



The know-how gained through experience with our L series, together with the availability of new technologies have lead Ero Electronic to design a new line of resistive load static relays.

The new line had to assure:

- **Reliability**
- **Security**
- **Cost saving**

### Reliability

The "strength" of an SSR is defined by its capability to be resistant, **without damages**, to an high intensity noise.

In order to use the "industrial" word, we have selected an SCR family able to assure a PRV (maximum inverse **repetitive** voltage in the OFF condition) of **1600 V** and a **dV/dt** that reaches **1000 V/μs**.

These characteristics put together with an isolation voltage equal to **7500 V peak** and an RC filter applied on the power terminals, guarantee an optimum noise immunity even in the harshest of industrial environments.

### Cost saving

The possibility to pack more instrument mixing different sizes, allows to saving spaces while the easy installation **reduces** the **mounting time** and installation **cost**.

For these reasons

- ❑ all models are equipped with a support for rear-of-board on wall or omega DIN rail mounting.
- ❑ The height of every model is constant.
- ❑ all of the terminals are accessible from the front.
- ❑ There are four screw terminals for power connection plus one for ground
- ❑ All terminals are "finger proof" (IP20)

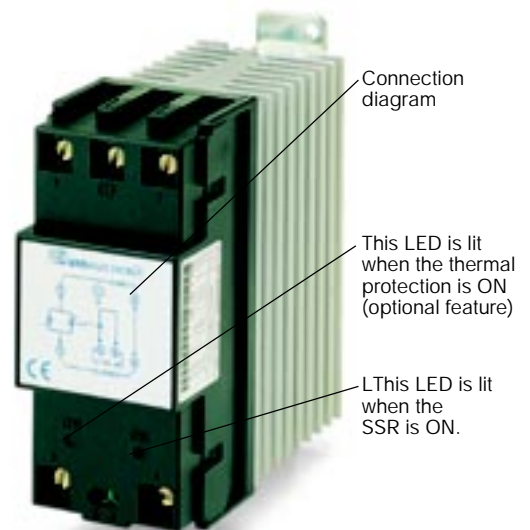
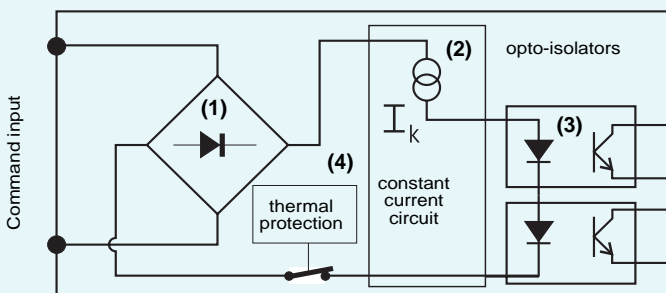
### CE marking

This instrument is 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).

## Security

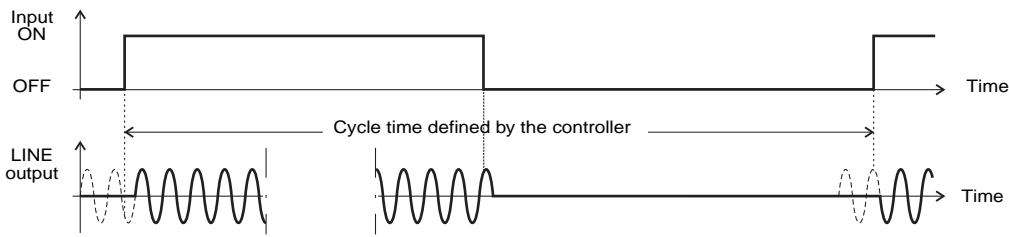
The input circuit of ISR, ITR and ISR-T has been designed in order to assure:

- 1) the immunity from polarity on the input signal (for PLC with NPN or PNP output) in order to avoid wrong connections and the consequential time waste;
- 2) a constant behaviour with an input signal from 4.5 (9 for ITR models) to 35 V DC (thank to constant current optoisolator driver);
- 3) the security of a isolation voltage able to reach 7500 V;
- 4) a complete protection against continual overload, insufficient ventilation, exceeding the maximum operating temperature or any other condition which can generate an instrument overheating.





