THYRICON Industrial Series 1P3, 3P3.20/40/80

Technical Catalogue

Description

THYRICON 1P3, 3P3.20/40/80 microcontroller based, zero-cross switching thyristor modules are designed to switch capacitive loads up to 75 kVAr for power factor control (PFC) applications.

THYRICON can be triggered by means of any type of power factor controllers, programmable logic controllers (PLC) etc. with a response time less than 20ms.

Features

- Used in the design of dynamic PFC systems for low voltage grids.
- Thyristors can be controlled independently appropriate for the unbalanced load compensation (optional)
- Tracks and switches at zerocrossing instants of voltage difference between capacitor and line.
- Monitors faults and status via LED.
- High switching speed, less than 20 msec.
- Prevents inrush currents at switching instants.
- No voltage transients caused by switching operations
- No noise during switching.
- Compact design ready for connection
- Silent operation
- Maintenance free
- Long operational life

Application

THYRICON industrial series products are used in PFC applications requiring fast response and high power quality. Installations with rapid changing and high fluctuating loads like pressing, welding machines, elevators, cranes, arc and ladle furnaces, wind turbines etc. pumping stations, commercial and public buildings are the example application areas. Appropriate for unbalanced load compensation by independent thyristor module control option.

Technical Specifications	1P3.20	3P3.20	1P3.40	3P3.40	1P3.80	3P3.80
Operating Voltage	230 VAC	400 VAC	230 VAC	400 VAC	230 VAC	400 VAC
Max. Operating Voltage	275 VAC	480 VAC	275 VAC	480 VAC	275 VAC	480 VAC
Operating Frequency	50Hz, 60Hz					
Nominal Operating Current	20A		40A		80A	
Supply Voltage	220 VAC					
Max. Power Consumption (Conduction Loss)	57W		114W		228W	
Max. Power Consumption (Control+Cooling)	10W		40W		40W	
Max. Capacitor Power	4,6 kVAr	24 kVAr	9,2 kVAr	48 kVAr	18,4 kVAr	96 kVAr
Trigger Signal	10 – 30VDC (Recommended: 24VDC)					
Switching Time	<20msec					
Re-switching Time	Depends on degree of de-tuning and value of discharge resistor.					
Operating Temperature	between -10°C to 55°C					
Display	Power Led, Conduction and Fault Status Led (RGB)					
Number of Thyristor Module	3					
Cooling	Passive cooling with aluminum heat sink		Passive cooling with aluminum heat + Air cooling (fan operates at 50°)			
Thermal Protection	Module is disabled at 85°C					
Dimensions (wxhxd)	130x240x140		130x240x200		130x240x200	
Weight (kg)						
Assembling	Vertical mounting on mounting plate					
Degree of Protection	IP20					

Structure and Operating Principles

THYRICON industrial series products are compact units with thyristor modules, driver circuit and cooling unit.

Upon the trigger signal from control devide, the thyristors are swictced at the zero crossing instants of anode-cathode voltage difference. Conduction of the thyristor modules are independent from the other. Optionally each thyristor module can be controlled by seperate control signal. Upon the loss of trigger signal, thyristors turn off by natural commutation.

1P3 ve 3P3 industrial series modules have fault detection feature.

RGB Led Thyristor State Table	
Green	Thyristor is conducting
Red	Thyristor Fault. Contact with service.
Blue	Check fuses. If fuses are healty, board fault. Contact with service
Do not lit	Thyristor is not conducting

Thyristors will not conduct in the case of trigger signal available but on the loss of power on the terminals of thyristor modules. This status will be evaluated as fault. On the other hand, if the thyristors are conducting on the loss of trigger signal, this condition will also be evaluated as fault. RGB leds on the module indicates the conduction and fault status of each thyristor module.

There is an auxiliary contact output in 1P3 and 3P3 industrial series products. The function of this contact can be configured by the switch located on the side of the module. The first option, output is closed when there is fault, the second option, output is closed when the thyristors conduct.

The modules except 1P3.20 and 3P3.20 are cooled by both aluminum heat sink and fan. On 1P3.20 and 3P3.20 products fan is not available. If the temperature reaches to 85°C thyristors are disabled.

Module switches to normal operation again when it reaches to the proper temperature. In ventilated models the fan is activated when the coolant temperature reaches to 50°C.

Safety Instructions and Precautions

Thyristor modules may only be used for the purpose they have been designed for.

The installation and commissioning must be done by qualified electrical staff.

Do not work with live conductors.

Thyristor-modules may only be used in combination with appropriate safety devices (Super-fast fuses and surge arresters - see “Recommended Use” part).

The devices have to be protected against moisture and dust – a sufficient cooling has to be assured.

Use power capacitors with suitable rated values depending on application (see “Recommended Use” part)

For PFC-systems without harmonic filter reactors, it is mandatory to use current limitation reactors per thyristor module.

