THYRATRON
ELECTRONIC APPLICATIONS S.A.

Power Protector Stabilizer

PPS MFS-Lw [v1.6]

- Instruction Manual -

CE RoHS COMPLIANT PQS CERTIFIED

PPS MFS-Lw is an incorporated **P**ower **P**rotector **S**tabilizer that stabilizes the voltage and supervises voltage, frequency and current in order to ensure the safe operation of **commercial refrigeration appliances** *(appliances falling into EN/IEC 60335-2-89 scope)*. The product is split type and consists of the **ECU** (**E**lectronic **C**ontrol **U**nit) and the **Trafo** (Autotransformer).

PRODUCT FEATURES:

- Voltage stabilizer
- Voltage and Frequency Supervisor
- Overcurrent Protection
- Intelligent Time delay 4’30”+0”to 30’’ random
- Surge protection
- Industrial design
- Explosion Proof Relays (EN60079-15)
- Reconnecting Voltage Hysteresis
- Zero-Crossing
- Led Indicators
- Zero current change over
- Split type / Incorporated Use / Incorporated Use

ECU (Electronic Control Unit) & Trafo

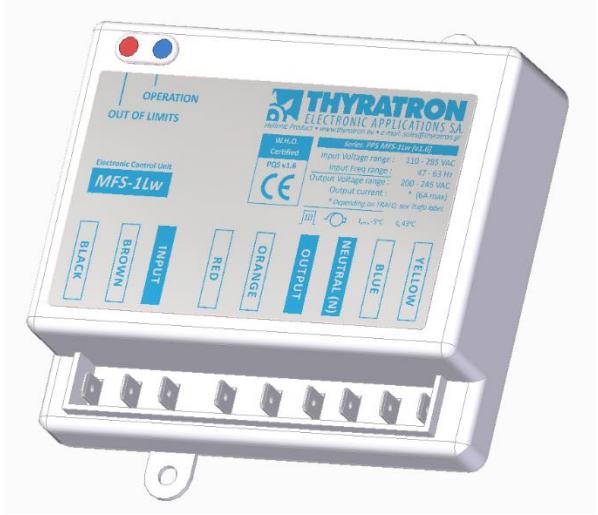
(1): Red led “OUT OF LIMITS”

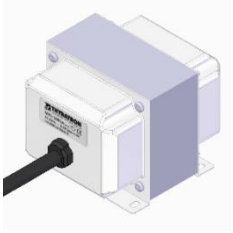
(2): Blue led “OPERATION”

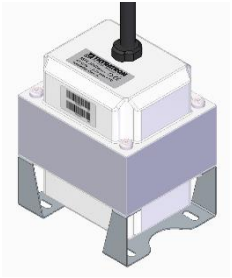
(3): Mounting points

(4): Fast on terminals

(5): Connection cables - Fast On female terminal

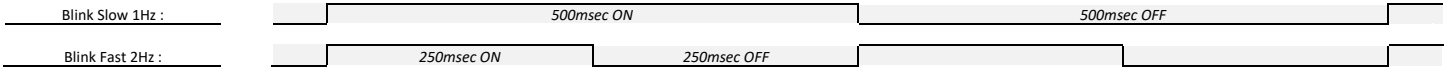






LED INDICATION

EVENT	*Red LED "OUT OF LIMITS"*	*Green LED "OPERATION"*
Normal operation	Off	On
Start-Up delay	Blink Slow *(1Hz)*	Off
Frequency out of limits	Blink Fast *(2Hz)*	Off
Temperature out of limits	Blink Slow *(1Hz)*	Blink Slow *(1Hz)*
PPS MFS Failure or No Power	Off	Off
Short Circuit Detected	Blink Slow *(1Hz)*	On



VOLTAGE STABILIZASION

OUTPUT VOLTAGE *limits*	
The stabilizer ensures that the output voltage will remain inside the output limits, if the input voltage fluctuation is between the input limits	200 VAC ±1% *(195.5 VAC @ Lowest Input Voltage)* / 245VAC ±1%

VOLTAGE & FREQUENCY MONITORING

	INPUT VOLTAGE *limits*	**FREQUENCY *limits***
PPS_MFS-Lw monitors the voltage and frequency of mains power and cuts off the output, whenever the values of mains power goes out of limits.	110 - 285VAC	47 - 63 Hz

OVER CURRENT PROTECTION

	Time Reaction		
PPS_MFS-Lw monitors the output current and cuts off the output when the values goes out of limits.	1.5 x I_{rated} < 120 Sec	7.2 x I_{rated} < 10Sec	10 x I_{rated} < 0.1 Sec

