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PROFESSIONAL ELECTRONICS

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Mess- und Prüftechnik. Die Experten.

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Your Partner:

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TPS/T/D

EN USER MANUAL

READ AND SAVE
THESE INSTRUCTIONS
LEGGI E CONSERVA
QUESTE ISTRUZIONI

Clicca qui per vedere la versione del manuale in Italiano.

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TPS/T/D Models covered in this manual:

Model	Code
TPS/T/D 10KVA	99116213
TPS/T/D 20KVA	99116313
TPS/T/D 40KVA	99116413
TPS/T/D 60KVA	99116513
TPS/T/D 90KVA	99116713

This manual applies to TPS/T/D firmware version 67 and later.
Please check the latest manual version at www.elettrotestspa.it
To consult older manual versions, please contact our support at service@elettrotestspa.it

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Document list:

This manual is completed by a list of documents, useful to understand all the features of your TPS/T/D.
Scan the QR-code or click on the link to directly download the documents.

Documents	Description	Link	QR-code
User Manual	Latest manual version	Manual	
TPS/D Protocol Elettrotest	Describes how the Elettrotest remote communication protocol works for your TPS/D	Elettrotest Protocol	
TPS/D Protocol SCPI	Describes how the SCPI remote communication protocol works with your TPS/D.	SCPI Protocol	
TPS/M/D Protocol ModBus	Describes how the ModBus remote communication protocol works for your TPS/D	ModBus Protocol	

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Documents	Description	Link	QR-code
PSM Interface	*Elettrotest Power Supply Manager* Free software for remote use.	PSM_Interface	
Driver LabView	Manual and LabView Drivers for PS-interface	Driver LabView	

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After sale support
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Thank you for purchasing the TPS/T/D generator.

TPS/T/D is a high-performance variable voltage generator (amplitude and frequency) in order to simulate and electrical line for test for different application (laboratory, test line, production line)

Responsibility:

Elettrotest disclaims any responsibility for damage to people or things caused by an improper use of its products.

Mandatory

- **Verify voltage, power and frequency compatibility between TPS/T/D range and electrical specification of equipment under test (EUT).**
- **Electrical components of the system must be suitable for the rated voltage and current of TPS/T/D model (paragraph 2)**
- **This equipment is not provided with input plugs and must be connected to the electrical grid using appropriate safety devices, including a disconnector at the input, as well as those specified in paragraph 6.3.**
- **The electrical components, which by construction cannot support external influences (of the generator in all its range), can only be used on condition that adequate additional protection has been provided with automatic disconnection protection.**

Notes:

This manual lists precautions and information about operating procedure of device.
The content of this manual is subject to change without prior notice because of continuing improvements on the instrument's.
Should you have any questions or find any error please contact us by email.

Version:

This manual is written for **TPS/T/D firmware version 67** and higher.
To consult older manual versions, please contact our support at service@elettrotestspa.it

SAFETY WARNINGS

The manufacturer urges users to read the user manual for our products before installation.
The installation must be carried out by qualified technical staff. The non-observance of the warnings in this manual can cause electric shocks, even fatal ones.

Please find some general safety warnings below.

- Do not connect this equipment to the electrical grid without all the mandatory safety devices indicated in the safety paragraphs.
- TPS/T/D must be connected to safety ground through the correct connections. The non-observance or the degradation of this earth connection can lead to electric shocks, even fatal ones. As regards the correct connection modes, please refer to the information contained in paragraph 4.
- Disconnect TPS/T/D from the mains before any work on the equipment and on the connected power loads.
- Before touching the load or the output connector make sure that the power supply on the device has been disconnected for at least 30 minutes. This is the time necessary in order for the capacitors inside the device to discharge. The non-observance of this discharge time can lead to electric shocks, even fatal ones.
- Avoid heavy shocks to the equipment (especially during transport) or exposure to extreme weather conditions.
- Any damage to the product due to transportation, incorrect installation or improper use is not covered by the guarantee supplied by the manufacturer.
- Do not use the equipment in explosive environments or in the presence of dust, acids or corrosive and/or inflammable gases.
- Tampering with or dismantling any component in the equipment will void the warranty automatically.
- Do not operate or store under conditions where condensing may occur or where conductive debris may enter in the case.
- Keep the ventilation holes on the front and rear free from obstruction.
- **Do not make dielectric strengths test on the input or output of the equipment. Contact Elettrotest if you need to do specific test**

ELECTRIC RISK
There are dangerous voltages inside TPS/T/D and over the output connector.
The non-observance of the warnings suggest in this manual can lead to electric shocks, even fatal ones.

OVERHEATING RISK
In the case of a ventilation system failure, the metal parts of the inverter may reach high temperatures (in some cases higher than 70°C).

WARNING SIGNS AND LABELS

The power supply is labelled according to the hazard risk level.

Following signs are typically applied:

Dangerous Voltage

High Voltage

Protective Earth

Read user manual

Chassis Terminal

Dangerous Voltage: Warning of dangerous voltage, typically located near the input/output terminals.

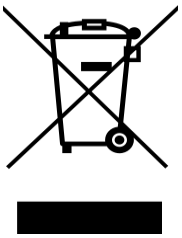
High Voltage: Warning of high voltage, typically located near the input/output terminals.

Protective Earth: Symbol that indicates the main protective earth input and output, typically located near the earth input/out terminals.

Chassis Terminal: Symbol that indicates that the Neutral terminal is connected to the Earth which is connected to the chassis.

Read user manual: Symbol indicating the importance of reading the user manual before operating the machine.

DISPOSAL



INFORMATION FOR USERS ON THE CORRECT HANDLING OF WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE)

In reference to European Union directive 2012/19/EU issued on 24 July 2012 and the related national legislation, please note that:

- WEEE cannot be disposed of as municipal waste and such waste must be collected and disposed of separately;
- the public or private waste collection systems defined by local legislation must be used. In addition, the equipment can be returned to the manufacturer at the end of its working life when buying new equipment;
- the equipment may contain hazardous substances: the improper use or incorrect disposal of such may have negative effects on human health and on the environment;
- the symbol (crossed-out wheeled bin) shown on the product or on the packaging and on the instruction sheet indicates that the equipment must be disposed of separately;
- in the event of illegal disposal of electrical and electronic waste, the penalties are specified by local waste disposal legislation.

INDEX

1. INTRODUCTION

TPS/T/D is a power source that supplies sinusoidal stable voltage. Its output voltage is adjustable in frequency, amplitude and phase.
All this features can be controlled via remote interfaces (RS-232/485 and LAN) or using the 7'' display user panel.

1.1. MAIN FEATURES

1.1.1. Output voltage

The output voltage is guaranteed perfectly sinusoidal, with a distortion of less than 0.3% regardless of the load. The value of output voltage is kept perfectly stable within 0.1% with linear load and a full load.
The load that TPS/T/D is able to drive can vary from a pure capacity to a pure inductance.
The output voltage is adjustable with continuity from zero to full scale.
TPS/T/D can in fact provide the nominal power at various full scales and this allows the TPS/T/D to adapt himself to the disparate needs of the user, without having heavy limitations on the output current.
Furthermore TPS/T/D is capable to keep the voltage stable also with time variable loads, as for example the pulsating loads. In fact, TPS/T/D recovers the distortion of the waveform within 200us with linear load and the amplitude of the voltage within 0.1% in less than half period.
Furthermore, TPS/T/D can bear a short circuit for an indefinite time without suffering any consequence.

1.1.2. Output frequency

In AC configuration TPS/T/D allows the regulation of the output frequency from 10 to 80Hz without any derating, and up to 320Hz with derating of the output performance.
This output frequency can be regulated with continuity within the above-mentioned range of frequencies and it has a stability of 0.01% with respect to the set frequency.

1.1.3. User interface

TPS/T/D is intended to have a user-friendly interface. It is also featured the possibility of a host computer control, thus allowing to perform tests automatically. TPS/T/D allows various usage selections: wires drop compensation, working frequency. Furthermore, TPS/T/D gives the user clear information on the status of the output. Set voltage and set frequency are monitored and the output voltage is read with a precision of 0.3%.
The user is also warned in case of over current obtainable by the TPS/T/D, or in case of high loss in the wires, that should not exceed 5% of the set voltage.
We underline again that TPS/T/D automatically limits the maximum allowed current, avoiding damages to the equipment; the only consequence is that, in this case, it is not guaranteed the precision of the output waveform neither the accuracy of the output voltage.
The user can set the output voltage through the LCD touchscreen, the same possibility is valid for the setting of the frequency and the phase.
The above possibility makes the TPS/T/D very flexible in those applications where it is requested a continuous variation of the two regulated magnitudes, around a given values.

1.1.4. General performances

All the following features are valid within the range of the normal operating limits; they are not valid during the limitation of the output current

PARAMETER	VALUE
Distortion of the output waveform (1)	<0.3%
Stability of the output voltage	<0.1% f.s.
Accuracy of the output voltage	<0.5% f.s.
Recovery-time of the output waveform	<200us
Maximum compensated drop on wires	5% s.v.
Recovery time of RMS	<200ms

f.s. stands for Full Scale; s.v. stands for Set Value

(1)With linear load;

1.1.5. General Specifications

The voltage is referred phase to neutral, with neutral connected to the earth.

PARAMETER	VALUE
Output Frequency Range	10Hz - 80Hz(1)
Phase Resolution	1°
Frequency Resolution	0.02Hz
Frequency Precision and Time Stability	100ppm
Output Voltage (2)	300Vac
Output Voltage Resolution	0.025% f.s. (12 bit f.s.)
Operating Temperature	5°C - 40°C

(1) Frequency can be increased up to 320 Hz at lower performance than the nominal.

1.1.6. Ambiental Conditions

The TPS/T/D models are designed for operation under the following environmental conditions:

DESCRIPTION	VALUE
TPS Operating Enviroment	Internal use
Max altitude	2000m s.l.m.
Operating temperature	5°C – 40°C
Pollution Degree	2
Enviroment relative humidity	80% max until 31°C * Linear decrease up to 50% for temperatures up to 40°C
Input voltage stability	Max ±10% rated input voltage
Transient overvoltage category	2

The generator has been designed to withstand transient overvoltages, typical of mains power.

Note:

The manufacturer declines all responsibility in the event of use by the customer of this equipment in environmental conditions different from those indicated in this chapter.

2. MODELS

The following tables show all the characteristics of all TPS/T/D codes:

	TPS/T/D 10KVA (7.5K22.5S)		TPS/T/D 20KVA (15K45S)		TPS/T/D 40KVA (30K60S)		TPS/T/D 60KVA (50K120S)		TPS/T/D 90KVA	
MAIN CHARACTERISTICS										
Code	***99116213***		***99116313***		***99116413***		***99116513***		***99116713***	
Input Voltage	400Vac ± 10% 3PH without Neutral									
Input Frequency	47-63Hz									
Maximum Input Current[2]	20A		64A		120A		250A		250A	
Output Voltage Range[3]	**150V**[3]	**300V**[3]	**150V**[3]	**300V**[3]	**150V**[3]	**300V**[3]	**150V**[3]	**300V**[3]	**150V**[3]	**300V**[3]
Output Voltage AC	0 - 150	0 - 300	0 - 150	0 - 300	0 - 150	0 - 300	0 - 150	0 - 300	0 - 150	0 - 300
Output Frequency Range	*10-320Hz*[5]		*10-320Hz*[5]		*10-320Hz*[5]		*10-320Hz*[5]		*10-320Hz*[5]	
Configuration	***Continuous***	***InRush***	***Continuous***	***InRush***	***Continuous***	***InRush***	***Continuous***	***InRush***	***Continuous***	***InRush***
Max. output Power	10KVA	7.5KVA/22.5KVA	20KVA	15KVA/45KVA	40KVA	30KVA/60KVA	72KVA	50K120S	95kVA	No inrush mode
Possible Output Configuration	1phase (P+N) / 3phase (3P+N)		1phase (P+N) / 3phase (3P+N)		1phase (P+N) / 3phase (3P+N)		1phase (P+N) / 3phase (3P+N)		3phase (3P+N) [4]	
Output Characteristic	Isolated		Isolated		Isolated		Isolated		Isolated	
DIMENSION / WEIGHT										
Height	1600 mm		1600 mm		1600 mm		1800mm		1800mm	
Widht	625 mm		940 mm		940 mm		1200mm		1200mm	
Depth	625 mm		625 mm		625 mm		800mm		1000mm	
Weight [1]	300 Kg		400 Kg		600 Kg		1000 Kg		1200 Kg	
GENERAL										
Operating Temperature	0°C - 35°C									
User Interface	7” Touch Screen Display									
Communication Interface	RS232, RS485 , ETHERNET									
Communication Protocol	Elettrotest, SCPI, Modbus RTU , Modbus TCP/IP									
Protection	Overtemperature, Overvoltage, Undervoltage, Inverter									
Current Limitation	Programmable and selectable from PEAK & RMS Limit									
Efficiency	Better than 88% at full power									

MAXIMUM OUTPUT CURRENT IN SINGLE-PHASE MODE																		
Configuration	***Continuous***		***InRush***		***Continuous***		***InRush***		***Continuous***		***InRush***		***Continuous***		***InRush***		***Continuous***	
Range	**150V**	**300V**	**150V**	**300V**	**150V**	**300V**	**150V**	**300V**	**150V**	**300V**	**150V**	**300V**	**150V**	**300V**	**150V**	**300V**	**150V**	**300V**
RMS continuous [2]	66.7A	33.3A	49.6A	24.8A	133A	66.5A	100A	50A	267A	133A	200A	100A	480A	240A	330A	165A	No single-Phase option	
Inrush Current (3 seconds) [2]	No InRush		149A	74.4A	No InRush		300A	150A	No InRush		400A	200A	No InRush		800A	400A	No single-Phase option	

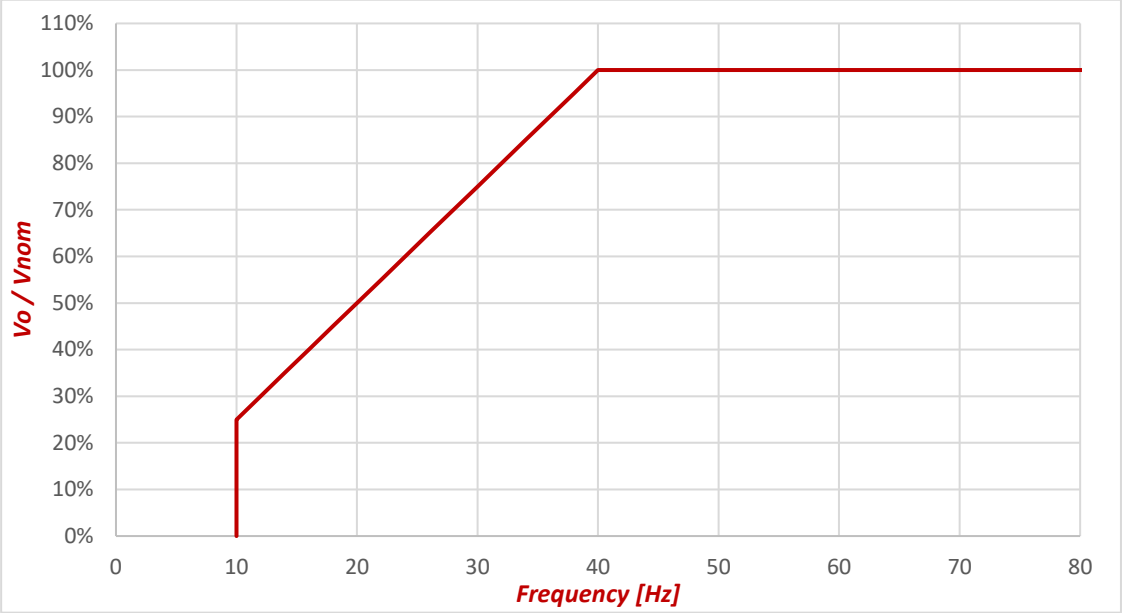
MAXIMUM OUTPUT CURRENT IN THREE-PHASE MODE																		
Configuration	***Continuous***		***InRush***		***Continuous***		***InRush***		***Continuous***		***InRush***		***Continuous***		***InRush***		***Continuous***	
Range	**150V**	**300V**	**150V**	**300V**	**150V**	**300V**	**150V**	**300V**	**150V**	**300V**	**150V**	**300V**	**150V**	**300V**	**150V**	**300V**	**150V**	**300V**
RMS continuous [2]	22.2A	11.1A	16.6A	8.33A	44.4A	22.2A	33.3A	16.7A	88.9A	44.5A	66.6A	33.3A	160A	80A	112A	56A	213A	107A
Inrush Current (3 seconds) [2]	No InRush		50A	25A	No InRush		100A	50A	No InRush		133A	66.7A	No Inrush		266A	133A	No InRush option	

OUTPUT CHARACTERISTIC	
Output Noise	Less than 1000 mVrms
Output voltage stability	Less than 0.1% f.s.
Output voltage precision	Less than 0.5% f.s.
THD	Less than 0.3%
Waveform recovery time	Less than 200 µs
Maximum compensation of drop on wires	5% s.v.
Recovery time of the compensation for the drop on wires	Less than 200 ms

[1] Approx Value
[2] At nominal voltage value with linear load
[3] Other voltage range if requested
[4] Option available with reduced power
[5] With an output Frequency from 80Hz to 320Hz there will be a performance derating. If the frequency value is set under 40Hz, it is not possible to set the maximum voltage level.
f.s. = full scale; s.v.= set value

2.1. Voltage/Frequency Ratio

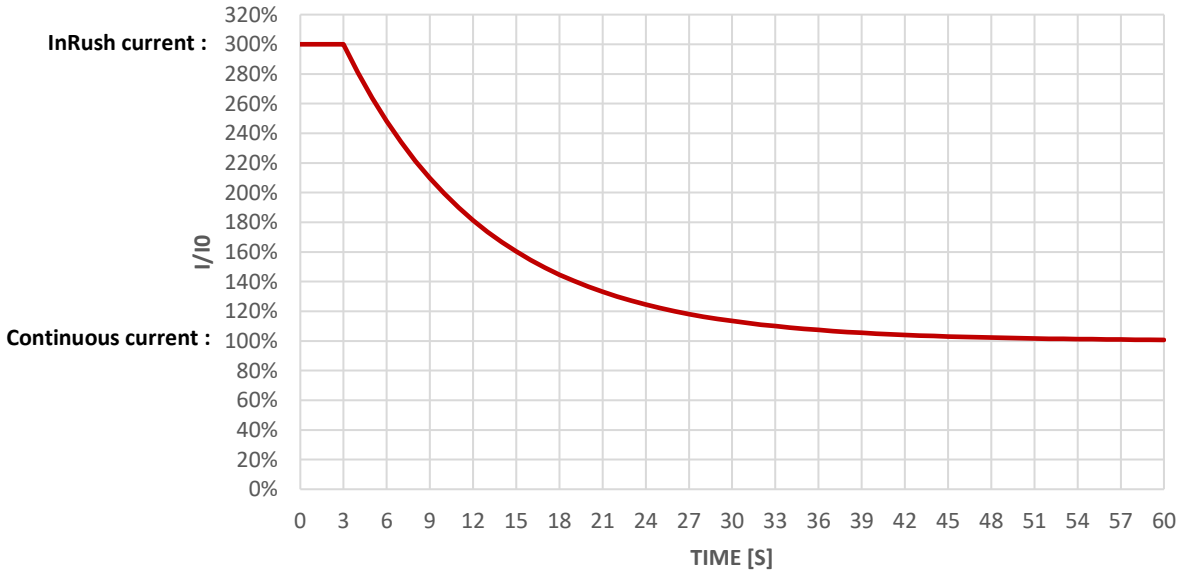
The allowable frequency range extends from 10 Hz to 320 Hz. Within the 40 Hz to 320 Hz range, the output voltage can be freely set without restrictions. In contrast, from 10 Hz to 39 Hz, the maximum settable output voltage is subject to derating, as detailed in the graph below.