In dynamic PFC-systems it is advised to use discharge resistors for fast switching. Do not use discharge reactors.

The PFC-capacitors will stay energized even when the particular step has been switched off. Protection against contacts has to be guaranteed.

Even in switched off state no electrical isolation is achieved for electronic switches. Therefore parts of the systems may not be touched after switching off the complete system before the capacitors have been completely discharged and switching device is isolated from the grid.

Installation and Operation

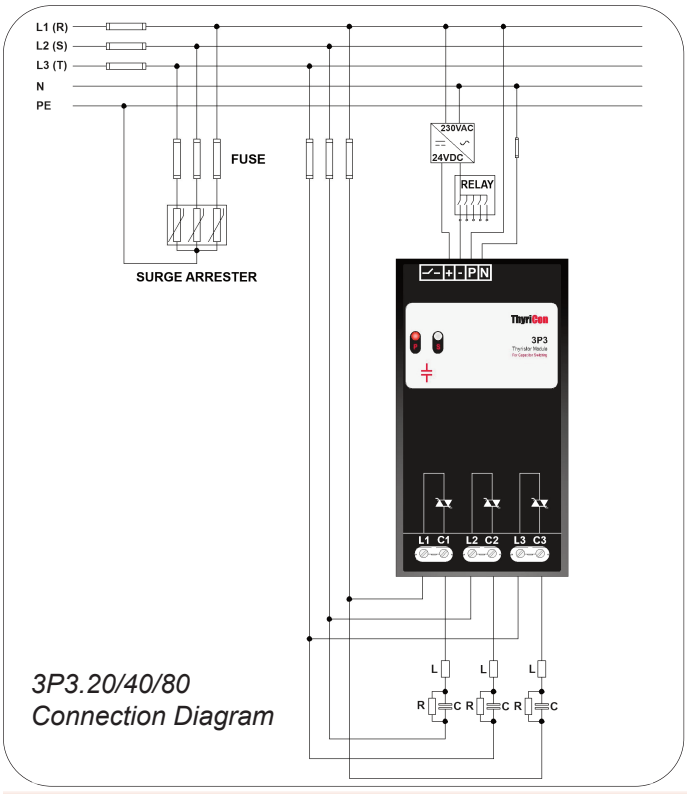
The mechanical mounting is done on a mounting plate from front side using the mounting pieces and screws supplied with the product (see “Mounting and Dimesions” part).

The electrical connections to main terminals are done according to “connection diagram” part according to application. It is mandatory to use super fast electronic fuses as branch fuses of the THYRICON module to protect the semiconductor device!

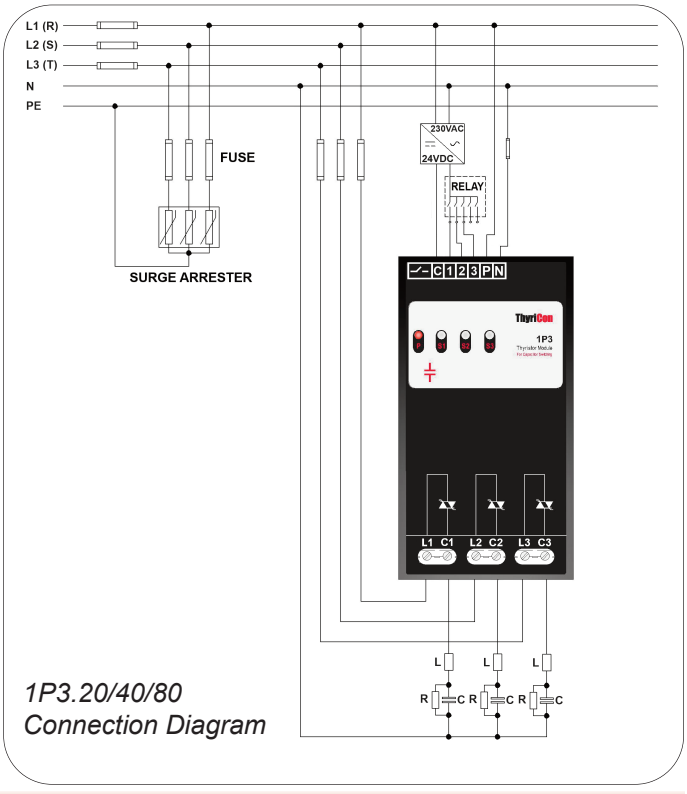
Connect a supply voltage of 220VAC to the power terminals and triggering signal of 10 – 30 VDC (coming from the PFC-controller or an adequate control system) to the triggering terminals of the connector supplied by the product in the given order and insert the connector to the socket located at the upper side of the device.

