



Power Protector Stabilizer

MFS-i Series

- User Manual -

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The following document applies to PPS MFS-i / -iR / -iF

Thyatron started producing **Power Protector Stabilizer** in 1992. The company has over 1.000.000 pieces on the market. MFS series superiority originates from the **OEM design** of the product based on needs and demands born directly from field knowledge provided by the customer.



PPS MFS-i is a incorporated **Power Protector Stabilizer** that supervises voltage, frequency, temperature, current* and stabilizes voltage for normal operation of **commercial refrigeration appliances** (*appliances falling into EN/IEC 60335-2-89 scope*). PPS MFS also has a function of randomized starting delay after the out of limits 3 minute cut off. PPS MFS-i uses soft start for smooth power connection. The product is split type - the **ECU** (Electronic Control Unit) and the **Trafo** (Autotransformer).

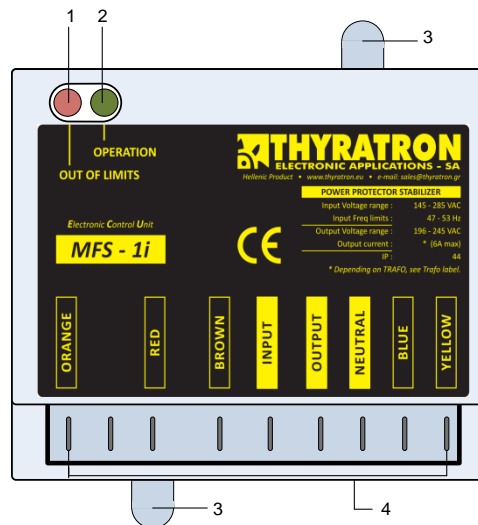
PRODUCT FEATURES

- Voltage stabilizer ^{1.4}
- Voltage & Frequency supervisor ^{1.5}
- Intelligent ambient temperature protection ^{1.6}
- Intelligent Time delay 2'30" +0" to 30" random (*zero at start up on production*) ^{1.7}
- Surge protection ^{1.8}
- Reconnecting Voltage Hysteresis ^{1.9}
- Zero Crossing
- Soft Start ^{1.10}
- Zero current change over (New)
- Wide ambient temperature range from -40 °C to +85 °C

***Current controlled output (on request)**

1. GETTING TO KNOW YOUR APPLIANCE

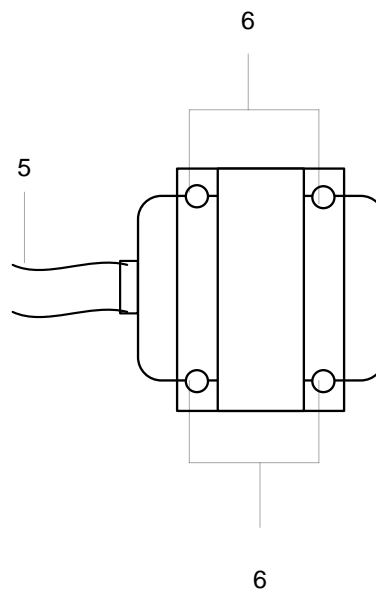
1.1. Electronic Control Unit - ECU



1. Red LED
2. Green LED
3. Mounting points
4. Fast on terminals

1.2. Autotransformer - Trafo

Electrical function: Non short circuit proof



5. Connection cables - Fast On female terminal (Installation Guide)
6. Mounting points

1.3. LED INDICATION

EVENT	RED LED	GREEN LED
Normal operation	Off	On
3 minutes delay	Blink slow	Off
Frequency out of limits	Blink fast	Off
Temperature out of limits	Blink slow	Blink slow
PPS MFS Failure or No Power	Off	Off

1.4. VOLTAGE STABILIZATION

PPS MFS-i performs voltage correction and stabilization using Autotransformer, Relays and Triacs.

PPS MFS-i makes switching in order to keep the output voltage within limits.