Furthermore, in the 80 Hz to 320 Hz range, output current limitations may arise depending on the characteristics of the Power supply and load.

2.2. INRUSH CURRENT VS TIME

The inrush current stay at the value indicated in the Models table only for 3 seconds.
Then it will follow the line in the graph shown hereunder until the ampere value for the continuous mode.



3. WHEELS MOUNT

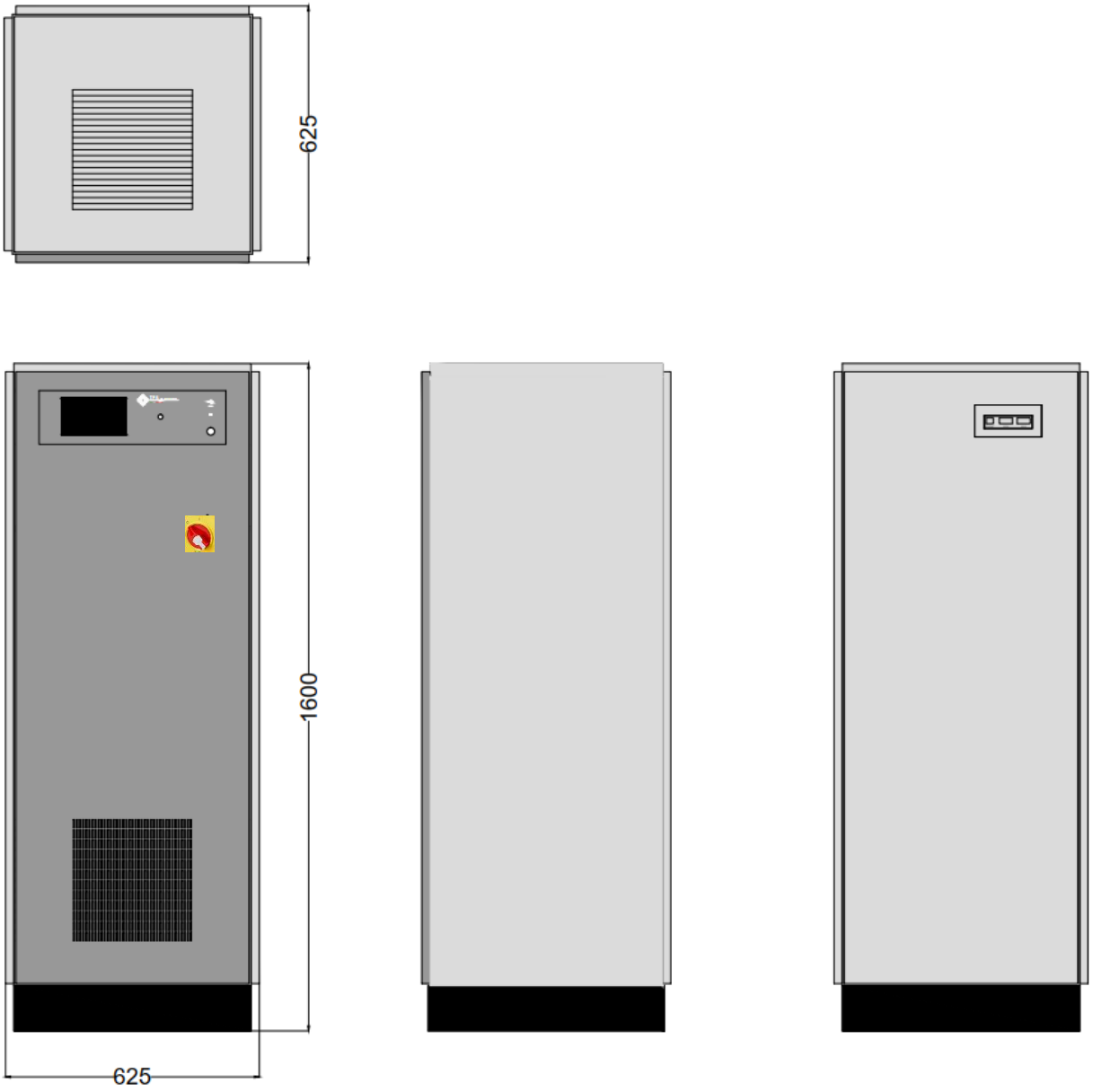
Not for all the codes of the TPS/T/D series the wheels are installed by default. Down here there is a list with options based on the model.

Model	Wheels	Accessory
99116213 TPS/T/D 10KVA	Supplied with the machine but not mounted*	-
99116313 TPS/T/D 20KVA	Supplied with the machine but not mounted*	-
99116413 TPS/T/D 40KVA	Supplied with the machine but not mounted*	-
99116513 TPS/T/D 60KVA	Not supplied with the machine	99997500
99116713 TPS/T/D 90KVA	Not supplied with the machine	99997505

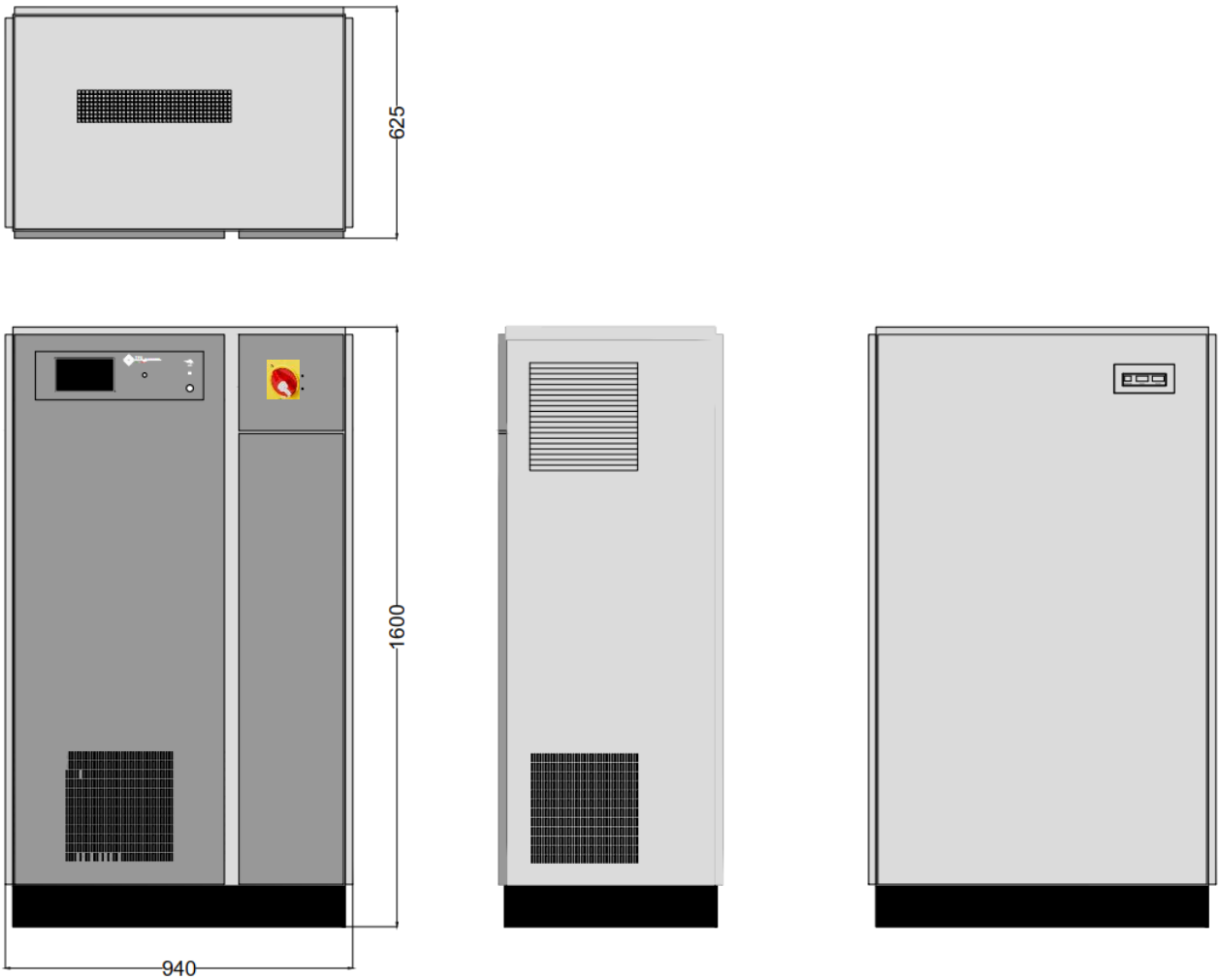
**If you need mounted, it is necessary to order the option 99101500 Wheels Mounted Option*

4. MECHANICAL DRAWINGS

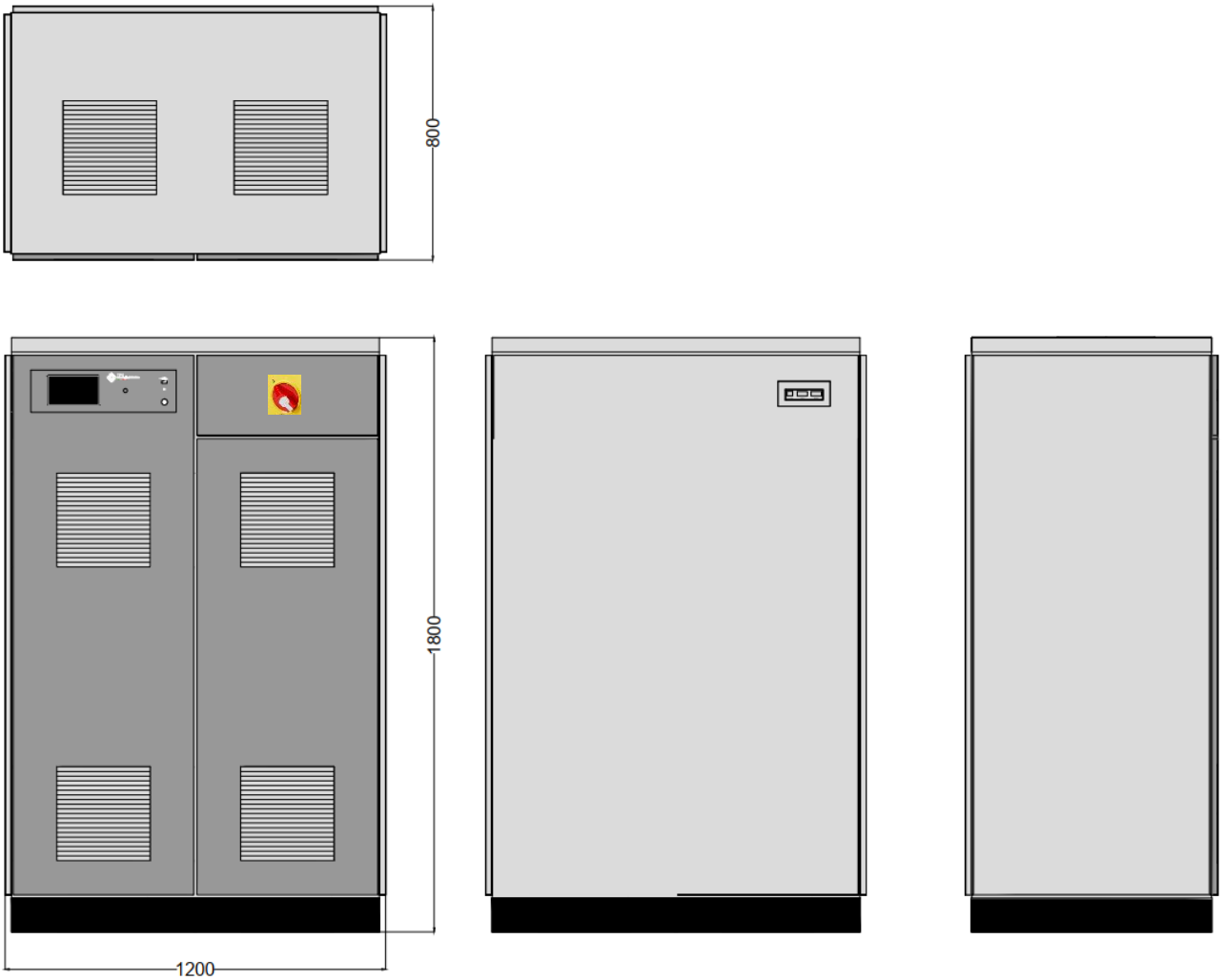
4.1.1. TPS/T/D 10KVA



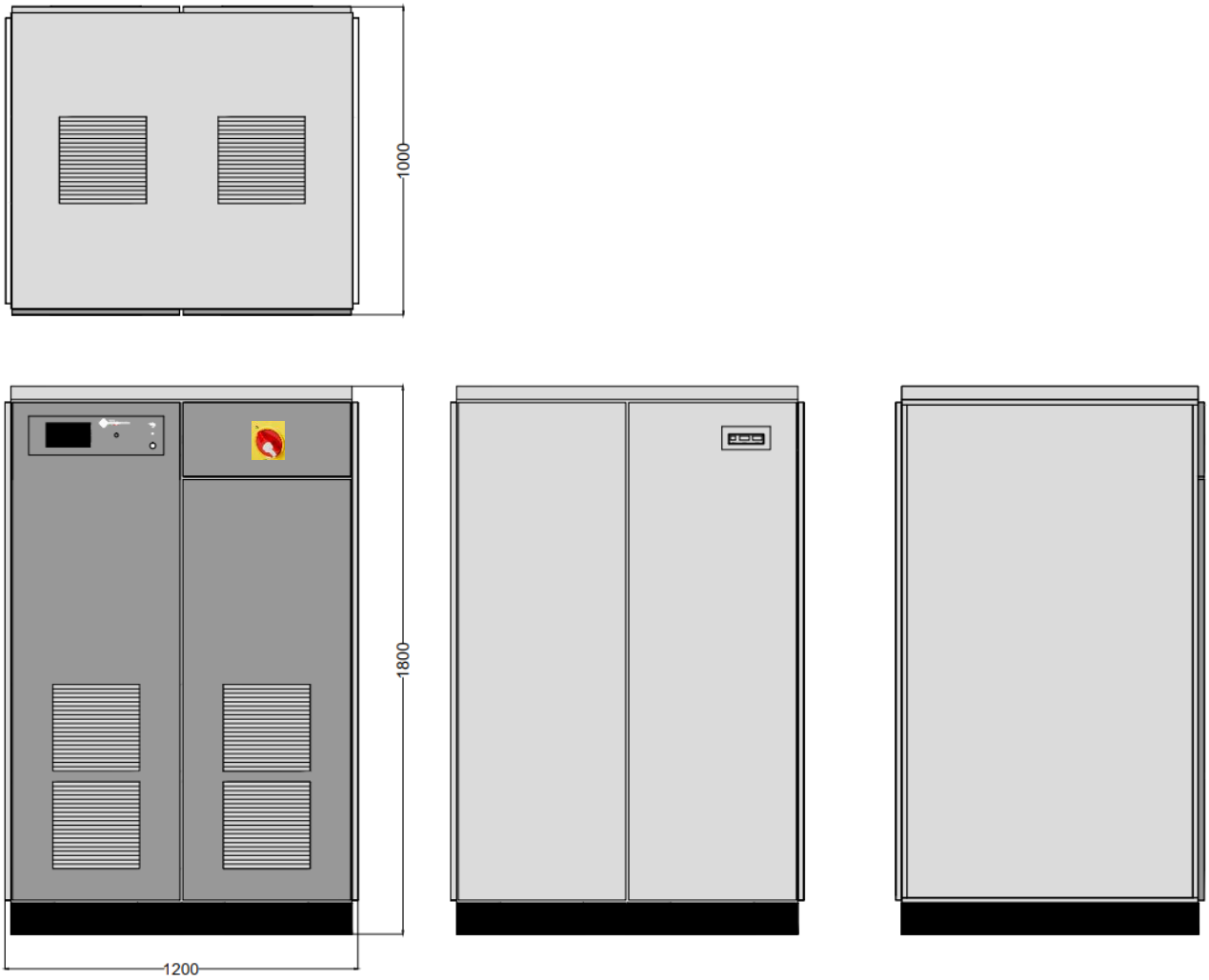
4.1.2. TPS/T/D 20KVA & TPS/T/D 40KVA



4.1.3. TPS/T/D 60KVA

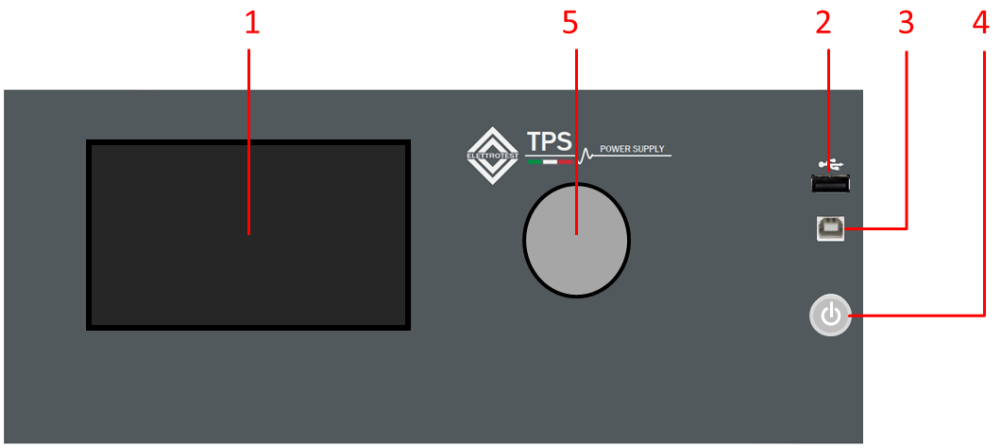


4.1.4. TPS/T/D 90KVA



5. NOTES FOR USERS

5.1.1. FRONT PANEL



Item	Name	Description
1	Touch Screen	Input programming data or options by using touch screen interface
2	USB Type A Interface	USB Type A for storage key
3	USB Type B Interface	USB type B for upgrade firmware
4	Power Switch	Press this button to switch on/off power part
5	Knob	Rotate to change the selected data

