

Single Phase high isolation protection system HI-SOL Series

Instructions for use and maintenance



 *It's a very DANGEROUS VOLTAGE. DISCONNECT the EQUIPMENT BEFORE OPENING the CASE. INSTALLATION AND TECHNICAL SERVICE MUST BE provided BY A QUALIFIED OPERATOR. USE ONLY ISOLATED AND PROFESSIONAL TOOLS*

Attention: Inside the Product there are tensions Dangerous. Unplug the appliance from the mains before opening the product. Installation and technical assistance must only be carried out by qualified personnel and professional tools



**Before using the appliance, please read the user's manual carefully
Please note the user manual is an integral part of the device.**



Use of the appliance is reserved to qualified personnel



**Do not disassemble the apparatus, for any intervention contact the technical service
NO CHANGES ARE ALLOWED TO THIS DEVICE**

WARNING: To avoid risk of electric shock, this equipment must only be connected to a supply mains with protective earth

MAN-TRAS-HISOL R01.1_250429_ENG

IN THE EVENT OF SERIOUS ACCIDENTS, IMMEDIATELY INFORM THE MANUFACTURER AND THE COMPETENT AUTHORITIES.

Dati tecnici e immagini sono solo indicativi e possono essere variati in qualsiasi momento senza alcun preavviso

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FUNDAMENTAL SAFETY STANDARDS

1. When opening the packaging, check the integrity of the appliance, paying particular attention to the presence of damage to the plastic parts, which may make accessible live internal parts of the appliance, and to breakage and/or peeling of the Power cord. **In Such cases do not connect the plug to the power outlet. Carry out these checks before each use.**

2. Before connecting the appliance, always check that the electrical data indicated on the data label and the type of plug used correspond to those of the mains electricity to which you intend to connect it.

3. Pay particular attention to:

- Place the appliance on flat, stable surfaces and on the entire base;
- Do not use the appliance in environments where there are anesthetic mixtures inflammable with air, oxygen or nitrous oxide;
- Avoid touching the appliance with wet hands and always avoid the appliance coming into contact with liquids;
- Do not pull the power cord to remove the plug, but hold it with your fingers to remove it from the mains socket;
- Store and use the appliance in environments protected from atmospheric agents and at a distance from any heat sources;
- Unplug the appliance from the power outlet when not in use or turn it off by means of the special switch;
- Pay particular attention not to obstruct the ventilation grids of the device during operation.

4. **This appliance must only be used for the intended use, i.e. as a power supply device.** Any other uses are to be considered improper and dangerous and the manufacturer cannot be held liable for any consequences that improper use or connection to electrical systems that do not conform to the regulations in force. **Do not use the appliance for any purpose other than that provided by the manufacturer.**

5. If the device is to be used in a medical room where protection with the IT-M power supply system is provided (local Group 2, CEI 64-8 sez. 710), in the event of a first earth fault of the device, this does not cause the intervention of the earth leakage control.