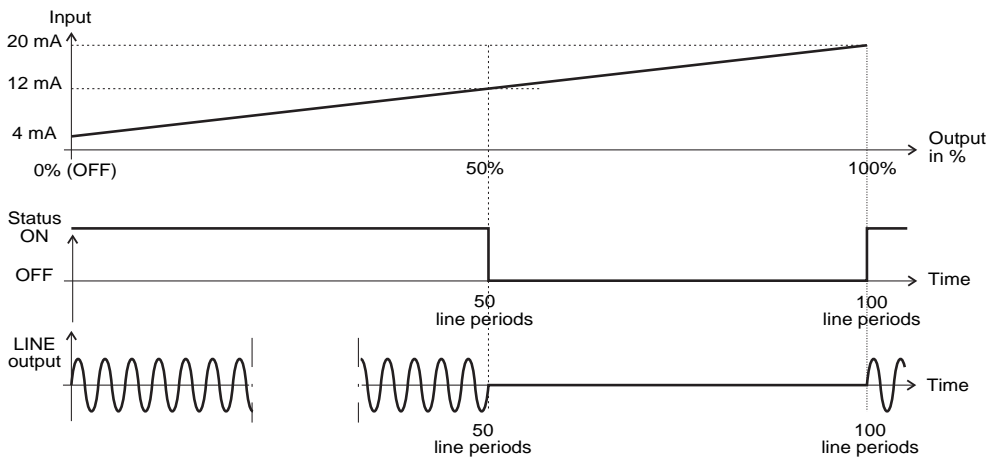
## ISR, ISR-T e ITR - Operative mode



The zero-crossing solid state relays instantaneously acquire the input status but they switch the power output only when the voltage applied to the power input cross to zero. In this applications the cycle time is defined by the controller. The solid state relay, unlike the electromechanical relay, do not generate any audible noise or line disturbance due to the power switching but, above all, allows to improve control quality using a very short cycle time.

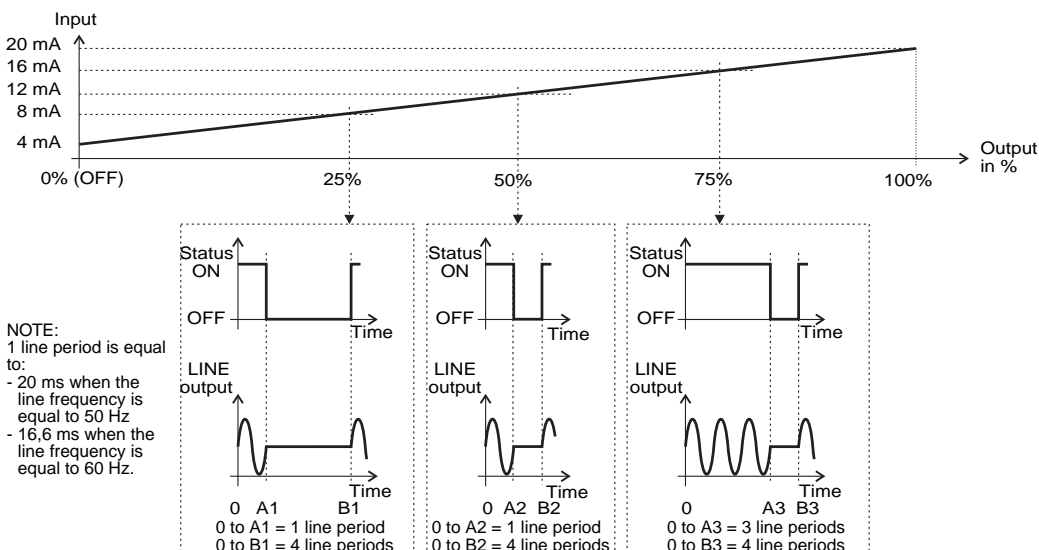
## ISL - Operative mode

### Fast cycle



This operative mode aimed to guarantee the best control quality. For this reason, it automatically detects the line frequency and sets the cycle time to 100 line periods (1 line period is equal to 20 ms for 50 Hz lines or 16.6 ms for 60 Hz lines). In this way it selects the minimum cycle time able to assure an output accuracy of 1%. Once the cycle time is fixed the instrument modulates the ON **and** OFF periods (cycle time = ON + OFF period) in order to obtain the requested power output.