Series / OUTPUT VOLTAGE limits			
PPS MFS-i	196 - 245 VAC $\pm 2\%$	PPS MFS-xxxIR	205 - 245VAC $\pm 2\%$
PPS MFS-iE	100 - 125 VAC $\pm 2\%$	PPS MFS-xxxIF	198 - 262 VAC $\pm 2\%$

1.5. VOLTAGE & FREQUENCY MONITORING

PPS MFS-i monitors voltage and frequency of main power and cuts off the output when the values of main power (voltage or frequency) come out of limits.

Series	INPUT VOLTAGE limits	INPUT FREQUENCY limits
PPS MFS-i / -iR	145 - 285VAC $\pm 3\%$	47 - 53 Hz $\pm 0.2\text{Hz}$ Or 57 - 63 Hz $\pm 0.2\text{Hz}$
PPS MFS -iF	145 - 300VAC $\pm 3\%$	
PPS MFS -iE	55 - 160VAC $\pm 3\%$	57 - 63 Hz $\pm 0.2\text{Hz}$

1.6. TEMPERATURE MONITORING

PPS MFS-i has temperature sensor to monitor ambient temperature. When the temperature is higher than the upper limit or the curve of temperature rises abruptly over 10 minutes, then PPS MFS-i cuts off the output to protect the cooler and itself.

Series	TEMPERATURE limits	CURVE of TEMPERATURE
PPS MFS-i / -iR/ -iF	+80 °C	$d\theta > 15\text{ °C} / 15\text{ min}$

1.7. INTELLIGENT TIME DELAY

- Delayed start allows the cooling circuit to balance the pressure of cooling gases, preventing startup under high pressure, increasing the lifetime of compressor.
- Intelligent time delay protects network overload and voltage drop, in case of many coolers are installed in the same power line.
- Intelligent time delay is activated after 30min of continuous operation. This function saves time on the production line, because there is no delay.

1.8. SURGE PROTECTION

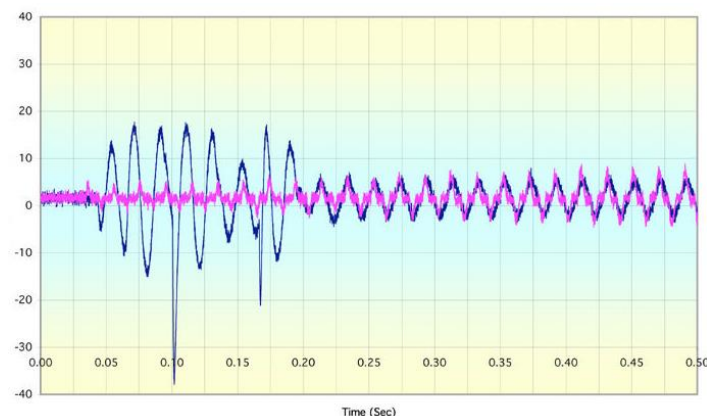
PPS MFS uses components to absorb surges in order to provide some protection to the commercial refrigerators from them.

1.9. RECONNECTING VOLTAGE HYSTERESIS

If PPS MFS-i reconnects after a cut off and the line voltage fluctuates near the lower limit (0-5Volts), the device uses a voltage window in order to avoid continuous cutoffs due to voltage drop from connecting and igniting of the unit.

1.10. SOFT START

PPS MFS-i use “Voltage Zero - Crossing” and Triac to perform Soft-Start*. The effect of this operation is to reduce the starting current, thereby avoid voltage drops in the network and smooth the mechanical start of compressor, increasing its lifetime.



*Minimum Current for this operation is 0.06A.

1.11. STORAGE

Should not be stored in high temperature or high humidity condition. Usage, beyond the specified shelf life could compromise product long term reliability. The suitable condition is +5 to +35°C and less than 75%RH in Relative Humidity indoor. Shelf Life, 2 years.

