table.

Note:

These values only need to be changed if a value is required other than the default.

3 FREQ. LEVELS					
	Default values	Definition	**Adjustment range	M-G	M-M
OV. F	I 105%	Over-frequency threshold source [I]	102 – 130%	•	•
OV. F HYS	I 103%	Source [I] over-frequency hysteresis	101 – 129%	•	•
UND. F	I 095%	Under-frequency threshold source [I]	60 – 98%	•	•
UND. F HYS	I 097%	Source [I] under-frequency hysteresis	61 – 99%	•	•
OV. F	II 105%	Over-frequency threshold source [II]	102 – 130%	•	•
OV. F HYS	II 103%	Source [II] over-frequency hysteresis	101 – 129%	•	•
UND. F	II 095%	Under-frequency threshold source [II]	60 – 98%	•	•
UND. F HYS	II 097%	Source [II] under-frequency hysteresis	61 – 99%	•	•

** Adjustment range given:

- As percentages of Fnom

Programming

4 TIMERS

To reach timer menu from frequency menu press once .

> Parameter Display

The timers menu integrates 10 parameters described in the table below.

The table explains parameters' definition, settings possibilities, and default values.

Timer precision: setting value: +0/+500 ms

Timers operation is described in operational flow chart.

> Parameter modification

Display the required parameter for modification.

Apply the same procedure as described in the Setup Menu for network voltage modification. Possible settings are described in the previous table.

Note:

These values only need to be changed if a value is required other than the default.

4 TIMERS VALUE					
	Default values	**Definition**	**Adjustment range**	**M-G**	**M-M**
1FT	0003 SEC	Source [I] loss time delay (source [I] **F**ailure **T**imer) When source [I] disappears, 1FT is started. If source [I] is restored before the end of 1FT, the switchover cycle is not engaged.	0 – 60 secondes	•	•
1RT	0180 SEC	Source [I] restoration time delay (source [I] **R**eturn **T**imer) When source [I] reappears, 1RT is started. At the end of 1RT, source [I] is considered present. If source [I] disappears before the end of 1RT, the switchover is not executed. If the replacement source disappears during 1RT, the latter dynamically and temporarily adopts the 3 s setting value.	0 – 3600 secondes	•	•
10T	0002 SEC	Return to zero time delay from source [I] (source [I] to **0** **T**imer) Only accessible if the Setup menu parameter RETURN 0 is activated. Waiting time delay following source [I] failure, before switchover to position 0. This time delay avoids opening directly to short-circuit or load impact.	0 – 10 secondes	•	•
2AT	0005 SEC	Stabilisation time delay (source [II] **A**vailable **T**imer) Stabilisation time delay for voltage and frequency on Source [II] . The time delay starts as soon as the source voltage is above the hysteresis value. This time delay must be completed to enable transfer to Source [II]	0 – 60 secondes	•	
2CT	0180 SEC	genset cooling time (source [II]) (source [II] **C**ool Down **T**imer) Following a switchover sequence, and after returning to source [I], source [II] (genset) is kept running for 2CT to enable it to cool down.	0 – 600 secondes	•	

Programming

4 TIMERS

4 TIMERS VALUE					
	Default values	**Definition**	**Adjustment range**	**M-G**	**M-M**
20T	0010 SEC	Return to zero time delay from source II (source II to **0** **T**imer) Only accessible if the Setup menu parameter RETURN 0 is activated. Waiting time delay following source II failure, before switchover to position 0. This time delay avoids opening directly to short-circuit or load impact.	0 – 10 secondes	•	•
2ST	0030 SEC	Genset starting timeout delay (source II) (source II **S**tart **T**imer) Time delay started at the same time as the starting request. If after 2ST source II (genset) has not started, an error message is displayed «FAIL START».	0 – 600 secondes	•	
0DT	0003 SEC	Zero Position, Dead Band Timer: This is the minimum electric dead time (blackout time) delay. This defines the minimum load supply down time in the 0 position so as to allow residual voltages that may be generated by the load (such as motors) to decay. ***Note: This time delay setting value in the Zero position is applicable with SI and/or SII available.*** ***When a transfer is initiated after a loss of source, the time delay starts counting down from the loss of source.***	0 – 20 secondes	•	•
TOT	UNL	«On Load Test» duration time delay (**T**est **O**n Load **T**imer) This time delay defines the On Load Test time. It starts when the Test is initiated. The return to the network takes place at the end of TOT.	UNL (Illimité) LMT (de 10 à 1800 secondes)	•	
TFT	UNL	«Off Load test» time delay (**T**est off **L**oad **T**imer) This time delay defines the Off Load Test duration.	UNL (Illimité) LMT (de 10 à 1800 secondes)	•	

> Information

In a situation of mains returns, if the genset shutsdown, the 1RT timer is automatically set to 3 seconds to allow a quick return to the mains.

Programming

I-O MENU

5 I-0					
		**Variable**	**Definition**	**Adjustment range**	**Default value**
IN 1	- - -	IN I	Input 1	See table following pages	/
IN 1	NO	IN I	Input 1 status	NO or NC	NO
IN 2	- - -	IN 2	Input 2	See table following pages	/
IN 2	NO	IN 2	Input 2 status	NO or NC	NO
IN 3	- - -	IN 3	Input 3	See table following pages	/
IN 3	NO	IN 3	Input 3 status	NO or NC	NO
OUT 1		OUT 1	Output 1	See table following pages	/
OUT 2		OUT 2	Output 2	See table following pages	/
OUT 3		OUT 3	Output 3	See table following pages	/

NO : Normal Open (Open)
NC : Normal Close (Closed)

Programming

Inputs description

		M-G*	M-M*
Automatic operation inhibited			
INH	Automatic operation inhibited, same function as manual mode. All Automatic operation is then inhibited. Start gen state will not change even if the network is lost.	●	●
Test on load			
TON	Activates on load test. Retransfer remains locked until contact is deactivated.	●	
Test off load			
TOF	Activates off load test (genset started and stopped).	●	
Forcing to source II (genset) in TON and EON mode			
MSR	During an on load test or a delayable external on load operation request, validating the input enables you to remain in back-up position in all circumstances (loss of this source), as long as the test is active. This input has priority over parameters PRIO TON and PRIO EON.	●	
Confirms return to priority source			
RTC	Remote manual transfer. Transfer back to source I initiated upon the contact closing. Same function as the variable "RETRANS" cleared with the keypad. This SETUP menu variable must also be at YES to validate operation by the input.	●	●
Source I / source II alarm			
AL1 / AL2	Informs the user by flashing the fault LED and indicating F12 ALR - 1 / F22 ALR - 2 on the screen. This message disappears along with the alarm	●	●
Source I / source II fault			
FT1 / FT2	Informs the user by flashing the fault LED and indicating F11 FLT - 1 / F21 FLT - 2 on the screen. Disappears after validation and reset (by activating RST input, opening and then closing the cover or via RS485). Immediately shifts the changeover switch to position 0, without 10T or 20T time delay. NB, only works if the 2nd TRIP parameter is activated.	●	●
Fault reset			
RST	Reinitialises a fault	●	●