7. Disposal of the appliance must be carried out according to the specific laws in force in each country.

SPECIFICATIONS

Model	HI-SOL02M	HI-SOL03M	HI-SOL05M	HI-SOL06M	HI-SOL08M	HI-SOL10M
Type	Class I 16KV ISOLATION TRANSFORMER					
No. of phases	Single phase					
Rated input voltage	220-230Vac - 50/60Hz					
Rated power	2kVA	3.15kVA	5kVA	6.3kVA	8kVA	10kVA
Screen type	Copper earthed screen between the windings					
Winding construction	Copper / Copper					
Rated output voltage	220-230Vac - 50/60Hz					
Electric class	I					
Primary protection	MCB 8A	MCB 15A	MCB 20A	MCB 25A	MCB 32A	MCB 40A
Secondary protection	MCB 8A	MCB 15A	MCB 20A	MCB 25A	MCB 32A	MCB 40A
Input connections	2 x 6 sq.mm. terminals + PE		2 x 10 sq.mm. terminals + PE			
Isolation class	H					
Isolation pri/sec	16kV					
Surge suppressor	20kA/40kA x 2 poles					
Signals and monitoring	Output Digital V-meter / A-meter Output line ON light					
Auxiliary outlet	1 x 10 A Schuko outlet with 10 A protection fuse					
Isolation monitoring	RI-R22 adjustable isolation tester on board					
Cooling	AF controlled by thermal contact					
Protection	IP20					
Weight kg	25	30	35	45	60	80
Dimensions mm	19" rack x 4U x depth 350mm		19" rack x 5U x depth 400mm		19" rack x 5U x depth 460mm	
Operating conditions	Ambient temperature: 5 ÷ 25 °c					
	Ambient humidity percentage: 30 ÷ 75% RH					
	Altitude: 0 ÷ 1000m above sea level					
Conditions of storage and transport.	Ambient temperature: -40 ÷ 70 ° C					
	Ambient humidity percentage: 10 ÷ 100% RH					
Standards	CEI EN 61558-2-4					

Model	HI-SOL03T	HI-SOL06T	HI-SOL08T	HI-SOL10T
Type	Class I 16KV ISOLATION TRANSFORMER			
No. of phases	Three phase			
Rated input voltage	380-400Vac - 50/60Hz			
Rated power	3kVA	6kVA	8kVA	10kVA
Rated input voltage	380-400Vac + N - 50/60Hz			
Vector group	Dyn11			
Screen type	Copper earthed screen between the windings			
Winding construction	Copper / Copper			
Electric class	I			
Primary protection	MCB 3 x 4A	MCB 3 x 8A	MCB 3 x 10A	MCB 15A
Secondary protection	MCB 3 x 4A	MCB 3 x 8A	MCB 3 x 10A	MCB 15A
Input connections	2 x 6 sq.mm. terminals + PE		2 x 10 sq.mm. terminals + PE	
Isolation class	H			

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SYMBOLOLOGY

	Manufacturer – symbol ISO 7000-3082
	Manufacturing date – symbol ISO 7000-2497 (week and year)
	Medical Device – symbol 5.7.7
	Model type – symbol ISO 7000-2493
	Serial Number – symbol ISO 7000-2498
UDI	UDI code according to (UE) 2017/745 (not yet available)
	Alternate current – symbol IEC 60417-5032
	Potential compensation
	Protective Earth
	Attention Consult the attached documentation
	General Danger
~	Ac

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Hz	Network frequency
A	Ampere
VA	Voltamperes
F	Fuse
-T	Delayed fuse
	Refer to the User manual – symbol ISO7000-1641
	This product complies with EU directive 2012/19 / EC. The crossed-out bin symbol shown on the appliance indicates that the product, at the end of its useful life, having to be treated separately from household waste, must be taken to a different collection center for electrical and electronic equipment, or returned to the seller at the time of purchase of new equivalent equipment. The user is responsible for transferring the appliance to the appropriate collection facilities at the end of its life. The appropriate separate collection for the subsequent start-up of the discharged appliance for recycling, treatment and environmentally compatible disposal helps to avoid possible negative effects on the environment and health and favors the recycling of the materials of which the product is made. For more detailed information regarding the collection systems available, contact the local waste disposal service
	Mark of conformity (min height mm.5)
	Top – packing symbol ISO 7000-0623
	Fragile – packing symbol ISO 7000-0621
	Keep dry – packing symbol ISO 7000-0626
	Keep safe from sun light – packing symbol ISO 7000-0624

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	Temperature limit – packing symbol ISO 7000-0632
	Humidity limit– packing symbol ISO 7000-2620
	Atmospheric Pressure limit – packing symbol ISO 7000-2621

The manufacturer, the fitter and the installer or the importer are considered to be responsible for safety, performance and reliability only if the electrical system to which the appliance is connected is constructed in accordance with the regulations in force.

Supplied Accessories

The device is equipped with no accessories.