1.12. APPROVALS

Approvals		
CE	LVD European Directive 2014/35/EU <ul style="list-style-type: none">• EN 61558-1• EN 61558-2-13	EMC European Directive 2014/30/EU <ul style="list-style-type: none">• EN 61000-6-1• EN 61000-6-2• EN 61000-6-3• EN 61000-6-4• EN 62041

2. SPECIFICATIONS

2.1. Power Protector Stabilizer MFS-i/ -iR/ -iF / -iE

2.1.1. Series: PPS MFS-1i / -2i

PPS MFS-i Series :		PPS MFS-1i				PPS MFS-2i		
Model of PPS MFS-xxxi Series :		045	070	090	120	170	220	270
<i>xxx: 045, 070, 090, 120, 170, 220, 270</i>								
Power Supply	Nominal Voltage	220 - 240 VAC						
	Operation Voltage Bandwidth	110 - 310 VAC						
	Ambient Temperature	-40 - 85 °C						
	Humidity	0 - 85 %RH						
Input	Low Voltage	145 VAC ±3% with hysteresis						
	High Voltage	285 VAC ±2%						
	Lower Freq. Limit (50/60 Hz)	47 Hz ±0.2Hz or 57 Hz ±0.2Hz						
	Upper Freq. Limit (50/60 Hz)	53 Hz ±0.2Hz or 63 Hz ±0.2Hz						
Output	Voltage range	196 - 245 VAC ±2%						
	Max. Current (A)	2.0	3.0	4.0	6.0	8.0	10.0	12.0
	Continuous Operation (45°C) Current (A) @ Low Voltage	1.5	2.2	3.0	4.5	6.0	7.5	9.0
Start Up Time, Time Delay		- 3 minutes (2'30'' + 0'' to 30'' random) -Zero on Production Line for first 30 minutes continuous operation of life cycle						
Thermal protection		- Temperature limits +80 °C - Temperature differential 15 °C / 15 minutes						
Plastic Housing		UL94 V-0 Flame Retardant						
IP Class		IP44						
Life time		Relay lifetime cycles 350,000						
Connections		6.3mm x 0.8mm flat, terminal						
Cable Harness - Lengths		250mm / 550mm / 1000mm versions						
Insulation Class, Transformer Windings		F (155 °C)						
Total weight (Kg) (ECU, Trafo with cable 250mm)		2.0	2.1	2.6	3.3	4.3	5.4	6.2

2.1.2. Series: PPS MFS-1iR / -2iR

PPS MFS-iR Series :		PPS MFS-1iR				PPS MFS-2iR		
Model of PPS MFS-xxxIR Series :		045	070	090	120	170	220	270
<i>xxx: 045, 070, 090, 120, 170, 220, 270</i>								
Power Supply	Nominal Voltage	220 - 240 VAC						
	Operation Voltage Bandwidth	110 - 310 VAC						
	Ambient Temperature	-40 - 85 °C						
	Humidity	0 - 85 %RH						
Input	Low Voltage	145 VAC ± 3% with hysteresis						
	High Voltage	285 VAC ±2%						
	Lower Freq. Limit (50/60 Hz)	47 Hz ±0.2Hz or 57 Hz ±0.2Hz						
	Upper Freq. Limit (50/60 Hz)	53 Hz ±0.2Hz or 63 Hz ±0.2Hz						
Output	Voltage range	205 - 245 VAC ±2%						
	Max. Current (A)	2.0	3.0	4.0	6.0	8.0	10.0	12.0
	Continuous Operation (45°C) Current (A) @ Low Voltage	1.5	2.2	3.0	4.5	6.0	7.5	9.0
Start Up Time, Time Delay		- 3 minutes (2'30" + 0" to 30" random) - Zero on Production Line for first 30 minutes continuous operation of life cycle						
Thermal protection		- Temperature limits +80 °C - Temperature differential 15 °C / 15 minutes						
Plastic Housing		UL94 V-0 Flame Retardant						
IP Class		IP44						
Life time		Relay lifetime cycles 350,000						
Connections		6.3mm x 0.8mm flat, terminal						
Cable Harness - Lengths		250mm / 550mm / 1000mm versions						
Insulation Class, Transformer Windings		F (155 °C)						
Total weight (Kg) (ECU, Trafo with cable 250mm)		2.25	2.64	3.45	4.0	4.42	6.26	7.17

