

## Technical Catalogue

### Description

THYRICON 3P2.20/40/80/120/160 microcontroller based, zero-cross switching thyristor modules are designed to switch capacitive loads up to 100 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 in 380V and 400V-grids.
- Tracks and switches at zero-crossing 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.

Technical Specifications	3P2.20	3P2.40	3P2.80	3P2.120	3P2.160
Operating Voltage	400 VAC				
Max. Operating Voltage	480 VAC				
Operating Frequency	50Hz, 60Hz				
Nominal Operating Current	20A	40A	80A	120A	160A
Supply Voltage	220 VAC				
Max. Power Consumption (Conduction Loss)	38W	76W	152W	228W	304W
Max. Power Consumption (Control+Cooling)	6W		38W		
Max. Capacitor Power	13.5kVAR	27 kVAR	54 kVAR	83 kVAR	110 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	Fault and Status Led				
Number of Thyristor Module	2				
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) mm	130x190x140	130x190x140	130x190x200	130x240x200	190x290x220
Weight (kg)	3,2	3,2	4,7	5,6	8,2
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 device, the thyristors are switched at the zero crossing instants of anode-cathode voltage difference. Conduction of the thyristor modules are independent from the other. Upon the loss of trigger signal, thyristors turn off by natural commutation.

Flashing power led (green) indicates that supply is ready on supply terminals, while flashing status led (red) indicates that the module is triggered and thyristors are conducting.

3P2 industrial series modules have fault detection feature. 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. If the faults maintain 5 sec., the power led will blink, indicating the fault.

There is an auxiliary contact output in 3P2 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 3P2.20/40 are cooled by both aluminum heat sink and fan. On 3P2.20/40 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 Dimensions" part).

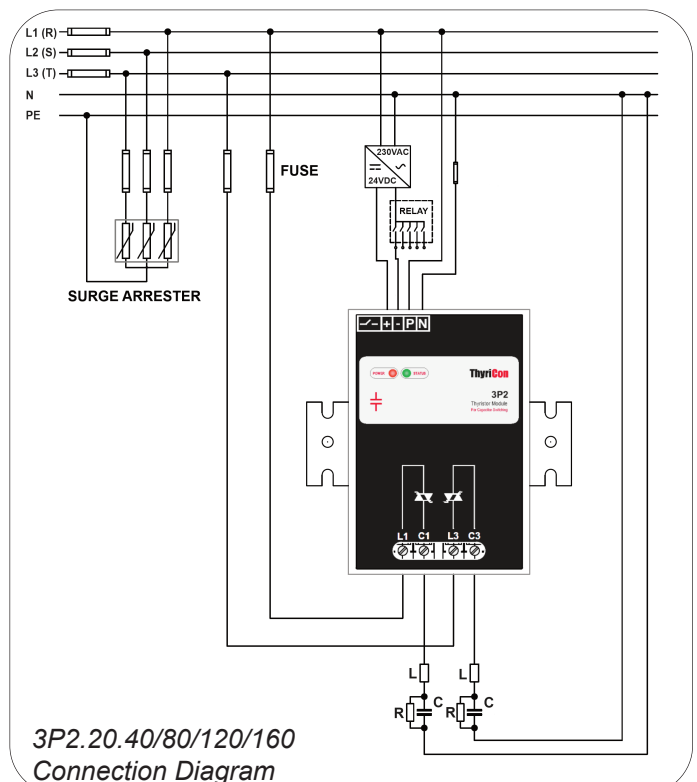
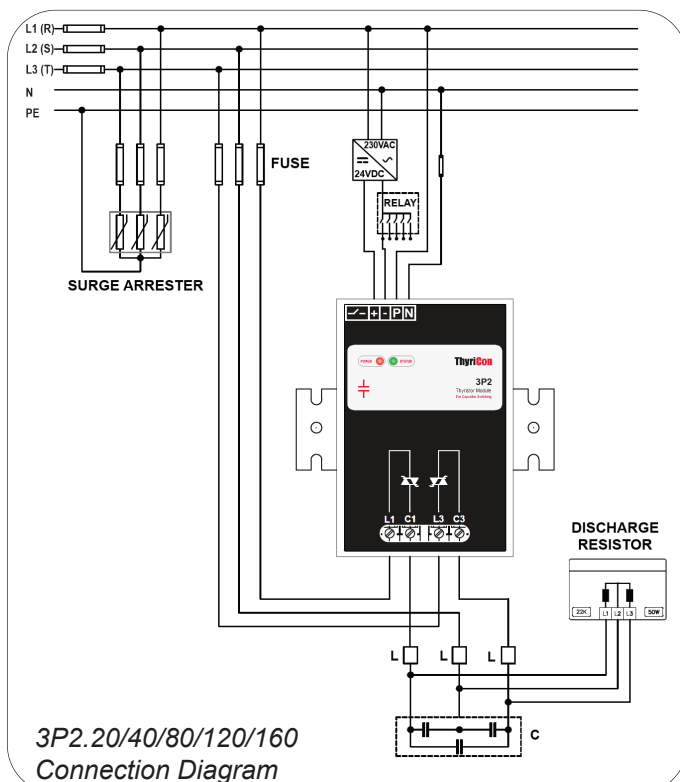
The electrical connections to main terminals are done according to "connection diagram" part according to application. It is mandatory to use super fast electronic fuses as branch fuses of the THYRICON module to protect the semiconductor device!