### Single cycle



This operative mode drastically reduces the cycle time. The line period is taken as time base and the algorithm modulates the cycle time modifying the ON or the OFF period. At 50% the minimum cycle time is obtained that is equal to 2 line periods (1 line period is equal to 20 ms for 50 Hz lines or 16.6 ms for 60 Hz lines). The single cycle is the ideal mode to control systems with very low thermic inertia like infrared heating systems based on quartz or Nichel/Crome lamps.

## ISL - with linear input

### SPECIAL FUNCTION

- Fully digital control carried out by an 8 bit microcontroller.
- **Device powered by the input signal.**
- Self synchronizing system.
- 2 operative modes.
- Commutation type: zero crossing, **full wave.**
- Complete protection against the most common causes of malfunction.

### GENERAL SPECIFICATIONS

<b>Input type:</b>	4-20 mA linear.
<b>Input impedance:</b>	300 Ω.
<b>Operative modes:</b>	2 programmable operative modes: - Fast cycle - Single cycle ] for operative mode descriptions see page 3
<b>Switching type:</b>	zero crossing full wave.
<b>Load type:</b>	resistive.
<b>Min. holding current:</b>	50 mA RMS.
<b>Leakage current:</b>	10 mA RMS.
<b>Min. latching voltage:</b>	20 V
<b>Voltage drop on SCR:</b>	1.2 V.
<b>Insulation:</b>	- between power circuit and earth: 3000 V RMS for 1 second. - between command and power circuits: 3000 V <sub>pk</sub>
<b>Insulation resistance:</b>	> 1 MΩ at 500 V DC for ISL 400 V. > 2 MΩ at 500 V DC for ISL 600 V.
<b>Operational temperature:</b>	from 0 to 50 °C (from 32 to 122 °F).
<b>Humidity:</b>	from 20% to 85% RH non condensing.
<b>Storage temperature:</b>	from - 20 to + 70 °C (-4 to 158°F)
<b>Protection:</b>	IP 20.
<b>Mounting:</b>	rear-of-board on wall or omega DIN rail.
<b>Terminals:</b>	screw terminals with front access.
<b>Approval:</b>	UL and cUL.

## ISR - with SCR

### GENERAL SPECIFICATIONS

<b>Command type:</b>	time proportioning.
<b>Rated control voltage:</b>	OFF state = 0 to 2 V DC ON state = 4.5 to 35 V DC Constant current (15 mA).
<b>Input type:</b>	zero crossing.
<b>Switching type:</b>	resistive.
<b>Load type:</b>	resistive.
<b>Min. holding current:</b>	50 mA RMS.
<b>Leakage current:</b>	10 mA RMS.
<b>Min. latching voltage:</b>	20 V
<b>Voltage drop on thyristors:</b>	1.2 V.
<b>Insulation:</b>	- between power circuit and earth: 3000 V RMS for 1 second. - between command and power circuits: 7500 V <sub>pk</sub>
<b>Insulation resistance:</b>	> 100 MΩ at 500 V DC.
<b>Operational temperature:</b>	from 0 to 50 °C (from 32 to 122 °F).
<b>Humidity:</b>	from 20% to 85% RH non condensing.
<b>Storage temperature:</b>	from - 20 to + 70 °C (-4 to 158°F)
<b>Protection:</b>	IP 20.
<b>Mounting:</b>	rear-of-board on wall or omega DIN rail.
<b>Terminals:</b>	screw terminals with front access.
<b>Approval:</b>	UL and cUL.