5.1.2. COMUNICATIONS REAR PANEL

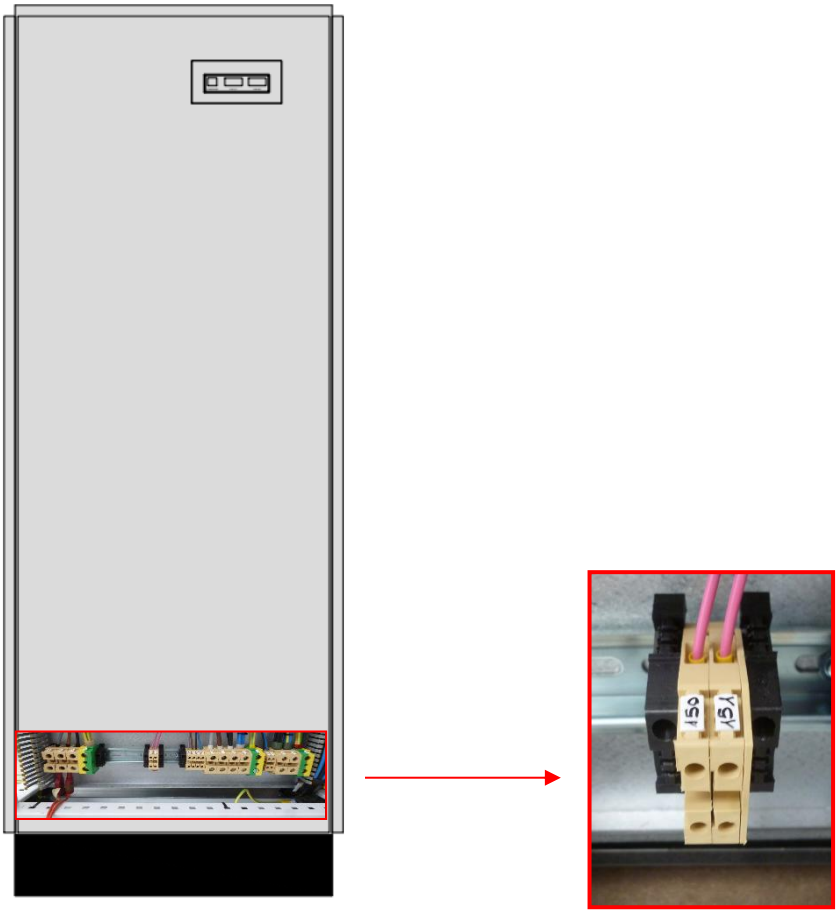
Item	Name	Description
1	Ethernet Interface	This interface is used for remote control via Ethernet cable
2	RS232 Interface	This interface is used for remote control via RS232 cable
3	RS485 Interface	This interface is used for remote control via RS485 cable

You can select the interface from the touch panel

5.2. ENABLE SWITCH

The TPS/T/D has a clean 24Vac contact, for the emergency disabling of the generator output.
For normal operation of the generator, the contact must be closed. Opening this contact disables the generator output, but does not interrupt the input power to the generator and does not disable the touch display.
This contact is supplied as normally closed via a shorting lead, but can be used to connect a possible emergency switch, which when pressed disables the generator output.

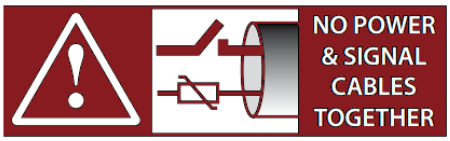
The terminals used for this purpouse are the 150 & 151 terminals. Those can be found taking off the rear panel, near the input/output terminals.



TPS/M/D 10KVA REAR PANEL

Note: Indications for other TPS/T/D models can be found in cap. 6.3

6. INSTALLATION



READ CAREFULLY IN THE TEXT!

6.1. GENERAL NOTES

6.1.1. Inspection

After unpacking the product, please inspect any damage that may have occurred during the shipment. Save all packing materials in case the product has to be returned one day. If any damage is found, please file a claim with the carrier immediately. Do not return the product to the factory without obtaining the prior Return Merchandise Authorization (RMA) acceptance from ELETTROTEST S.P.A.

6.1.2. Product ambient placement

After unpacking the product, ensure the product is positioned securely in a stable, well-ventilated location that meets all specified clearance and access requirements.
Please make sure that the product is installed 1 meter away from the walls.

Install the generator in a fixed position, near any fixed protection devices such as residual-current circuit breakers and/or disconnect switches.
Ensure that the power cables have sufficient gauge to support the maximum input current of the generator.

Detailed information on the external protection devices for the generator's input and output can be found in Chapter **6.3** of this manual.

Attention: Do not place the product in confined or small spaces that may hinder access to the external disconnector of the system. Additionally, inadequate ventilation could prevent proper cooling, potentially leading to device malfunctions.

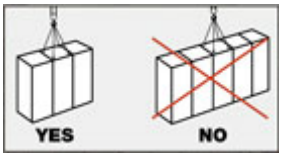
6.2. MOVIMENTATION INSTRUCTIONS

The TPS/T/D is delivered mounted on a pallet, suitable for handling with mechanized equipment.
Move the power supply unit to its final installation location and then remove the pallet from the TPS/T/D using a lifting trolley.

6.2.1. Movement with pallet truck

HANDLING INSTRUCTIONS

- Check the pallet integrity before lifting.
- Properly position the pallet truck under the pallet, ensuring that the forks are fully inserted and balanced.
- Lift the load gradually and keep it at an appropriate height from the ground throughout the entire transport.
- **Final positioning:**
  Once the installation site in reached, lower the load slowly and ensure that the surface is level and capable of supporting its weight.



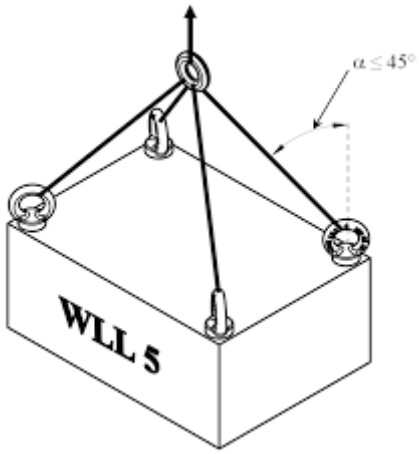
SAFETY PRECAUTIONS

⚠ WARNING: RISK OF TIPPING OR DAMAGE TO THE LOAD

Transport path:
The route must be flat, free of obstacles, and without slopes greater than 5%.
Avoid uneven ground, potholes, or slippery surfaces (e.g., wet or oily floors).
Load stability:
Do not exceed a handling speed of 3 km/h.
For long-distance movements, secure the load with straps to prevent slipping.
Operators:
Never stand under a lifted load.
Keep a safe distance from other people during transport.

6.2.2. Pallet removal

To remove the pallet, it is necessary to lift the TPS using an overhead crane or hoist.
Attach the lifting slings to the four eyebolts located on the top of the cabinet and connect them to the crane hook, ensuring that the angle does not exceed 45°, as shown in the figure below.



Connect the slings to the crane hook, ensuring that the lifting point is centered on the load's center of gravity. Then, slowly lift the load just a few centimeters off the pallet.

Stop and verify that the load is stable and well-balanced. Once confirmed, remove the pallet, making sure the load is fully suspended and stationary.

After removing the pallet, slowly lower the TPS onto a safe and level surface.

⚠ **WARNING:**
Before performing the pallet removal operation, ensure that the lifting equipment has a rated capacity greater than the weight of the load.

6.3. POWER CABLING

6.3.1. I/O cable Ratings

For a correct installation of the device, use the following recommendations for the Input and Output cables:

Item	Preferred Cable Type	Minimum required insulation
3Ph+PE input cable	N07VK cables*	Single
3Ph output cable	N07VK cables*	Single
1Ph output cable	N07VK cables*	Single
Output sense cables	FS17 cables*	Single
RS232/RS485	DB9 Straight Through	-
Ethernet	Cat.6 cable	-

*I/O cable dimensions depend on input/output current ratings.

6.3.2. Cable installation process

To wire correctly your TPS/T/D follow these instructions:

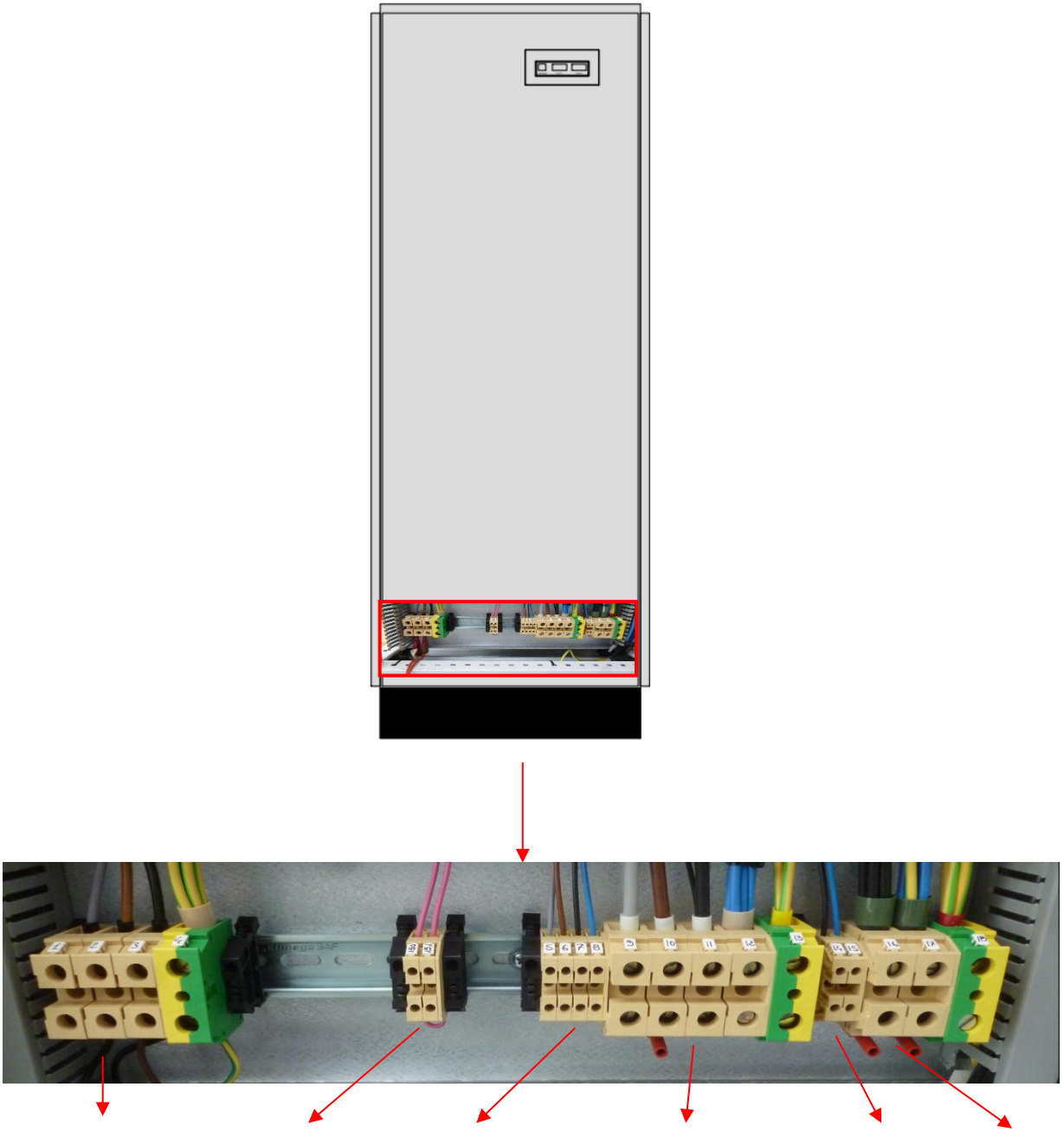
1. Take off the rear panel.
2. Connect a supply cable 3P+PE of adequate size to support the current of the model.
3. Connect the load cable of correct size to support the maximum load current for the Three-Phase or Single-Phase output.
4. If needed, connect the three-phase or single-phase sense cable, depending on which output is used.
5. Close the rear Panel.

Remember to create two separate output lines, one for the power cables and one for the signal cables.

Attention: Always ensure that the protective grounding is connected to the respective earth terminals (PE) of the generator. The manufacturer disclaims any responsibility for damages to persons or property resulting from non-compliance with the wiring instructions provided in this chapter.

6.3.3. TPS/T/D 10KVA

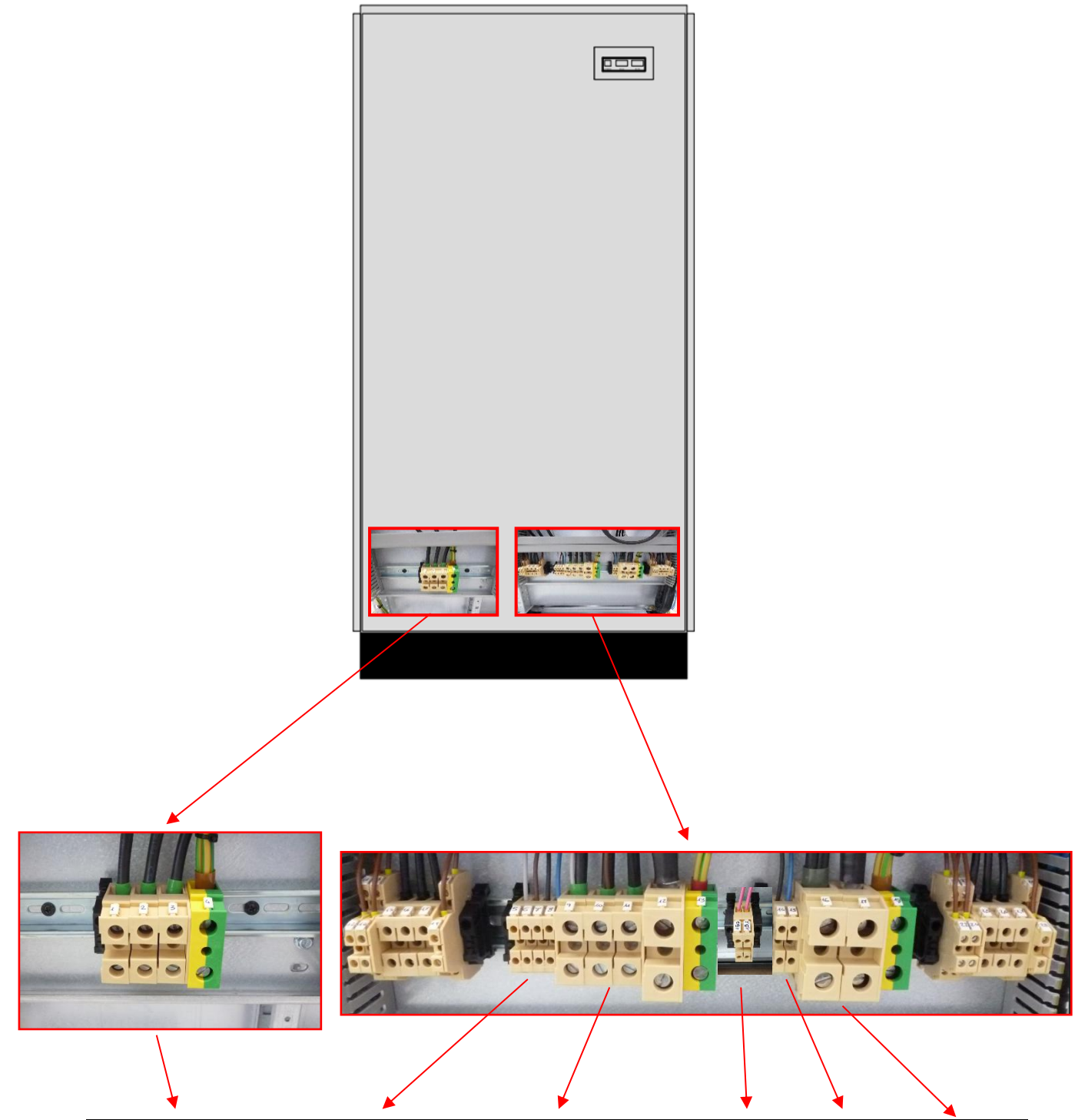
Follow the table below to connect the right input/output terminals.