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



## Recommended Use

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

12,5 kVAr	32 A
25 kVAr	63 A
50 kVAr	125 A
75 kVAr	160 A
100 kVAr	250 A

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

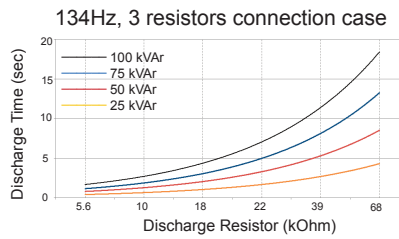
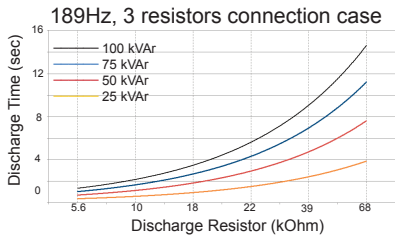
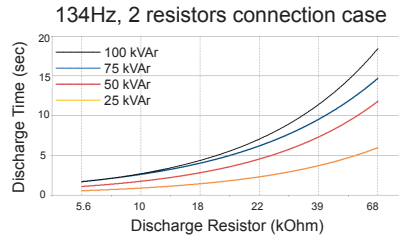
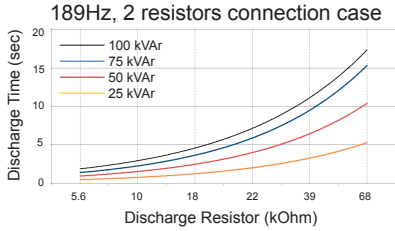
(ex: VAL-MS-230ST Phoenix Contact)

\* For a 400V-grid recommended minimum rated capacitor voltages:

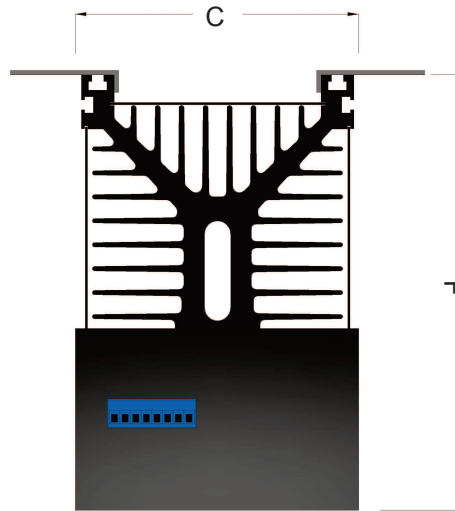
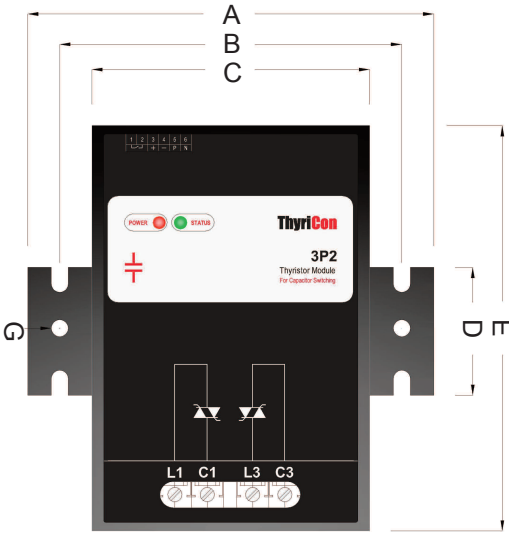
- 400V for systems without reactors
- 440V for detuned reactors up to %7
- 480V for detuned reactors up to %14

\* 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

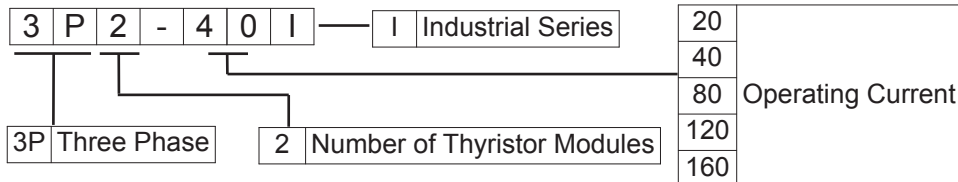


## Mounting and Dimensions



mm	3P2 20/40	3P2.80	3P2.120	3P2.160
A	190	190	190	259
B	160	160	160	233
C	130	130	130	190
D	60	60	60	60
E	190	190	240	290
F	140	200	200	220
G	ø8	ø8	ø8	ø10

## Ordering Information



## 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.

**Elektrolojik Energy Technologies Engineering, Industry and Trading Ltd. Co.**

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