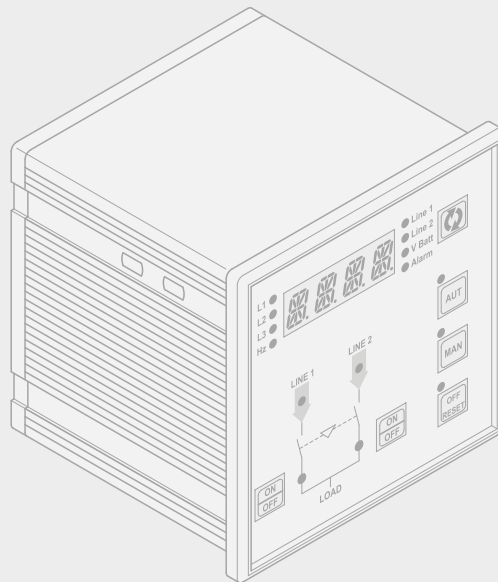


Automatic transfer switch 4 226 80

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WARNING

- Carefully read the manual before the installation or use, taking count of the informations of instruction sheet given with to the product.
- These equipments have to be installed by qualified personnel, in compliance to local standards, to avoid damages or safety hazards.
- Before any device maintenance operation, remove the supply from measuring inputs or isolate them cutting the supply from other sources.
- Legrand assumes no responsibility if the device isn't properly used, if installative informations aren't respected or if the device is tampered.
- Products described here below are subject to alterations and changes without prior notice. For this reason the catalogues data couldn't have contractual value.
- Clean the instrument with a soft dry cloth; do not use abrasives, liquids.
- Due of presence of electrical connections, the safety standards have to be respected.
- The ATS is supplied with Legrand standard parameters. These couldn't respect the necessity of the specific application/ installation. For this reason it is necessary to know the parameters and eventually to modify them in order to better integrate the device to the plant.



SAFETY INSTRUCTIONS

This product should be installed in compliance with installation rules, preferably by a qualified electrician. Incorrect installation and use can lead to risk of electric shock or fire.

Before carrying out the installation, read the instructions and take account of the product's specific mounting location.

Do not open up, dismantle, alter or modify the device.

All Legrand products must be opened and repaired exclusively by personnel trained and approved by Legrand. Any unauthorised opening or repair completely cancels all liabilities and the rights to replacement and guarantees.

Use only Legrand brand accessories.

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1. General features

1.1 Description

- Automatic transfer switch controller.
- Two voltage measuring inputs for three-phase + neutral.
- 12-24-48 VDC power supply.
- 4 -digit 14-segment LED display.
- 15 status and measure LED indicators.
- 6-keys membrane keypad.
- 6 programmable digital inputs.
- 6 programmable relay outputs (5NO + 1 C/O).

1.2 Applications

- Utility-to-utility or utility-to-generator changeover.
- Control of motorized circuit breakers or contactors.
- Three-phase, two-phase or single-phase voltage controls.
- Phase-phase voltage and/or phase-neutral voltage control.
- Controls of minimum voltage, maximum voltage, phase loss, asymmetry, minimum frequency, maximum frequency, with independent enable and delay.

1.3 Installation

- Install the unit following the correct wiring diagrams.
- Program parameters as function of the wiring diagram adopted paying particular attention to the programming of inputs/outputs.

2. ATS front panel description

- The unit front panel is equipped with a LED display which shows all electrical measures/parameters and ATS (automatic transfer switch) programming parameters. These information are available pushing the supply sources selection keys (Line 1 and Line 2) and the pushing of **(M)** key in order to view all measures.

2.1 Selection keys

- The **(M)** key allows to select and to see all electrical values of power supply sources (Line 1 and Line 2).
- keys OFF/RESET **(F)** – MAN **(H)** – AUT **(G)** enable to select the operating mode, which is displayed by the corresponding LED.
- Two keys **(I)** allow the electrical manual control of circuit breakers of Line 1 and Line 2. In order to enter to programming menu it is necessary to enable OFF-RESET mode.

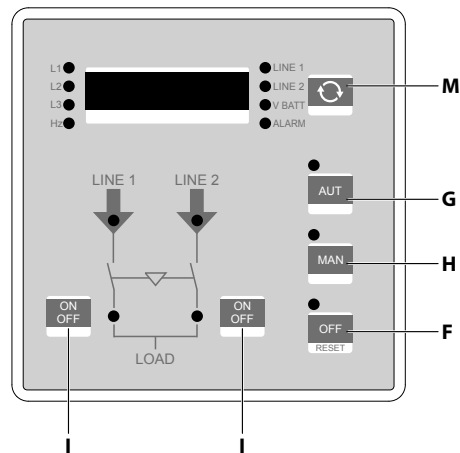


Fig. 1 - Front panel

2.2 Measure selection

- Press the key on the right of display **(M)** repeatedly to display the different measures. After 1 minute without touching the key, the measure comes back to default measure.
- Line-to-line (L-L) voltages, line-to-neutral (L-N) voltages and frequency are available for each line.
- The battery supply voltage is shown through the dedicated LED (only if the battery function is activated).
- Red LED combinations **(L)** indicate which measure is selected. The list of measures changes depending on whether the unit is set up for three-phase, two-phase or single-phase control.
- In case of alarms or messages, the display shows a scrolling text. Pressing the selection key **(M)**, the alarm could be masked temporarily and allows to access to measures.
- When load is switched between line 1 and line 2, the measure selected on the display follows automatically the load.

2.3 LEDS

- Some LEDs are present on the front panel to show the status of the ATS and/or the circuit breakers it controls.

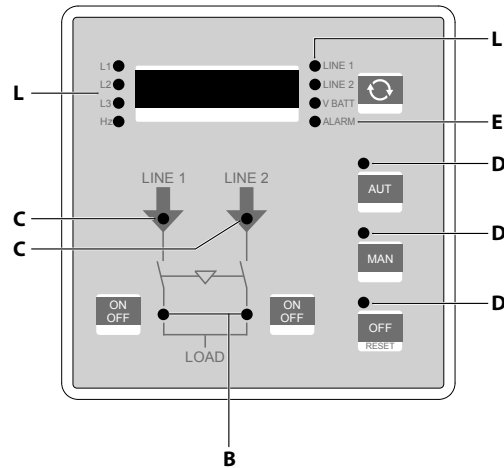


Fig. 2 - Frotal

The following table details the meaning of the different LEDs

LED	FUNCTION	COL.	ON	OFF	FLASHING
L	LED MEASURE SELECTION	Red	Measure selection		-
C	LED CONTROL LINES 1/ LINES 2	Green	Voltage and frequency within set limits	Voltage or frequency out of set limits	Presence or absence delay time running
B	LED LINE STATUS	Yellow*	Breaker closed	Breaker opened	Breaker in operation
D	LED OFF/RESET KEY	Red	OFF / RESET Mode		OFF/RESET Mode
	LED MAN KEY	Red	MAN Mode		MAN Mode
	LED AUT KEYS	Red	AUT Mode		AUT Mode
E	LED ALARM	Red			Alarm active

* If auxiliary signals (feedback) have been suitably connected and programmed, the LEDs represent the circuit breakers status; otherwise they represent the status of control outputs.