	Input line				\	Enable Switch		\	Sense 3-PH				Output 3-PH					\	Sense 1-PH		Output 1-PH		
	1	2	3	4	\	150	151	\	5	6	7	8	9	10	11	12	13	\	14	15	16	17	18
	L1	L2	L3	PE	\	En1	En2	\	L1	L2	L3	N*	L1	L2	L3	N*	PE	\	L1	N*	L1	N*	PE
Terminal Type	Cabur CBD.35			Cabur TE.50/O	\	Cabur CBD.4		\	Cabur CBD.4				Cabur CBD.35				Cabur TE.50/O	\	Cabur CBD.4		Cabur CBD.35		Cabur TE.50/O

** Both the output Neutral terminals are connected to the output PE terminals*

6.3.4. TPS/T/D 20KVA - TPS/T/D 40KVA

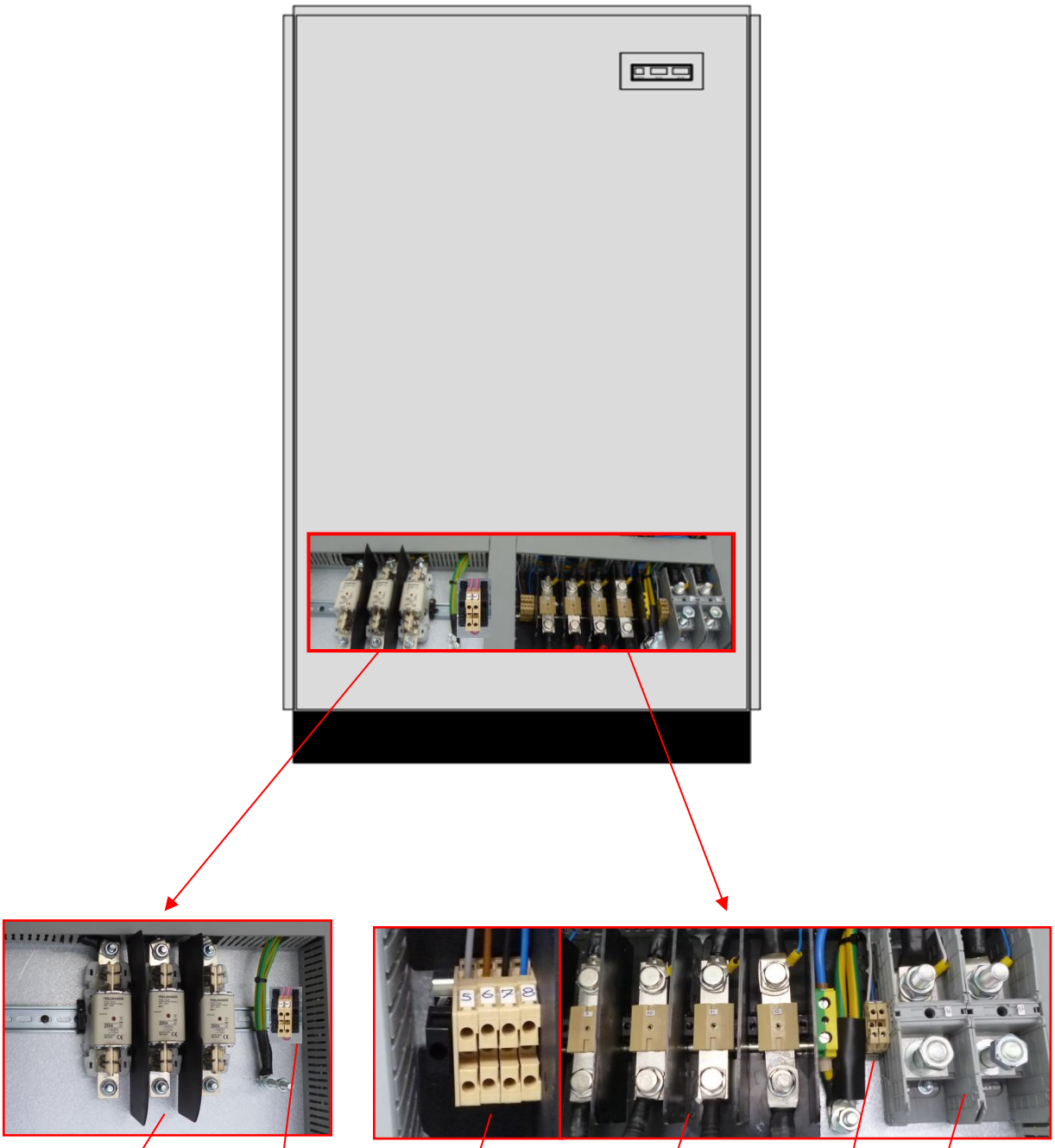


	Input line				\	Sense 3-PH				Output 3-PH					Enable Switch		Sense 1-PH		Output 1-PH		
	1	2	3	4	\	5	6	7	8	9	10	11	12	13	150	151	14	15	16	17	18
	L1	L2	L3	PE	\	L1	L2	L3	N*	L1	L2	L3	N*	PE	En1	En2	L1	N*	L1	N*	PE
Terminal Type	Cabur CBD.35			Cabur TE.50/O	\	Cabur CBD.4				Cabur CBD.35			Cabur CBD.70	Cabur TE.50/O	Cabur CBD.4		Cabur CBD.4		Cabur CBD.70		Cabur TE.50/O

** Both the output Neutral terminals are connected to the output PE terminals*

6.3.5. TPS/T/D 60KVA

TPS/T/D 60KVA REAR PANEL

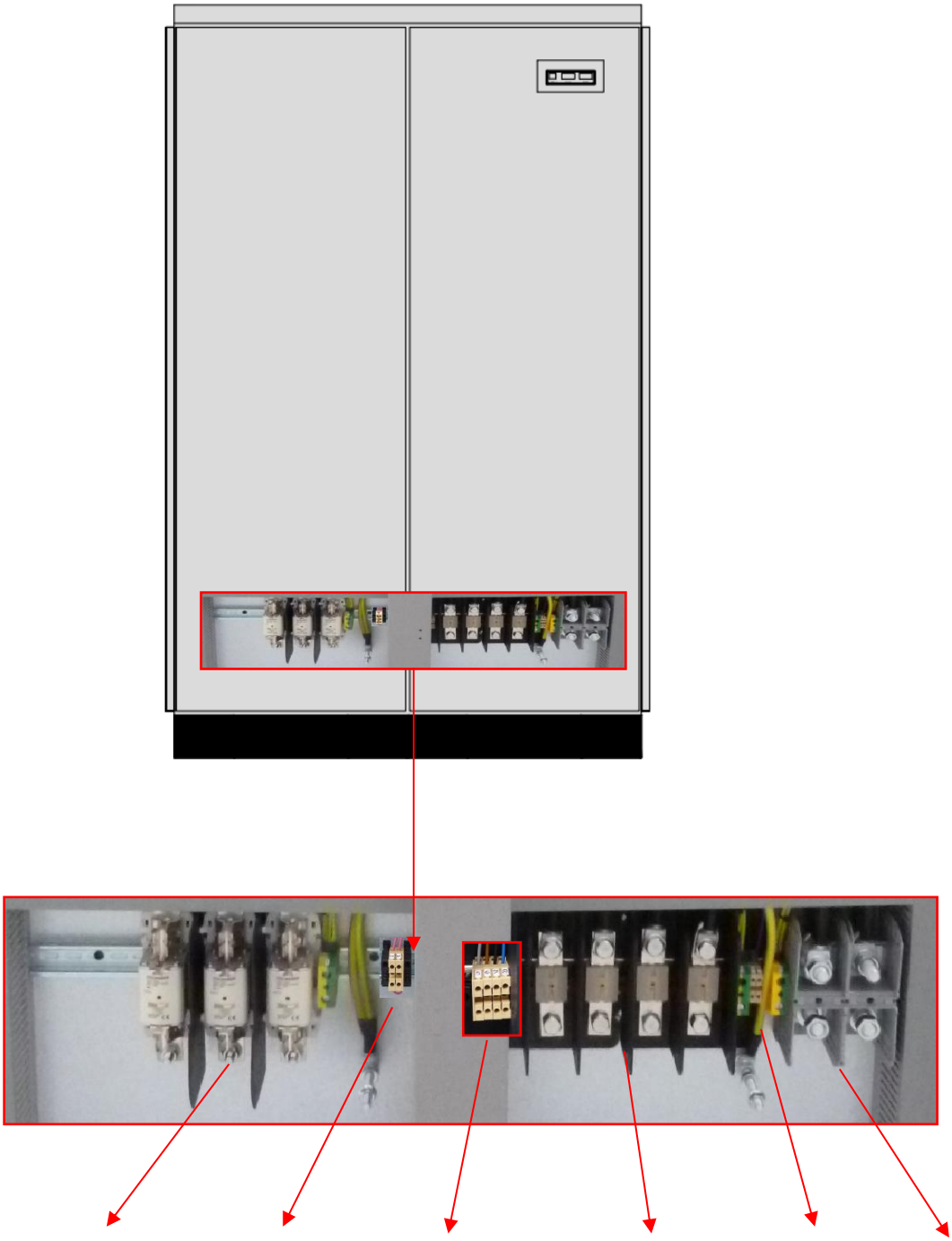


	Input line				Enable Switch		\	Sense 3-PH				Output 3-PH					Sense 1-PH		Output 1-PH	
	1	2	3	4	150	151	\	5	6	7	8	9	10	11	12	13	14	15	16	17
	L1	L2	L3	PE	En1	En2	\	L1	L2	L3	N*	L1	L2	L3	N*	PE	L1	N*	L	N*
Terminal Type	ITALWEBER NHU-1 DINX3S			M8 Screw	Cabur CBD.4		\	Cabur CBD.4				CABUR ACB.185/BB				M10 Screw	Cabur CBD.4		Phoenix RBO 16	

** Both the output Neutral terminals are connected to the output PE terminals*

6.3.6. TPS/T/D 90KVA

TPS/T/D 90KVA REAR PANEL



	Input line					Enable Switch		\	Sense 3-PH				Output 3-PH					Sense 1-PH**		Output 1-PH**		
	1	2	3	4	\	150	151	\	5	6	7	8	9	10	11	12	\	14	15	13	16	17
	L1	L2	L3	PE	PE	En1	En2	\	L1	L2	L3	N*	L1	L2	L3	N*	PE	L1	N*	PE	L	N*
Terminal Type	ITALWEBER NHU-1 DINX3S			Cabur TE.50/O	M10 Screw	Cabur CBD.4		\	Cabur CBD.4				CABUR ACB.185/BB				M10 Screw	Cabur CBD.4		Cabur TE.50/O	Phoenix RBO 16	

** Both the output Neutral terminals are connected to the output PE terminals*
*** Terminals present only for single-phase option.*

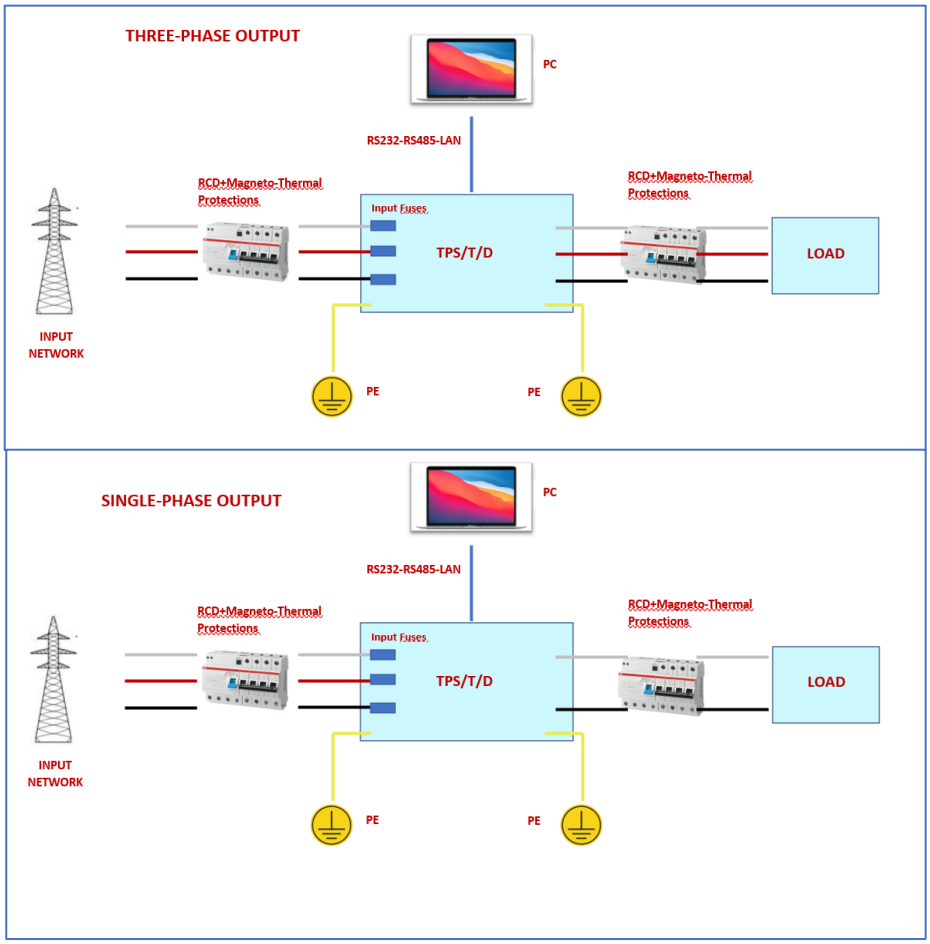
6.4. PROTECTION DEVICE

ATTENTION:
The guidelines for electrical protections provided in this manual serve as recommendations for sizing the input and output protections of the generator.
Elettrotest disclaims any responsibility for any failures or damages to persons or property resulting from incorrect sizing of the generator's input and output protections.
Always consult local regulations to connect the TPS in a safety & correct way.

6.4.1. GENERAL DIAGRAM

Mandatory
Safety protection (Magneto-thermal and differential) are mandatory according to the nominal TPS/T/D characteristic.
An additional adequate protection **must be add** when electrical components (cable, Equipment under test – EUT) cannot support TPS/T/D performance.

Examples of general diagram for protections:



Note: In addition to the RCD and the magneto-thermal protection at the generator's power line input, it is mandatory to install a disconnector.

6.4.2. RCD PROTECTION

A Residual Current Device (RCD), or differential current switch, is a device that instantly interrupts an electrical circuit to prevent serious harm from electric shock. It is recommended to use a type B RCD with a ground fault current rating of 30 mA, based on the nominal specifications of the input. The machine may draw more than 100 mA at high frequency; ensure that the RCD is equipped with a high-frequency filter.
For the TPS/D models listed in this manual, we recommend using a differential switch with the following characteristics:

Model	Pole	In	Type
TPS/T/D 10kVA	3	25A	B
TPS/T/D 20kVA	3	63A	B
TPS/T/D 40kVA	3	125A	B
TPS/T/D 60kVA	3	250A	B
TPS/T/D 90kVA	3	250A	B

As indicated in the table above, it is advisable to use a type B differential protection device on the input line, selected according to the nominal specifications of the TPS/T/D model in use.
The differential protection for the single-phase/three-phase output depends on the final load and the type of installation.

6.4.3. MAGNETO-THERMAL PROTECTION

The magnetic circuit breaker protects the line from overloads and short circuits. Its specifications generally depend on the load and the wiring (cable size and length).
For the TPS/D models listed in this manual, we recommend using a magnetic circuit breaker with the following characteristics:

Model	Pole	In	Type
TPS/T/D 10kVA	3	25A	C
TPS/T/D 20kVA	3	63A	C
TPS/T/D 40kVA	3	125A	C
TPS/T/D 60kVA	3	250A	C
TPS/T/D 90kVA	3	250A	C

As indicated in the table above, it is advisable to utilize a type C magnetic circuit breaker on the input line, selected according to the nominal specifications of the TPS/T/D model in use.
The magnetic protection on the output side depends on the final load and the type of installation.

6.4.4. LINE FUSES

Fuses can be used to protect power line of the TPS/T/D. It's recommended to use delayed fuses according to the nominal input characteristic (see section 2).
The layout may be different and depends the model design

6.4.5. INTERNAL FUSES TPS/T/D 10kVA

The table below lists the internal fuses for the TPS/T/D 10kVA:

Item	Name	Description	Size	In	Type	Voltage
1	QBB1-QBB2-QBB3	Input Line	10x38	25A	GL	500Vac
2	QBB4-QBB5-QBB6	Pre-charge Line	10x38	1A	AM	500Vac
3	QBB7-QBB8	Auxiliary transformer Input	10x38	2A	AM	500Vac
4	FCA1-FCA2	Auxiliary transformer output	5x20	2,5A	AT	250Vac
5	FCA3-FCA4-FCA5-FCA6	Linee ausiliarie (aux)	5x20	1,25A	AT	250Vac
6	FCA7-FCA8	Fusibile per Enable Switch	5x20	1,25A	AT	250Vac

This list serves only to highlight the characteristics of the internal fuses for the TPS/T/D 10kVA.
The replacement of one or more internal fuses of the TPS/T/D 10kVA is allowed exclusively for qualified personnel and only when the machine is physically disconnected from the input supply and has been turned off for at least 30 minutes to allow the discharge of hazardous internal voltages.
In case of need, please contact the manufacturer via email at: service@elettrotestspa.it

6.4.6. INTERNAL FUSES TPS/T/D 20kVA

Indications The table below lists the internal fuses for the TPS/T/D 20kVA:

Item	Name	Description	Size	In	Type	Voltage
1	QBB1-QBB2-QBB3	Input Line	10x38	63A	GL	500Vac
2	QBB4-QBB5-QBB6	Pre-charge Line	10x38	1A	AM	500Vac
3	QBB7-QBB8	Auxiliary Transformer input	10x38	2A	AM	500Vac
4	FCA1-FCA2	Auxiliary Transformer output	5x20	2,5A	AT	250Vac
5	FCA3-FCA4-FCA5-FCA6-FCA9-FCA10	Auxiliary Lines	5x20	1,25A	AT	250Vac
6	FCA7-FCA8	Fuse for Enable switch	5x20	1,25A	AT	250Vac

This list serves only to highlight the characteristics of the internal fuses for the TPS/T/D 20kVA.
The replacement of one or more internal fuses of the TPS/T/D 20kVA is allowed exclusively for qualified personnel and only when the machine is physically disconnected from the input supply and has been turned off for at least 30 minutes to allow the discharge of hazardous internal voltages.
In case of need, please contact the manufacturer via email at: service@elettrotestspa.it

6.4.7. INTERNAL FUSES TPS/T/D 40kVA

Indications The table below lists the internal fuses for the TPS/T/D 40kVA:

Item	Name	Description	Size	In	Type	Voltage
1	QBB1-QBB2-QBB3	Input Line	22x58	100A	GL	500Vac
2	QBB4-QBB5-QBB6	Pre-charge Line	10x38	1A	AM	500Vac
3	QBB7-QBB8	Auxiliary Transformer input	10x38	2A	AM	500Vac
4	FCA1-FCA2	Auxiliary Transformer output	5x20	2,5A	AT	250Vac
5	FCA3-FCA4-FCA5-FCA6-FCA9-FCA10	Auxiliary Lines	5x20	1,25A	AT	250Vac
6	FCA7-FCA8	Fuse for Enable switch	5x20	1,25A	AT	250Vac

This list serves only to highlight the characteristics of the internal fuses for the TPS/T/D 40kVA.
The replacement of one or more internal fuses of the TPS/T/D 40kVA is allowed exclusively for qualified personnel and only when the machine is physically disconnected from the input supply and has been turned off for at least 30 minutes to allow the discharge of hazardous internal voltages.
In case of need, please contact the manufacturer via email at: service@elettrotestspa.it

6.4.8. INTERNAL FUSES TPS/T/D 90kVA

Indications The table below lists the internal fuses for the TPS/T/D 90kVA:

Item	Name	Description	Size	In	Type	Voltage
1	QBB1-QBB2-QBB3	Input Line	Blade	250A	GG	500Vac
2	QBB6-QBB7-QBB8	Pre-charge Line Phase R	10x38	1A	AM	500Vac
3	QBB9-QBB10-QBB11	Pre-charge Line Phase S	10x38	1A	AM	500Vac
4	QBB12-QBB13-QBB14	Pre-charge Line Phase T	10x38	1A	AM	500Vac
5	QBB15-QBB16-QBB17	Inverter input phase R	22x58	63A	GL	500Vac
6	QBB18-QBB19-QBB20	Inverter input phase S	22x58	63A	GL	500Vac
7	QBB21-QBB22-QBB23	Inverter input phase T	22x58	63A	GL	500Vac
8	QBB4-QBB5	Auxiliary Transformer input	10x38	4A	AM	500Vac
9	FCA1-FCA2	Auxiliary Transformer output	5x20	2,5A	AT	250Vac
10	FCA3-FCA4 & *FCA7 to FCA16*	Auxiliary Lines	5x20	1,25A	AT	250Vac
11	FCA5-FCA6	Fuse for Enable switch	5x20	1,25A	AT	250Vac

This list serves only to highlight the characteristics of the internal fuses for the TPS/T/D 90kVA.
The replacement of one or more internal fuses of the TPS/T/D 90kVA is allowed exclusively for qualified personnel and only when the machine is physically disconnected from the input supply and has been turned off for at least 30 minutes to allow the discharge of hazardous internal voltages.
In case of need, please contact the manufacturer via email at: service@elettrotestspa.it

6.5. ACCESSORIES

The tables below show a list of accessories that are supplied with the purchase of a TPS/T/D generator.