* M-G: Mains - genset application - M-M: Mains - Mains application

Outputs description

		M-G*	M-M*
Source available			
S1A /S2A	Source I / Source II available. Output activated (closed) if source I / source II is within the defined setting ranges (same function as LED on front panel).	●	●
At least one source available			
SCA	Source I or II available. Output activated (closed) if at least one of the 2 sources is within the defined settings ranges.	●	●
Position auxiliary contact			
AC1/AC2/ AC0	Outputs activated respectively when product is in position I / position II / position 0.	●	●
Load supplied by source I / by source II			
LO1 / LO2	Indicates which source is supplying the load. Output LO1 / LO2 activated if the 2 following conditions are simultaneously validated: position I / position II is closed and source I / source II is available (LO1 = AC1 et S1A / LO2 = AC2 et S2A). position I / position II is closed and source / source is available (LO1 = AC1 and S1A / LO2 = AC2 and S2A).	●	●
Fault summary			
FLT	Output activated (closed) if at least one fault (internal or transferred external) is activated.	●	●
Product operational (no fault + product in Auto mode)			
POP	Output activated (closed) if the product is deemed "operational" i.e. it is in AUT mode, the supply is present and no fault is detected.	●	●
Synthesis TON			
TOS	Output is activated in case of test on load.	●	

* M-G: Mains - genset application - M-M: Mains - Mains application

Visualization

PRODUCT METERING

> General comments

Metering is active as soon as the unit is powered.

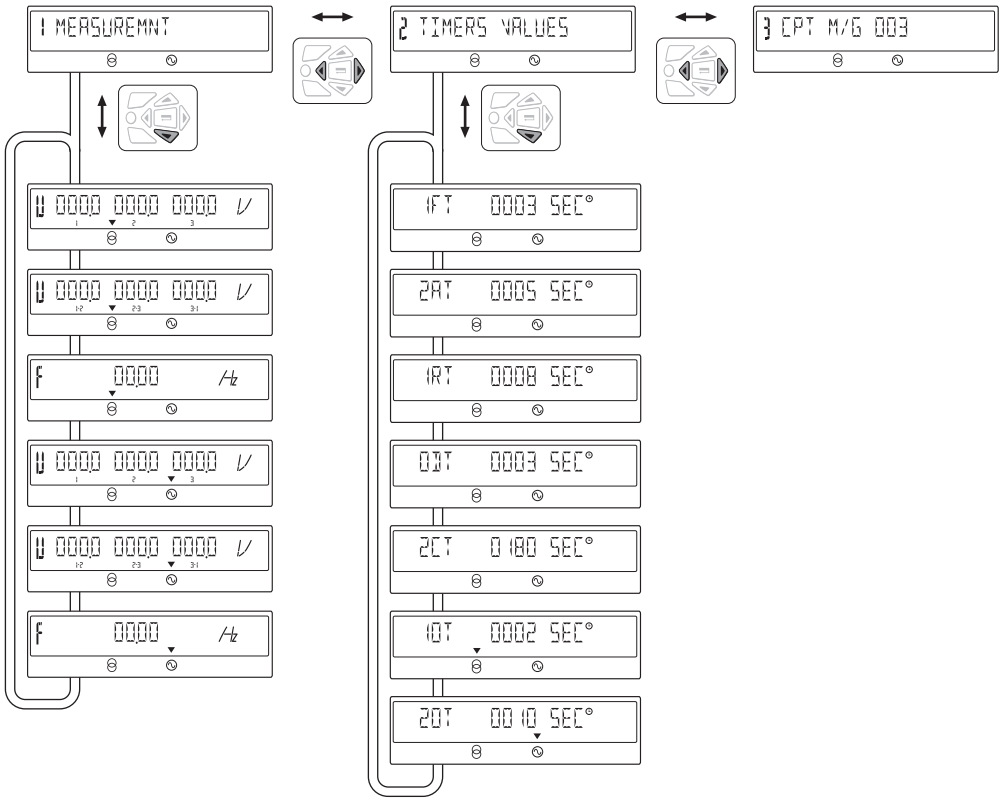
Commutation cycles have priority over Visualisation mode and display timers count down as soon as they are active.

Any value available in this mode can be kept on the screen once displayed. excepted during commutation cycle; comes back to timer count down after 5 s.

After commutation cycle, the display comes back to Mains voltage display (first variable of the mode).

Visualisation mode architecture is as described hereunder.

To access requested value press , , , or .



Visualization

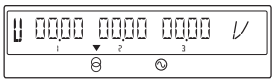
PRODUCT METERING

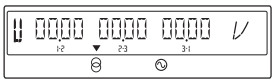
> Values definition

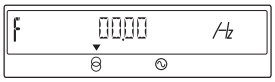
All these values are not accessible on all networks

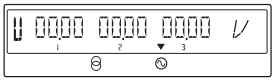
- **4NBL:** Mains V1, V2, V3, U12, U23, U31
  Gen V1, V2, V3, U12, U23, U31
- **2NBL:** Mains U12, U23, U31 / Gen U12, U23, U31
- **2BL:** Mains U12 / Gen U12
- **3NBL:** Mains U12, U23, U31 / Gen U12, U23, U31
- **41NBL/42NBL:** Mains V1, V2, V3 / Gen V1

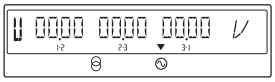
Mains and Generator sensing are 3 phases.

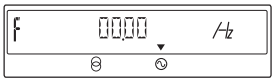

Mains voltage L1-N, L2-N, L3-N

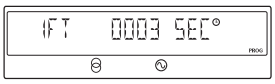

Mains voltage L1-L2, L2-L3, L3-L1


Mains frequency

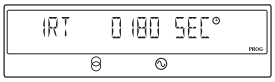

Generator voltage L1-N, L2-N, L3-N

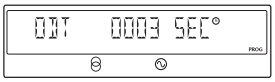

Generator voltage L1-L2, L2-L3, L3-L1

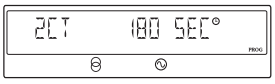

Generator frequency

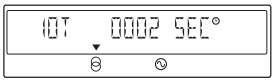

Loss of mains validation timer

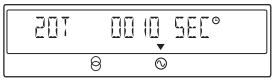

Delay on transfer timer


Mains return validation timer


Dead band timer


Run on timer (Generator cool down period)

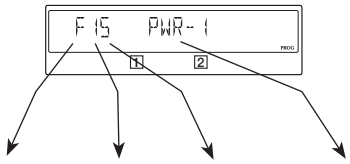

Fail Protection Mains Timer


Fail Protection Generator Timer

Visualization

ENCODING PRINCIPLE

> Example



Type of message:
M: Event
F: Fault

Source in question
0: common
1: source 1
2: Source 2

Message identification n°
see opposite table

Description

Message identification		
No	Status message	Fault message
0	Manual switching	Duty cycle
1	Under-voltage	Fault
2	Over-voltage	Alarm
3	Under-frequency	Neutral wiring / Phase rotation mismatch
4	Over-frequency	Capacitor back to 0
5	Phase unbalance	Insufficient switchover power
6	Phase rotation	Position not reached

