

Instruction Manual

November 1999

Model 7PA / 7PL and Model 7PB / 7PF Power Control

An Invensys Company





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ASSEMBLING

WARNINGS:

- 1) The correct functionality of these devices is guaranteed only if transport, storage, installation, wiring, working condition and maintenance are executed in compliance with this manual.
- 2) The protection degree of these devices is equal to IP 20 (according to CEI EN 60529) and they are connected to dangerous power lines, for these reasons:
 - installation, wiring and maintenance must be executed by qualified personnel;
 - all warnings contained in this manual must be complied.
- 3) Do not execute any dielectric strength or insulation resistance test on the power terminals.
These type of tests could damage the power semiconductors.
- 4) Circuit-breaker:
 - a switch or circuit-breaker shall be included in the building installation;
 - It shall be in close proximity to the equipment and within easy reach of the operator;
 - it shall be marked as the disconnecting device for the equipment.

NOTE: a single switch or circuit-breaker can drive more than one device.
- 5) Before to execute any operation on the load or its connections, disconnect the device from the power line by the circuit breaker.

- 6) During continuous operation, the heat sink could reach a temperature higher than 80 °C (176 °F) Before execute any operation to the device, you have to be sure that its temperature is decreased to an acceptable value.
- 7) For placing the device, choose a cleaned position, easy to reach, and possibly without vibration.
- 8) The ambient temperature must be comprised between 0 °C and 50 °C (32 to 122 °F).

GENERAL ASSEMBLING INFORMATIONS

- 1) These devices must be assembled vertically or with a maximum inclination of 20°.

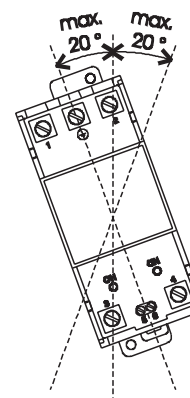


Fig. 1

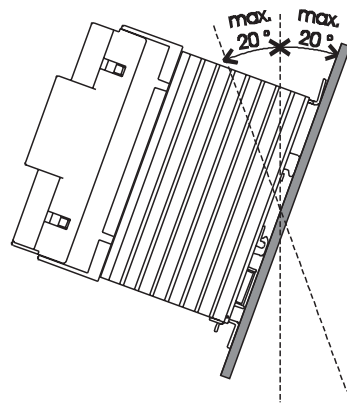


Fig. 2

- 2) In order to allow a sufficient heat dissipation, these devices must be spaced 100 mm out to the bottom and 150 mm out to the top of the cabinet or any other element (I.E. raceway) which can compromise the air flow.

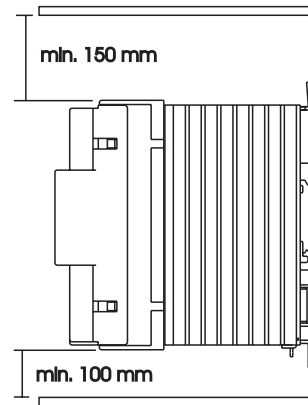


Fig. 3

- 3) The manufacturer strongly recommends against to assemble two or more devices one upon another but, if necessary, the distance between the two devices must be longer than 400 mm.

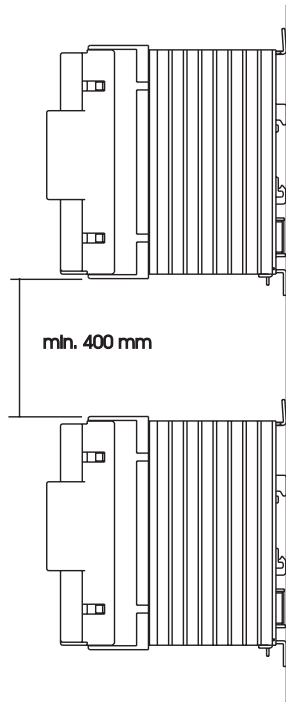
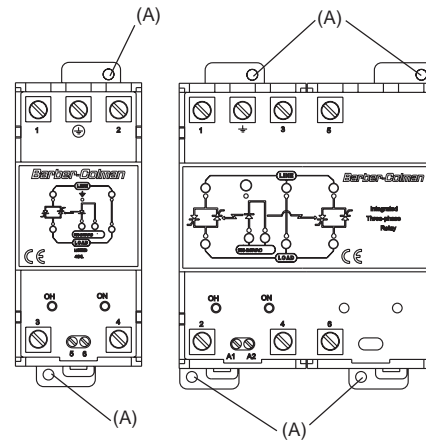


Fig. 4

The device can be mounted either on wall or on a Omega DIN rail.