6.5.1. TPS/T/D 10kVA ACCESSORIES

Item	Description	Pcs
1	Fuse 10x38 GL-25A	2
2	Fuse 10x38 AM-2A	2
3	Fuse 10x38 AM-1A	2
4	Fuse 5x20 AT-2,5A	2
5	Fuse 5x20 AT-1,25A	2
6	USB KEY	1

6.5.2. TPS/T/D 20kVA ACCESSORIES

Item	Description	Pcs
1	Fuse 22X58 GL-63A	2
2	Fuse 10x38 AM-2A	2
3	Fuse 10x38 AM-1A	2
4	Fuse 5x20 AT-2,5A	2
5	Fuse 5x20 AT-1,25A	2
6	USB KEY	1

6.5.3. TPS/T/D 40kVA ACCESSORIES

Item	Description	Pcs
1	Fuse 22X58 GL-100A	2
2	Fuse 10x38 AM-2A	2
3	Fuse 10x38 AM-1A	2
4	Fuse 5x20 AT-2,5A	2
5	Fuse 5x20 AT-1,25A	2
6	USB KEY	1

6.5.4. TPS/T/D 60kVA ACCESSORIES

Item	Description	Pcs
1	Fuse NH-1 GG-250A	2
2	Fuse 22X58 GL-100A	2
3	Fuse 10x38 AM-2A	2
4	Fuse 10x38 AM-1A	2
5	Fuse 5x20 AT-2,5A	2
6	Fuse 5x20 AT-1,25A	2
7	USB KEY	1

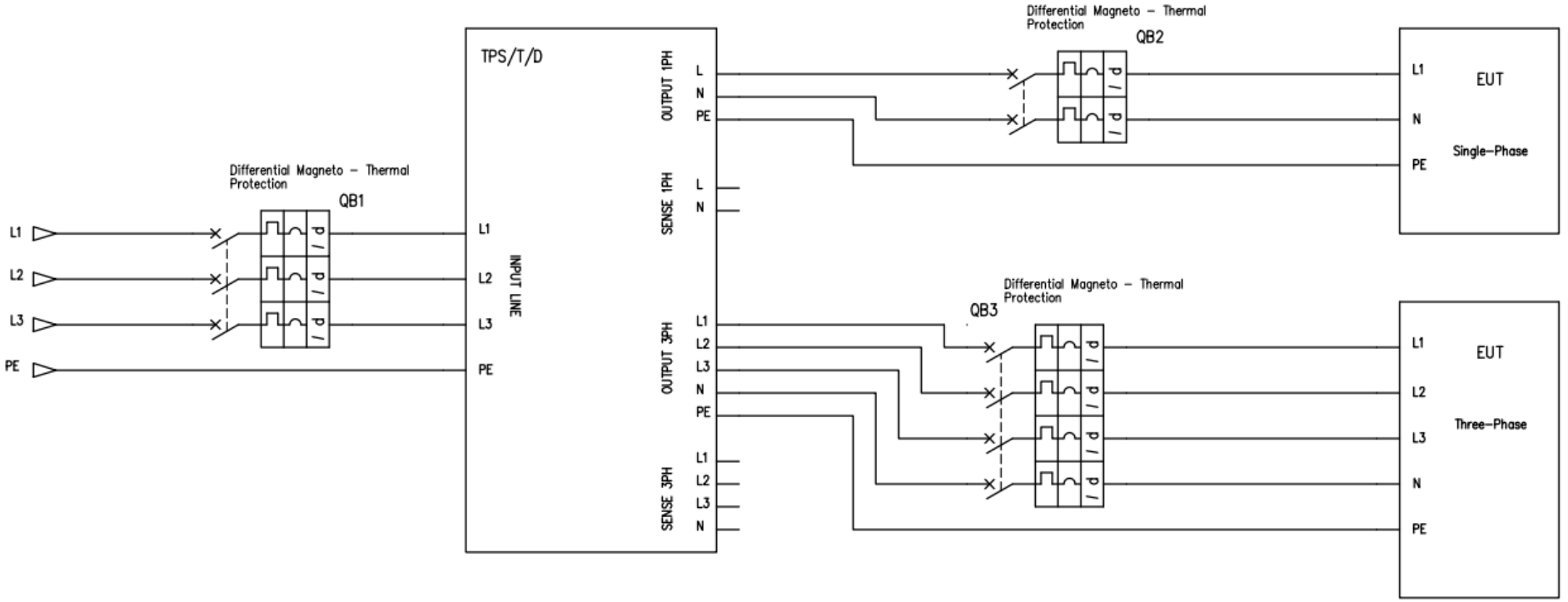
6.5.5. TPS/T/D 90kVA ACCESSORIES

Item	Description	Pcs
1	Fuse NH-1 GG-250A	2
2	Fuse 22X58 GL-100A	2
3	Fuse 10x38 AM-2A	2
4	Fuse 10x38 AM-1A	2
5	Fuse 5x20 AT-2,5A	2
6	Fuse 5x20 AT-1,25A	2
7	USB KEY	1

6.6. WIRING DIAGRAM

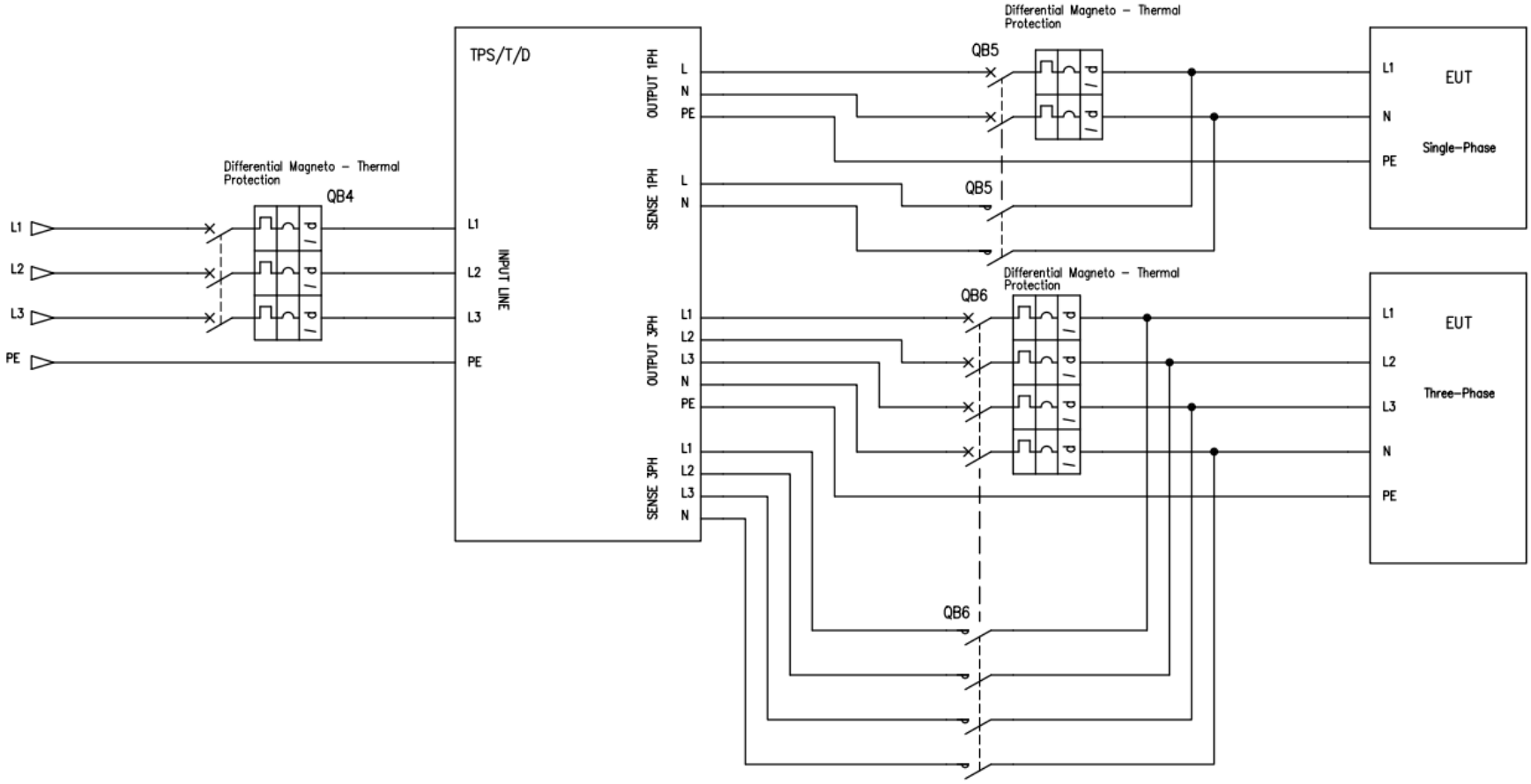
6.6.1. 2 WIRE CONFIGURATION

Use this layout in case it is not necessary to wire the sense terminals.



6.6.2. 4 WIRE CONFIGURATION

Use this layout in case it is necessary to wire the sense terminals to have exactly the setted voltage at the input of the EUT.



7. REMOTE CONTROL

7.1. Control software

TPS/T/D can be remotely controlled via RS232, RS485, LAN communication according to a copyrighted free protocol, SCPI or ModBus Protocol. For further details on protocols, see the specific manuals.

7.2. RS232 serial cable

Use a serial cable according to the standard defined in the figure below:

WIRING CONNECTION		
PC		TPS/T/D
DB9 Poles Female		DB9 Poles Male
2	⇔	2
3	⇔	3
5	⇔	5

7.3. RS485 pinout

Use a serial cable according to the standard defined in the figure below:

DB9 Poles Female	
1:	B
2:	A
5:	GND

8. LOCAL OPERATION

The product can support local operation or remote operation enabled via complete communication interfaces, such as RS232, RS485, Ethernet.
In this section, the local operation enabled via the 7-inch touch screen on the front panel will be described.
The product is configured for local operation when it is turned on.

8.1. POWER ON

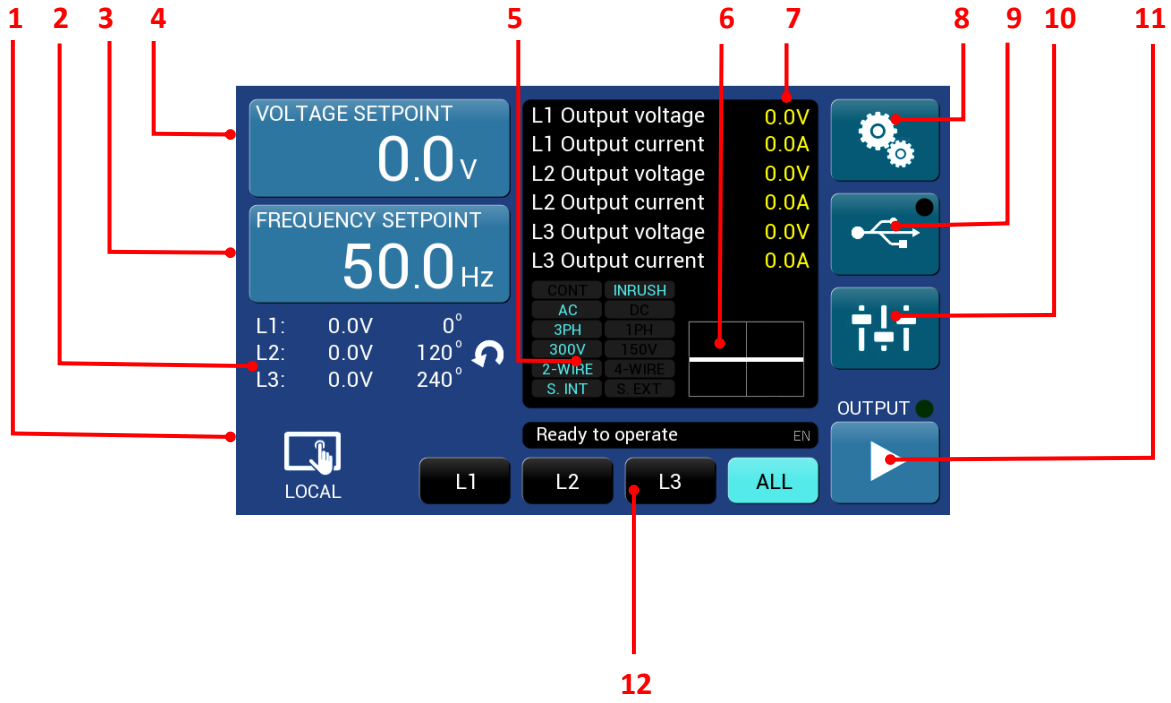
Apply power to the unit and turn the ON/OFF switch (see section 4) in position 1; in this condition the touch screen on the front panel will light up and:

- if the power switch (see section 5.1.1) is in position OFF, TPS/T/D will not start, the user must press it to start the boot process.

- if the power switch (see section 5.1.1) is in position ON, will be displayed the boot page with logo and the revision of the installed firmware. The start up procedure will be completed with the home page view

8.2. HOME PAGE

When the user turns on the TPS/T/D, the touchscreen shows the HOME PAGE after the startup procedure. The TPS/T/D starts at the factory default configuration (for the first start) or at the last stored setting.



Item	Name	Description
1	Local/Remote Icon	Displays if the TPS/T/D is in Local or Remote mode
2	Set Phases and phases rotation	Displays the set voltage and phase values for the three phases. Displays also the output phases rotation*
3	Frequency Setpoint button	Allows to set the frequency value
4	Voltage Setpoint button	Allows to set the voltage value
5	Mode display	Display the set up mode of the TPS/T/D, when you push it you go to OPERATION SETTINGS
6	Waveform display	Click here to modify/see the out values graphs
7	Output Voltage & Current	Displays the value of output voltage and current
8	General Settings button	Allows access to the settings menu page
9	USB button	Allows access to the USB menu page
10	Slide button	Allows access to special functions page
11	Output button	Allows to enable the output
12	Phase selection	Allows to select and control a single output phase or all toghether

*) It is possible to change the rotation of the phases via the advanced command mode.

8.3. VOLTAGE SETPOINT

By clicking on the 

button, the "VOLTAGE SETPOINT" button will be colored to confirm the choice and a numeric keyboard will appear to manually set the voltage value.

Then press "Enter" to confirm the new setting.

8.4. FREQUENCY SETPOINT

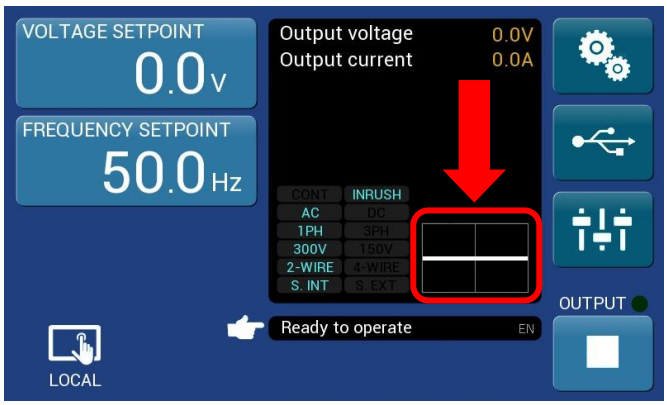
By clicking on the 

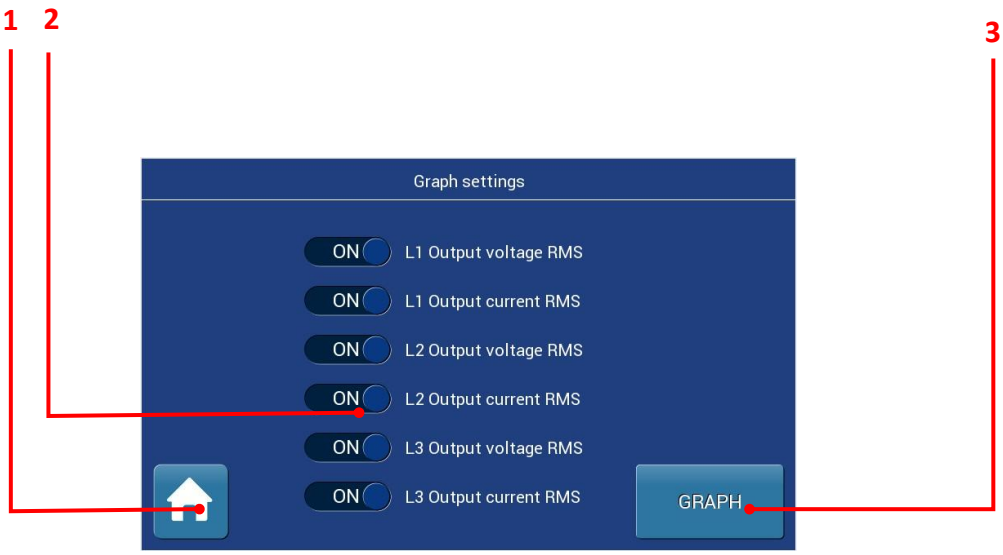
button, the "FREQUENCY SETPOINT" button will be colored to confirm the chose and a numeric keyboard will appear to manually set the frequency value.

Then press "Enter" to confirm the new setting.

8.5. GRAPHS SETTINGS MENU

By clicking on the display  it is possible to see the Graphs Settings menu, in which you can choose to see the voltage and current RMS values graphs for each phase.