2.1.3. Series: PPS MFS-1iF / -2iF

PPS MFS-iF Series :		PPS MFS-1iF				PPS MFS-2iF		
Model of PPS MFS-xxxIF Series :		045	070	090	120	170	220	270
<i>xxx: 045, 070, 090, 120, 170, 220, 270</i>								
Power Supply	Nominal Voltage	220 - 240 VAC						
	Operation Voltage Bandwidth	110 - 310 VAC						
	Ambient Temperature	-40 - 85 °C						
	Humidity	0 - 85 %RH						
Input	Low Voltage	145 VAC ± 3% with hysteresis						
	High Voltage	300 VAC ±3%						
	Lower Freq. Limit (50/60 Hz)	47 Hz ±0.2Hz or 57 Hz ±0.2Hz						
	Upper Freq. Limit (50/60 Hz)	53 Hz ±0.2Hz or 63 Hz ±0.2Hz						
Output	Voltage range	198 - 262 VAC ±2%						
	Max. Current (A)	2.0	3.0	4.0	6.0	8.0	10.0	12.0
	Continuous Operation (45°C) Current (A) @ Low Voltage	1.5	2.2	3.0	4.5	6.0	7.5	9.0
Start Up Time, Time Delay		- 3 minutes (2'30'' + 0'' to 30'' random) - Zero on Production Line for first 30 minutes continuous operation of life cycle						
Thermal protection		- Temperature limits +80 °C - Temperature differential 15 °C / 15 minutes						
Plastic Housing		UL94 V-0 Flame Retardant						
IP Class		IP44						
Life time		Relay lifetime cycles 350,000						
Connections		6.3mm x 0.8mm flat, terminal						
Cable Harness - Lengths		250mm / 550mm / 1000mm versions						
Insulation Class, Transformer Windings		F (155 °C)						
Total weight (Kg) (ECU, Trafo with cable 250mm)		2.0	2.1	2.6	3.3	4.3	5.4	6.2

2.1.4. Series: PPS MFS-1iE / -2iE

PPS MFS-iF Series :		PPS MFS-1iE		PPS MFS-2iE
Model of PPS MFS-xxxIE Series :		050	070	100
<i>xxx: 050, 070, 100</i>				
Power Supply	Nominal Voltage	110 - 125 VAC		
	Operation Voltage Bandwidth	55 - 160 VAC		
	Ambient Temperature	-40 - 85 °C		
	Humidity	0 - 85 %RH		
Input	Low Voltage	75 VAC ± 3% with hysteresis		
	High Voltage	140 VAC ±3%		
	Lower Freq. Limit (60 Hz)	57 Hz ±0.2Hz		
	Upper Freq. Limit (60 Hz)	63 Hz ±0.2Hz		
Output	Voltage range	100 - 125 VAC ±2%		
	Max. Current (A)	4.0	6.0	8.0
	Continuous Operation (45°C) Current (A) @ Low Voltage	3	4.5	6.0
Start Up Time, Time Delay		- 3 minutes (2'30" + 0" to 30" random) - Zero on Production Line for first 30 minutes continuous operation of life cycle		
Thermal protection		- Temperature limits +80 °C - Temperature differential 15 °C / 15 minutes		
Plastic Housing		UL94 V-0 Flame Retardant		
IP Class		IP44		
Life time		Relay lifetime cycles 350,000		
Connections		6.3mm x 0.8mm flat, terminal		
Cable Harness - Lengths		250mm / 550mm / 1000mm versions		
Insulation Class, Transformer Windings		F (155 °C)		
Total weight (Kg) (ECU, Trafo with cable 250mm)		2.5	2.5	3.8

3. FURTHER INFORMATION

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