3. Operating modes

- Through of three keys **OFF-RESET / MAN / AUT** is possible to select the required operating mode, which will be shown when the corresponding red LED turns on.
- The selected operating mode is kept when power supply is removed and then restored.

3.1 Reset mode (OFF RESET)

- In this mode the ATS look over the lines status but does not perform any changing actions.
- All visual displays, concerning both measures and status LEDs, remain active.
- If the control of changeover device is pulse-type, in OFF-RESET both controls remain disabled. Otherwise, if it is in continuous control mode, the behaviour depends upon P2.19 programming.
- In order to access to the programming menu, it is mandatory to shift to OFF-RESET mode.
- By pressing the OFF-RESET key, retentive alarms can be cleared, ensuring that the conditions generating the alarm have been removed.

3.2 Manual mode (MAN)

- In MAN mode it is possible to manually command breakers from ATS. In order to do that, it is necessary to press the key (I key) of selected line. The key has to be pushed for almost 300ms.
- At each ON/OFF (I) key pressure the circuit breaker status is switched over. The command is accepted only if 1 s has elapsed from the end of the previous switching and the system conditions allow this.
- If a manual command is given to close a circuit breaker while the other one is still closed, the ATS first of all opens the other circuit breaker and then it closes the one commanded, interposing the programmed interlock time.
- When operating with a generator set, the generator startup and shutdown can be manually commanded on the secondary line by pressing and holding down the MAN key (H) for 5 seconds.

3.3 Automatic mode (AUT)

- In automatic mode the ATS checks permanently the state of lines and breakers. Starting from the state of lines it performs autonomously the checks, the managing, the closing/opening operations of breakers and the optional startup/shutdown of the generator set.
- When the main line exceeds the specified limits for a time higher than set, the green LED (line presence) switches off giving an alarm. The ATS disconnects the load from the main line and connects it to the secondary line (if it is within adjusted thresholds). After the priority line returns within the specified thresholds, the ATS moves the load on this one after it has checked the stability and the quality of line. It provides time to the eventual cooling cycle of generator set.
- Automatic operating cycles vary both as a function of the type of application (utility-to-utility, utility-to-generator) and as a function of the type of switching devices used (motorized circuit breakers – see chapter 3.9 - or contactors – see chapters 3.10).

3.4 Off-load priority line test mode



PAY ATTENTION

it causes a status change of changeover system

- Starting from AUT mode, it is possible to simulate a 1 minute voltage failure on the main line.
- The ATS will respond in the same manner and time set for standard automatic mode. It will be possible to check the correct changeover time.
- To do this simulation, starting from AUT mode, press the **AUT** key (G) and the line 2 **ON-OFF** key (I) together for 10 seconds.
- The letters F.SI (Failure Simulation) will be shown on the display during the execution of the whole cycle.
- To stop the test before the end, repeat the starting procedure (**AUT+ON/OFF Line 2**) or switch to **OFF – RESET** mode.

3.5 Utility-to-generator Application

- In the utility-to-generator application (U-G, default setting) the load is usually connected to the utility (Line 1).
- If this source (Line 1 – Utility) doesn't respect the specified checking parameters (voltages-frequency), after the delay P2.13, the ATS gives to the generator the starting signal (Line 2).
- When generator voltage is within programmed limits, the load is connected to it.
- When primary source comes back within the specified limits (Line 1 – Utility), the ATS commands the switching from line 2 to line 1.
- The generator is kept in operation without load for a time set by P2.14 to allow it to cool down.
- The automatic transfer switch sends a start/stop command to the generator through a relay output (H terminal block). The outputs could be managed using programmable inputs in relations to the informations of generator status (see chapter parameter).

3.6 Utility-to-utility Application

- In the utility-to-utility (U-U) application, the load is usually connected to the main utility (Line 1) and the transfer to the secondary utility (Line 2) occurs in case of main line anomaly or the transfer signal is given from the outside.

3.7 EJP Function (Erasing day peak)

- For applications requiring the EJP function (Erasing day peak), it is possible to use two programmable inputs set to functions S.GE (start generator) and E.TR (External transfer).
- Parameter P2.20 can also be used to define a generator start delay.

4. Commands

4.1 Control of change over devices

- For line changeover, the automatic transfer switch can control different types of devices such as motorized circuit breakers and contactors.
- In relation to the type of changeover devices used with the automatic transfer switch, it is necessary to use the appropriate wiring diagrams.
- The regulation of programmable inputs/outputs is described in the manual.
- Programmable outputs are set by default for use with motorized breakers (see the wiring diagrams).
- The device status feedback inputs must be wired in order to ensure the reliability system operation.
- If the device status inputs are used, the automatic transfer switch, after power-on, does not send commands to the switching devices until the relative line status is not stable (until of voltage presence/absence time has gone).
- Internal control relays are neither interlocked electrically nor mechanically.

4.2 Control of motorized circuit breakers

- For the control of motorized circuit breakers, 4 outputs are needed (open and close commands for line 1 and line 2) and two inputs for circuit breakers status feedback (OC contacts) too, plus additional two optional inputs for overload protection alarm signaling (CTR).
- Open and close commands can be used in continuous or pulse mode, that is kept until the circuit breaker has reached the required position and safety time.
- The two command modes can be selected through the appropriate parameter P2.07 in the general data menu.
- If a breaker close command sent by the ATS hasn't a reply from the feedback input, before generating a timeout alarm the automatic transfer switch executes an open command and then re-attempts to close the breaker. If the operation fails again the timeout alarm is generated.
- Inputs associated to the CTR inputs are ignored for a 15 seconds window every time an open command is sent to circuit breakers. This prevents a false alarm in case the opening of circuit breakers has been done by ST/UVR.

4.3 Control of contactors

- If a couple of contactors is used, two outputs are necessary for the maintained command of circuit breakers closing status (and two inputs for the status feedback).
In this case, the command must be programmed in contactor mode (P2.07 = CNT).

N.B. : it isn't possible to associate with contactor mode devices different by contactors.