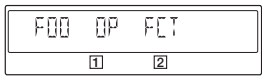
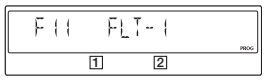
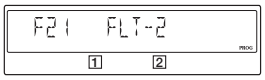
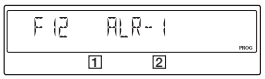
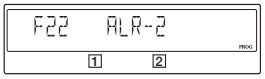
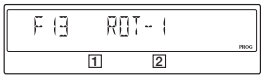
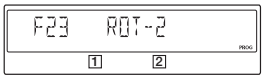
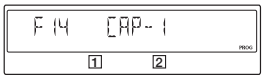
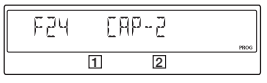
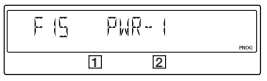
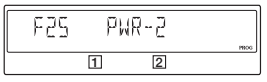
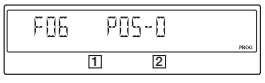
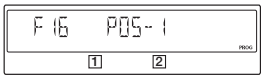
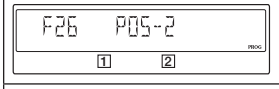
> Events list

Message	Definition
M00 MANUAL	Manual switching
M11 UV 1	Under-voltage on source 1
M21 UV2	Under-voltage on source 2
M12 OV 1	Over-voltage on source 1
M22 OV2	Over-voltage on source 2
M13 UF 1	Under-frequency on source 1
M23 UF2	Under-frequency on source 2

Message	Definition
M14 OF 1	Over-frequency on source 1
M24 OF2	Over-frequency on source 2
M15 UNB 1	Phase unbalance on source 1
M25 UNB2	Phase unbalance on source 2
M16 ROT 1	Incorrect direction of rotation on source 1
M26 ROT2	Incorrect direction of rotation on source 2

Visualization

ERROR MESSAGES LIST

Error message	Definition	Action	Reset
	**Duty cycle**		
	Limited number of operations in a defined period.	Wait 1 min. for the error message to disappear.	Automatic
	**Source** 1 **/source** 2 neutral wiring mismatch		
	The neutral on source 1 is not wired on the same side as the neutral on source 2.	Rewire one of the two sources. E.g. both neutrals on the left, or both neutrals on the right.	Open and then close the cover
 	**Source** 1 / **source** 2 fault		
	This fault only appears if input FT1/FT2 (see I-O Menu) and the parameter 2ND TRIP (see Setup Menu) are activated. Activation of this fault shifts the changeover switch to position 0.	Resolve the external problem that caused activation of input FT1/FT2	Open and then close the cover or activate the RST input, if configured (see I-O Menu) or via RS485.
 	**Alarm 1 / Alarm 2**		
	This fault only appears if input AL1/AL2 is activated (see I-O Menu).	Resolve the external problem that caused activation of input AL1/AL2. Once this is done, the error message will automatically disappear.	Automatic
 	**Phase rotation fault on source** 1 **/source** 2		
	The phase rotation does not correspond to the ROT PH. variable in the Setup menu.	Either invert two phases on source 1 / source 2, or change the status of the ROT PH. variable in the Setup menu, if both sources are faulty.	Automatic
 	**Return to zero capacitor charging fault on source** 1 **/source** 2		
	Recharging malfunction of capacitor associated with source 1 / source 2.	Provisional action: deactivate the RETURN 0 function in the Setup menu (Set to NO), or open the cover and operate manually. Then: contact your retailer.	Open and then close the cover
 	**Insufficient switchover power on source** 1 **/source** 2		
	The power is insufficient to leave position II/I.	Supply the power (U,I) from source 1 or 2 for at least 20 secs or open the cover and operate manually.	Open and then close the cover
  	**Fault position 0, I, II** 1 2		
	Following an electric or automatic order, position 0 / I / II is not reached.	Provisional action: open the Aut/Man cover and operate manually. Then: contact your retailer.	Change source status. Manual operation.
	**Source starting timeout** 2		
	If the genset does not start after the 2ST delay, the message will be sent.	Press the validation key. Check that 2ST is greater than 15s at 2AT.	Check the genset.

Manual operation

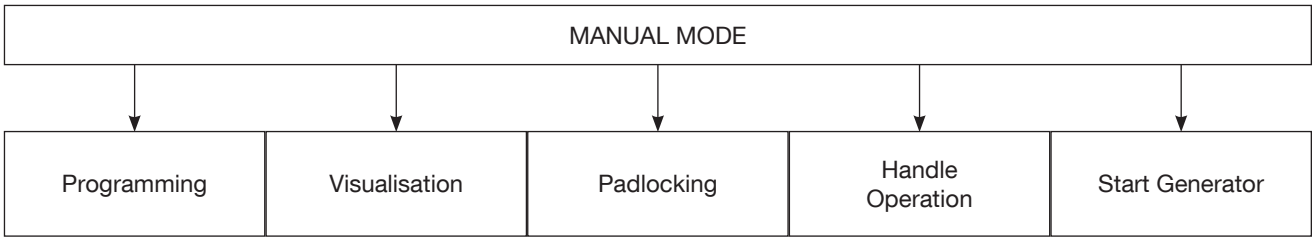
To access Manual Mode operation open the front cover

MANUAL MODE

Once in manual mode (cover open) it is possible:
- to access programming and visualisation menus
- to padlock the switch
- to operate the switch with the handle
- to start the Gen using test off load pushbutton.

As soon as the manual mode is activated (cover open), **all automatic actions are inhibited.**

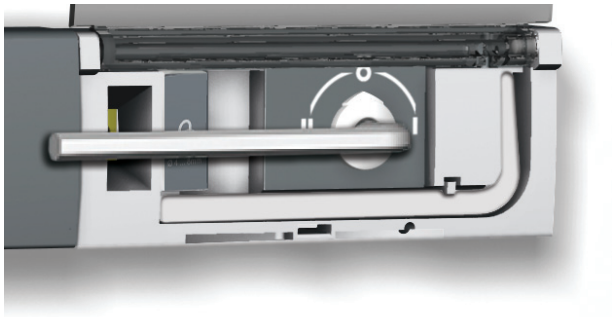
The same result is achieved, if the contact (Excepted the start order if mains failed) between the 207 and 208 terminals is closed : in this case, programming, visualisation, test off load are available.



New stable switch position when returning to automatic mode from manual mode:

The switch transfers to required control position according to flow charts the cover is closed or as soon as Power returns back.

Do not force the product (Max 10 Nm)



MANUAL OPERATION

Take the handle, attached on the front face under the cover, to manually operate the switch.

Verify the switch position on the front position label before any manual operation:

Do not leave the manual handle in automatic mode.