Cleaning

In order to clean the outer casing of the appliance, wear disposable latex gloves and clean with a damp cloth and denatured alcohol. Be careful not to wet the power outlets.

Before cleaning, unplug the appliance plug from the mains, and disconnect any equipment that may be powered by it.



Before performing any verification operations in case of anomalies or malfunction, please contact the K-FACTOR technical service.

K-FACTOR does not offer any kind of guarantee for the equipment which, following verification of the technical service, is tampered with.

Contact Technical Service (BY E-MAIL OR WHATSAPP ONLY)

service@kfactor.it [whatsapp: +39-3518052001](https://www.whatsapp.com/channel/002913518052001)

Information



Warnings for the correct disposal of the product within the meaning of the European Directive 2002/96/EC.

At the end of its useful life the product must not be disposed of with municipal waste.

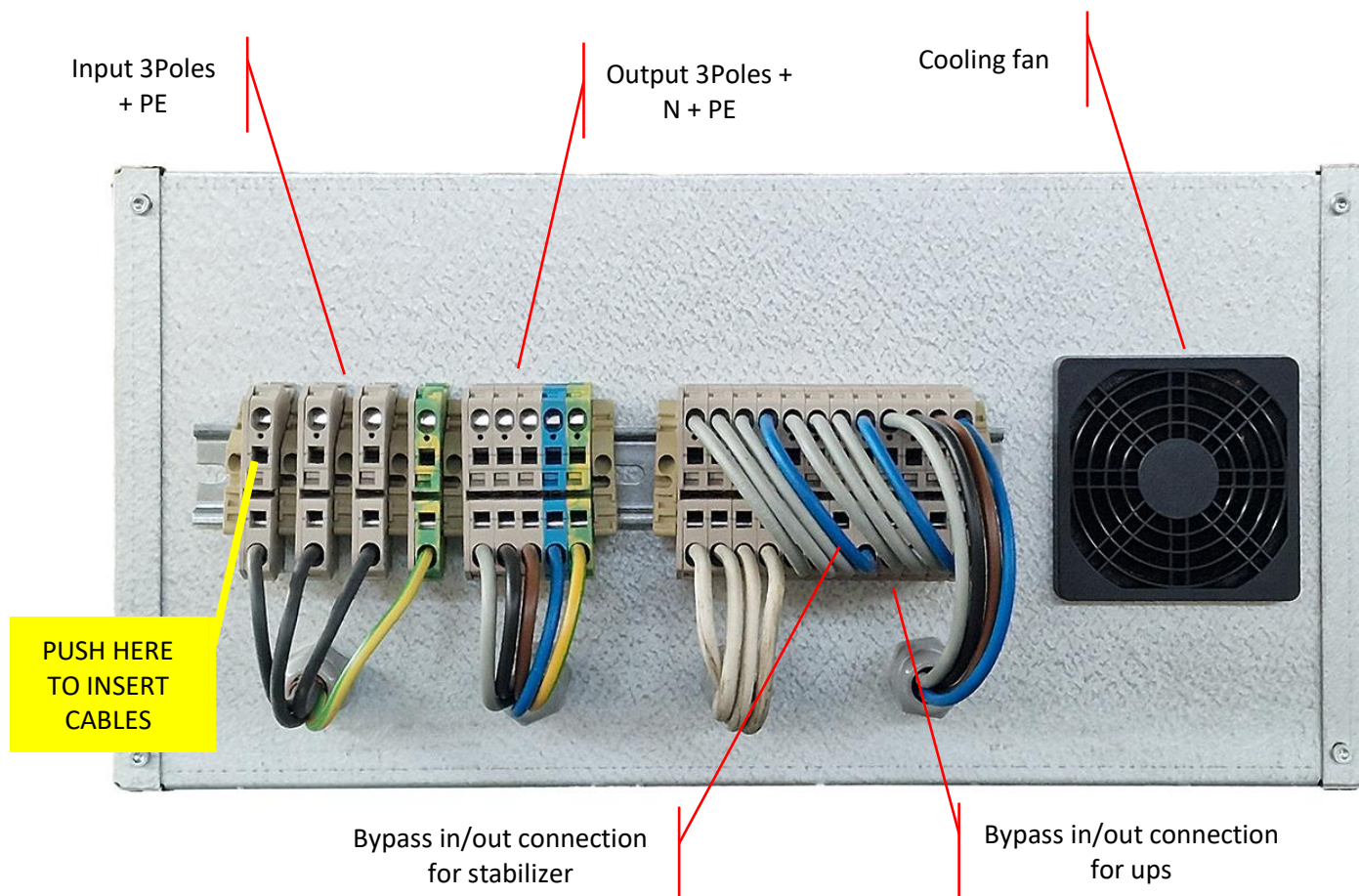
It can be delivered at the appropriate separate collection centers prepared by the municipal administrations, or at the retailers that provide this service. Disposing of the product separately allows to avoid possible negative consequences for the environment and for the health deriving from its inadequate disposal and it allows to recover the materials of which it is composed in order to obtain an important saving of energy and of resources. To underline the obligation to dispose of the electro-medical equipment separately, the product is marked with the trademark of the mobile trash container.