WALL MOUNTING

For wall mounting you can use the (A) holes.



In this case it is advisable to use two M4 screws with a torque of 1Nm.

For the mounting template and the mechanical dimensions of all models, please refer to the appropriate drawing, located in the "Mechanical dimensions" paragraph.

OMEGA DIN RAIL MOUNTING

For rail mounting use an Omega DIN rail in accordance with EN 50 022 (35 x 7.5 mm or 35 x 15 mm) regulations.

MOUNTING

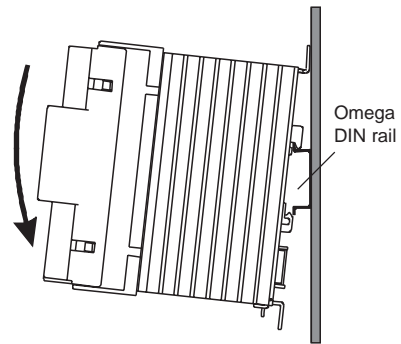


Fig. 5

REMOVING

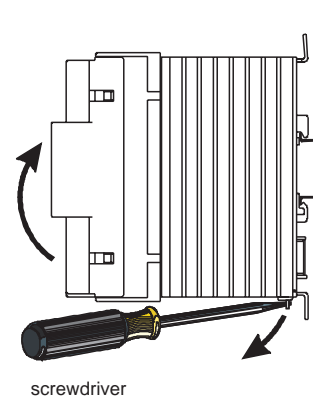


Fig. 6

For the mechanical dimensions of all models, please refer to the appropriate drawing, located in the Appendix A.

CONNECTION DIAGRAMS

GENERAL NOTES FOR WIRING

WARNINGS:

- 1) The wiring must be executed only after you have mounted the device correctly.
- 2) Before connecting the device, you have to be sure that the power line voltage value is less than the nominal value reported on the device's identification label.
- 3) Before connecting the device, you have to be sure that the current absorbed by the load (see **Power ⇒ nominal current conversion** paragraph) is less than the device nominal current as a function of the ambient temperature and the Duty cycle (see **Trend of the nominal current in relation with the ambient temperature and duty cycle** paragraph).
- 4) Before execute any operations, be absolutely sure that the device is disconnected from the power line through the circuit breaker.
- 5) Use copper wires only.
- 6) The neutral (if used) must be connected to the 2 and 4 terminals.
- 7) The power input **IS NOT** fuse protected; so it is necessary placing an external one selected among the types shown in Table 1.

NOTE:

The Manufacturer decline any responsibility for injury and/or property damage if NO fuse or fuse not included in Table 1 is used. The warranty validity also depends on it.

Table 1

7PA / 7PL 7PB / 7PF	Fuse	
	Manuf.	model
20/25 - 400	Ferraz	6600CPURGA22X58/32
	Bussmann	FWP.32A.22F
	Gould	52443
35 - 400	Ferraz	6600CPURGA22X58/50
	Bussmann	FWP.50A.22F
	Gould	53251
40/45 - 400	Ferraz	6600CPURGA22X58/50
	Bussmann	FWP.50A.22F
	Gould	53251
60 - 400	Ferraz	6600CPURGA22X58/80
	Bussmann	FWP.80A.22F
	Gould	53259
80 - 400	Ferraz	6600CPURGA22X58/100
	Bussmann	FWP.100A.22F
	Gould	53263
20/25 - 600	Ferraz	6600CPURD22X58/32
35 - 600	Ferraz	6600CPURD22X58/50
40/45 - 600	Ferraz	6600CPURD22X58/50
60 - 600	Ferraz	6600CPURD22X58/80
80 - 600	Ferraz	6600CPURD22X58/100

- 8) For connecting the devices to the power line, use appropriate sized wires with 75 °C (167 °F) minimum temperature rating. The following table shows the recommended sizes:

Nominal current	φ wires (mm ²)	AWG
25 A	6	10
35 A	6	10
45 A	10	8
60 A	16	6
80 A	25 (*)	4

(*) without wire terminal

- 9) The torque for tightening the terminals is:
- for 7PA/7PL 25 and 35 A terminals 1, 2, 3, 4 and earth
 - max = 7.08 lbf.-in.(0.8 Nm)
 - suggested = 6.2 lbf.-in (0.7 Nm)
 - for 7PA/7PL 45, 60 and 80 A terminals 1, 2, 3, 4 and earth
 - max = 17.7 lbf.-in (2 Nm)
 - suggested = 13.28 lbf.-in (1.5 Nm)
 - for 7PA/7PL (all models) terminals 5 and 6
 - max = 4.43 lbf.-in (0.5 Nm)
 - suggested = 2.93 lbf.-in (0.33 Nm)
 - for 7PB/7PF (all models) terminals 1, 2, 3, 4, 5, 6 and earth
 - max = 17.7 lbf.-in (2 Nm)
 - suggested = 13.28 lbf.-in (1.5 Nm)
 - for 7PB/7PF (all models) terminals A1 and A2
 - max = 4.43 lbf.-in (0.5 Nm)
 - suggested = 2.93 lbf.-in (0.33 Nm)

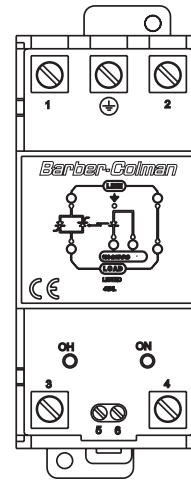


Fig. 7.A TERMINAL BLOCK FOR 7PA / 7PL

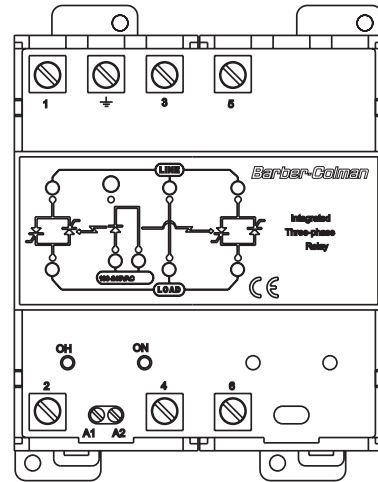


Fig. 7.B TERMINAL BLOCK FOR 7PB / 7PF

Power ⇒ nominal current conversion

In order to have a quick check of the device working conditions, we provide you the formulas to calculate the nominal current for each device in relation to the total power and the connection type.

Preliminary notes:

- 1) Only a resistive load must be applied to the device, so in the following formulas the $\cos \phi$ will be considered equal to 1.
- 2) the formulas related with the 3-phase applications are referred to a balanced 3-phase system only.

Single-phase connection

$$I_{RMS} = \frac{P}{V_{RMS}}$$

where:

P = power (in Watts).

V_{RMS} = **phase to neutral** or **phase to phase** voltage (in Volts)

I_{RMS} = nominal current (in Amperes)

3-phase without neutral connection (star or delta application)

$$I_{RMS} = \frac{P}{\sqrt{3} \cdot V_{RMS}}$$

where:

P = Total load power (in Watts).

V_{RMS} = **phase to phase** voltage (in Volts)

I_{RMS} = nominal current (in Amperes)

3-phase with neutral connection (star application)

$$I_{RMS} = \frac{P}{3 \cdot V_{RMS}}$$

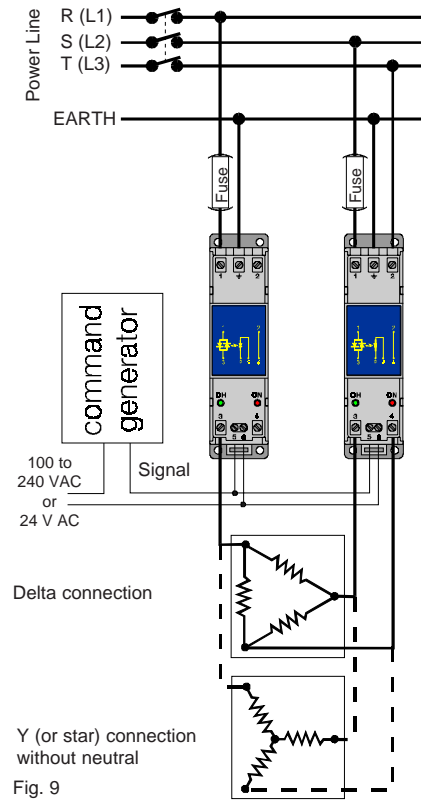
where:

P = Total load power (in Watts).