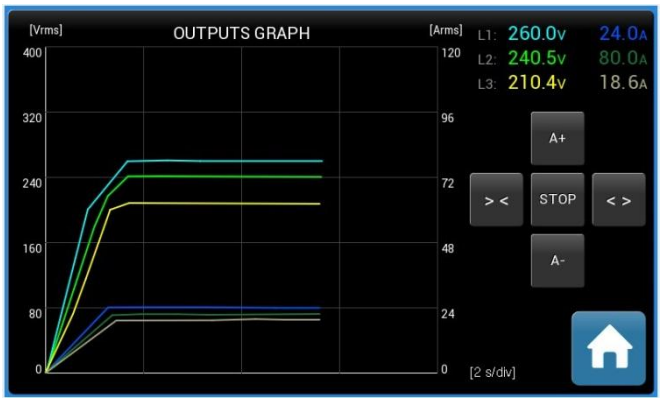




Item	Name	Description
1	Home button	Allows to come back to the Home page
2	Enable Voltage/current Graph	Allows to enable/disable the visualization of the graph of RMS voltage and current for each phase
3	Graph Button	Allows to access the Graph page

8.5.1. Graph page

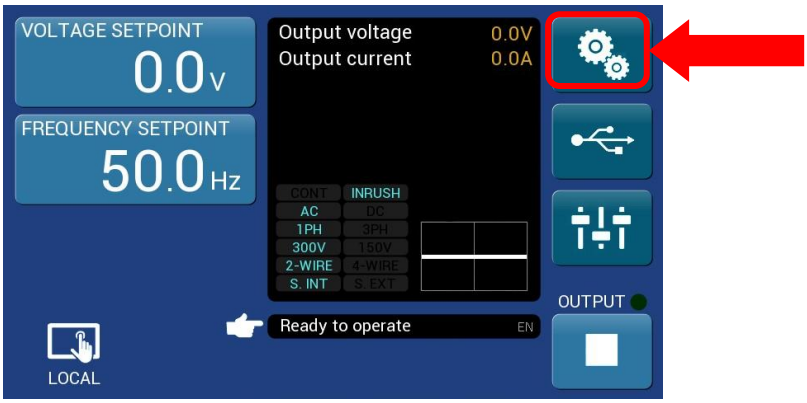
Clicking on GRAPH on the Graphs settings menu will show the graph page, in which it is possible to see the RMS voltage and current progression.

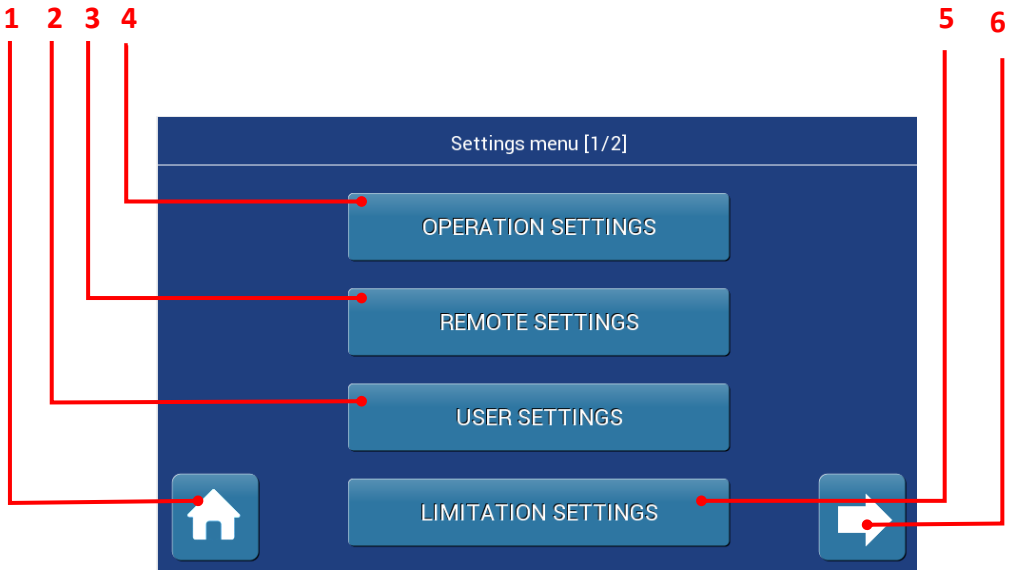


- The >< and < > buttons allows to change the s/div scale from a minimum of 2 s/div to a maximum of 10s/div
- The A+ and A- buttons allows to change the Vrms scale from a minimum of 0-50Vrms to a maximum of 0-400Vrms
- The STOP button allows to stop the graphs flow.

8.6. SETTINGS MENU

By clicking on the  button, allows to access the Settings Menu page.



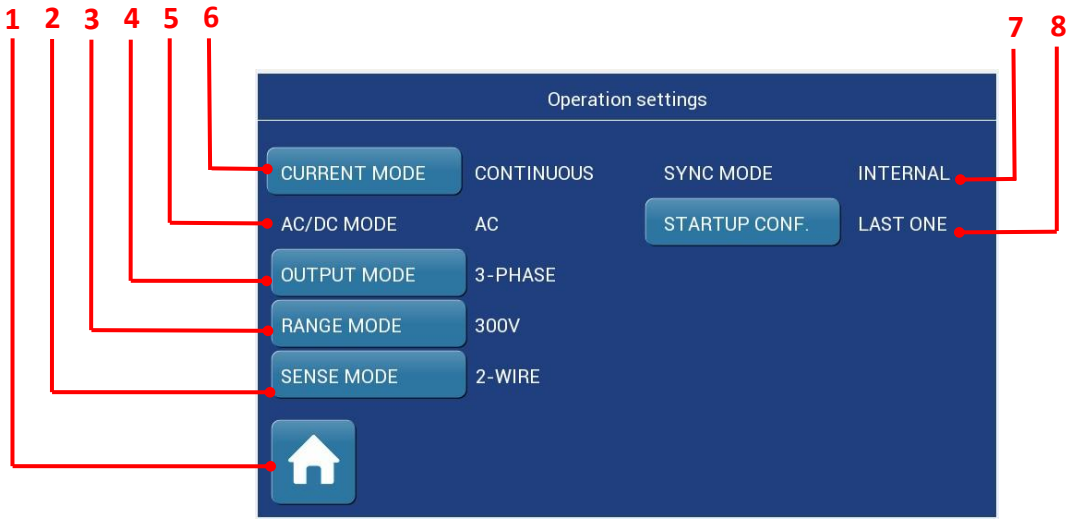


Item	Name	Description
1	Home button	Allows to come back to the Home page
2	User Setting button	Allows to access the User Settings page
3	Remote Setting button	Allows to access the Remote Settings page
4	Operation Setting button	Allows to access the Operation Settings page
5	Limitation Settings button	Allows to access the Limitation Settings page
6	Next page	Allows to access to the next menu page

8.7. OPERATION SETTINGS

By clicking on the general OPERATION SETTING button 

, allows to access the Operation setting menu page.



Item	Name	Description
1	Home button	Allows to come back to the Home page
2	SENSE BUTTON	Allow to change the sense mode from • 2-WIRE • 4-WIRE
3	RANGE MODE BUTTON	Allow to change the range • 150V • 300V
4	OUTPUT MODE BUTTON	Allow to change the output from single-phase to three-phase • Single-Phase • Three-Phase
5	AC/DC MODE BUTTON	For the TPS/T/D generator family this button is not enabled. This machine has only AC mode
6	CURRENT MODE	Allows to change from inRush or continuous Mode: • Continuous • InRush
7	SYNC MODE	For the TPS/T/D generator family this button is not enabled. This machine has only internal mode
8	STARTUP CONFIGURATION	Allows to select in which configuration the machine will startup

8.7.1. CURRENT MODE

With current mode button you can select to use the machine in continuous mode or inRush mode. In continuous mode the output current is continuously higher than in inRush mode, where you can have almost more than three times the output current, but only for 3 seconds.

8.7.2. AC/DC

The TPS/T/D is able to supply only AC voltage with the limit you can find on the chart 2, each phase are independent so it is possible to supply three different AC voltage for each phase.
This button is not enabled for this type of machine.

8.7.3. OUTPUT MODE

The output mode enable you to switch from single-phase output to three-phase output. In single-phase mode the machine supply all the power in only one phase.

8.7.4. RANGE MODE

With the Range mode button you can select the output voltage range from 150V to 300V.
Selecting range 150 (low range) it is possible to set the output voltage from 0Vac to 150Vac.
Selecting range 300 (high range) it is possible to set the output voltage from 0Vac to 300Vac.

With the 150V range you can have more output current than in the 300V range.

8.7.5. SENSE MODE

The output voltage's stabilization behave in the same way in both the configurations on the TPS/T/D output terminals (2 wire) and on a possible long distance outlet (4 wire), to eliminate the fall in voltage due to cable connections. To operate the long distance stabilization first connect the opposite terminals on the back of the machine following the indications at the voice INSTALLATION. The choice of the kind of long distance stabilization can be operated by pushing the buttons SENSE, the 4WIRE and 2WIRE configuration is indicated with a LED. Note that the TPS/T/D corrects voltage drop on wires up to 5% of set voltage to prevent any overheating of the line, exceeded this limit, the TPS/T/D does not guarantee that the value of output voltage is equal to the voltage setting and It displays an error signal (see VOLTAGE ALARMS).

8.7.6. SELECT STARTUP CONFIGURATION

By clicking on the STARTUP CONF. button on the Operation Setting Menu, allows to access the startup configuration page, where you can select in which configuration the machine will startup.

Item	Name	Description
1	X button	Allows to restore the values before the last changes and to go back to the operation setting menu
2	Factory Button	By clicking on Factory, the TPS/M/D will startup with the factory settings configurations
3	Last One Button	By clicking Last, the TPS/M/D will start with the latest settings set in the machine*
4	User1 Button	By clicking User1, the TPS/M/D will start with the user1 configuration. The user1 configuration can be modified by clicking on the Startup configurations menu
5	User2 Button	By clicking User2, the TPS/M/D will start with the user2 configuration. The user2 configuration can be modified by clicking on the Startup configurations menu

*The setting has to be set for more than 15s before turning off the TPS to be registered.

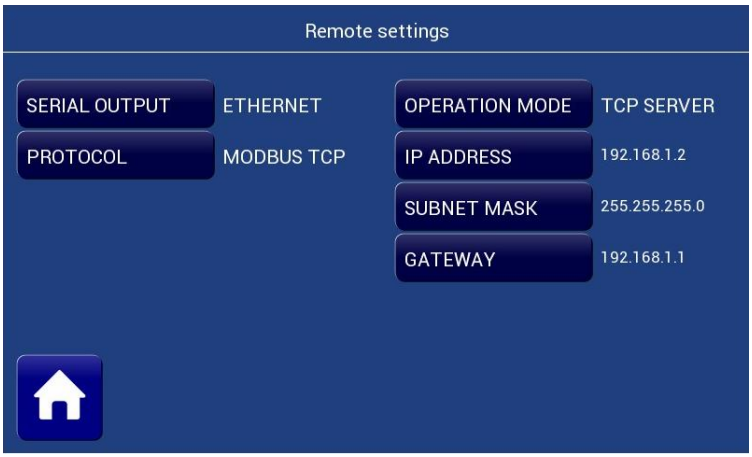
8.8. REMOTE SETTINGS

By clicking on the general REMOTE SETTING button 

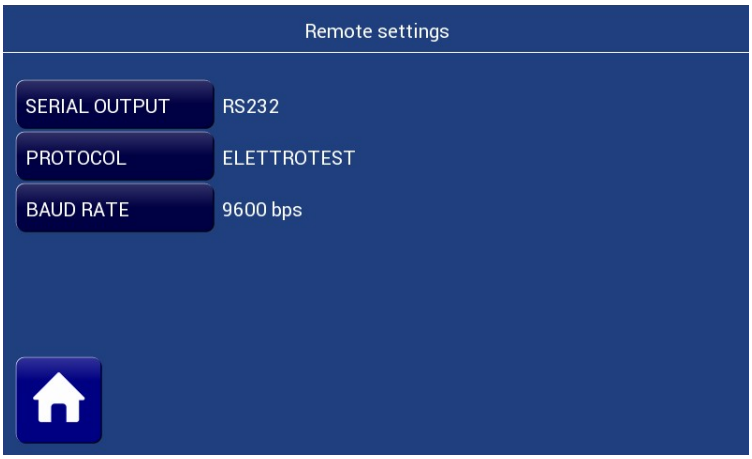
, allows to access the settings menu page, this page depends from the serial output (ETHERNET / RS232 / RS485), down there is a table with the available protocol in the different interface

		Port			
		RS232	**RS485**	**Ethernet Virtual Com**	**Ethernet TCP Server**
Protocol	**Elettrotest**	✓ *1200/9600/19200*	✓ *1200/9600/19200*	✓ *(Baud rate select by Moxa driver interface)*	✓ *(protocol encapsulated on TPC communication)*
	SCPI	✓ *1200/9600/19200*	✓ *1200/9600/19200*	✓ *(Baud rate select by Moxa driver interface)*	✓ *(protocol encapsulated on TPC communication)*
	Modbus RTU	✓ *1200/9600/19200*	✓ *1200/9600/19200*	✓ *(Baud rate select by Moxa driver interface)*	✓ *(protocol encapsulated on TPC communication)*
	Modbus TCP/IP	✗	✗	✗	✓

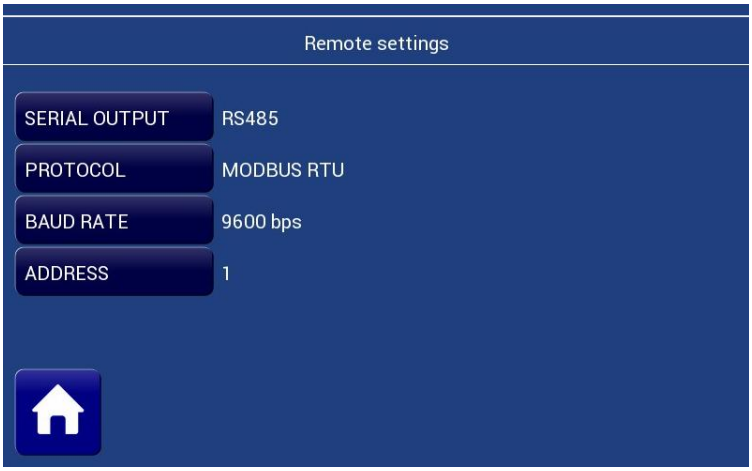
8.8.1. ETHERNET settings



8.8.2. RS 232 settings



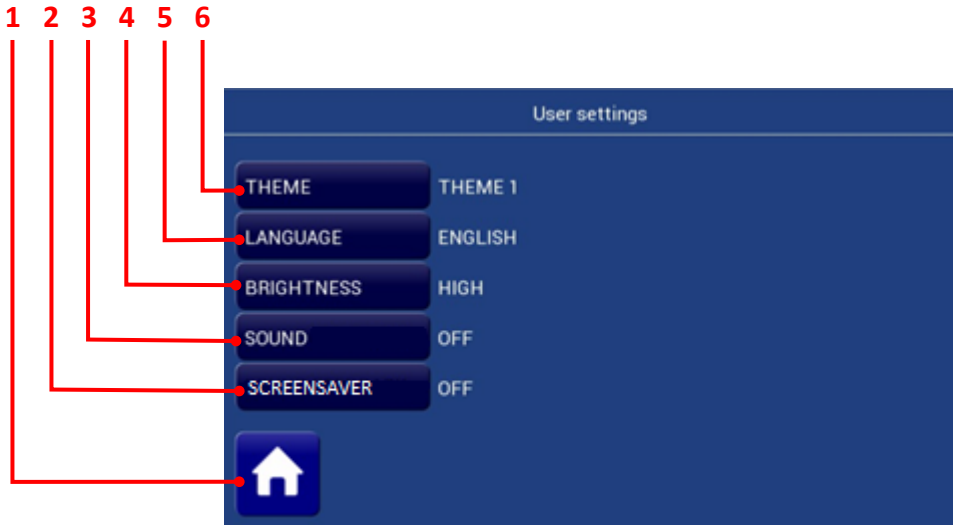
8.8.3. RS485 settings



8.9. USER SETTINGS

By clicking on the general USER SETTING button 

, allows to access the settings menu page

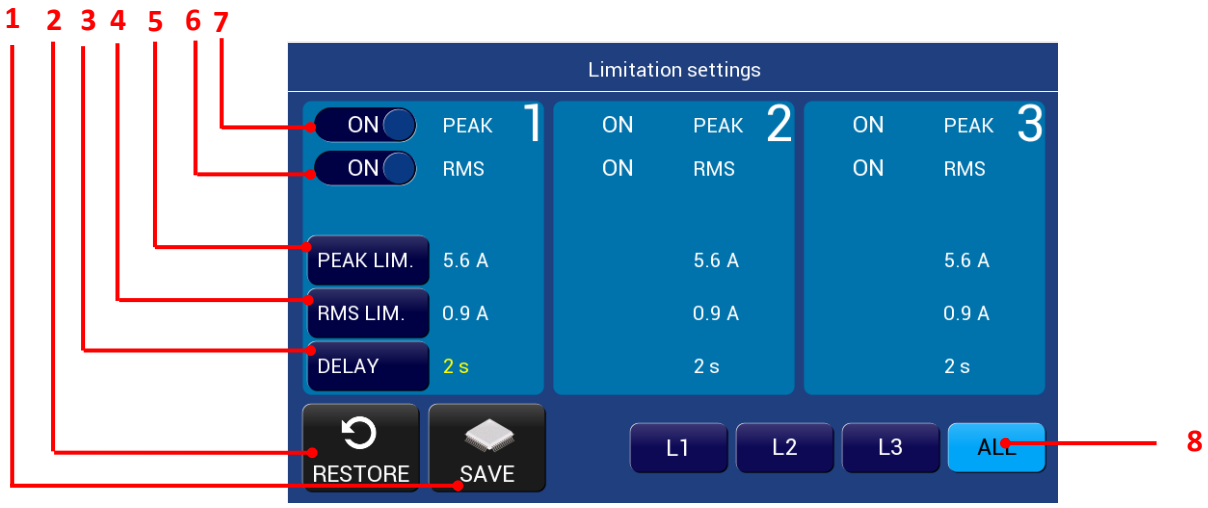


Item	Name	Description
1	Home button	Allows to come back to the Home page
2	Screensaver button	Allows to enable screensaver on the display, after 3 minutes without touching the display
3	Sound Feedback button	Allows to enable o disable sound feedback
4	Brightness button	Allows to change the display brightness
5	Language button	Allows to change the menu language
6	Theme button	Allows to change the interface colours

8.10. Output current limit

By clicking on the general LIMITATION SETTINGS button 

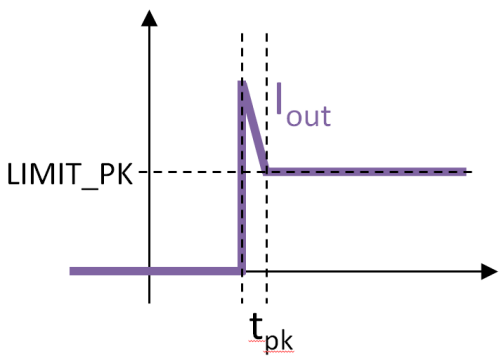
, allows to access the limit settings page