If the supply power of the module and supply power for the capacitor bank are switched on, the thyristor module is ready for operation.

Connection Diagram



3P3.20/40/80 Connection Diagram



1P3.20/40/80 Connection Diagram

Recommended Use

* It is recommended to use super fast fuses for each thyristor module.

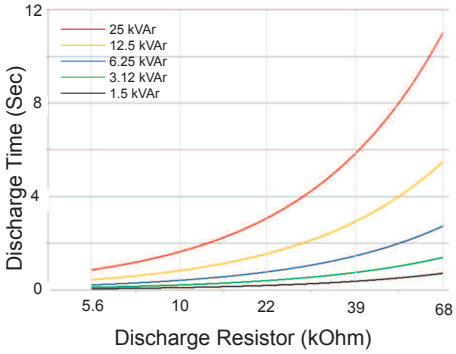
1(3)P20	32 A
1(3)P40	63 A
1(3)P80	125 A

* Semiconductor devices can be easily damaged at voltage spikes. For this reason, it is recommended to use surge arresters in the panel.

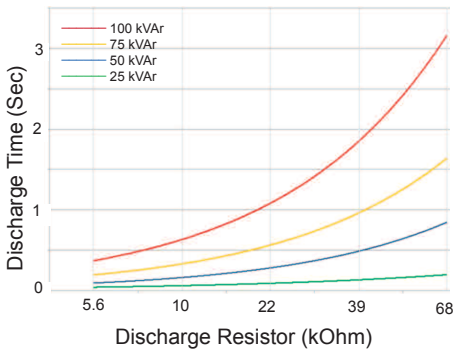
(ex: VAL-MS-230ST Phoenix Contact)

* For a 400V-grid recommended minimum rated capacitor voltages:
  - 400V for systems without reactors
  - 440V for detuned reactors up to %7
  - 480V for detuned reactors up to %14

189Hz, star connection case



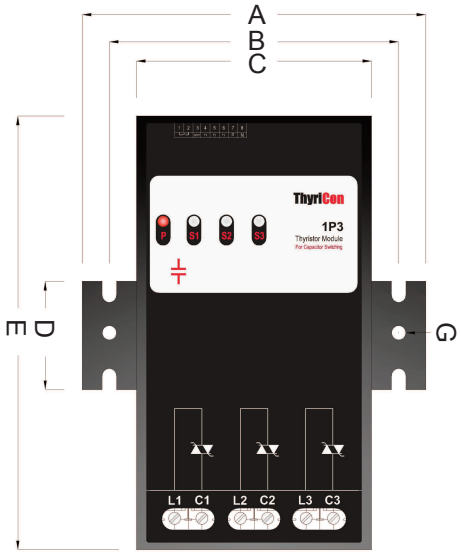
189Hz, delta connection case

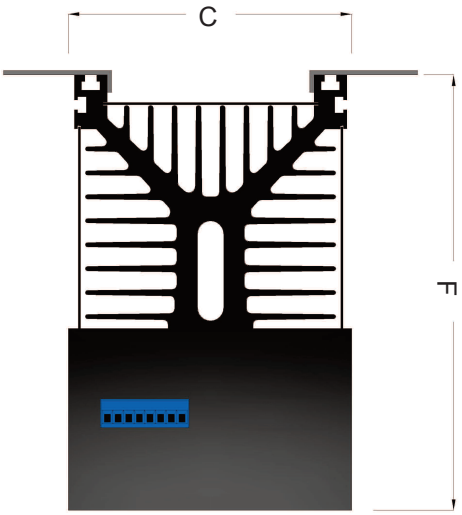


* The value of discharge resistors can be selected according to the desired switching time using the graphs. Discharge resistors should be chosen in the appropriate power. Recommended minimum power rating values for the discharge resistors are given in table:

68k	5W
39k	10W
22k	25W
18k	25W
10k	50W
5.6k	100W

Mounting and Dimensions





mm	1(3)P3.20	1(3)P3.40	1(3)P3.80
A	190	190	190
B	160	160	160
C	130	130	130
D	60	60	60
E	240	240	240
F	140	140	200
G	ø8	ø8	ø8

Ordering Information

3	P	3	-	4	0	I	A

1P	Single Phase
3P	Three Phase

3	Number of Thyristor Modules

20	Operating Current
40	
80	

I	Industrial Series

A	Single Control Signal
B	Seperate Control Signal for Each Phase

Warranty Terms and Conditions

Elektrolojik Energy Tech. Ltd. Co. warrants a trouble free operation of the THYRICON Industrial Series device within 24 months from the date of sale, on condition that following terms are provided:

- the proper connection and operation
- the safety of the quality control seal
- the integrity of case, no trace of opening, cracks, spalls etc.

The warranty shall not apply to malfunctions or damages resulting from accidents or user supplied faults.

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