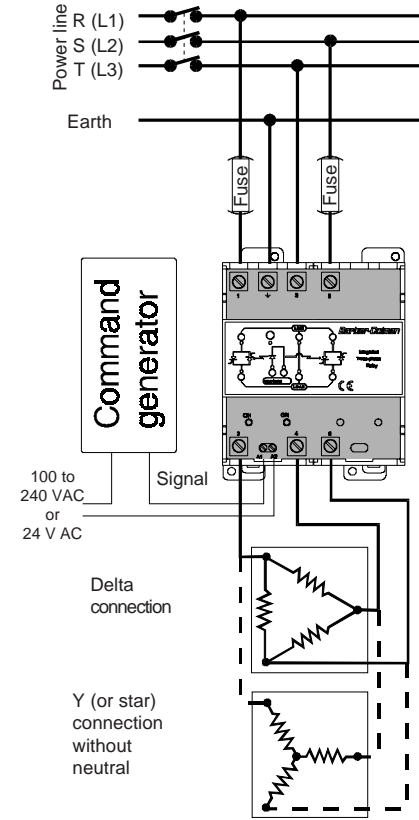
V_{RMS} = **phase to neutral** voltage (in Volts)

I_{RMS} = nominal current (in Amperes)

Three phase without neutral connection



7PB AND 7PF CONNECTION



Three phase with neutral connections

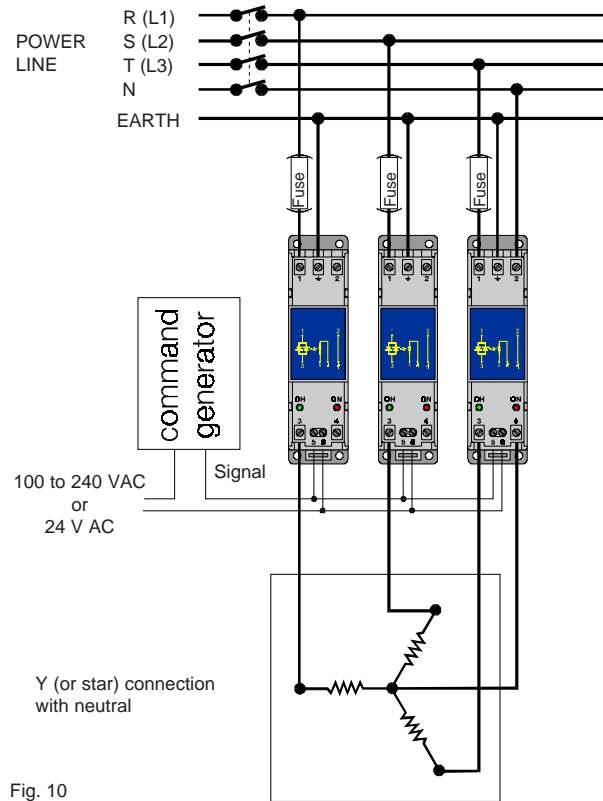


Fig. 10

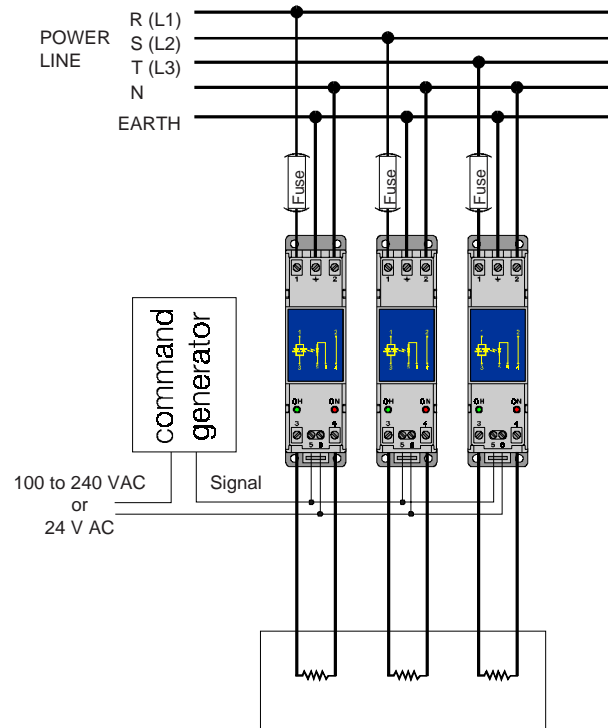


Fig. 11

GENERAL SPECIFICATIONS

Mounting: rear-of-board on wall or omega DIN rail.

Terminals: screw terminals with front access.

Load type: resistive.

Min. holding current: 500 mA RMS.

Leakage current: 10 mA RMS.

Min. latching voltage: 40 V

Voltage drop on power semiconductor: 1.2 V.

Rated control voltage:

- for 240 VAC model

OFF state = 0 to 10 V AC

ON state = 100 V (-10%) to 240 V (+10%) AC

- for 24 VAC model

OFF state = 0 to 4 V AC

ON state = 24 V ($\pm 15\%$) AC

Input current: < 33 mA.

Insulation:

- between power circuit and earth: 2200 V DC for 1 minute.

- between command and power circuits: 3500 V DC for 1 minute.

Operational temperature: from 0 to 50 °C (from 32 to 122 °F).

Humidity: from 20 % to 85 % RH non condensing.

Storage temperature: from - 20 to + 70 °C (-4 to 158 °F)

CE MARKING

These devices are conforming to the 89/336/EEC and 93/68/EEC council directives for Electromagnetic compatibility (reference harmonized standard EN-50081-2 for Emissions and EN-50082-2 for Immunity) and to the 73/23/EEC and 93/68/EEC for Low Voltage (Standard reference UL508 part VIII and CEI EN 50178).