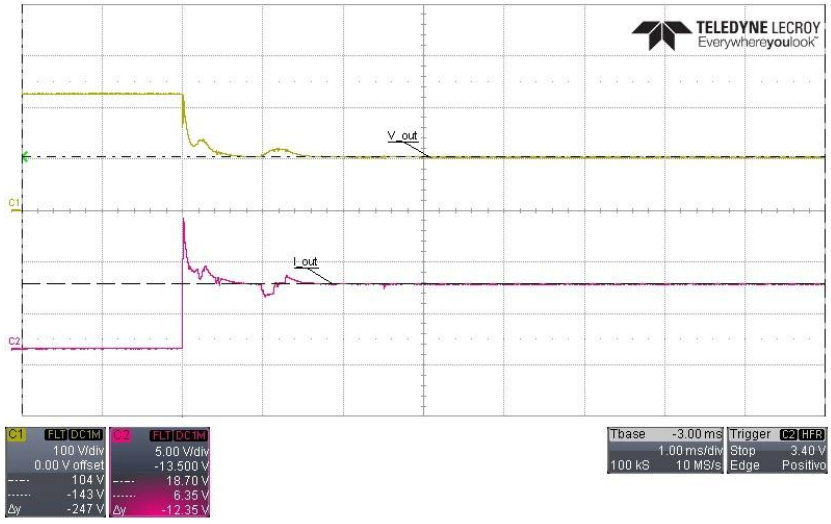
Item	Name	Description
1	Save Button	Allows to save the changes
2	Restore Button	Restore the values before the last changes
3	Delay Button	Set a delayed time for the RMS limit to intervene
4	RMS LIM. Button	Set the RMS limit value [A]
5	PEAK LIM. Button	Set the peak limit value [A]
6	RMS Button	Enable or disable the RMS limit
7	PEAK Button	Enable or disable the Peak limit
8	Select phase button	Allows to control a single phase or all phases together

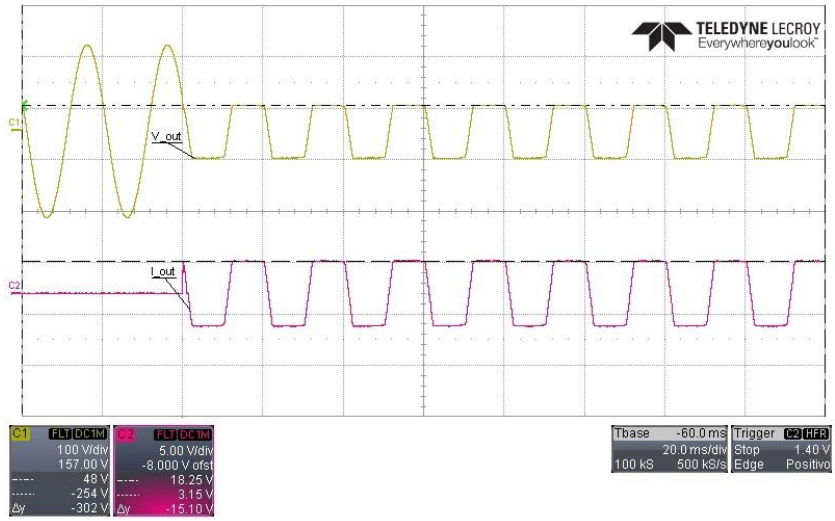
8.10.1. Peak limit

Output current is limited instantaneously without delay at the limitation set. Only an initial transient peak remains, due to the output capacitor discharge.



As visible in the graphs below, if the Peak limit intervene, it “cuts” the output waveform to maintain it under the set peak limit.





8.10.2. RMS Limit

The RMS current limit limits the RMS value of the output current. When the generator output current reaches the set limit, a timer starts. When the timer reaches the set delay time (min. 2s - max. 60s), the TPS/T/D stops.
Unlike the peak limit, the RMS limit does not truncate the waveform but keeps it intact until the delay time expires.

8.11. MODIFY USER STARTUP CONFIGURATIONS

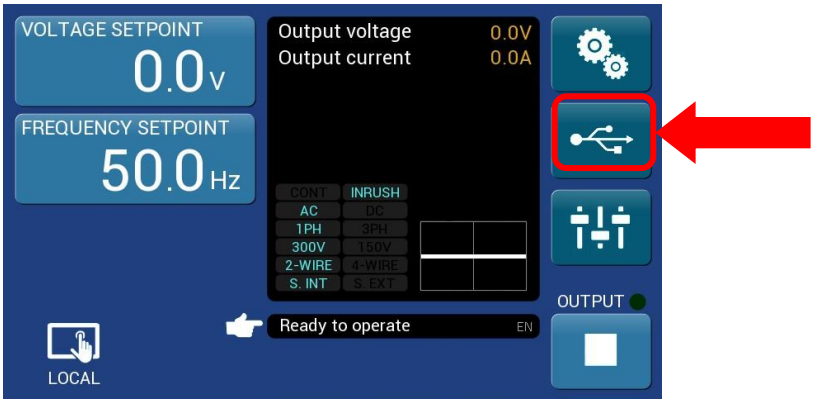
By clicking on the STARTUP CONFIGURATIONS button, allows to access the startup configuration menu, where it is possible to see the factory & last one configuration and where it is possible to modify the USER1 and USER2 configuration.

Note: The "factory" and the "Last one" start up configuration are not editable.

Item	Name	Description
1	Home Button	Allows to go back to the homepage
2	FREQ Button	Allows to set a Frequency that will be set at startup
3	VOLTAGE Button	Allows to set a Voltage that will be set at startup
4	Mode Buttons	Allows to set the operational modes that will be set at startup
5	Menu Arrows	Allows to move between startup configurations pages: Factory, Last One, User1, User2

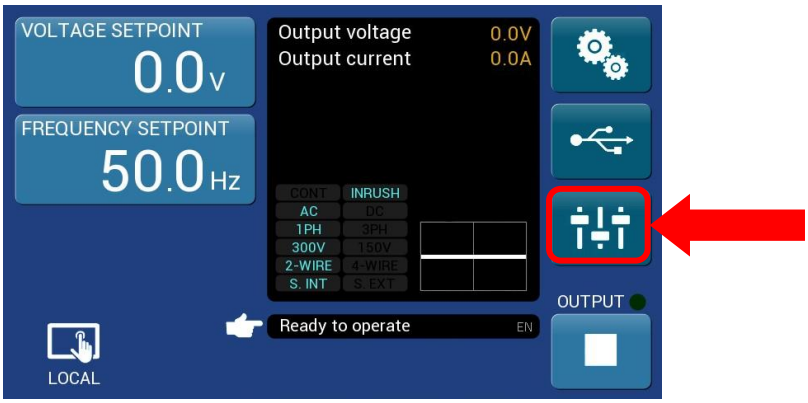
8.12. USB STORE

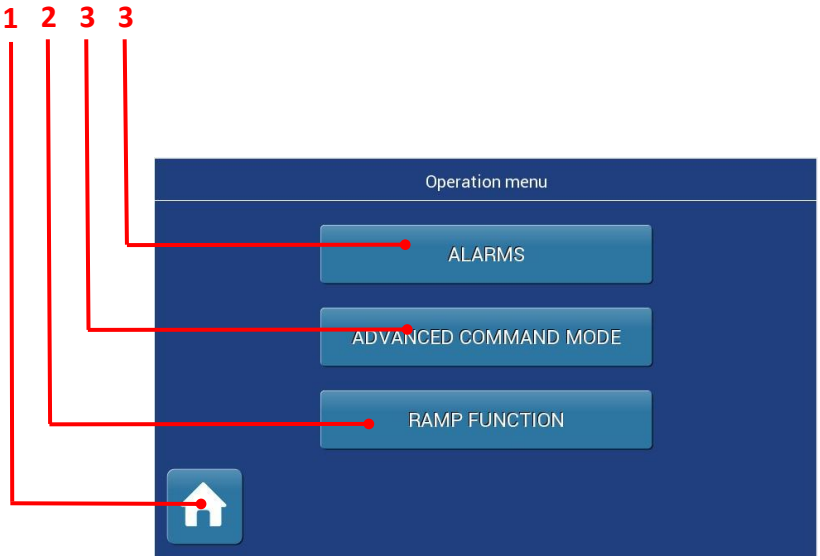
When you have insert the USB key on the front panel connection and you press the button you can create a new file XXXXX.txt with a note into the header. After inserting the name and the note the TPS/T/D start to store every second different parameter divided by ";", pay attention before remove the usb press the usb button. Check Table of the data saved on the usb



8.13. OPERATION MENU

By clicking on the button  , allows to access the Operation menu page



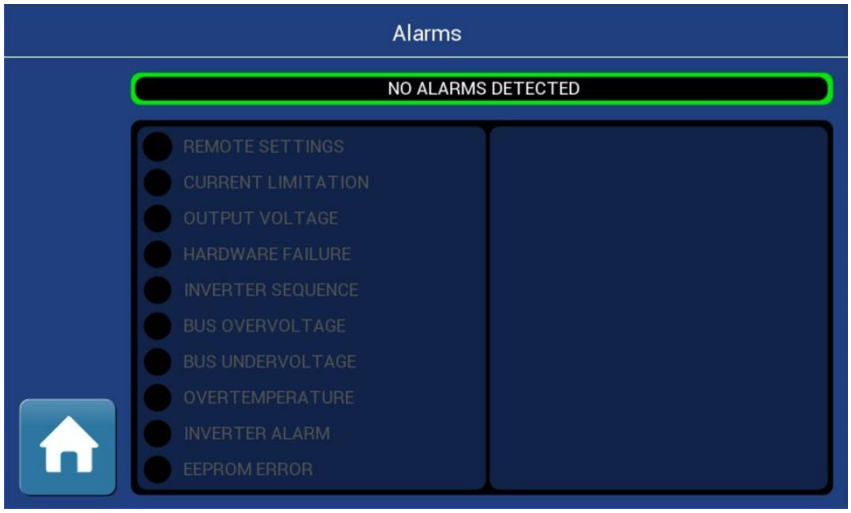


Item	Name	Description
1	Home button	Allows to come back to the Home page
2	Ramp Function	Allows to access the ramp function Menu
3	Advanced command mode(1)	Allows to access the Advanced command mode page
4	Alarms button	Allows to access the Alarm page

(1) Only for Elettrotest use.

8.14. ALARMS

By clicking on the button ALARMS , allows to access the Alarms page



8.14.1. REMOTE SETTING

The alarm appears when there is problem with the communication board

REMOTE SETTING ALARM does not cause any stop.

8.14.2. CURRENT LIMITATION

TPS/T/D works a control of the output current and this allows it to support for an indefinite time the output short circuit. In case of loads that absorb an higher current than the setted or nominal one, TPS/T/D works a limitation of the same current and enable the current limiation alarms. In case of current limitation the output wave is no more guaranteed and so it will show an harmonic distortion.
Not linear loads with an overload less than the nominal one but with a very high crest factor current allow the current defence.

CURRENT ALARM does not cause any stop.

8.14.3. VOLTAGE ALLARM

TPS/T/D controls, in addition to the harmonic distortion, the RMS value of the output voltage both in 2WIRE and in 4WIRE configuration.
if the output voltage is different by a value equal or grater than 5% of the set voltage value, a special alarm is generated (Output Voltage).

VOLTAGE ALARM does not cause any stop.

8.14.4. INVERTER COMMUNICATION

The alarm appears when there is problem on the communication between the inverter and the display.

8.14.5. BUS OVERVOLTAGE & UNDERVOLTAGE

TPS/T/D can work with network voltage variations of ±10%, if these limits are exceeded TPS/T/D stops and show the alarm.
If the network voltage is too low TPS/T/D stops and the **UNDERVOLTAGE** alarm is on.
If the network voltage is too high TPS/T/D stops and the **OVERVOLTAGE** alarm is on.

If the supply phases have been inverted, both the UNDERVOLTAGE and OVERVOLTAGE alarms are generated. Check POWER CABLING and change the phases on the input connector.

8.14.6. OVERTEMPERATURE

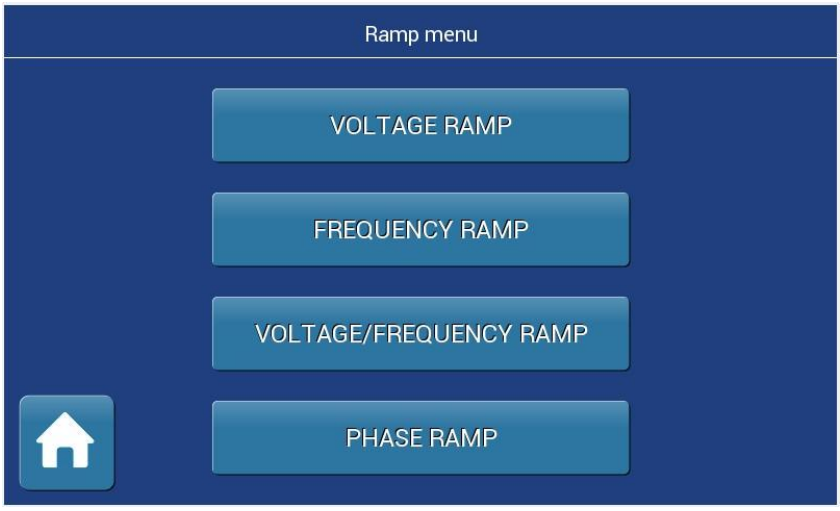
The alarm appears in case of high temperature inside of TPS/T/D. TPS/T/D stops and the **OVERTEMPERTURE** alarm is active

8.14.7. INVERTER ALARM

In case of bad operations of the overload sections (inverter) TPS/T/D stops and the **INVERTER alarm** is active

8.15. RAMP FUNCTION

By clicking on the RAMP FUNCTION button , allows to access the Ramp functions page.

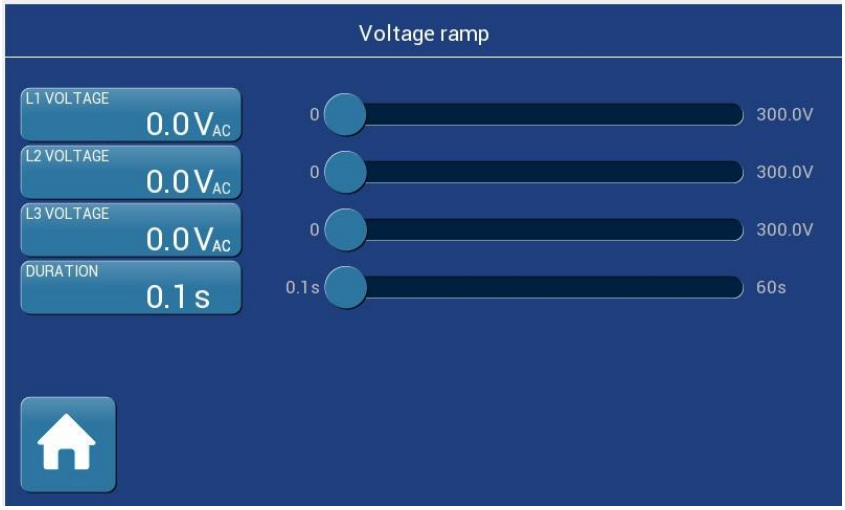


The ramp functions allows you to perform voltage, frequency, voltage/frequency and phase ramps to arrive in a certain value in a set time.

Attention: *The ramp fuction can only be started with the output enabled. If the output is not enabled, the setpoint will be reached instantly without any ramp time.*

8.15.1. Voltage Ramp

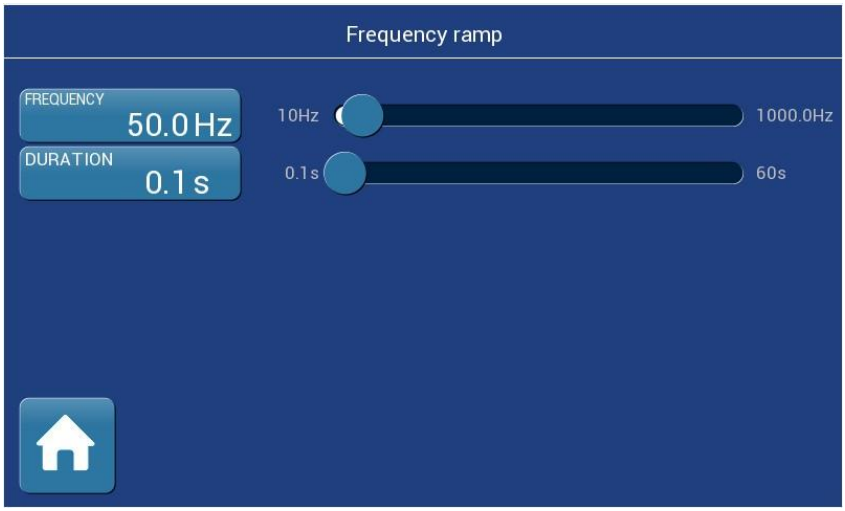
This functions allows to set a voltage ramp that arrives to a set value in a set time.
It is possible to set three different voltage levels, one for each phase, with the same duration to permform three different voltage ramps.



Once the voltage level is set, press the “Run button” to start the ramp.

8.15.2. Frequency Ramp

This functions allows to set a frequency ramp that arrives to a set value in a set time.

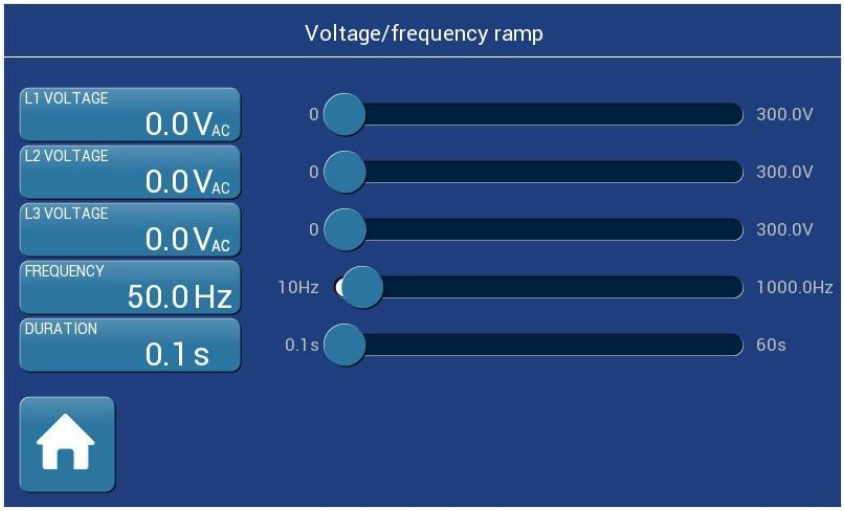


Once the desired frequency level is set, press the “Run button” to start the ramp.