5. Controls

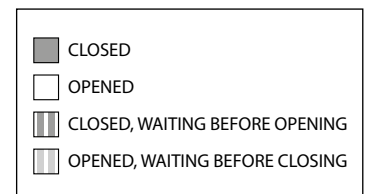
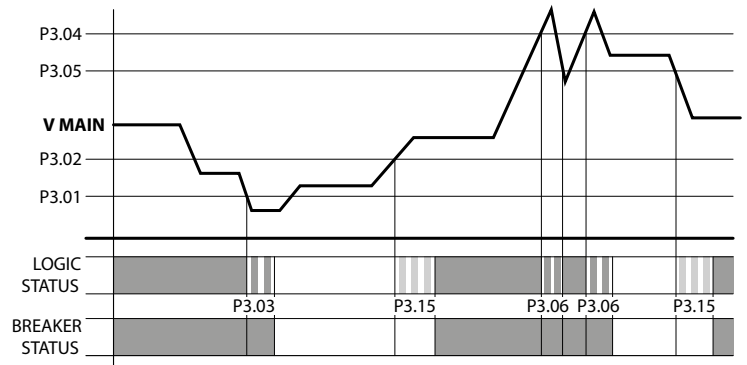
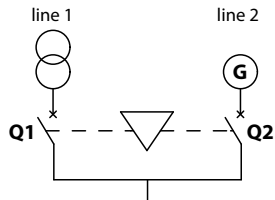
5.1 Voltage controls

- All the conditions that can establish whether a power source is or not complies to the needs are defined by the user through menu P1 (nominal data) and menus P3 and P4 (respectively line 1 and line 2 voltage limits).
 - Nominal voltages and frequency of power supply can be set through menu P1. These ones will be used as reference to set acceptable thresholds.
 - A voltage ratio (VT) can be set to the ATS voltages to control inputs in case of a lower voltage proportional to one of plant is applied. In this case, both the visualization and the setting of thresholds will be the real values of power plant.
 - The ATS can be programmed to perform voltage controls on three-phase with or without neutral, two-phase or single-phase utilities (P1.03).
 - In the case of three-phase or two-phase utility, you can choose whether to control/monitor L-L voltage, L-N voltage, or both (P1.04).
- N.B.:** The rated voltage set with P1.01 has to be equal to the phase-to-phase voltage.
- In the following table are shown the possible controls that can be made on each line. The ones marked with * in OFF column can be excluded.

CONTROL	DESCRIPTION	OFF
Minimum voltage	One or more phases with $V < V$ threshold	Not excludible
Maximum voltage	One or more phases with $V > V$ threshold	*
Phase loss	Absence of one phase voltage. The ATS can work faster than a normal decrease.	*
Asymmetry (unbalance)	Phases within the Maximum-Minimum range but too unbalanced	*
Minimum frequency	Frequency with $f < f$ threshold	*
Maximum frequency	Frequency with $f > f$ threshold	*
Phase sequence	Reverse rotation of phases	*

- Each control parameter in the table can be managed with an independent delay. The anomaly must persist more than the time specified to generate "voltage presence signal" alarm.
- When all the line parameters are restored within the specified control limits, before the line may be used, it has to be stable for all the time "delay line presence". The duration of this time is specified by two independent parameters: the first one defines the delay time when the alternative line is available; the second one (normally shorter) defines the delay in case of the alternative line is not available.
- All controls, except minimum voltage, may be excluded independently, by setting the relevant parameters to OFF. The limits of minimum and maximum voltage are specified by setting two thresholds each: the first one (P3.01) defines the point below which voltage is considered no more acceptable; the second one (P3.02), closer to the rated voltage, defines the value beyond which it is again compatible. For example: it can be stated that below 80% of the voltage rated value, the controlled line can no longer be used and it has to be opened. The voltage level, in order to be again considered acceptable, has to grow up above the 85% of rated voltage. This defines a 5% hysteresis. The same principle is applied to maximum voltage (P3.04 and P3.05).

5. Controls



- As concerns frequency thresholds, there is a fixed hysteresis equal to 1% of rated frequency.
- In case of alarm for "phase loss", it is necessary wait that voltage rated value of missing phase is higher than threshold of "voltage presence" (P3.02).

6. Alarms

- In presence of an alarm, the ATS identifies the kind of alarm/anomaly occurred and specifies on the display the relative code.
- Alarms could be of two types: retentive and non-retentive.
For non-retentive alarms, the indication goes off automatically when the alarm conditions stop.
For retentive alarms, the indication goes off when the alarm conditions stop and a manual reset is done from the unit front panel: this is done by pressing key OFF/RESET (and then moving to OFF mode).
- The presence of any alarm is signaled by the light up of the relevant flashing ALARM LED(LED E).
- An alarm can be disabled by programming to OFF the parameter defining its threshold or the programmable input generating it.

In the following table are described the possible alarms and their meaning. The MODE column indicates the operating modes (**OFF MAN AUT**) where the alarm can be enabled.

COD	DESCRIPTION	MODE
A01	Battery voltage too low	0 M A
A02	Battery voltage too high	0 M A
A03	Timeout	A
A04	Timeout	A
A05	Line 1 wrong phase sequence	0 M A
A06	Line 2 wrong phase sequence	0 M A
A07	Load not powered timeout	A
A08	Generator not available	0 M A
A09	Emergency	0 M A
A10	Line 1 circuit breaker protection trip	A
A11	Line 2 circuit breaker protection trip	A

- **A01 - A02** – Battery voltage out of threshold for a time exceeding the time set.
- **A03 - A04** – The changeover device, after command generated by the ATS, did not perform the opening or closing operation within the max. time.
The overcoming of time P2.08 generates a time out alarm (A03 or A04). After this alarm, the ATS inhibits any following opening/closing changeover command. Alarm A03 and A04 are generated only if at least one of the two power sources is present.
- **A05 - A06** – The phase sequence detected on line 1 – line 2 does not correspond to the programmed one.
- **A07** – The load remained de-energized for a time exceeding the one programmed by P2.11 because supply lines were not available or because both circuit breakers remained open.
- **A08** – It can be generated by two events:
the first one generated by the opening of programmable ATS inputs wired to a contact “generator not ready”.
The second, after having sent the command to start to the generator, the voltage does not become acceptable within the time specified by P2.11.
If the alarm is generated by the external input then it is not retentive. When alarm stops, it goes off automatically.
Otherwise, if it is generated by the generator voltage missing, it is retentive and, thus, must be resetted using RESET/ OFF key.
- **A09** – Alarm generated by the opening of the external emergency input. Both circuit breakers will be opened.
- **A10 - A11** – Generated by the closing of programmable input CTR (CTR.1 and CTR.2 functions). The open and close commands of the circuit breaker are inhibited avoiding the changeover on failure.