Installation category: II

Pollution degree: 2

CHARACTERISTICS OF THE 7PA AND 7PL MODELS

MODEL	Amp. - V	Amp. - V	Amp. - V	Amp. - V	Amp. - V
CHARACTERISTICS	25-400	35-400	45-400	60-400	80-400
Nominal voltage	400 V	400 V	400 V	400 V	400 V
Nominal current(@ 50 °C)	25 A	35 A	45 A	60 A	80 A
Non-rep. surge current	280 A	400 A	400 A	1200 A	1200 A
I ² t for fusing (10 ms)	550	860	860	10180	10180
Non-rep. peak voltage	1300 V	1300 V	1300 V	1300 V	1300 V
ΔV/Δt	500 V/μs	500 V/μs	500 V/μs	500 V/μs	500 V/μs
PRV	1200 V	1200 V	1200 V	1200 V	1200 V
Total power dissipation (I = I _{nom})	30 W	45 W	55 W	75 W	100 W
Weight	630 g	630 g	900 g	1100 g	2000 g

MODEL	Amp. - V	Amp. - V	Amp. - V	Amp. - V	Amp. - V
CHARACTERISTICS	25-600	35-600	45-600	60-600	80-600
Nominal voltage	600 V	600 V	600 V	600 V	600 V
Nominal current(@ 50 °C)	25 A	35 A	45 A	60 A	80 A
Non-rep. surge current	280 A	400 A	400 A	1200 A	1200 A
I ² t for fusing (10 ms)	550	860	860	10180	10180
Non-rep. peak voltage	1700 V	1700 V	1700 V	1700 V	1700 V
ΔV/Δt	1000 V/μs	1000 V/μs	1000 V/μs	1000 V/μs	1000 V/μs
PRV	1600 V	1600 V	1600 V	1600 V	1600 V
Total power dissipation (I = I _{nom})	30 W	45 W	55 W	75 W	100 W
Weight	630 g	630 g	900 g	1100 g	2000 g