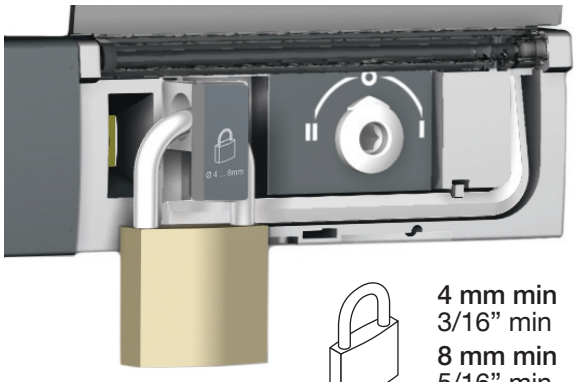
- from position I turn anti clockwise to reach position 0
- from position 0 turn anti clockwise to reach position II
- from position II turn clockwise to reach position 0
- from position 0 turn clockwise to reach position I

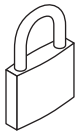
PADLOCKING

Padlock is only possible in manual operating mode (front cover opened).

Padlocking is configurable in position 0 only or in 3 positions (I-0-II).

Manually pull the padlock handle to allow the padlock to be inserted into the hole provided





4 mm min
3/16” min
8 mm min
5/16” min

Automatic operation

Ensure cover is fully closed and switch is in automatic mode. Close the front cover “Click” to access automatic operation.

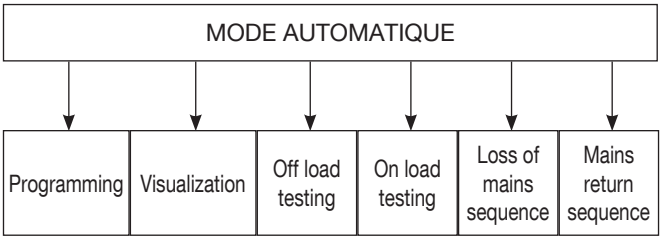
The automatic mode must be activated as soon as source switching is required after loss of mains condition.

The unit integrates a power capacitor source to provide enough power during black out (loss of mains) to wait for generator starting and to eventually drive the switch to zero position if required. Further external protection will be required if “phasing” is a concern.

POSSIBLE ACTION

Once in automatic mode it is possible:

- to access programming and visualisation menus
- to start off load or on load testing
- to start a loss of Mains sequence
- to start a Mains return sequence



MANUAL-AUTOMATIC MODE/POWER RETURN CONDITION

- 2 seconds the unit is switched from manual to automatic mode, the automatic cycle is started.
- Mains and generator voltage & frequency are verified to define the new stable position of the switch.
- The same table is considered after a complete power off action (Power cap must be completely discharged = 3 minutes).

Read timers definition for 1RT or 1FT understanding.

NEW STABLE POSITION OF THE SWITCH

Original switch position	Status of supply	New position
Mains	Available, genset standby or running	Mains
Mains	Mains unavailable for 2AT time period, genset standby or running	Genset. If genset Standby, then start genset first and wait for AT TIMER before transfer
Genset	Genset on load, mains unavailable	Genset
Genset	Genset on load, mains available for 1RT time period	Mains
Zero	Mains available, genset standby	Count down 1RT (3 sec) before transfer to Mains
Zero	Mains available, genset running	Genset to count down 1RT before transfer to Mains
Zero	Mains unavailable, genset running	Genset
Zero	Mains unavailable, genset standby	No action (because no supply). When supply becomes available change to mains or genset

LOSS OF MAINS SEQUENCE

This sequence is started as soon as the switch is in automatic mode and in position I.

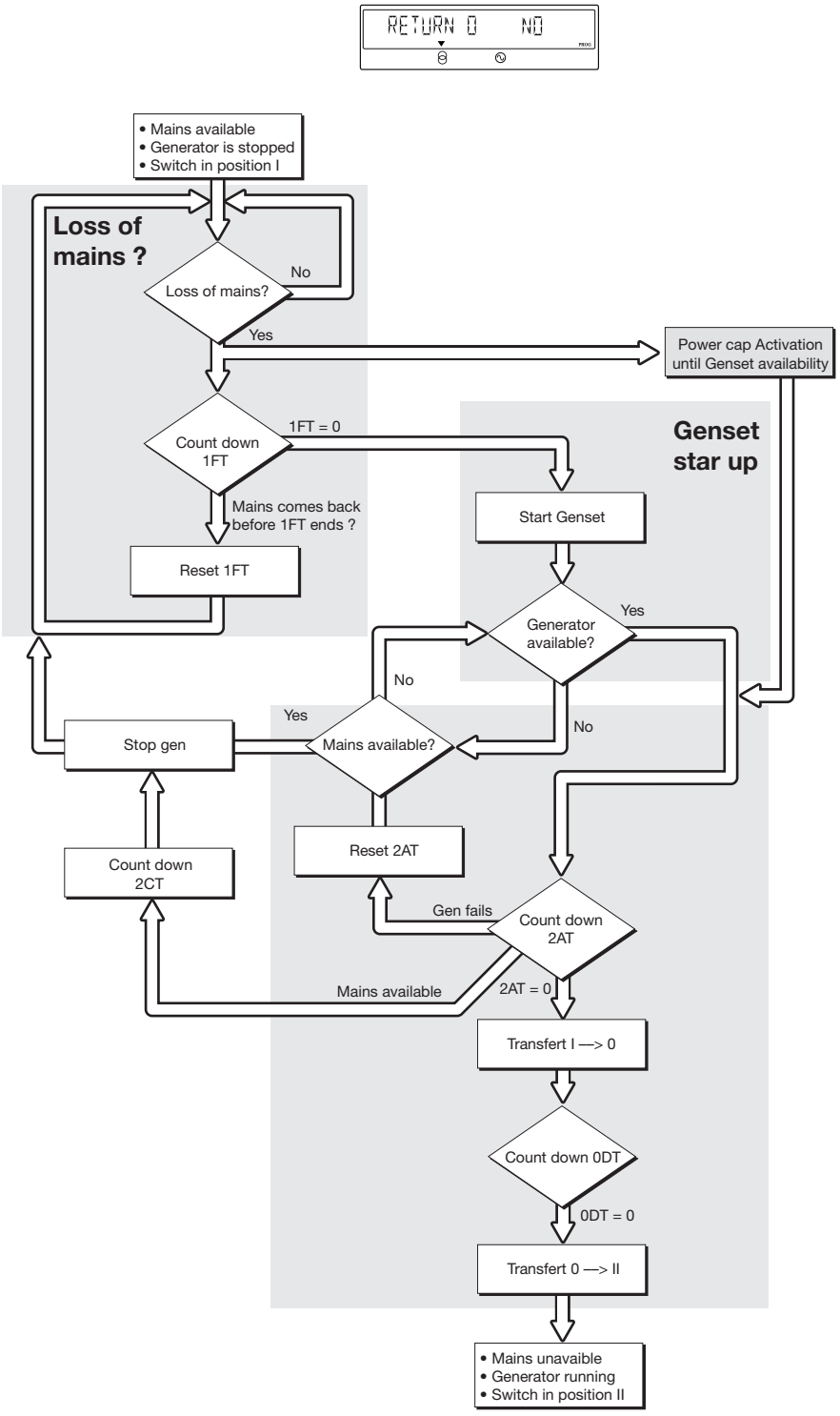
- mains is available
- switch is in position I (Mains)
- generator is on or off.

It is possible to inhibit completly the automatic sequence using the CTI contact (closing the contact between terminals 207 - 208). This can be useful to inhibit the transfer in case of power outage due to load short circuit.