	ISL/ ISR 25 400	ISL/ ISR 35 400	ISL/ ISR 45 400	ISL/ ISR 60 400	ISL/ ISR 80 400	ISL/ ISR 25 600	ISL/ ISR 35 600	ISL/ ISR 45 600	ISL/ ISR 60 600	ISL/ ISR 80 600
Nominal voltage (MAX +10%)	400 V	400 V	400 V	400 V	400 V	600 V	600 V	600 V	600 V	600 V
Nominal current (@ 50°C)	25 A	35 A	45 A	60 A	80 A	25 A	35 A	45 A	60 A	80 A
Non-rep. surge current	280 A	400 A	400 A	1200 A	1200 A	280 A	400A	400 A	1200 A	1200 A
I <sup>2</sup> t for fusing (10 ms)	550	860	860	10180	10180	550	860	860	10180	10180
Non-rep. peak voltage	1300 V	1300 V	1300 V	1300 V	1300 V	1700 V	1700 V	1700 V	1700 V	1700 V
ΔV/Δt	500 V/μs	500 V/μs	500 V/μs	500 V/μs	500 V/μs	1000 V/μs	1000 V/μs	1000 V/μs	1000 V/μs	1000 V/μs
PRV	1200 V	1200 V	1200 V	1200 V	1200 V	1600 V	1600 V	1600 V	1600 V	1600 V
Total power dissipation (I = I <sub>nom</sub> )	30 W	45 W	55 W	75 W	100 W	30 W	45 W	55 W	75 W	100 W
Weight	630g	630 g	900 g	900 g	1100 g	630 g	630 g	900 g	900 g	1100 g

# ISR T / ITR

## ISR T with triac

### GENERAL SPECIFICATIONS

<b>Command type:</b>	time proportioning.
<b>Rated control voltage:</b>	OFF state = 0 to 2 V DC ON state = 4.5 to 35 V DC
<b>Input type:</b>	Constant current (15 mA).
<b>Switching type:</b>	zero crossing.
<b>Load type:</b>	resistive.
<b>Min. holding current:</b>	50 mA RMS.
<b>Leakage current:</b>	10 mA RMS.
<b>Min. latching voltage:</b>	20 V
<b>Voltage drop on triac:</b>	1.8 V.
<b>Insulation:</b>	- between power circuit and earth: 1800 V RMS for 1 second. - between command and power circuits: 7500 V <sub>pk</sub>
<b>Insulation resistance:</b>	> 100 MΩ at 500 V DC.
<b>Operational temperature:</b>	from 0 to 50 °C (from 32 to 122 °F).
<b>Humidity:</b>	from 20% to 85% RH non condensing.
<b>Storage temperature:</b>	from - 20 to + 70 °C (-4 to 158°F)
<b>Protection:</b>	IP 20.
<b>Mounting:</b>	rear-of-board on wall or omega DIN rail.
<b>Terminals:</b>	screw terminals with front access.
<b>Approval:</b>	UL and cUL.

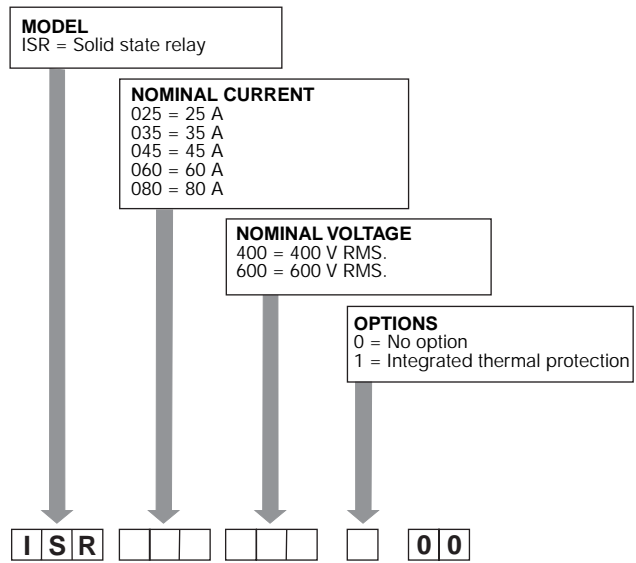
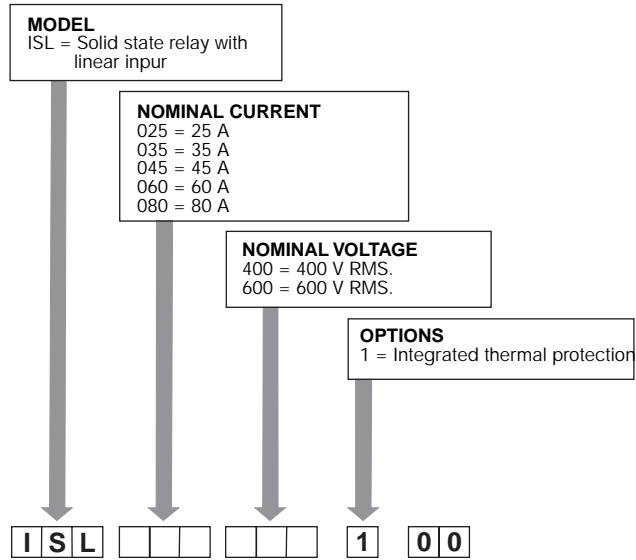
## ITR - Three-phase