SPECIFICATIONS

PPS_MFS-Lw Series [v1.6]:			PPS_MFS-1Lw [v1.6]			PPS_MFS-2Lw [v1.6]	
PPS MFS-xxxLw *Series* ***(xxx: 070, 085, 100, 150, 200)***			**070**	**085**	**100**	**150**	**200**
Input	Continuous Voltage withstand range (@ 25^{0}C)		60 - 500 VAC				
	Nominal Input Voltage		230VAC				
	Voltage regulation range		110 - 285 VAC				
	Nominal Frequency / Frequency limits		50 or 60 Hz / 47 - 63Hz				
Output	Nominal Output Voltage		230VAC				
	Voltage range		200 VAC ±1% *(195.5 VAC @ Lowest Input Voltage)* - 245 VAC ±1%				
	Nominal Frequency / Frequency limits		50 - 60 Hz / 47 - 63Hz				
	Current Capacity I_{rated} (A) *(Continuous Operation (43^{0}C) @ Low Voltage)*				3.2		
	Overcurrent Protection		1.5 x I_{rated}< 120 Sec / 7.2 x I_{rated}< 10 Sec / 10 x I_{rated}<100 mSec				
	Automatically Reconnection Time Delay / Start-Up Time		4’30’’ + 0” to 30’’ random / Zero Time on Production Line for first 30 minutes continuous operation of life cycle				
IP Class			IP4X				
Insulation Class (transformer windings)			Class H (180ºC)				
Ambient Temperature range *(use/transport, storage)*			t_{amin}-5 to t_a+43ºC *during use* /-30°C to +70°C *when the device is inactive*				
Ambient Humidity range *(transport, storage, use)*			5 - 95% RH, non-condensing				
Overvoltage Category and Pollution Degree			OVG: III, P3				
Plastic Housing			UL94 V-0 Flame Retardant, GWT 850ºC				
Relays			Relay lifetime cycles 350,000, Explosive Atmospheres Certified (IEC 60079-15 type of protection "n")				
Connections			Fully Insulated Fast On 6.3mm x 0.8mm				
Cable Harness - Lengths			250 mm /550mm/1000mm				
Overall Dimension / Total weight	ECU		114 x 121 x 32.5±1.0mm / 0.267 ±0,1kg				
	Trafo	- Standard installation - Vertical installation			108.5x94.5 x131±1.0mm 4.02±0.1kg		

SAFETY INSTRUCTIONS - INSTALLATION

What this chapter contains

This chapter contains the safety instructions you must follow when installing, operating, and servicing the **Power Protector Stabilizer MFS**. If ignored, physical injury or death may follow and/or damage may occur to the **PPS_MFS**. Read the safety instructions before you work on the unit. These warnings are intended for all who work on the PPS_MFS, or its wiring.

WARNING! Only a qualified electrician may carry out the work described in this chapter. Ignoring the safety instructions can cause physical injury, death or/and damage to the equipment. Make sure that the device is disconnected from the mains (input power) during installation.

Beware of hot surfaces. Some parts, such as a transformer, may remain hot for a while after disconnecting the electrical supply.

Electrostatic discharge warning warns of electrostatic discharge which can damage the equipment.

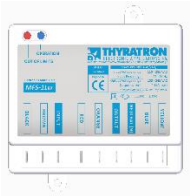
- Only qualified personnel are allowed to install and maintain the PPS_MFS.
- The ECU contain components sensitive to electrostatic discharge. Do not open the plastic enclosure or touch the fast-on terminals.
- PPS MFS is intended to be built into commercial refrigeration appliances or other enclosures that provide protection against certain external influences and in any direction, protection against direct contact and electric shock. It shall be installed in an area where it is inaccessible without disassembly of the enclosing area.
- Never work on the PPS_MFS or its wiring when mains power is applied. Always ensure that the voltage between the device input terminals, labeled INPUT and NEUTRAL, is close to 0V, by measuring with a multimeter (impedance of at least 1 MOhm). Externally supplied control circuits may cause dangerous voltages on the device even when the mains power on the drive is switched off.
- Do not perform any insulation or voltage withstand tests on the device.
- When reconnecting the wiring, always check that the Phase - Neutral order is correct.
- Do not change the electrical installations of the PPS_MFS. Changes may affect the safety performance or operation of the device unexpectedly. The customer is responsible for all customer-made changes.
- Make sure that dust from boring and grinding does not enter the drive when installing. Electrically conductive dust that enters the unit may cause damage or malfunction.
- Do not fasten the device through welding.