Attention: *It is not possible to set three different frequency values. The output frequency is the same for all the phases.*

8.15.3. Voltage/Frequency Ramp

This functions allows to set a Voltage/Frequency ramp that arrives to a set frequency and voltage values in a set time.

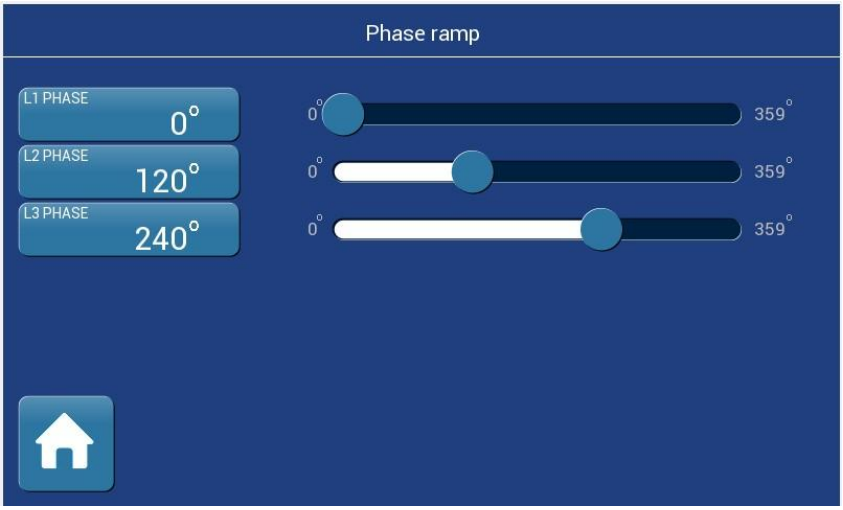


Once the desired voltage and frequency levels are set, press the “Run button” to start the ramp.

Attention: *It is not possible to set three different frequency values. The output frequency is the same for all the phases.*

8.15.4. Phase Ramp

This functions allows to change the output phase of the three-phase output channel of the TPS/T/D



Once the desired phase levels are set, press the “Run button” to change the output values.

Attention: *The phase values are set instantly after the run button is pressed. There is no ramp time.*

9. NORMAL USE HAZARDS

This chapter illustrate the potential risks associated with normal use of the TPS/T/D.
These requirements apply to all TPS/T/D models listed in this manual.

9.1. 4-WIRE OUTPUT VOLTAGE ERROR

In the event of incorrect connections of the sense wires at the output of the generator, the voltage displayed may not correspond to the actual voltage available at the output terminals. This situation arises when an output voltage is set in 4-wire operating mode without the sense wires connected; under these circumstances, the output voltage indicated on the display will read 0V, while the voltage available at the output terminals will be the set value, with a tolerance of +5%. Despite this, the display will trigger a voltage alarm to indicate the presence of a fault.

Attention: Before performing any operations on the generator, such as connecting or disconnecting the input and output cables, disconnect the generator from the power supply using the input disconnector and wait at least 30 minutes.

9.2. OUTPUT VOLTAGE INDICATION WITH ACTIVE ALARMS

In the presence of active alarms indicated both on the homepage and in the “Alarms” section, the output voltage displayed on the homepage may differ from the actual voltage present at the output terminals.
If it is necessary to intervene on the output terminals and/or the final load, it is mandatory to proceed only with the machine powered off.

10. TABLE OF THE DATA SAVED ON THE USB

Item	Name	Description
1	Standby/Ready/Failure	0= Standby, 1= Ready, 2= Failure,
2	Output	0=OFF, 1=ON
3	Output mode DC	0 = AC, 1= DC (fixed to 0)
4	Output mode Single-phase	0 = 1PH, 1= 3PH
5	4-wire sense	0 = 2 wire 1 = 4 wire
6	Current inRush	0 = Continuous, 1 = inRush
7	Voltage setpoint L1	Set voltage of L1 [V]
8	Voltage setpoint L2	Set voltage of L2 [V]
9	Voltage setpoint L3	Set voltage of L3 [V]
10	Voltage setpoint ALL	Set voltage of all the phase together [V]
11	Frequency setpoint	Set frequency for all the phases [Hz]
12	Phase setpoint L1	Set phase of L1[deg]
13	Phase setpoint L2	Set phase of L2[deg]
14	Phase setpoint L3	Set phase of L3[deg]
15	Voltage output L1	Measured output voltage of L1 [V]
16	Voltage output L2	Measured output voltage of L2 [V]
17	Voltage output L3	Measured output voltage of L3 [V]
18	Current output L1	Measured output current of L1 [A]
19	Current output L2	Measured output current of L2 [A]
20	Current output L3	Measured output current of L3 [A]
21	Fail L1	0 = no blocking alarm, 1= blocking alarm
22	Fail L2	0 = no blocking alarm, 1= blocking alarm
23	Fail L3	0 = no blocking alarm, 1= blocking alarm
24	Alarms L1	Alarm of the L1 line
25	Alarms L2	Alarm of the L2 line
26	Alarms L3	Alarm of the L3 line
27	Uptime [day]	The number of days from the turn on
28	Uptime [hour]	The number of hours from the turn on
29	Uptime [min]	The number of minutes from the turn on
30	Uptime [sec]	The number of seconds from the turn on
31	Running [day]	The number of days with the output active from the last turn on of the machine
32	Running [hour]	The number of hours with the output active from the last turn on of the machine
33	Running [min]	The number of minutes with the output active from the last turn on of the machine
34	Running [sec]	The number of seconds with the output active from the last turn on of the machine

35	Total [day]	The total number of days the machine is turn on
36	Total [hour]	The total number of hours the machine is turn on
37	Total [min]	The total number of minutes the machine is turn on
38	Total [sec]	The total number of seconds the machine is turn on
39	Total runnig [day]	The total number of days the machine is turn on with the output active
40	Total running [hour]	The total number of hours the machine is turn on with the output active
41	Total running [min]	The total number of minutes the machine is turn on with the output active
42	Total running [sec]	The total number of seconds the machine is turn on with the output active
43	Peak lim L1	0 = Peak lim disabled, 1= Peak lim enabled
44	Peak lim L1 [A]	Display the set peak lim for phase L1
45	Peak lim L2	0 = Peak lim disabled, 1= Peak lim enabled
46	Peak lim L2 [A]	Display the set peak lim for phase L2
47	Peak lim L3	0 = Peak lim disabled, 1= Peak lim enabled
48	Peak lim L3 [A]	Display the set peak lim for phase L3
49	RMS lim L1	0 = RMS lim disabled, 1= RMS lim enabled
50	RMS lim L1 [A]	Display the set RMS lim for phase L1
51	RMS lim L2	0 = RMS lim disabled, 1= RMS lim enabled
52	RMS lim L2 [A]	Display the set RMS lim for phase L2
53	RMS lim L3	0 = RMS lim disabled, 1= RMS lim enabled
54	RMS lim L3 [A]	Display the set rms lim for phase L3
55	RMS lim time L1 [s]	Display the setted delay time for phase L1
56	RMS lim time L2 [s]	Display the setted delay time for phase L2
57	RMS lim time L3 [s]	Display the setted delay time for phase L3
58	Rms lim alarm	0 = no alarm, 1= alarm
59	Inverter simulation	0 = normal mode, 1=inverter simulation mode

11. SERVICE AND MAINTENANCE

11.1. MAINTENANCE / CLEANING

Your TPS/T/D doesn't need any recurring maintenance, except for the one suggested in the scheduled maintenance paragraph.
However, a cleaning schedule for the air filters and the fans can be optimal to keep 100% functional your device. Cleaning frequency depends on the ambient condition.

Remember that heavily dirty filters and fans could lead to overheating problems and therefore to machine failure.

11.1.1. Scheduled maintenance

A planned maintenance schedule is suggested for keeping your TPS/T/D perfectly functional.
Machine maintenance is recommended after about these TPS/T/D working hours:

- ~20000 Hours to change the fans;
- ~40000 Hours to change the capacitors;
- From 7 to 10 Years for general maintenance;

You can check the TPS/T/D working hours on the display and via remote.
Please, note that it is necessary to return the machine to ELETTROTEST S.P.A for the scheduled maintenance.

11.2. ALARMS DIAGNOSIS AND REPAIRS

If one or more alarms are shown, the user **must not** try to repair the TPS/T/D by himself. Please contact ELETTROTEST S.P.A service.

If the problem doesn't solve even with the service support, the machine needs to return to the supplier (with or without guarantee).

To return your TPS/T/D ensure that:

- The device needs to be fully assembled and in a suitable transport packaging.
- ELETTROTEST S.P.A needs to be contacted before the shipment.
- A fault description needs to be attached.
- If shipping is abroad, the necessary customs papers are attached.

11.3. BASIC TROUBLESHOOTING

Please, check these tables for problems that can be solve via basic operations.

11.3.1. Overvoltage/Undervoltage alarms

Cause	Solution
Wrong input connections	Open the input connections and check the input voltage, that needs to be (*)230V ± 10% for 1Phase machines and (*)400V ± 10% for 3Phases machines
Broken fuse	Check all the fuses.
Power from EUT to TPS	TPS don’t accept power from the EUT.

*) Check your TPS/T/D plate to see the designed INPUT voltage for your device.

11.3.2. Overtemperature alarms

Cause	Solution
Fans coverage	Check that all the ventilation parts need to be not cover and air filters must be clean
Fans Failure	Check that all the fans are working correctly

11.3.3. Inverter alarm

Cause	Solution
Power module failure	TPS must return to the supplier
Power line	Check the input voltage and all the fuses.

11.3.4. Max DV OUT alarm

Cause	Solution
Low voltage setted	If a very low voltage is set, DV OUT led is generally on.
Wrong 2/4 wires configuration	Check with the schematics the voltage inside the machine. The thermal switch is closed when it’s not in alarm.
Output current limitation	Check the output voltage and current.
Calibration	The machine is out of calibration. Please contact the service.

11.3.5. Limit IOUT alarm

Cause	Solution
Overload	Chek the output voltage and current, remove the EUT and check the behavior.

12. GUARANTEE

The instrument is guarantee for one year in all his mechanical and electronic components.
Naturally are not admitted handlings not anticipated in the present handbook.
The instrument has consigned complete of CERTIFICATE of CALIBRATION, that guarantees the integrity of the same.
Such document must accompany the apparatus in case of periodic verification always.

13. REVISION INDEX

Elettrotest Spa is committed to a program of continuous improvement of products and information to the customer.
Therefore, the company reserves the right to make changes to the documentation and specifications without notice and assumes no responsibility for any incorrect information.

Rel.	Date	Descriptions
06_	26/09/25	Appendix A,B,C with TPS/T/D model variants added
05_	26/06/25	Max current info added on models table
04A	16/04/25	Graph Inrush Current vs Time added
04_	09/04/25	Movimentation info added
03_	25/10/24	Installation & Safety chapter update
02A	25/07/24	Fixed installation note and input separator added
02_	07/03/24	Wheels mount notes added & out phases rotation added
01B	19/02/24	Errata corridge output protections
01A	10/11/23	Ramp description added
01_	08/09/23	User startup configuration, Reset Button & Graphs display added - FW rev.86
00_	07/06/23	First emission

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14. APPENDIX “A” – TPS/T/D 20KVA MODEL VARIANTS

This chapter provides the electrical and construction specifications of all variants of the standard TPS/T/D 20KVA power supply described in the previous chapters.

	TPS/T/D 20kVA 460V			
MAIN CHARACTERISTICS				
Code	***9911631Q***			
Input Voltage	400Vac ± 10% 3PH without Neutral			
Input Frequency	**47-63Hz**			
Maximum Input Current	**64A**			
Output Voltage Range	**230V**		**460V**	
Output Voltage AC	*0-230V$_{ac}$*		*0-460V$_{ac}$*	
Output Frequency Range	10 - 320 Hz *with derating for output frequencies > 80Hz*			
Configuration	***Continuous***		***InRush***	
Max. output Power	20KVA		15KVA/45KVA (Cont./inRush)	
Possible Output Configuration	1phase (Ph+N) / 3phase (3Ph+N)			
Output Characteristic	Isolated			
DIMENSION / WEIGHT				
Height	1600 mm			
Widht	940 mm			
Depth	625 mm			
Weight	400 Kg			
GENERAL				
Operating Temperature	0°C - 35°C			
User Interface	7” Touch Screen Display			
Communication Interface	RS232, RS485 , ETHERNET			
Communication Protocol	Elettrotest, SCPI, Modbus RTU , Modbus TCP/IP			
Protection	Overtemperature, Overvoltage, Undervoltage, Inverter			
Current Limitation	Programmable and selectable from PEAK & RMS Limit			
Efficiency	Better than 88% at full power			
MAXIMUM OUTPUT CURRENT IN SINGLE-PHASE MODE				
Configuration	***Continuous***		***InRush***	
Range	**230V**	**460V**	**230V**	**460V**
RMS continuous	86.5A	43.2A	65A	32.5A
Inrush Current (3 seconds)	No InRush		195A	97.5A
MAXIMUM OUTPUT CURRENT IN THREE-PHASE MODE				
Configuration	***Continuous***		***InRush***	
Range	**230V**	**460V**	**230V**	**460V**
RMS continuous	28.5A	14.2A	21.5A	10.7A
Inrush Current (3 seconds)	No InRush		65A	32.5A
OUTPUT CHARACTERISTIC				
Output Noise	Less than 1000 mVrms			
Output voltage stability	Less than 0.1% f.s.			
Output voltage precision	Less than 0.5% f.s.			
THD	Less than 0.3%			
Waveform recovery time	Less than 200 µs			
Maximum compensation of drop on wires	5% s.v.			
Recovery time of the compensation for the drop on wires	Less than 200 ms			

15. APPENDIX “B” – TPS/T/D 40KVA MODEL VARIANTS

This chapter provides the electrical and construction specifications of all variants of the standard TPS/T/D 40KVA power supply described in the previous chapters.

	TPS/T/D 40KVA 175/350V			
MAIN CHARACTERISTICS				
Code	***9911641H***			
Input Voltage	400Vac ± 10% 3PH without Neutral			
Input Frequency	**47-63Hz**			
Maximum Input Current	**64A**			
Output Voltage Range	**175V**		**350V**	
Output Voltage AC	*0-175V_{ac}*		*0-350V_{ac}*	
Output Frequency Range	10 - 320 Hz *with derating for output frequencies > 80Hz*			
Configuration	***Continuous***		***InRush***	
Max. output Power	40KVA		30KVA/60KVA (Cont./inRush)	
Possible Output Configuration	1phase (Ph+N) / 3phase (3Ph+N)			
Output Characteristic	Isolated			
DIMENSION / WEIGHT				
Height	1600 mm			
Widht	940 mm			
Depth	625 mm			
Weight [(1)]	600 Kg			
GENERAL				
Operating Temperature	0°C - 35°C			
User Interface	7” Touch Screen Display			
Communication Interface	RS232, RS485 , ETHERNET			
Communication Protocol	Elettrotest, SCPI, Modbus RTU , Modbus TCP/IP			
Protection	Overtemperature, Overvoltage, Undervoltage, Inverter			
Current Limitation	Programmable and selectable from PEAK & RMS Limit			
Efficiency	Better than 88% at full power			
MAXIMUM OUTPUT CURRENT IN SINGLE-PHASE MODE				
Configuration	***Continuous***		***InRush***	
Range	**175V**	**350V**	**175V**	**350V**
RMS continuous	228.5A	114.2A	171.2A	85.6A
Inrush Current (3 seconds)	No InRush		342.5A	171.2A
MAXIMUM OUTPUT CURRENT IN THREE-PHASE MODE				
Configuration	***Continuous***		***InRush***	
Range	**175V**	**350V**	**175V**	**350V**
RMS continuous	76A	38A	57A	28.5A
Inrush Current (3 seconds)	No InRush		114A	57A
OUTPUT CHARACTERISTIC				
Output Noise	Less than 1000 mVrms			
Output voltage stability	Less than 0.1% f.s.			
Output voltage precision	Less than 0.5% f.s.			
THD	Less than 0.3%			
Waveform recovery time	Less than 200 µs			
Maximum compensation of drop on wires	5% s.v.			
Recovery time of the compensation for the drop on wires	Less than 200 ms			

16. APPENDIX “C” – TPS/T/D 90KVA MODEL VARIANTS

This chapter provides the electrical and construction specifications of all variants of the standard TPS/T/D 90KVA power supply described in the previous chapters.

	TPS/T/D 90KVA 130/260V			
MAIN CHARACTERISTICS				
Code	***9911671D***			
Input Voltage	400Vac ± 10% 3PH without Neutral			
Input Frequency	**47-63Hz**			
Maximum Input Current	**64A**			
Output Voltage Range	**130V**		**260V**	
Output Voltage AC	*0-130V_{ac}*		*0-260V_{ac}*	
Output Frequency Range	10 - 320 Hz *with derating for output frequencies > 80Hz*			
Configuration	***Continuous***		***InRush***	
Max. output Power	95KVA		**No InRush Mode**	
Possible Output Configuration	3phase (3Ph+N)			
Output Characteristic	Isolated			
DIMENSION / WEIGHT				
Height	1800mm			
Widht	1200mm			
Depth	1000mm			
Weight [(1)]	1200 Kg			
GENERAL				
Operating Temperature	0°C - 35°C			
User Interface	7” Touch Screen Display			
Communication Interface	RS232, RS485 , ETHERNET			
Communication Protocol	Elettrotest, SCPI, Modbus RTU , Modbus TCP/IP			
Protection	Overtemperature, Overvoltage, Undervoltage, Inverter			
Current Limitation	Programmable and selectable from PEAK & RMS Limit			
Efficiency	Better than 88% at full power			
MAXIMUM OUTPUT CURRENT IN SINGLE-PHASE MODE				
Configuration	***Continuous***		***InRush***	
Range	**130V**	**260V**	**130V**	**260V**
RMS continuous	No single-Phase option		No InRush	
Inrush Current (3 seconds)	No single-Phase option		No InRush	
MAXIMUM OUTPUT CURRENT IN THREE-PHASE MODE				
Configuration	***Continuous***		***InRush***	
Range	**130V**	**260V**	**130V**	**260V**
RMS continuous	243.5A	121.7A	No InRush	
Inrush Current (3 seconds)	No InRush		No InRush	
OUTPUT CHARACTERISTIC				
Output Noise	Less than 1000 mVrms			
Output voltage stability	Less than 0.1% f.s.			
Output voltage precision	Less than 0.5% f.s.			
THD	Less than 0.3%			
Waveform recovery time	Less than 200 µs			
Maximum compensation of drop on wires	5% s.v.			
Recovery time of the compensation for the drop on wires	Less than 200 ms			