Automatic operation

LOSS OF MAINS SEQUENCE

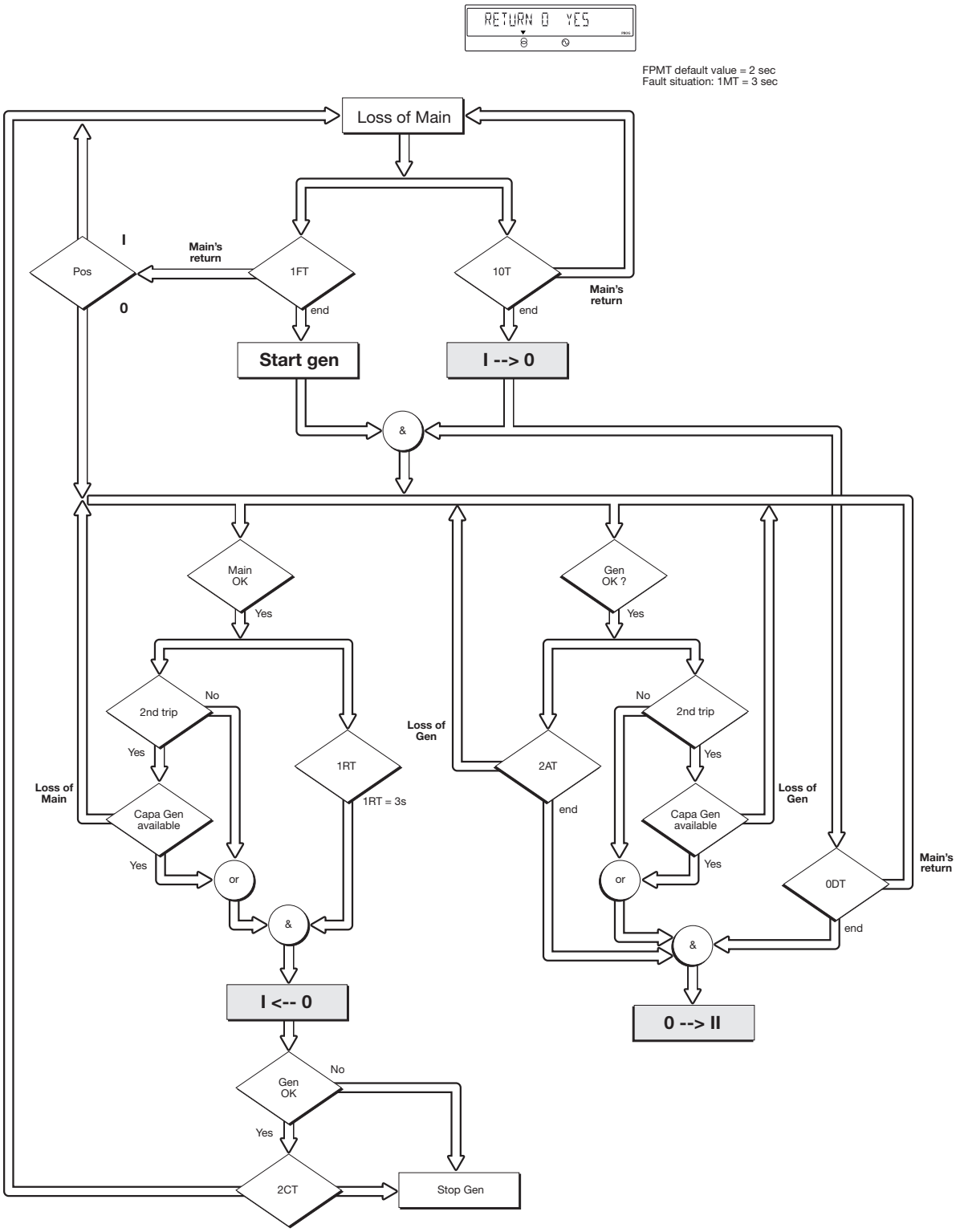
> "RETURN TO 0 POSITION" variable set to NO



Automatic operation

LOSS OF MAINS SEQUENCE

Loss of Main
Return to 0 position = Yes



Automatic operation

MAINS RETURN AUTOMATIC SEQUENCE

This sequence is started as soon as the unit is in automatic mode and in position II.

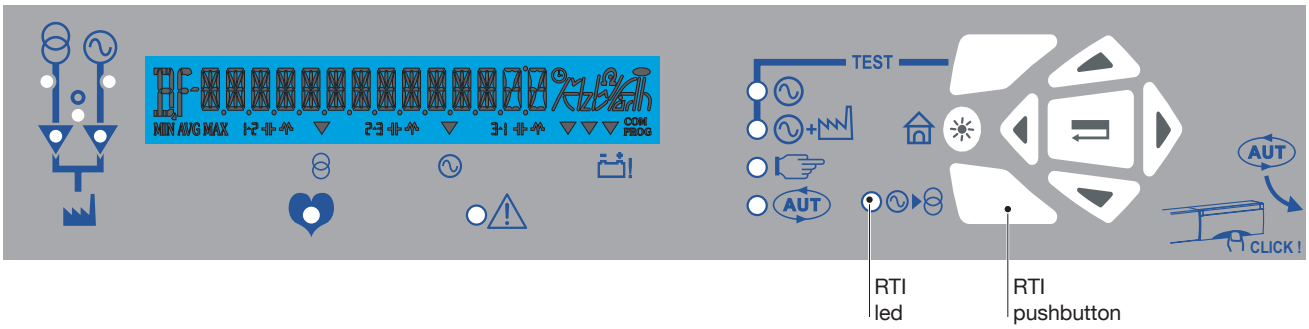
Position II:

- Mains is not available
- Switch is in position II (Generator)
- Generator is on