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1. INSTALLATION



The device does not require any particular mechanical installation but can be installed on a standard 19" rack support / enclosure



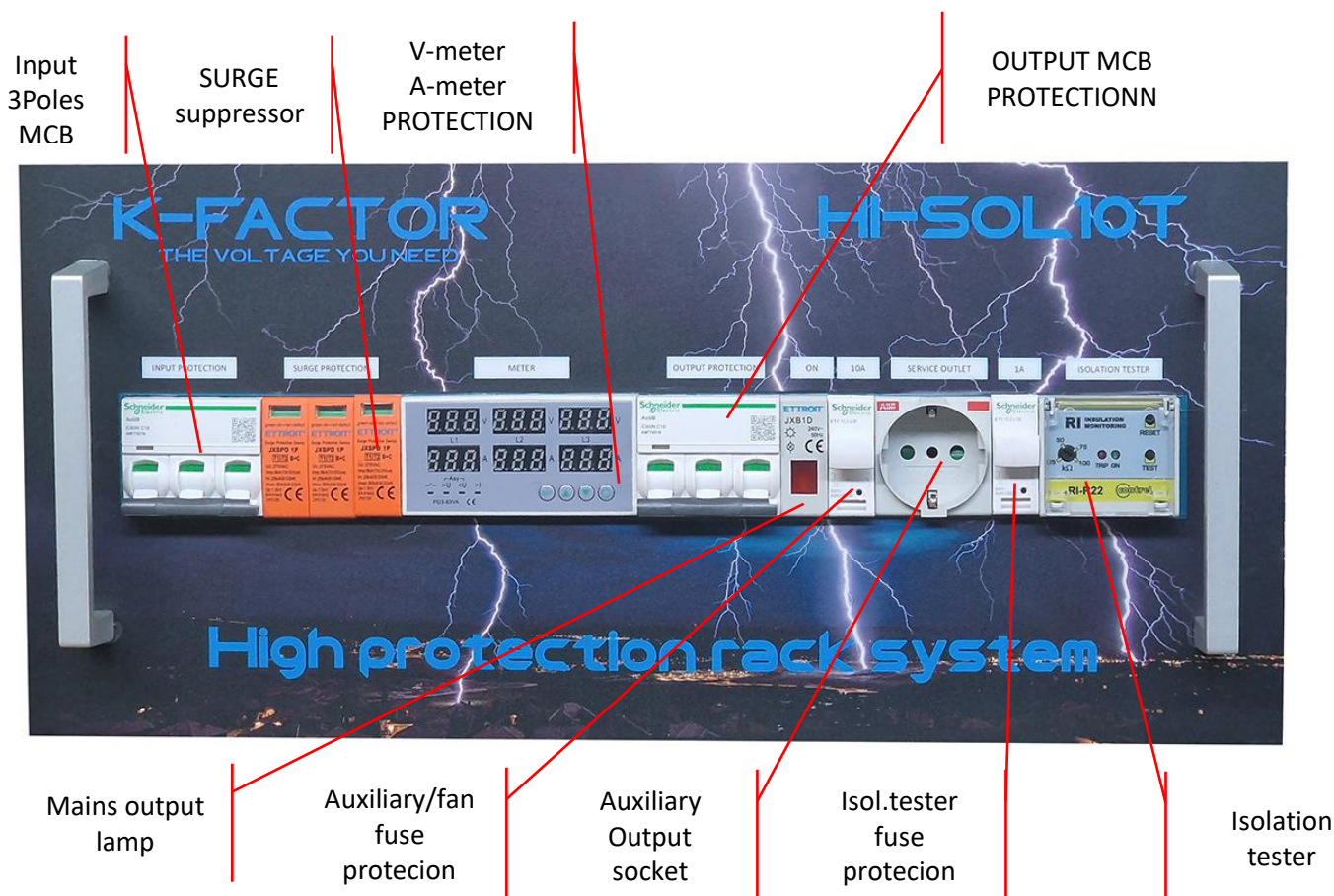
- 1) Check the availability of a protected power point 220-230Vac 2P+PE (single phase units) or 380-400Vac 3P+PE (three phase units) and that the system is off before making any connections. Check the continuity of the Earth Connection of the power socket to be connected to the appliance. Insert the network cable into the transformer input terminal, pushing the mechanism with a screwdriver to lock the cable.
- 2) **Connect the equipment (s) to be fed by means of an isolating transformer to one of the outlets with a suitable cable size to the output terminals. The Connection to the device of the equipment to be fed presupposes a preliminary verification of the power of the equipment. The total power of the equipment installed on the secondary must not exceed the power of the transformer itself (2kVA, 3kVA,...).**
 All cables must comply with the regulations of the countries and installation Sites In which this isolating transformer is used.
 All cables used must be three poles with ground connection, or 4 to 5 poles with ground connection for the three phase.
- 3) If it's required by the project, replace the bridging cables with a UPS and / or a stabilizer of an appropriate power.