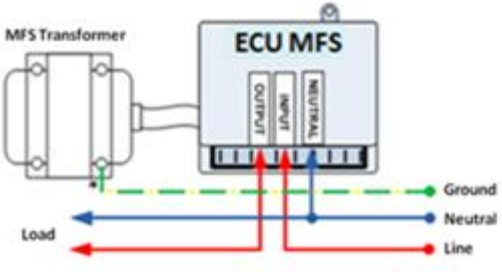
Note: (1) Traces of rust on sharp edges and any yellowish film (removable by rubbing) that may appear on outer surfaces of the autotransformers iron cores due to certain conditions (marine environments, high humidity, rain, snow, wind, dust, pollution, ultraviolet rays, and sea salt), have no effect in high reliability performance and lifetime of the product.

(2) The fast-on terminals on the device are at a dangerously high voltage when the input power is on.

INSTALLATION AND MAINTENANCE WORK

- The PPS_MFS consists of two parts, the Electronic Control Unit (ECU) and the Autotransformer (Trafo). The ECU and the Trafo of the device are delivered in a separate cardboard box. The type, size, and material of the package depend on the frame size of the Autotransformer.
- The combination of appliance enclosure and stabilizer enclosure should achieve a solids ingress rating of IP5X or better.
- It is recommended that a protection device, such as an MCB, is installed on the appliances input, calculated based on the current consumption of the appliance and considering the stabilizer current drain at low voltages.
- Confirm compatibility with the connection terminals as well as equal or better insulation than the Panduit DNF18-250FIB-3K in order to ensure IP rating. The connectors are Fast On terminals 6.3x0.8mm.
- The parts of the PPS_MFS must be connected by using fast-on terminals taking into account the coloring code of the cables and ECU.
- The device must be installed in an upright position (see figure on the right) with space for adequate airflow.
- An earth-ground connection must be fastened on the Trafo. Details about grounding the Transformer Enclosure during implementation in the appliance. (IEC 60417-5019)





Before powering the device:

- Confirm the color coding between ECU and Autotransformer
- Confirm the correct fitting of the terminals to ensure IP rating of the connections.

MAINTENANCE, TROUBLESHOOTING

The PPS_MFS is maintenance-free and is made up of non-repairable / refurbishable parts. In the event of a failure of the PPS MFS, both ECU and Trafo have to be replaced with new, unused units. Partial replacement is not advisable.

Red led "OUT OF LIMITS"	***Blue led "OPERATION"***	**EVENT**	**Actions**
Off	On	Normal operation	
Blink Slow *(1Hz)*	Off	- Start-Up delay - Voltage out of limit	- Wait until the output is enabled (max 5mins). - If the output was not enabled in 5 mins, the voltage being supplied to the stabilizer is out of limits. Check the input voltage.
Blink Fast *(2Hz)*	Off	Frequency out of limits	- The frequency of the voltage being supplied to the stabilizer is out of limits. Check the input frequency.
Blink Slow *(1Hz)*	Blink Slow *(1Hz)*	Temperature out of limits	- Check for hot spots near to the ECU.
Off	Off	- No input power - Stabilizer failure	- Check if mains power Turning On - If mains power is on, the stabilizer needs to be replaced (Trafo and ECU).
Blink Slow *(1Hz)*	On	Short circuit detected	- Disconnect mains power and check for a short circuit in the refrigerator. - In order to reset the voltage stabilizer after a short circuit detection ($10xI_{rated}$), disconnect mains power, wait for at least 20 seconds and reconnect* the refrigerator (power cycle). The output is reconnected automatically with a time delay. *Warning: Reconnection of the refrigerator to mains power when a short circuit has been detected, must be done after the failure has been resolved.

STORAGE

Should not be stored and/or transported in high temperature or high humidity conditions. Usage beyond the specified shelf life could compromise product long term reliability. The suitable conditions are +5 to +35°C and less than 95% RH indoors. Applicable ambient temperature and humidity range during transport and storage: -30 to +70°C, 5% to 95% RH.

GUARANTEE & RETURNS

Thyratron S.A. provides a guarantee of 2 years from the date of purchase of this product. Please refer to file “PP4-1.ef10_General Conditions of Sale” for full warranty terms and conditions.

END-OF-LIFE RESOURCE RECOVERY AND RECYCLING PROCEDURES.

Disposal of Old Electrical & Electronic Equipment (Applicable in the European Union and other European countries with separate collection systems).

This symbol on the product or on its packaging indicates that this product shall not be treated as household wastewhen disposed of. Instead, it shall be handed over to the applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. Please ensure your product(s) is/are disposed of by a registered WEEE waste carrier.

FURTHER INFORMATION

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