> Specific feature

Retransfer inhibit feature

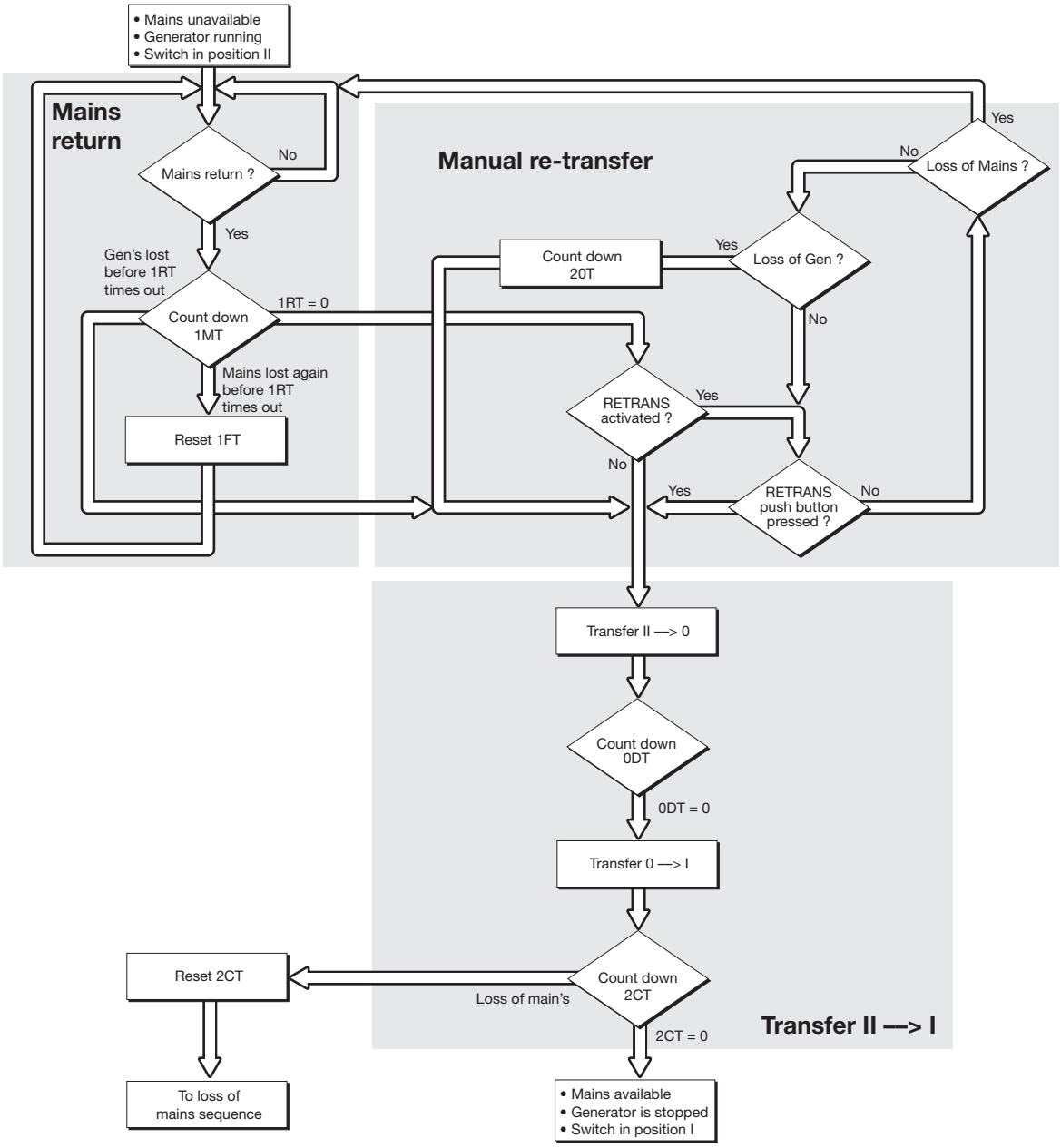
- Once the mains is back, it might be preferable not to immediately transfer the load from the generator to the mains.
- If retransfer inhibit feature has been enabled in the programming mode, the RTI led is on.
- Once retransfer from the generator to the mains is ready, RTI feature blocks the retransfer and the RTI led is blinking.
- A manual press on the RTI pushbutton is necessary to start retransfer.