In case of overcurrent, protection devices will open, with a consequent interruption of the power supply and shutdown of all the electrical equipment supplied by it.

Is necessary to pay attention to the functional compatibility of equipment powered by the device.

It is necessary to pay attention to the electromagnetic compatibility of equipment supplied by the device according to the room of use and their use as prescribed by standard EN 60601-1.

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2. USE

1. Turn on input circuit breaker. The isolation transformer and the surge suppressor are both supplied.
 - a. The surge suppressor provides protection against spikes and high voltage according to its specifications, Type T1+T2 B+C 1Pole 275V 25kA-50kA
 - b. The measuring device is provided with low voltage, high voltage, high current protection, with a time delay for both activation and deactivation. In case voltage or current are out of the threshold, after the set delay time, the meter will open its output contact and therefore output will be deactivated. Setting instructions of the measuring/protection device is shown on Appendix A of this manual
 - c. Close the output circuit breaker to enable output on the output terminals and the output auxiliary socket. A red lamp will be turned on to confirm that output is available on the output terminals. The fuse protects the cooling fan and the auxiliary socket. In case a fuse blows, please use a fuse according to the current label shown on the front plate. The cooling fan is activated through a 50°C thermal switch assembled close to the transformer winding. Usually, the auxiliary fuse allowed is 10 A max. After closing the output breaker the load connected to the output terminals can be safely used.
 - d. An Isolation tester is provided to continuously check isolation between the output windings and earth. The isolation resistance threshold is adjustable. Please refer to the manual of the specific item to adjust the threshold and test / reset the unit. A RED lamp will highlight the low isolation resistance level. On the tester terminals, a contact is available to remotely add a further alarm or a contactor to open the circuit in case of low resistance.