7. Configuration

7.1 Parameters set-up

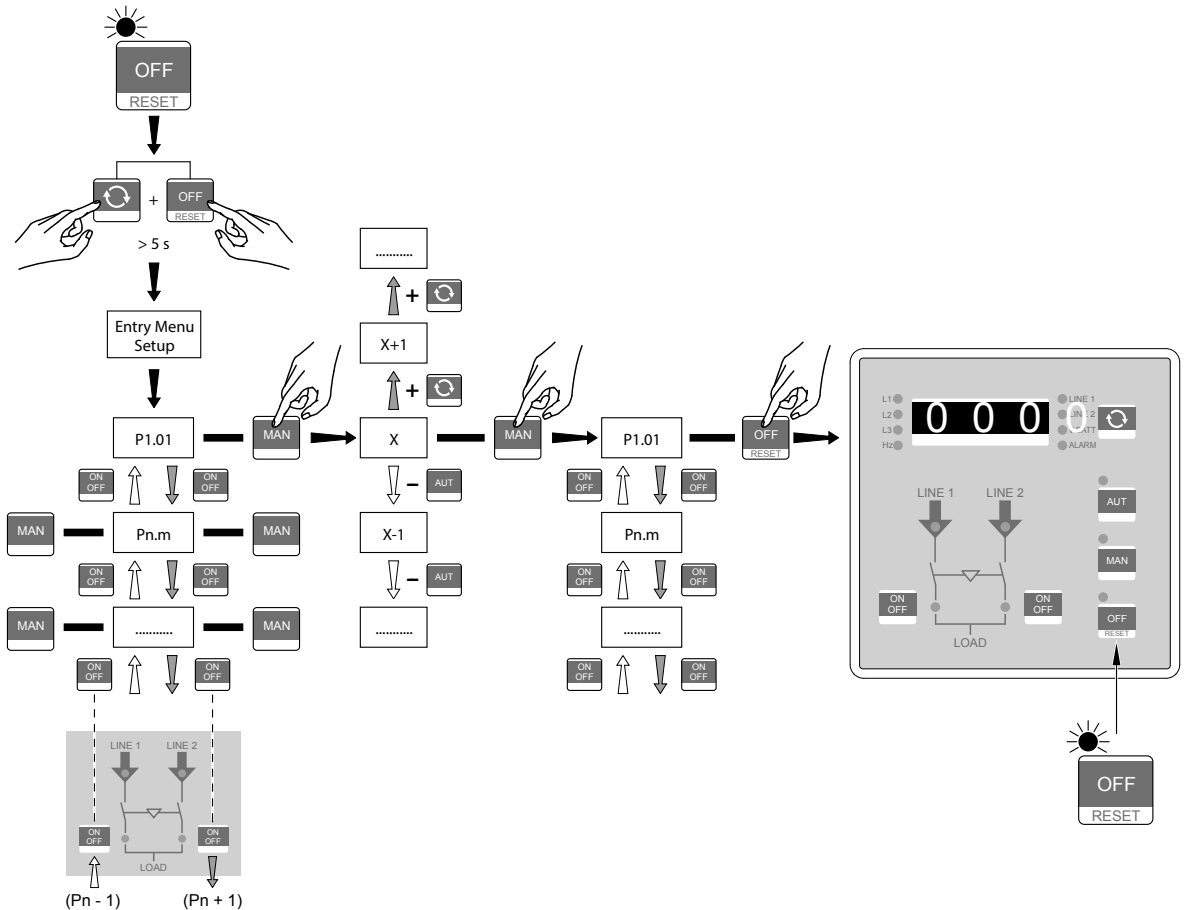
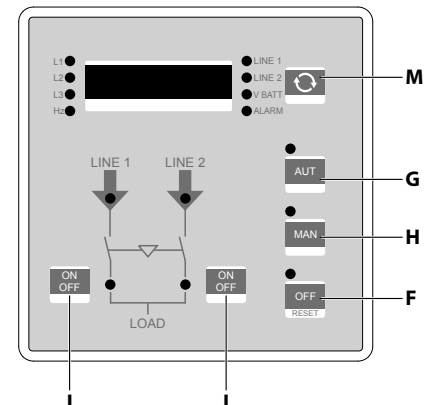


Fig. 3 - Parameters set-up

- To access parameter setup, starting with the unit in OFF-RESET mode, press the **(M)** and **(F)** keys together for 5 seconds. MENU SETUP text will appear on the display, wait a few seconds or press key **(F)** to access the menu.
- The display will show the code of the first parameter P1.01, that is menu P1, parameter 01.
- Press keys **(M)** and **AUT (G)** to scroll the parameters of the menu
- Press keys ON-OFF (I) to scroll the different menu (Line1: Pn-1 and Line 2: Pn+1 where Pn=parameter P).
- Press key **MAN (H)** to switch between the reference and the value of the parameter to modify.
- Press keys **(M)** and **AUT(G)** to modify the setting of selected parameter.
- Press key **OFF (F)** to quit parameters setup.
- Press keys ON/OFF (I) simultaneously to go back to the default setting of the parameter.
- If no keys are pressed for more than 2 minutes, the ATS exits setup automatically without saving the changes.



7.2 Menu table

MENU	DESCRIPTION
P1	System ratings
P2	General data
P3	Line 1 voltage control
P4	Line 2 voltage control
P5	Programmable inputs
P6	Programmable outputs
P7	Communication port for software SW ACU
A	Alarms

7.3 Menu P1 – Ratings

PAR	FUNCTION	RANGE	DEFAULT
P1.01	System rated voltage	100...690 VAC	400
P1.02	Voltage transformer (VT) ratio	1.00 ... 9.99	1.00
P1.03	Wiring configuration	3.nE – Three-phase + neutral 3.Ph – Three-phase 2.Ph – Two-phase 1.Ph – Single-phase	3.nE
P1.04	Type of voltage control	L-L – Line-to-Line L-N – Line-to-Neutral LLn – Line-to-Line + Line-to-Neutral	L-L
P1.05	Rated frequency	50 HZ 60HZ	50 HZ
P1.06	Rated battery voltage	AUTO 12V 24V 48V	AUTO
P1.07	Language	ENG English ITA Italiano FRA Francais ESP Espanol POR Portuguese DEU Deutsch	ENG English

- **P1.01** – Rated voltage used for threshold calculation; thresholds are expressed as Vn percentage.
- **P1.03** – It defines the kind of network to control. The setting between 3-phase and 3-phase + neutral influences the measure visualization only.
- **P1.04** – It specifies if the voltage controls are applied to L-L voltages, to L-N voltages or to both.
- **P1.05** – Rated frequency used as reference for frequency threshold calculation.
- **P1.06** – Used for alarms on battery voltage control. If set to AUTO the rated voltage of the battery is detected automatically.
- **P1.07** – Language used for alarms and other messages.