Automatic operation

MAINS RETURN AUTOMATIC SEQUENCE

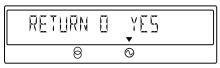
> Sequence description

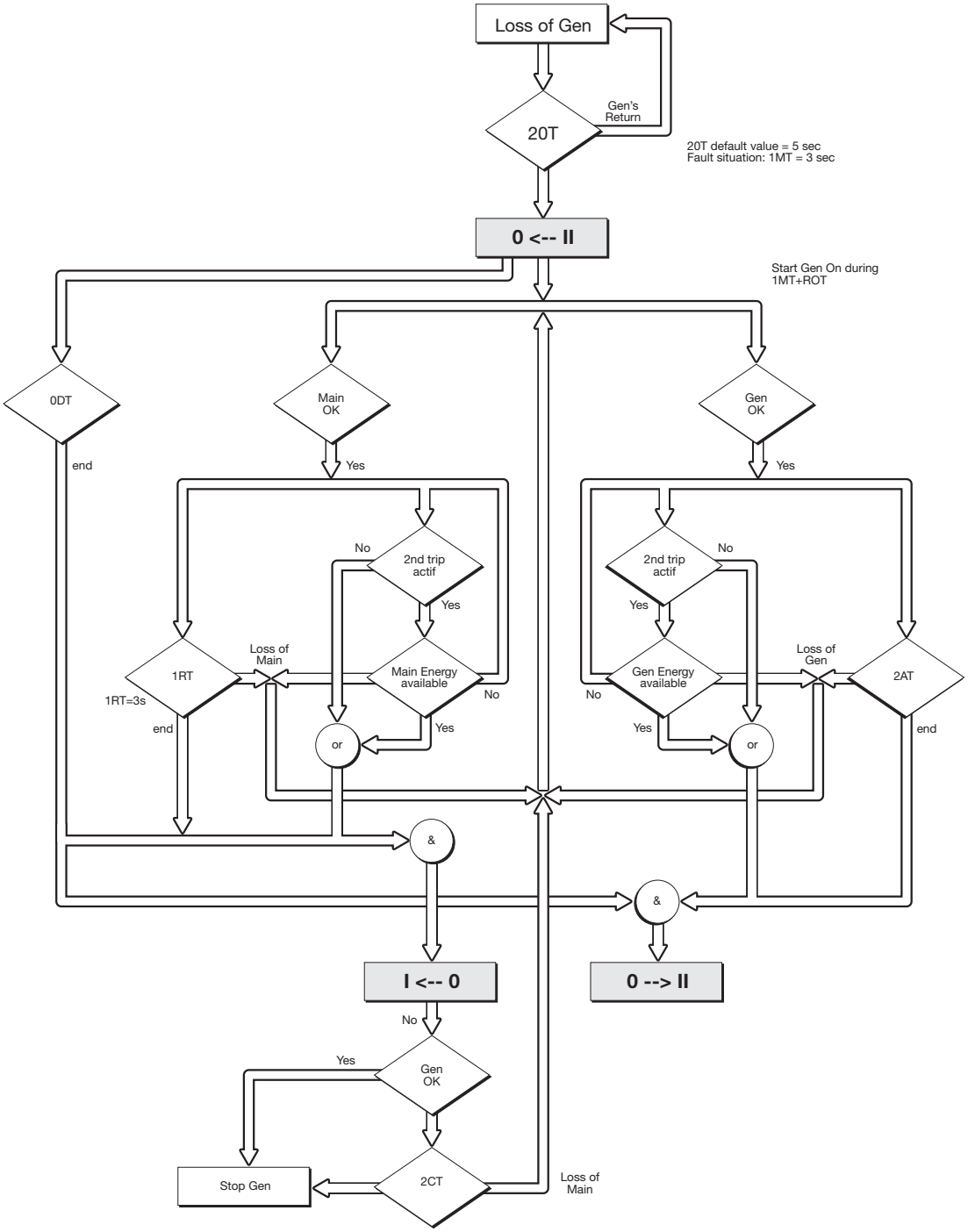


Automatic operation

GEN FAILURE

Loss of Gen
Return to 0 position = Yes

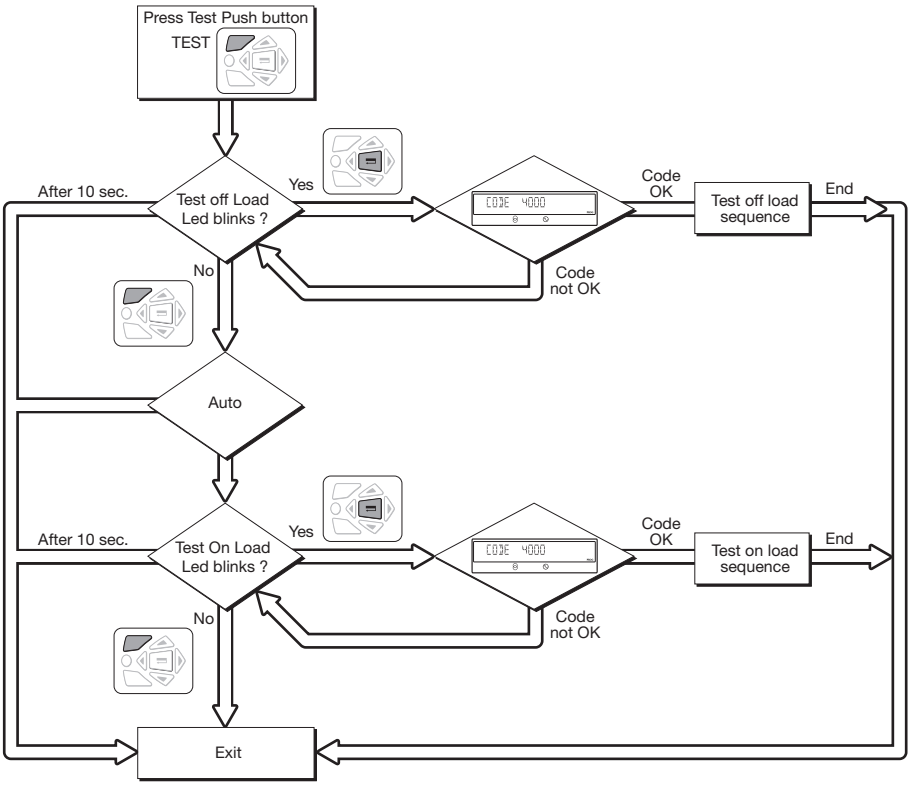




Test mode

TEST MODE ACCESS

> Functionality



Test mode

OFF LOAD TESTING

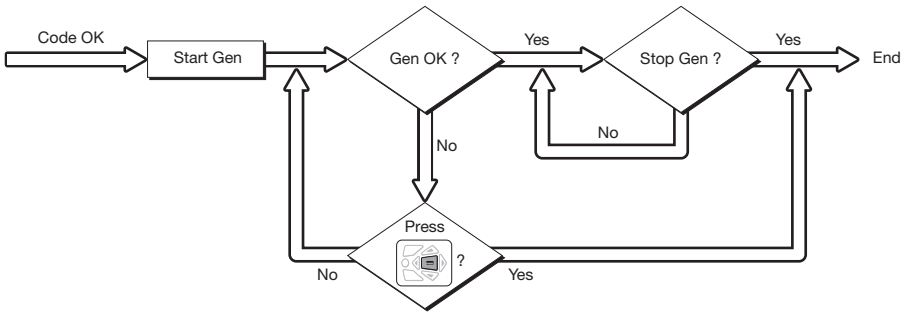
This test is possible in automatic mode in position I when the mains is available or in manual mode. It can be considered as a generator manual start in manual mode.

> Description

- This mode allows generator testing without load transfer from the mains to the generator.
- The generator is started and stopped normally.
- This test is always possible exept during a loss of main sequence.

> Sequence

Press test pushbutton to make test off load led blink and press validation pushbutton to start.



Test off load sequence

ON LOAD TESTING

This test is only possible in automatic mode, it allows to start the genset even if the mains is unavailable before and during a critical period on the mains.

> Description

- This test simulates a loss of mains condition. Loss of mains sequence is started and main's return sequence automatically activated as soon as generator is available
- All timers are run following their setting. The DBT is running not only during the "main's return" sequence but during the "loss of main's" sequence too!
- The "retransfer inhibit" feature is always actived during test on load (from keypad)

Press "TEST" pushbutton to make test on load Led blinking, press "validation" pushbutton to enter the code and start the test cycle, following loss of main + main's return sequences.

After the test, the automatic mode is actived.

> Remote activation via remote test

It is possible to remotely start the "test on load" closing the contact 207 and 209 on the control terminal.

The cycle is started as soon as the input is closed. The retransfer from generator to main is blocked, and only allowed once the input is de-activated.

Test mode

RETURN TO Ø FEATURE

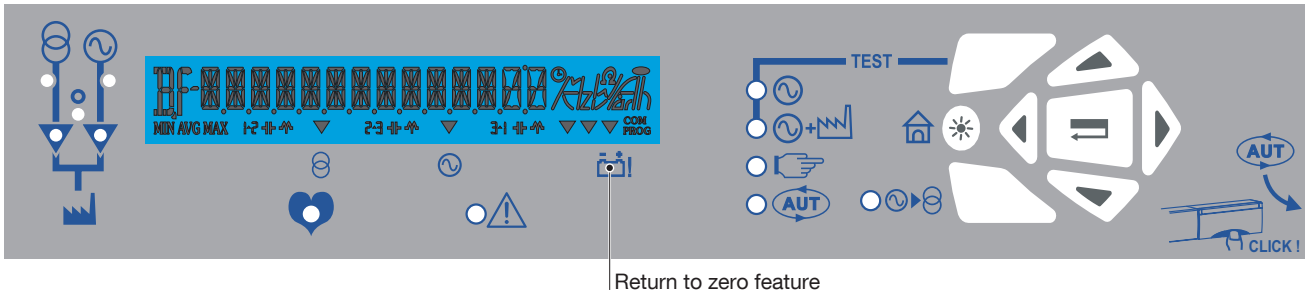
> Energy storage device end of life

Return to zero feature unavailability.

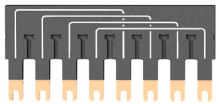
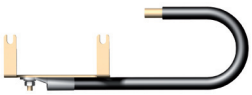
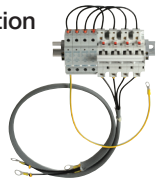
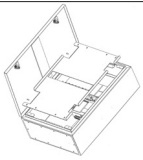
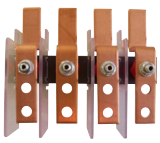
Unavailability of this optional feature will be indicated on the front panel. Please Refer to the trouble shooting guide.

Return to zero position feature is realised thanks to a internal energy storage device.

In case of failure of this component, a pointer remains on to inform operator that return to zero feature (“2nd TRIP”) is no longer operational.