### GENERAL SPECIFICATIONS

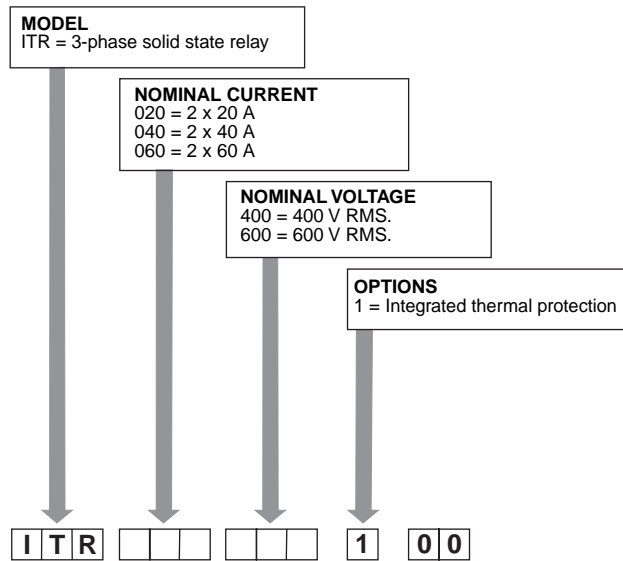
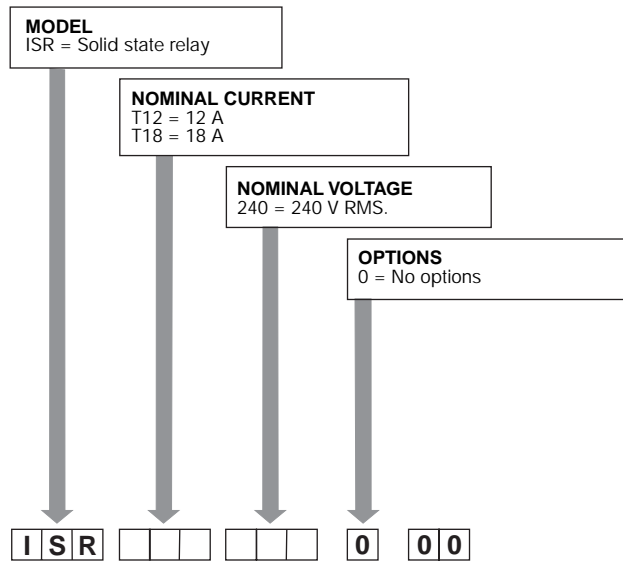
<b>Command type:</b>	time proportioning.
<b>Rated control voltage:</b>	OFF state = 0 to 4 V DC ON state = 9 to 35 V DC
<b>Input type:</b>	Constant current (15 mA).
<b>Switching type:</b>	zero crossing.
<b>Load type:</b>	resistive.
<b>Min. holding current:</b>	50 mA RMS.
<b>Leakage current:</b>	10 mA RMS.
<b>Min. latching voltage:</b>	20 V
<b>Voltage drop on SCR:</b>	1.2 V.
<b>Insulation:</b>	- between power circuit and earth: 3000 V RMS for 1 second. - between command and power circuits: 7500 V <sub>pk</sub>
<b>Insulation resistance:</b>	> 100 MΩ at 500 V DC.
<b>Operational temperature:</b>	from 0 to 50 °C (from 32 to 122 °F).
<b>Humidity:</b>	from 20% to 85% RH non condensing.
<b>Storage temperature:</b>	from - 20 to + 70 °C (-4 to 158°F)
<b>Protection:</b>	IP 20.
<b>Mounting:</b>	rear-of-board on wall or omega DIN rail.
<b>Terminals:</b>	screw terminals with front access.
<b>Approval:</b>	UL and cUL.