7. Configuration

7.4 Menu P2 – General data

PAR	FUNCTION	RANGE	DEFAULT
P2.01	Type of application	U-G = Utility to Generator U-U = Utility to Utility	U-G
P2.02	Phase Sequence control	OFF – Disabled 123 - Direct 321 - Inverse	OFF
P2.03	Main Line Selection	-1-Line 1 -2-Line 2	-1-
P2.04	Interlock time Line 1 ➔ Line 2	0.1...90.0s	6.0s
P2.05	Interlock time Line 2 ➔ Line 1	0.1...90.0s	6.0s
P2.06	Changeover Strategy	OBP - Open Before Presence of alternative line. OAP - Open After Presence of alternative line	OBP
P2.07	Circuit Breakers Control Type	PUL – Impulsive CON - Continuous CNT - Contactors	PUL
P2.08	Maximum time for Circuit Breaker Operation (A03 - A04 Alarms delay)	1...900s	5s
P2.09	Open command duration	0.0...60.0s	10.0s
P2.10	Close command duration	1.0...60.0s	1.0s
P2.11	Load not supplied timeout (A07 Alarm intervention delay)	OFF/1...3600s	60s
P2.12	Lock of automatic restore to main line	OFF – Disabled ON - Lock on	OFF
P2.13	Generator starting delay	0...900s	1s
P2.14	Generator cooling time	1...3600s	120s
P2.15	Battery minimum voltage threshold	OFF/70...100%	75%
P2.16	Battery maximum voltage threshold	OFF/10...140%	130%
P2.17	Battery alarm thresholds delay	0...60s	10s
P2.18	Voltage control enable in MAN mode	OFF/ON	OFF
P2.19	Continuous control in RESET/OFF mode	OFF - Open command outputs NOC-No change on control outputs	NOC
P2.20	EJP start delay	OFF/1..3600s	OFF

- **P2.01** – It defines the type of application for the control (with or without generator set) enabling the supervision of the relevant controls (inputs) / commands (outputs) signals.
- **P2.03** – Defines which is the main line, that is the line taking on the load when both sources are available.
- **P2.06** – OBP (Open Before Presence): in automatic mode, the open command of a circuit breaker is generated when the relative line goes out of limits, regardless of the status of the secondary line.
OAP (Open After Presence): in automatic mode, the open command of a circuit breaker is sent only after the secondary line is present within limits.
- **P2.07** – Defines the command typology of opening/closing outputs: they must be continuously active (application with contactors) or in pulse mode (application with breakers) because of the correct status after command is verified. If in pulse mode, the command could be extended for a adjustable time (see P2.09 and P2.10) even after positioning completion.
- **P2.08** – In case of the operation isn't executed within control delay P2.08, an alarm A03 or A04 is generated. The control is possible thanks to the auxiliary contacts OC wiring installed on products and cabled to the ATS.

- **P2.09** – Minimum duration of an opening command. This parameter identified the minimum time guaranteed by ATS in order to maintain opening command. It has to be set in case of using of motorized circuit breakers with charge springs motors. Setting in correct way this parameter, it has been guaranteed that command is long enough to order to complete the opening operation and charge springs.
This time is considered also when working in continuous mode.
- **P2.10** – Duration of the closing command.
- **P2.11** – If, in automatic mode, both sources are not available at the same time for a time exceeding P2.11, alarm A07 is generated.
- **P2.12** – Inhibition to come back to main line. If this parameter is enabled, after a transfer to the secondary line, restore to main line does not occur automatically when the latter becomes available again, but it must be commanded in manual mode.
- **P2.13** – Time elapsing between line 1 loss and the sending of the transfer signal to the generator on the secondary line. This time is independent of the circuit breakers opening time.
- **P2.14** – Time during which the generator is left in operation to cool after it has been disconnected from the load.
- **P2.18** – It enables or disables voltage control in MAN mode. If the control is enabled, no transfers are performed between the two lines, but the individual switching device is opened/closed when its voltage goes out / returns within limits.
- **P2.19** – It defines the performance of the open/close command outputs when working in continuous command mode and ATS is in RESET/OFF mode.
This parameter can be useful when working with contactors.
- **P2.20** – Delay between the EJP start signal and the effective start signal sent to the generator.

7.5 Menu P3 – Line 1 Voltage Control

PAR	FUNCTION	RANGE	DEFAULT
P3.01	Minimum voltage threshold – trip	70...98 %	85%
P3.02	Minimum voltage threshold – restore	75...100 %	90%
P3.03	Minimum voltage threshold -delay	0.1 900 s	1.0 s
P3.04	Maximum voltage threshold -trip	102...120% / OFF	115%
P3.05	Maximum voltage threshold -restore	100...115%	110%
P3.06	Maximum voltage threshold -delay	0.1 900 s	1.0 s
P3.07	Phase loss threshold	60 ... 85% / OFF	70%
P3.08	Phase loss threshold delay	0.1 ... 30.0 s	0.1 s
P3.09	Voltage unbalance threshold	1 ... 20% / OFF	15%
P3.10	Voltage unbalance threshold delay	0.1 ... 900 s	5.0 s
P3.11	Minimum frequency threshold	OFF / 80...100 %f	95%
P3.12	Minimum frequency threshold -delay	0.1 ... 900 s	5.0 s
P3.13	Maximum frequency threshold	101 ... 120% %f / OFF	105%
P3.14	Maximum frequency threshold -delay	0.1 ... 900 s	3.0 s
P3.15	Line 1 restore within limits -delay (when line 2 source not available)	1 ... 3600 s	10 s
P3.16	Line 1 restore within limits -delay (when line 2 source is available)	1 ... 3600 s	60

- **P3.01 - P3.02 - P3.03** – The first two parameters define the minimum voltage threshold and the related hysteresis upon restore.
- **P3.02** cannot be set to a lower value than P3.01.
- **P3.03** defines the intervention delay of this protection. See paragraph Voltage Controls.
- **P3.04 - P3.05 - P3.06** – The first two parameters define the maximum voltage threshold and the related hysteresis upon restore.
- **P3.05** cannot be set to a value exceeding P3.04.
Setting P3.04 to OFF will disable the maximum voltage control.