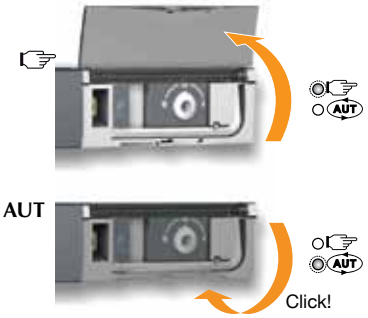


RANGE

		63 A	100 A	125 A	160 A
Complete product 	CTI_1 230Vac	348-7795	348-7798	348-7811	348-7813
	CTI 400Vac	348-7797	348-7799	348-7812	348-7814
Changeover switch 	CTI_1 230Vac	306-9846	306-9848	306-9849	306-9850
	CTI 400Vac	306-9851	306-9852	306-9853	306-9854
Bridging bar 		306-9836			306-9894
Auxiliary contacts 		306-9835			
Solid neutral 		306-9895			
Voltage sensing tap x 2 		306-9845			
Terminal shroud (2 pieces) 		306-9896			
Lightning protection 		355-1440			
IP 54 		348-8814			
Terminal extensions (3 pieces) 		348-8815			

TROUBLESHOOTING GUIDE

FAULT FINDING GUIDE

Symptom	Step	Result
01 Automatic operations availability.	**01** AUTO Led is on.	**> NEGATIVE** • Check that the switch has not been padlocked. • Check that the manual operating handle has been removed from housing. • Close the Auto/Manu front cover. • Then consult your local dealer.
		> POSITIVE • Go to the next step.
	02 Fault synthesis Led is off.	**> NEGATIVE** • Led is on Try to reset the product (see the instructions below). Then consult your local dealer. • Reset 
		> POSITIVE • Go to the next step.
	03 Power supply Led is blinking.	**> NEGATIVE** • Consult your local dealer.
		> POSITIVE • Go to the next symptoms.
02 The mains availability.	**01** Mains availability Led is on.	**> NEGATIVE** • Check lamp test. • Check that the mains return timer (1RT) is still not counting down. • Check that the mains protection system (breaker) is on (Position 1). • Then consult your local dealer.
		> POSITIVE • Go to the next steps or symptoms.
03 The genset availability (genset supposed started).	**01** Genset availability Led is on.	**> NEGATIVE** • Check lamp test. • Check that the genset stabilisation timer (2AT) is still not counting down. • Check that the genset protection system (breaker) is on (Position 1). • Then consult your local dealer.
		> POSITIVE • Go to the next steps or symptoms.

TROUBLESHOOTING GUIDE

FAULT FINDING GUIDE

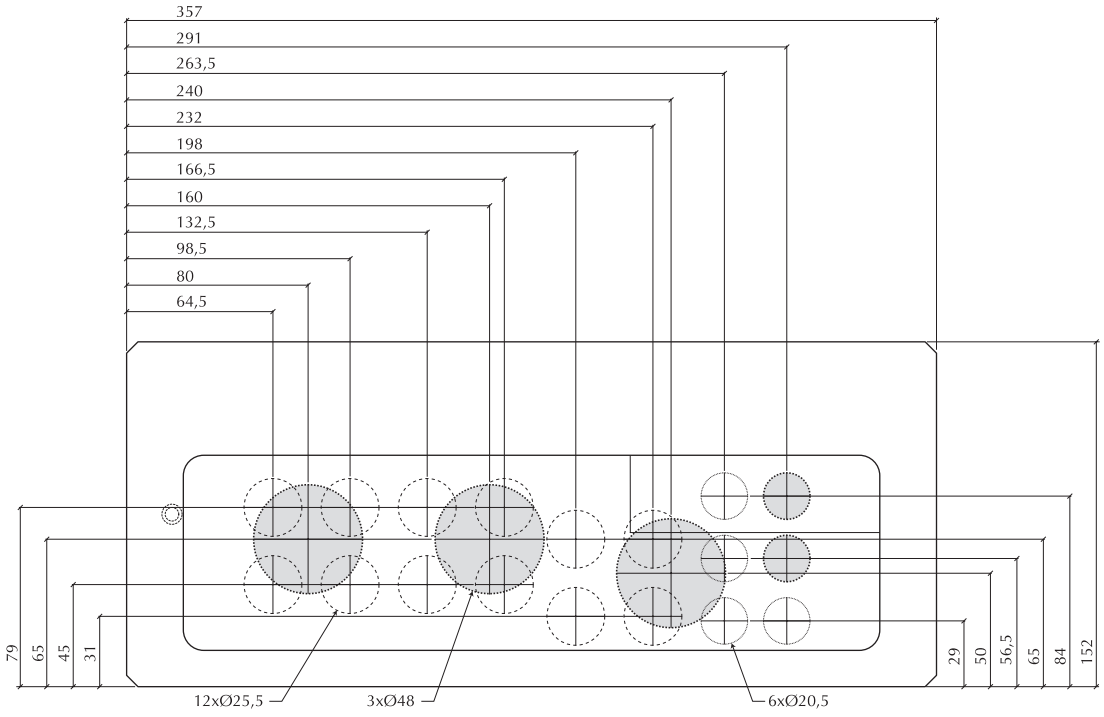
Symptom	Step	Result
04 The product doesn't transfer to the genset in case of mains failure or test on load.	**01** AUT Led is on & Fault synthesis Led is off & Power supply Led is blinking.	**> NEGATIVE** • Go to symptom 01.
		> POSITIVE • Go to the next step.
	02 Genset is started.	**> NEGATIVE** • Check that the mains failure timer (1FT) is still not counting down. • Check the genset control panel is set to the auto position. • Then consult your local dealer.
		> POSITIVE • Go to the next step.
	03 Genset availability Led is on.	**> NEGATIVE** • Go to symptom 03.
		> POSITIVE • Consult your local dealer.
05 The product doesn't transfer to the mains in case of mains return or test on load end.	**01** AUT Led is on & Fault synthesis Led is off & Power supply Led is blinking.	**> NEGATIVE** • Go to symptom 01.
		> POSITIVE • Go to the next step.
	02 Mains availability Led is on.	**> NEGATIVE** • Go to symptom 02.
		> POSITIVE • Go to the next step.
	03 Retransfer inhibit (RTI) function is off.	**> NEGATIVE** • Push the RTI push button: 
		> POSITIVE • Consult your local dealer.
06 Genset keeps on running after mains restores and switch retransfers to the mains position.	**01** AUT Led is on & Fault synthesis Led is off & Power supply Led is blinking.	**> NEGATIVE** • Go to symptom 01.
		> POSITIVE • Go to the next step.
	02 The run on time timer (2CT) is still counting down (visible on the display).	**> NEGATIVE** • Check the genset control panel is set to the auto position. • Then consult your local dealer.
		> POSITIVE • Wait for the 2CT end.

FAULT FINDING GUIDE

Symptom	Step	Result
07 Switch manual operations are not possible.	**01** The manual operation is possible	**> NEGATIVE** • Check the required rotation of the switch • Check that the sufficient torque has been applied. • Then consult your local dealer.
		> POSITIVE • Goal reached.
08 Switch padlocking operations are not possible.	**01** Possible to pull the padlocking mechanism	**> NEGATIVE** • Check that the product is in the 0 position for standard configuration. • Then consult your local dealer.
		> POSITIVE • Goal reached.

CTI Transfer Panel
APPENDIX

Drilling templates



NOTES