	ISR T 12 240	ISR T 18 240	ITR 20 400	ITR 40 400	ITR 60 400	ITR 20 600	ITR 40 600	ITR 60 600
Nominal voltage (MAX +10%)	240 V	240 V	400 V	400 V	400 V	600 V	600 V	600 V
Nominal current (@ 50°C)	12 A	18 A	20 A	40 A	60 A	20 A	40 A	60 A
Non-rep. surge current	160 A	208 A	280 A	400 A	1200 A	280 A	400 A	1200 A
I <sub>t</sub> for fusing (10 ms)	128	259	550	860	10180	550	860	10180
Non-rep. peak voltage	900 V	900 V	1300 V	1300 V	1300 V	1700 V	1700 V	1700 V
ΔV/Δt	250 V/μs	250 V/μs	500 V/μs	500 V/μs	500 V/μs	1000 V/ms	1000 V/μs	1000 V/μs
PRV	800 V	800 V	1200 V	1200 V	1200 V	1600 V	1600 V	1600 V
Total power dissipation (I = I <sub>nom</sub> )	18 W	27 W	50 W	90 W	130 W	50 W	90 W	130 W
Weight	510 g	510 g	1800 g	1800 g	1800 g	1800 g	1800 g	1800 g

## HOW TO ORDER

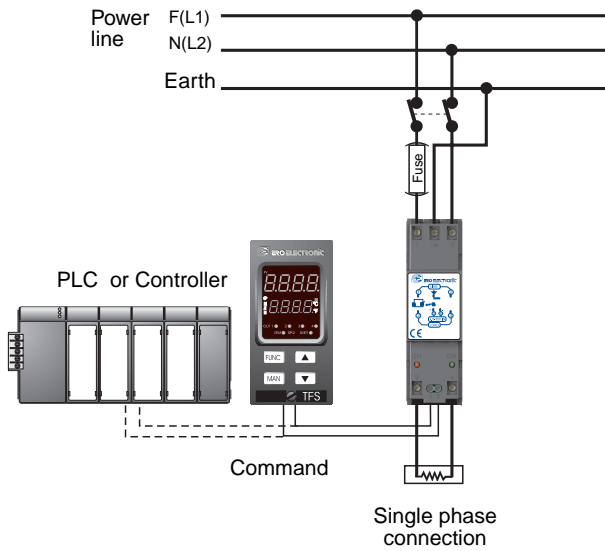


## HOW TO ORDER

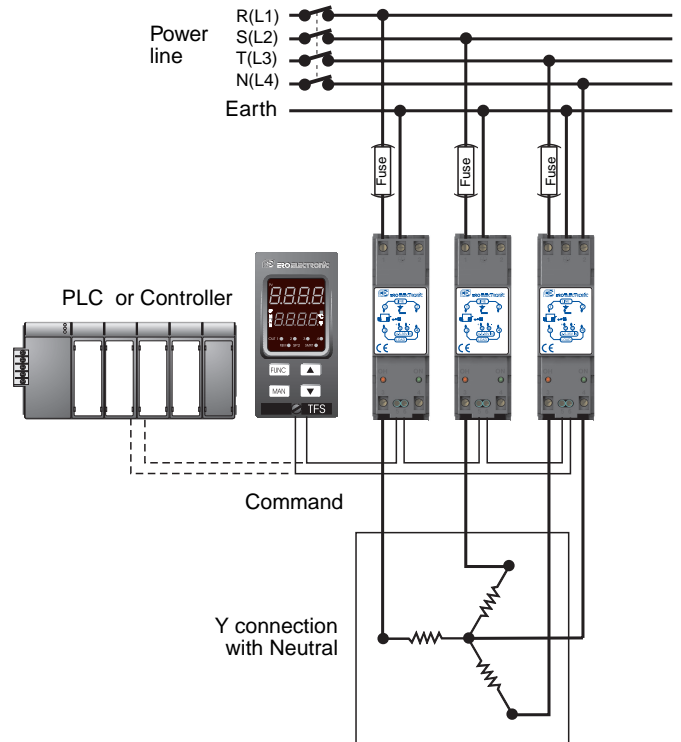




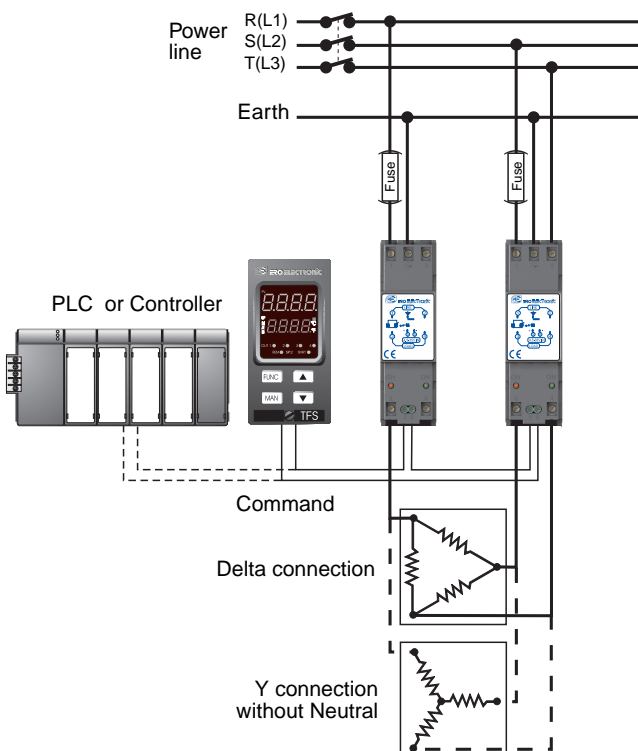
### Single phase connection for **ISR - ISR T - ISL**



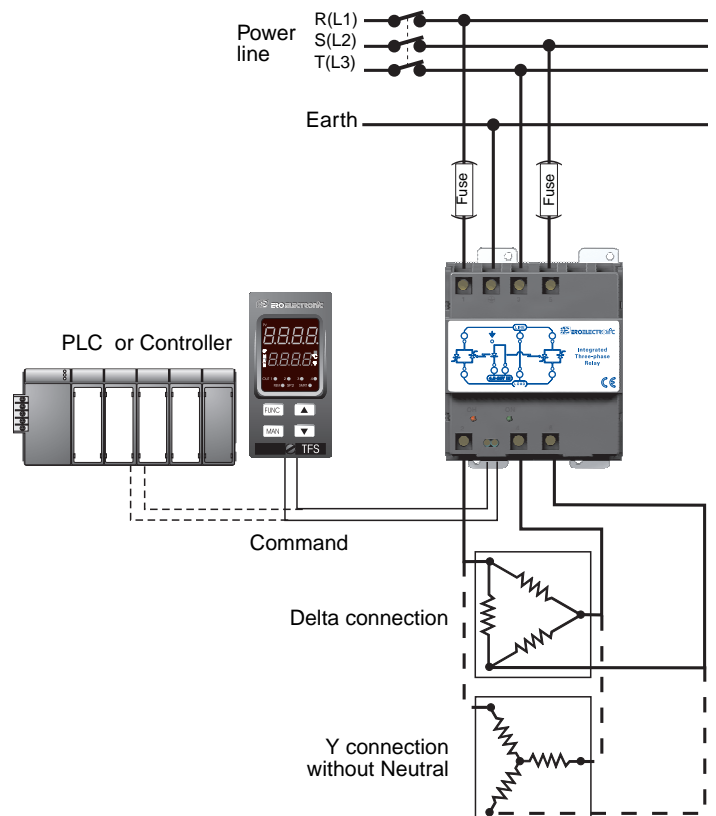
### Three-phase + neutral connection for **ISR - ISR T - ISL**



### Three-phase without neutral connection for **ISR e ISL**



### Three-phase without neutral connection for **ITR**





## The power ⇒ nominal current conversion

In order to simplify the selection of the suitable SSR model, the following formulas have been added, in accordance with the specific load connection, to calculate the nominal current of each SSR while knowing the total load power.