NOTE:

At the end of the installation the test of isolation must be carried, please refer to the manual of the isolation tester to properly carry the test. A further test should be scheduled to confirm the correct operation of the isolation tester over the time.

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3. REPLACING THE FUSES

AUXILIARY SOCKET

Turn OFF the loads connected to the auxiliary socket.

- Open the fuse drawer and remove the blown fuse; replace it with a new fuse.
Caution: Never replace the fuses with higher current than the rating shown on the label

ISOLATION TESTER

- Open the fuse drawer and remove the blown fuse; replace it with a new fuse.
Caution: Never replace the fuses with higher current than the rating shown on the label

4. MAINTENANCE

Expected service life: 10 years

Routine maintenance or repairs may be necessary during the planned service life.

It's very important to schedule a proper maintenance routine to keep the unit at the maximum protection level

DAILY MAINTENANCE ROUTINE

- Check that the **SURGE suppressor index is GREEN**
In case color is RED, it is required to rapidly
REPLACE the suppressor cartridge, otherwise the unit
won't be protected from spikes and surges.



- Check that auxiliary fuse is always good. Please **check daily continuity of the fuse**: if the fuse is blown the fan may not work and it may affect the proper cooling of the transformer. Immediately suspend the use of the transformer in case fuse is blown
- Check the **isolation tester is on** and the isolation resistance is regular (no alarm on)

Use the transformer ONLY if all the above conditions are respected.

EVERY 6 MONTHS

- Check that cooling fan is properly working, clean the fan filter.
- Test the isolation resistance twice and verify the proper operation of the isolation tester
- Check that the external surface of the instrument is clean and there are satisfactory general conditions
- Make sure that the casing is not broken or cracked, that all the components (switches and sockets) are present and that no liquids are spilled, or signs of improper use are present.
- Check the tightening of the screws.
- Check the integrity of the mains cable, the cable glands and the output cables
- Check the integrity and operation of the mains light

Recheck all functions of the appliance

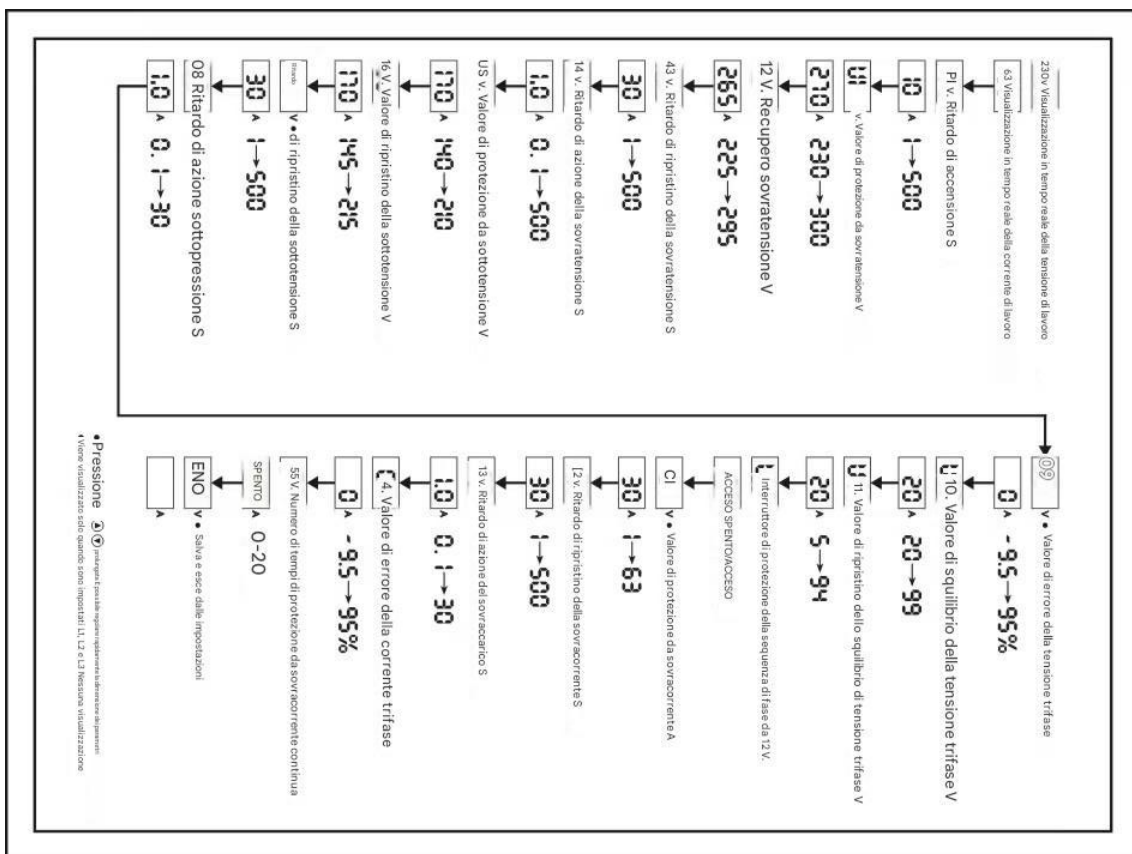
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5. TROUBLESHOOTING