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- **P3.06** defines the maximum voltage intervention delay. See paragraph Voltage Controls.
- **P3.07 - P3.08** – Voltage threshold below which a phase loss intervention occurs.
The delay for the phase loss is specified by P3.08.
- **P3.09 - P3.10 - P3.09** defines the maximum threshold for unbalance between phases, referred to voltage rating.
- **P3.10** defines the related intervention delay. This control may be disabled by setting P3.09 to OFF.
- **P3.11 - P3.12** – Threshold (it may be disabled) and intervention delay for minimum frequency.
- **P3.13 - P3.14** – Threshold (it may be disabled) and intervention delay for maximum frequency.
- **P3.15** – Delay for Line 1 restoring to the limit range, used when the line 2 source is not available. Generally shorter than P3.16, as the load is de-energized and the coming back on main line is privileged.
- **P3.16** – Delay for Line 1 restoring to the limit range, used when the load can be connected to line 2. Generally longer than P3.15, as the load is energized and consequently it is possible to wait longer before considering voltage steadily restored.

7.6 Menu P4 – Line 2 voltage control

PAR	FUNCTION	RANGE	DEFAULT
P4.01	Minimum voltage threshold – trip	70...98 % Vn	85%
P4.02	Minimum voltage threshold – restore	75...100 % Vn	90%
P4.03	Minimum voltage threshold-delay	0.1 ... 900 s	1.0 s
P4.04	Maximum voltage threshold -trip	102...120% Vn / OFF	115%
P4.05	Maximum voltage threshold -restore	100...115% Vn	110%
P4.06	Maximum voltage threshold delay	0.1 ... 900 s	1.0 s
P3.07	Phase loss threshold	60 ... 85% Vn / OFF	70%
P4.08	Phase loss threshold delay	0.1 ... 30.0 s	0.1 s
P4.09	Voltage unbalance threshold	1 ... 20% Vn / OFF	15%
P4.10	Voltage unbalance threshold delay	0.1 ... 900 s	5.0 s
P4.11	Minimum frequency threshold	OFF / 80...100 %f	95%
P4.12	Minimum frequency threshold -delay	0.1 ... 900 s	5.0 s
P4.13	Maximum frequency threshold	101 ... 120% f / OFF	105%
P4.14	Maximum frequency threshold -delay	0.1 ... 900 s	3.0 s
P4.15	Line 2 restore within limits -delay (when line 1 source not available)	1 ... 3600 s	10 s
P4.16	Line 2 restore within limits -delay (when line 1 source is available)	1 ... 3600 s	60

Note – For details on the functions of parameters see the previous paragraph 0.

7.7 Menu P5 – Programmable inputs

PAR	FUNCTION	RANGE	DEFAULT
P5.1.1	Prog. input Function 1 terminal 2.1 (Default OC1)	See the following list	FB.1
P5.1.2	Prog. input 1 mode normal/inverted	NOR/INV	NOR
P5.1.3	Closing delay	0.0 - 25.0s	0.0s
P5.1.4	Opening delay	0.0 - 25.0s	0.0s
P5.2.1	Prog. input Function 2 terminal 2.2 (Default OC2)	See the following list	FB.2
P5.2.2	Prog. input 2 mode normal/inverted	NOR/INV	NOR
P5.2.3	Closing delay	0.0 - 25.0s	0.0s
P5.2.4	Opening delay	0.0 - 25.0s	0.0s
P5.3.1	Prog. input Function 3 terminal 2.3 (Default CTR1)	See the following list	TR.1
P5.3.2	Prog. input 3 mode normal/inverted	NOR/INV	NOR
P5.3.3	Closing delay	0.0 - 25.0s	0.0s
P5.3.4	Opening delay	0.0 - 25.0s	0.0s
P5.4.1	Prog. input Function 4 terminal 2.4 (Default CTR2)	See the following list	TR.2
P5.4.2	Prog. input 4 mode normal/inverted	NOR/INV	NOR
P5.4.3	Closing delay	0.0 - 25.0s	0.0s
P5.4.4	Opening delay	0.0 - 25.0s	0.0s
P5.5.1	Prog. input Function 5 terminal 2.5	See the following list	E.TR
P5.5.2	Prog. input 5 mode normal/inverted	NOR/INV	NOR
P5.5.3	Closing delay	0.0 - 25.0s	0.0s
P5.5.4	Opening delay	0.0 - 25.0s	0.0s
P5.6.1	Prog. input Function 6 terminal 2.6	See the following list	IN.R
P5.6.2	Prog. input 6 mode normal/inverted	NOR/INV	NOR
P5.6.3	Closing delay	0.0 - 25.0s	0.0s
P5.6.4	Opening delay	0.0 - 25.0s	0.0s

7. Configuration

Functions of programmable Inputs

COD	FUNCTION
OFF	Input not used
FB.1	Line 1 circuit breaker closed (Feedback 1). Auxiliary contact OC informing the automatic transfer switch of the open/closed status of line 1 circuit breaker. If this signal is not connected, the automatic transfer switch considers the status of the circuit breaker corresponding to the status of control outputs
FB.2	Line 2 circuit breaker closed (Feedback 2). Auxiliary contact OC referred to the line 2.
TR.1	Line 1 circuit breaker protection (Trip 1). When the contact CTR.1 is closed, it generates an alarm of line 1 circuit breaker protection intervention
TR.2	Line 2 circuit breaker protection (Trip 2). Like CTR.1, referred to line 2
E.TR	Transfer to secondary line. When closed, it causes changeover to secondary line even if main line voltage is within limits. It can be used to switch the priority between line 1 and line 2. The secondary line circuit breaker remains activated until this line remains within limits. Can be used for EJP function
IN.R	It inhibits return to main line In AUT mode. When closed, it inhibits the return to main line after it has reverted to the limit range. It is used to prevent the second power cutout due to re-transfer from occurring automatically at an unforeseeable time
S.GE	Start Generator. In AUT mode, when closed, it causes the generator to start after the delay specified by P2.20. It can be used for EJP function
EME	Emergency NC contact which, if open, causes both circuit breakers to open and generates alarm A09.
GR.2	Line 2 generator ready (Generator ready 2). When closed, it signals that the generator connected to line 2 is available for use. If this signal is missing, alarm A08 is generated.
E.L1	Enable load on line 1 (Enable Load 1). It allows load connection on line 1, in addition to internal controls.
E.L2	Enable load on line 2 (Enable Load 2). Like EL.1, referred to line 2
LOC	Keypad lock (Lock). If closed, it locks all the functions from front keypad except measure viewing.
L.PA	Lock Parameters. If closed, it locks the access to setup menu.