**Note:** The following formulas are NOT sufficient for the fuse selection. The fuse must be in compliance with the characteristics of I<sup>2</sup>t and nominal voltage declared for each SSR model.

### Preliminary remarks:

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

### Single-phase connection

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

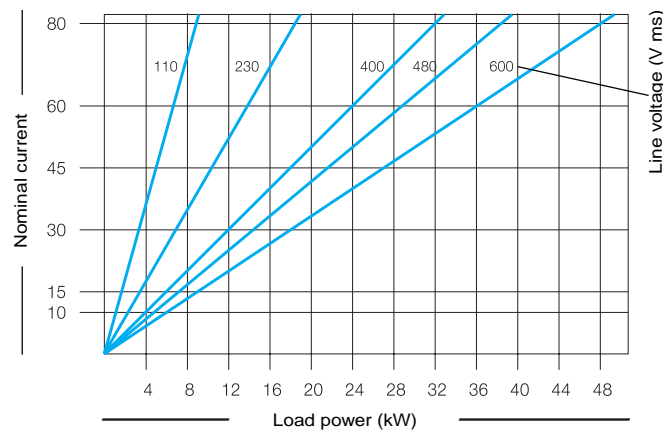
where:

P = power (in Watts).

V<sub>RMS</sub> = **phase to neutral** or **phase to phase** voltage (in Volts).

I<sub>RMS</sub> = nominal current (in Amperes).

The following diagram allows, for a single phase system, to select immediately the ISR model as function of the line voltage and of the load power.



### 3-phase without neutral connection (Y or delta application)

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

where:

P = Total load power (in Watts).

V<sub>RMS</sub> = **phase to phase** voltage (in Volts).

I<sub>RMS</sub> = nominal current (in Amperes).

### 3-phase with neutral connection (Y application)

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

where:

P = Total load power (in Watts).

V<sub>RMS</sub> = **phase to neutral** voltage (in Volts).

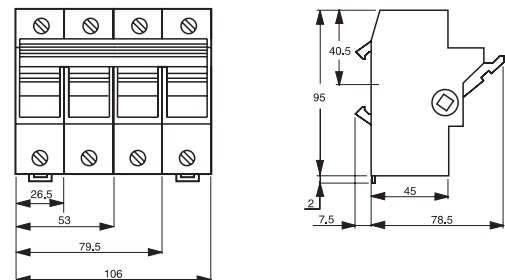
I<sub>RMS</sub> = nominal current (in Amperes).

## Fuses and fuseholder with circuit breaker

SSR Type	Fuse (*)	Fuseholder and circuit breaker	Connection
12 A	AISFU140020A0	AISF14MON0000	single phase
		AISF14TRIN000	3-phase + N
18 A	AISFU140032A0	AISF14MON0000	single phase
		AISF14TRIN000	3-phase + N
20 A 25 A	AISFU220032A0	AISF22MON0000	single phase
		AISF22TRI0000	3-phase
		AISF22TRIN000	3-phase + N
35 A	AISFU220050A0	AISF22MON0000	single phase
		AISF22TRI0000	3-phase
		AISF22TRIN000	3-phase + N
40 A 45 A	AISFU220050A0	AISF22MON0000	single phase
		AISF22TRI0000	3-phase
		AISF22TRIN000	3-phase + N
60 A	AISFU220080A0	AISF22MON0000	single phase
		AISF22TRI0000	3-phase
		AISF22TRIN000	3-phase + N
80 A	AISFU220100A0	AISF22MON0000	single phase
		AISF22TRI0000	3-phase
		AISF22TRIN000	3-phase + N

(\*) 10 PCS for each package

### AISF14 dimensions



### AISF22 dimensions