Defect Type	Cause	Remedy
The equipment does not turn on	Mains terminals not connected to the network	Check the correct insertion of the input cables in the input terminals
The device connected to the auxiliary socket does not work	Fuse blown	Immediately replace the fuse, the fuse blown may affect the proper cooling of the transformer
The equipment does not turn on	Overcurrent, low voltage or high voltage protection has occurred on the meter	Check if the voltage or current is outside the given threshold. Remove or change threshold if the voltage is still acceptable for the user, or wait until voltage is within the required thresholds
	The output protection breaker opened	Please check the load and verify there is no short circuit or excessive load or inrush power taken from an inductive load
If the above remedies have not been successful, unplug the mains from the system, isolate the equipment and contact the technical service.		

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APPENDIX A: VOLTAGE / CURRENT MEASURING DEVICE - PROTECTION



Intervallo di impostazione dei parametri tecnici			
Parametri tecnici	Time per range	Parametri predefiniti	Introduzione alla funzione
Ritardo dell'elettricità	1s-500s	10 secondi	Tempo necessario per ripristinare l'alimentazione dopo un'interruzione di corrente esterna
Valore di protezione da sovratensione	230V-300V	270 V	Quando la tensione è superiore al valore impostato, il protettore attiva la protezione dell'alimentazione
Valore di recupero della sovratensione	225V-295V	265 V	Quando la tensione è inferiore al valore impostato, il protettore si ripristina automaticamente. La velocità impostata deve essere inferiore del 5% al valore di protezione da sovratensione
Ritardo di ripristino della sovratensione	1s-500s	30	Tempo necessario per il ripristino automatico dopo il ripristino della tensione
Ritardo dell'azione della sovrappressione	0.1 s-30 s	1.0s	Tempo necessario per la protezione da sovracorrente quando la tensione è superiore al valore di protezione da sovratensione
Valore di azione di sottotensione	140 V-210 V	170 V	Quando la tensione è inferiore al valore impostato, il protettore attiva la protezione dell'alimentazione
Valore di recupero sottotensione	145V-215V	175 V	Quando la tensione si riprende al valore impostato, il protettore si ripristina automaticamente. Il valore impostato deve essere superiore di oltre il 5% rispetto al valore di protezione da sottotensione.
Ritardo ripristino sottotensione	1s-500s	30	Tempo necessario per il ripristino automatico dopo il ripristino della tensione
Ritardo azione sottotensione	0.1 s-30 s	1.0s	Tempo necessario per la protezione da sovracorrente quando la tensione è inferiore al valore di protezione da sottotensione
Errore di tensione trifase	-9.5%-9.5%	0	Correggere l'errore di tensione trifase
Valore di protezione da squilibrio di tensione trifase	20V-99V	20 V	L'errore tra la tensione trifase è maggiore del valore impostato e il protettore è spento per proteggere
Valore recupero dello squilibrio di tensione trifase	5V-94V	20 V	Quando l'errore tra la tensione trifase è inferiore al valore impostato, il protettore si ripristina automaticamente. La velocità impostata deve essere superiore al valore di protezione di 5 V
Interruttore di protezione sequenza fasi	Spento/ACCESO	SU	Abilitare o disabilitare la funzione di protezione della sequenza di fase
Valore di protezione da sovracorrente	1A-53A	30A	Manca una delle tensioni trifase e il protettore è spento
Ritardo di ripristino da sovracorrente	1s-500s	30	Una delle tre tensioni di fase manca e il protettore è spento
Ritardo di fusione eccessivo	0.1 s-30 s	1.0s	Quando la corrente è superiore al valore di protezione da sovracorrente, il tempo necessario per la protezione da sovracorrente
Errore della corrente trifase	-9.5%-9.5%	0	Correggere l'errore della corrente trifase
Tempi di protezione continua da sovracorrente	2-20 ore	Spento	Quando il numero di sovracorrenti continua supera il valore impostato, il protettore viene spento e deve essere abilitato manualmente
Protezione fase aperta	SU	1	Una delle tensioni trifase è mancante e il protettore è spento