CHARACTERISTICS OF THE 7PB AND 7PF MODELS

MODEL	Amp. - V	Amp. - V	Amp. - V
CHARACTERISTICS	20-400	40-400	60-400
Nominal voltage	400 V	400 V	400 V
Nominal current(@ 50 °C)	20 A	40 A	60 A
Non-rep. surge current	280 A	400 A	1200 A
I ² t for fusing (10 ms)	550	860	10180
Non-rep. peak voltage	1300 V	1300 V	1300 V
ΔV/Δt	500 V/μs	500 V/μs	500 V/μs
PRV	1200 V	1200 V	1200 V
Total power dissipation (I = I _{nom})	50 W	90 W	130 W
Weight	1800 g	1800 g	1800 g

MODEL	Amp. - V	Amp. - V	Amp. - V
CHARACTERISTICS	20-600	40-600	60-600
Nominal voltage	600 V	600 V	600 V
Nominal current(@ 50 °C)	20 A	40 A	60 A
Non-rep. surge current	280 A	400 A	1200 A
I ² t for fusing (10 ms)	550	860	10180
Non-rep. peak voltage	1700 V	1700 V	1700 V
ΔV/Δt	1000 V/μs	1000 V/μs	1000 V/μs
PRV	1600 V	1600 V	1600 V
Total power dissipation (I = I _{nom})	50 W	90 W	130 W
Weight	1800 g	1800 g	1800 g

MAINTENANCE

WARNING:

- 1) Before to execute any maintenance operation on the device, on the load or on their connections, disconnect it from the power line by a mechanical circuit breaker.
- 2) These devices are connected to dangerous power lines, for these reasons:
 - installation, wiring and maintenance must be executed by qualified personnel;
 - all warnings contained in this manual must be complied.
- 3) Do not execute any dielectric strength or insulation resistance test on the power terminals.
These types of test could damage the power semiconductors.
- 4) During continuous operation, the heat sink could reach a temperature higher than 80 °C (176 °F) Before execute any operation on the device, you have to be sure that its temperature is decreased to an acceptable value.

MAINTENANCE

- 1) REMOVE POWER FROM THE DEVICE BY USING A MECHANICAL CIRCUIT BREAKER
- 2) Using a vacuum cleaner or a compressed air jet (max. 5 kg/cm²) remove all deposit of dust and dirt which may be present on the heat sink and on the terminals.
- 3) To clean external plastic or rubber parts use only a cloth moistened with:
 - Ethyl Alcohol (pure or denatured) [C₂H₅OH] or
 - Isopropil Alcohol (pure or denatured) [(CH₃)₂CHOH] or
 - Water (H₂O)
- 4) Verify that there are no loose terminals (see paragraph **GENERAL NOTES FOR WIRING**).
- 5) Before switch ON the power, be sure that the device is perfectly dry.
- 6) Turn the power ON.

APPENDIX A
DIMENSIONS AND PANEL CUT OUT

7PA25
7PL25
7PA35
7PL35

Dimensions in inches (millimeters in parenthesis)

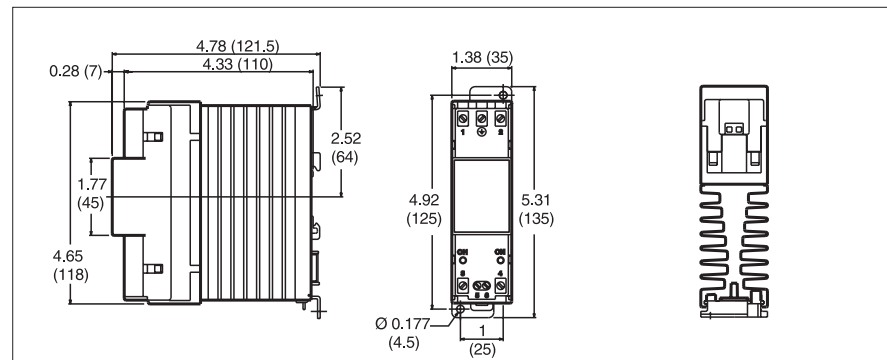


Fig.A.1

A. 1

Dimensions in inches (millimeters in parenthesis)