7.8 Menu P6 – Programmable outputs

PAR	FUNCTION	RANGE	DEFAULT
P6.1.1	Function of prog. output 1 terminal 4.1	See list	Opening Line 1
P6.1.2	Prog. output 1 mode	Nor / Inv	Nor
P6.2.1	Function of prog. output 2 terminal 4.3	See list	Closing Line 1
P6.2.2	Prog. output 2 mode	Nor / Inv	Nor
P6.3.1	Function of prog. output 3 terminal 5.1	See list	Opening Line 2
P6.3.2	Prog. output 3 mode	Nor / Inv	Nor
P6.4.1	Function of prog. output 4 terminal 5.3	See list	Closing Line 2
P6.4.2	Prog. output 4 mode	Nor / Inv	Nor
P6.5.1	Function of prog. output 5 terminal 3.1	See list	rdy
P6.5.2	Prog. output 5 mode	Nor / Inv	Nor
P6.6.1	Function of prog. output 6 terminals 3.3-3.4	See list	GC.2
P6.6.2	Prog. output 6 mode	Nor / Inv	Nor

Functions of Programmable Outputs

COD	FUNCTION
OFF	Output not used
OP.1	Line 1 circuit breaker open control (Open 1) Contact which closes to command the opening of line 1 circuit breaker. It may remain energized or be released when the operation is completed, depending on P2.07 setting (not used when contactors or switches are used).
CL.1	Line 1 circuit breaker close control (Close 1) Contact which closes to command the closing of line 1 circuit breaker. It may remain energized or be released when the operation is completed, depending on P2.07 setting.
OP.2	Line 2 circuit breaker open control (Open 2) Like OP.1, referred to line 2
CL.2	Line 2 circuit breaker close control (Close 2) Like CL.1, referred to line 2
OPA	Open control for both lines (Open All) Used to set motorized switches to neutral position, with both lines open.
GC.2	Generator Control 2 Start / stop control for the generator connected to line 2. When closed it commands the shutdown of the generator set. Used in Utility-Generator applications.
RDY	Automatic transfer switch Ready It signals that the unit is in automatic mode and without alarms, ready for intervention.
ALA	Global Alarm Energized output under standard conditions, de-energized in the presence of any alarm.
L1.S	Line 1 Status The output is energized when there are all the conditions to connect load to line 1.
L2.S	Line 2 Status The output is energized when there are all the conditions to connect load to line 2.

N.B. : P6.x.2 – Set the output relay status when the selected function is not active.

dir = not energized, **rev** = energized

7. Configuration

7.9 Menu A – Alarms

PAR	FUNCTION	RANGE	DEFAULT
A01.1	Enable A01	OFF / On	ON
A01.2	Latch (retentive)	OFF / On	ON
A01.3	Lock breaker Q1	OFF / On	OFF
A01.4	Lock breaker Q2	OFF / On	OFF
A01.5	Global alarm relay	OFF / On	ON
A02.1	Enable A02	OFF / On	ON
A02.2	Latch (retentive)	OFF / On	ON
A02.3	Lock breaker Q1	OFF / On	OFF
A02.4	Lock breaker Q2	OFF / On	OFF
A02.5	Global alarm relay	OFF / On	ON
A03.1	Enable A03	OFF / On	ON
A03.2	Latch (retentive)	OFF / On	ON
A03.3	Lock breaker Q1	OFF / On	ON
A03.4	Lock breaker Q2	OFF / On	OFF
A03.5	Global alarm relay	OFF / On	ON
A04.1	Enable A04	OFF / On	ON
A04.2	Latch (retentive)	OFF / On	ON
A04.3	Lock breaker Q1	OFF / On	OFF
A04.4	Lock breaker Q2	OFF / On	ON
A04.5	Global alarm relay	OFF / On	ON
A05.1	Enable A05	OFF / On	ON
A05.2	Latch (retentive)	OFF / On	ON
A05.3	Lock breaker Q1	OFF / On	OFF
A05.4	Lock breaker Q2	OFF / On	OFF
A05.5	Global alarm relay	OFF / On	ON
A06.1	Enable A06	OFF / On	ON
A06.2	Latch (retentive)	OFF / On	ON
A06.3	Lock breaker Q1	OFF / On	OFF
A06.4	Lock breaker Q2	OFF / On	OFF
A06.5	Global alarm relay	OFF / On	ON
A07.1	Enable A07	OFF / On	ON
A07.2	Latch (retentive)	OFF / On	OFF
A07.3	Lock breaker Q1	OFF / On	OFF
A07.4	Lock breaker Q2	OFF / On	OFF
A07.5	Global alarm relay	OFF / On	ON

PAR	FUNCTION	RANGE	DEFAULT
A08.1	Enable A08	OFF / On	ON
A08.2	Latch (retentive)	OFF / On	OFF
A08.3	Lock breaker Q1	OFF / On	OFF
A08.4	Lock breaker Q2	OFF / On	OFF
A08.5	Global alarm relay	OFF / On	ON
A09.1	Enable A09	OFF / On	ON
A09.2	Latch (retentive)	OFF / On	ON
A09.3	Lock breaker Q1	OFF / On	OFF
A09.4	Lock breaker Q2	OFF / On	OFF
A09.5	Global alarm relay	OFF / On	ON
A10.1	Enable A10	OFF / On	ON
A10.2	Latch (retentive)	OFF / On	ON

- **Axx.1** – General enable of the alarm. If alarm enable is set to OFF, the alarm is never generated.
- **Axx.2** – For non-retentive alarms, the indication goes off automatically when the alarm conditions expires, while for retentive ones a manual reset is needed from the unit front panels done by pressing key OFF / RESET (that is moving to OFF mode).
- **Axx.3 - Axx.4** – The open and close commands of the circuit breaker concerned are inhibited.
- **Axx.5** – If set to ON, when this alarm appears, the global alarm relay is energized.

8. Diagnostic Messages

- The ATS display can show messages to signal the implementation of a function or a particular situation.
- By pressing one of the keys for measure selection, the diagnostic display is temporarily stopped to allow to view the measure.

MESSAGES	
	GENERATOR STARTING
	COOLING TIME
	LINE FAILURE SIMULATION
	---- (Interlock time in progress)
	KEYPAD LOCK
	KEYPAD UNLOCK

9. Keypad Lock

- The automatic transfer switch keypad can be locked by means of a programmable input.
- Once the keypad is locked, it will only be possible to view measures, but not to change operating mode or to operate manually on circuit breakers. Only the keys for measure selection will remain enabled.
- Any attempt to use the locked keys will cause the message KEYBOARD LOCKED to be displayed.
- When the keypad will be locked, the display shows the sentence KEYBOARD LOCKED. When the keypad will be unlocked, the display shows the sentence KEYBOARD UNLOCKED.

10. Commands Menu

With this menu it is possible to execute the following commands:

- Set the factory default parameters.
- To access the commands menu, keep pressed key (F), press (M) for 2 times then press (G) for 3 times, press (H) for 4 times.
- The display will show COMMANDS MENU. Wait a few seconds or press the key (F) to access menu.
- The display shows the code of the first menu C01 that allow the restoring of default factory parameters (menus C02 / C03 reserved for internal use Legrand).
- Press key (M) to select the command.
- Press (I) to execute the selected command.
- Press key (F) to quit commands menu.
- If no keys are pressed for more than 2 minutes, the ATS left menu automatically.