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UE CONFORMITY DECLARATION



K-FACTOR SRL
Via Giotto 9
I-42014 Castellarano (RE)
Italia

Declares under its own responsibility that the isolation transformers HI-SOL:

comply with all applicable provisions in Regulation (EU) 2017/745 and related harmonized standards:

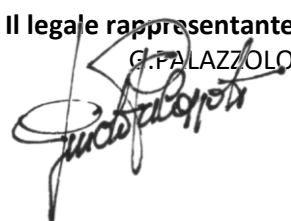
standards for isolation transformers:

EN IEC 61558-1:2019, EN IEC 61558-2-4:2010

They also satisfy all the applicable provisions of Directive 2011/65 / EU of the European Parliament and of the Council of 8 June 2011, on the restriction of the use of certain hazardous substances in electrical and electronic equipment and the Delegated Directive 2015/863 of the Commission of 31 March 2015, which amends Annex II of Directive 2011/65 / EU and of DIRECTIVE 2014/30 / EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonization of the laws of the Member States relating to electromagnetic compatibility

Castellarano, 29/04/2025

K-FACTOR SRL
Il legale rappresentante
G. PALAZZOLO



IN CASE OF ASSISTANCE

The company trusts in complete cooperation from the customers to improve its service.

We remind you some data to be recognized before contacting our technical service:

- a. Model number
- b. serial number
- c. Purchased from date of purchase.....
- d. Type of load
- e. Load connected (W) (can be found on the appliance data plates)
- f. Found defect

In the event of a return for repair, always attach a letter to the product quoting the requested data, together with the original packaging and ship free of charge to our address below

GUARANTEE

This guarantee is offered as an extra benefit and does not affect your legal rights.

All the voltage stabilisers and line conditioners are guaranteed by the Company for 12 months against faulty material or workmanship. If any part is found to be defective in this way within the first twelve months from the purchase date, we or our authorised service agents, we will replace or at our option repair that part without any charge for materials or labour, provided that the appliance has been used only in accordance with the instruction provided with each stabiliser and that it has not been connected to an unsuitable electricity supply, or subjected to misuse, neglect or damage or modified or repaired by any person not authorised by us.

The correct electricity supply voltage and frequency is shown on the rating plate on the appliance. This guarantee is normally available only to the original purchaser of the appliance, but the company will consider written applications for transfer.

Should any defect arise in any voltage stabilisers or line conditioners a claim under guarantee become necessary, the appliance should be carefully packed and returned to your local service agent. This copy of the guarantee should be attached to the appliance. Guarantee is applied only if the equipment is returned F.O.T. our factory. No technical intervention may be claimed for any reason at the place of installation under guarantee