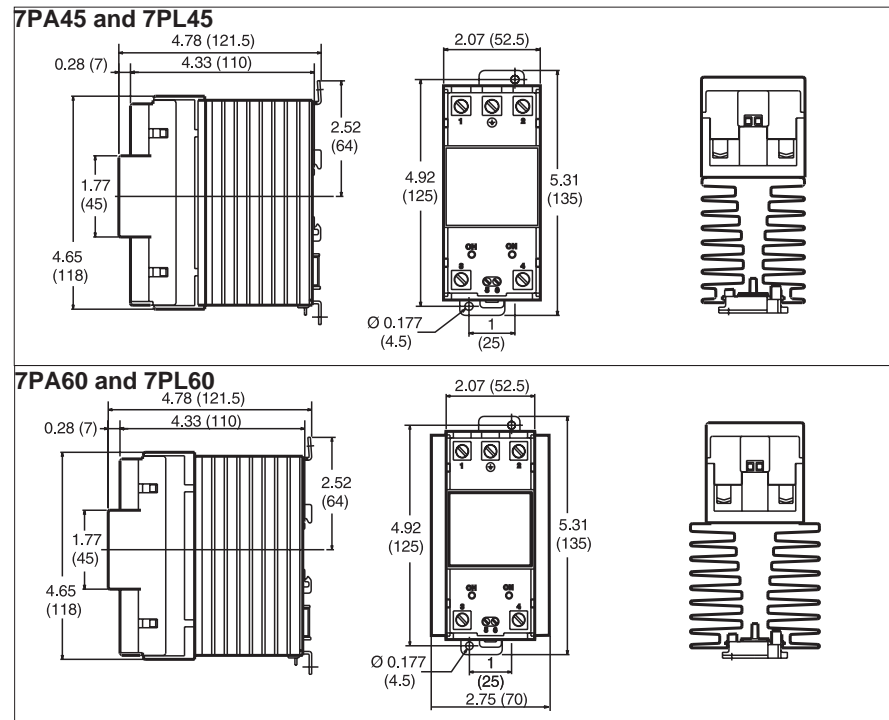


Fig. A.2

A. 2

Dimensions in inches (millimeters in parenthesis)

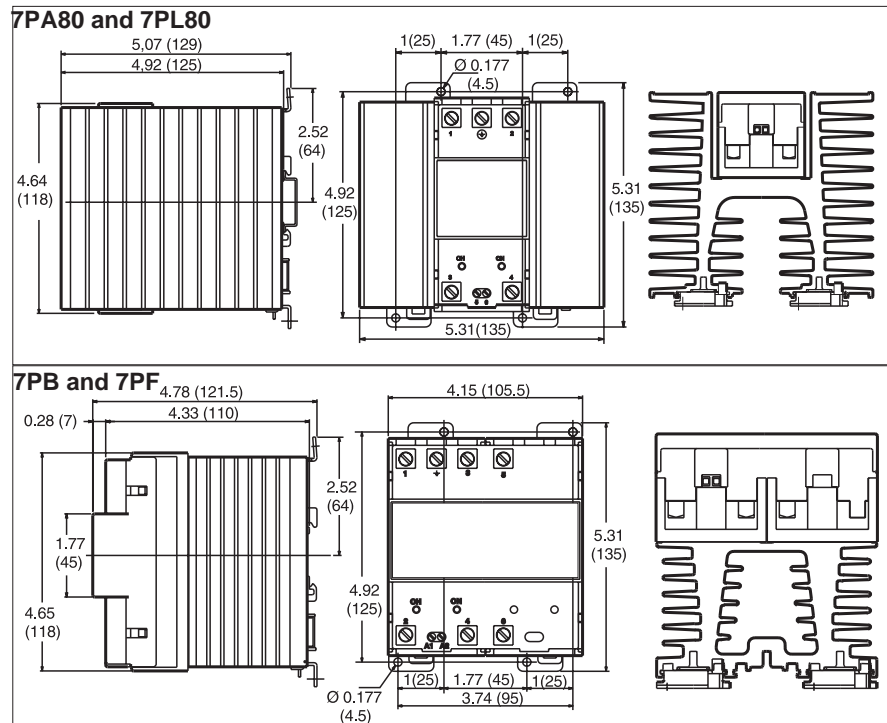


Fig. A.3

A. 3



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