COMMANDS MENU	
C01	PARAMETERS TO FACTORY DEFAULT
C02	FOR INTERNAL USE LEGRAND
C03	FOR INTERNAL USE LEGRAND

11. Rear connections

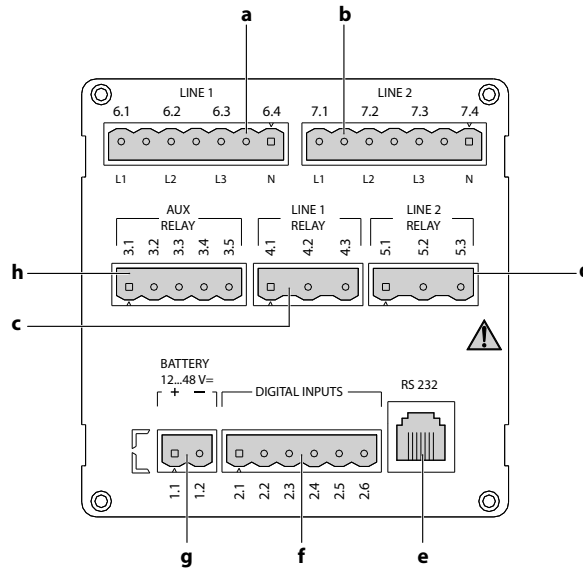


Fig. 4 -
Rear connections

- a** Check voltage line 1 (S Q1)
- b** Check voltage line 2 (S Q2)
- c** Command relay line 1 (Q1)
- d** Command relay line 2 (Q2)
- f** Programmable inputs
- g** DC AUX supply 12-24-48 VDC
- h** Programmable Relay

12. Dimensions

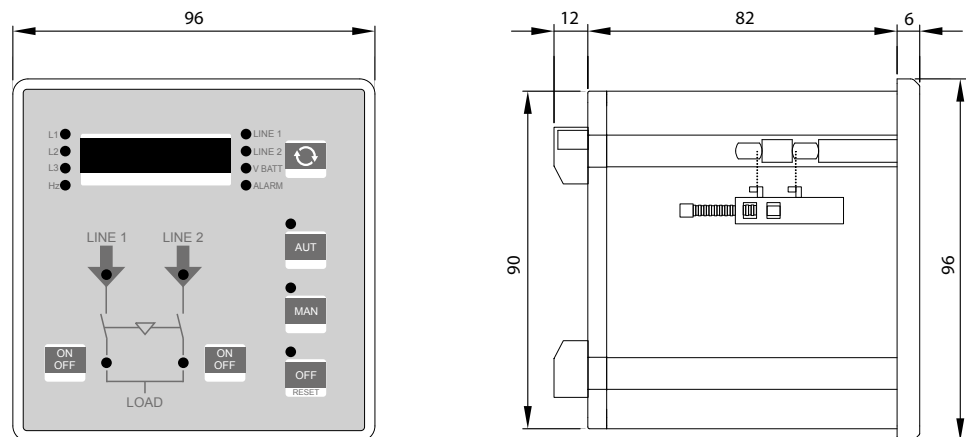


Fig. 5 -
Dimensions

13. Technical characteristics

TECHNICAL CHARACTERISTICS	
Auxiliary supply	
Rated battery voltage	12 o 24 o 48V DC
Maximum input current	250mA at 12V DC ,130mA at 24V DC and 70mA at 48V DC
Maximum input power consumption	3.3W
Operating voltage range	9÷60V DC
Digital inputs	
Type of polarity	Negative
Input current	8mA
Low input level	≤1,5V (typical 2,9V)
High input level	≥5,3V (typical 4,3V)
Input signal delay	≥50ms
Line 1 and Line 2 AC voltage inputs	
Maximum rated voltage Ue	100...480V AC L-L (277V AC L-N)
Measuring range	50...576V AC L-L (330V AC L-N)
Frequency range	45 ÷ 66Hz
Type of measurement	TRMS (true root mean square)
Input impedance	>1,1MΩ between L-L and >570kΩ between L-N
Wiring mode	1, 2 or 3 phase with or without neutral
Relay outputs for Line 1 switch control (voltage free)	
Number of relays 2	2
Type of contact	1 NO (single common)
Operating category	B300 - 8A 250Vac AC1 30V DC 8A - 30V DC 1A Auxiliary duty
Maximum current on 4.2 terminal	12A
Relay outputs for Line 2 switch control (voltage free)	
Number of relays	2
Type of contact	1 NO (single common)
Operating category	B300 - 8A 250Vac AC1 30V DC 8A - 30V DC 1A Auxiliary duty
Maximum current on 5.2 terminal	12A
Auxiliary relay outputs (voltage free)	
Number of relays	2
Type of contact	1 NO + 1 C/O
Operating category	30V DC 8A - 30VDC 1A Auxiliary duty

TECHNICAL CHARACTERISTICS	
Measurement accuracy	
Test conditions Temperature	+23°C ±1°C
Relative humidity	45 ±15%
Voltage	±0.5% f.s. ±1digit (0.1...1.2 Ue)
Frequency	±0.1% ±1digit
Ambient conditions	
Operating temperature	-20...+60°C
Storage temperature	-30...+80°C
Relative humidity	<90% non-condensing (IEC/EN 60068-2-78)
Altitude	≤2000m
Overvoltage category	3
Measurement category	CAT III
Maximum pollution degree	3
Climatic sequence	Z/ABDM (IEC/EN 60068-2-61)
Shock resistance	10g (IEC/EN 60068-2-27)
Vibration Resistance	0.7g (IEC/EN 60068-2-6)
Insulation voltage	
Rated insulation voltage Ui	480VAC
Rated impulse withstand voltage	4.0KV Uimp
Low voltage circuits (Digital inputs, RS232 and AUX relay outputs)	Double insulation
Connections	
Type of terminal	Removable screw terminal, plug-in
Conductor cross section (min - max)	0.2...2.5 mm ² (24...12 AWG)
Tightening torque	0.5 Nm (4.5 LBin)
Housing	
Version	Flush-mount 96x96mm
Material	Noryl UL94 V-0 black self-extinguishing
Degree of protection	IP54 on front - IP20 inside panel
Weight	470g
Certifications and compliance	
Compliant with standard	IEC/EN 60947-6-1, IEC/EN 61010-1, IEC/EN 61000-6-2, IEC/ EN 61000-6-3

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