

# USER'S MANUAL

Rev. 02/2021

# REVO SX

Solid-State Relay  
4x3,5A - 3x4,5A - 2x7A

006

M-RSX



**CD Automation S.r.l.**

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# Declaration of conformity

## Declaration of conformity - Dichiarazione di Conformità

### PRODUCT MANUFACTURER / PRODUTTORE:



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### Declare that the product / Dichiaro che il prodotto:

**Revo SX 4x3,5A - 3x4,5A - 2x7A**

PRODUCT DESCRIPTION: Electric power control  
SCOPE OF APPLICATION: Thermal control process  
DESCRIZIONE DEL PRODOTTO: Unità di controllo potenza elettrica  
UTILIZZO: Controllo processi termici

### FULFILLS THE REQUIREMENTS OF THE STANDARD:

Electrical safety Standard	EN60947-1: 2007 + A1 2011, A2 2014 EN60947-4-3: 2014
Generic Emission standard	EN60947-4-3: 2014 Group 1 Class A emissions
Generic Immunity standard	EN60947-4-3: 2014 Industrial Immunity

### SODDISFA I REQUISITI DELLA NORMA:

Specifica di sicurezza	EN60947-1: 2007 + A1 2011, A2 2014 EN60947-4-3: 2014
Specifica sulle emissioni	EN60947-4-3: 2014 gruppo 1 emissioni classe A
Specifica sulle Immunità	EN60947-4-3: 2014 Immunità industriale

CDAutomation declares that the products above mentioned are conforming to the directive  
CDAutomation dichiara che i prodotti sopra menzionati sono conformi alla direttiva  
Bassa Tensione (low Voltage) **EMC directive updated 2014/30/EU,**  
**Low Voltage Directive updated 2014/35/EU**

Issued on: 20/03/2017  
Data di emissione: 20/03/2017

Amministratore Unico e  
Legale Rappresentante  
**Simone Brizzi**









## Important warnings for safety

This chapter contains important information for the safety. The not observance of these instructions may result in serious personal injury or death and can cause serious damages to the Thyristor unit and to the components system included.

*The installation should be performed by qualified persons.*

In the manual are used symbols to give more evidence at the notes of safety and operativity for the attention for the user:


	This icon is present in all the operational procedures where the Improper operation may result in serious personal injury or death by Electrical Shock Hazard Symbol (a lightning bolt in a triangle) precedes an electric shock hazard CAUTION or WARNING safety statement.
	Warning or Hazard that needs further explanation than the label on unit can provide. Consult User's Guide for further information.
	Unit is compliant with European Union directives. See Declaration of Conformity for further details on Directives and Standards used for Compliance.
	If available, unit is a Listed device per Underwriters Laboratories. It has been investigated to ANSI/UL® 508 standards for Industrial Control Switches and equivalent to CSA C22.2 #14. For more detail search for File E231578 on <a href="http://www.ul.com">www.ul.com</a>
	ESD Sensitive product, use proper grounding and handling techniques when installing or servicing product.
	Do not throw in trash, use proper recycling techniques or consult manufacturer for proper disposal.


A **"NOTE"** marks a short message to alert you to an important detail.

A **"CAUTION"** safety alert appears with information that is important for protecting your equipment and performance. Be especially careful to read and follow all cautions that apply to your application.






















A **"WARNING"** safety alert appears with information that is important for protecting you, others and equipment from damage. Pay very close attention to all warnings that apply to your application.

### Safety notes

 **WARNING!** To avoid damage to property and equipment, injury and loss of life, adhere to applicable electrical codes and standard wiring practices when installing and operating this product. Failure to do so could result in damage, injury and death.

 **AVERTISSEMENT!** Pour éviter d'endommager la propriété et l'équipement, les blessures et la perte de vie, respecter les codes électriques en vigueur et les pratiques de câblage standard au moment de l'installation et de l'utilisation de ce produit. Dans le cas contraire, cela peut entraîner la mort, des blessures graves ou des dommages.

-  **WARNING!** All service including inspection, installation, wiring, maintenance, troubleshooting, fuse or other user serviceable component replacement must be performed only by properly qualified personnel. Service personnel must read this manual before proceeding with work. While service is being performed unqualified personnel should not work on the unit or be allowed in the immediate vicinity.
-  **AVERTISSEMENT!** Tous les services, y compris l'inspection, l'installation, le câblage, l'entretien, le dépannage, le remplacement de fusibles ou d'autres composants pouvant être réparés par l'utilisateur, doivent être effectués uniquement par un personnel d'entretien qualifié. Le personnel de service doit lire ce manuel avant d'effectuer tout travail. Pendant que l'entretien est exécuté, tout personnel non qualifié ne doit effectuer de travail sur l'appareil ni se trouver à proximité.
-  **WARNING!** When in use the power controller is connected to dangerous voltages. Do not remove the protective covers without first disconnecting and preventing power from being restored while servicing the unit.
-  **AVERTISSEMENT!** Au moment de l'utilisation, le régulateur de puissance est connecté à des tensions dangereuses. Ne retirer aucun couvercle de protection sans d'abord débrancher l'appareil et ainsi empêcher l'alimentation d'être rétablie pendant l'entretien.
-  **WARNING!** Do not use in aerospace or nuclear applications.
-  **AVERTISSEMENT!** Ne pas utiliser pour les applications aérospatiales ou nucléaires.
-  **WARNING!** The units are not developed to manage capacitive and inductive loads.
-  **AVERTISSEMENT!** Les unités ne sont pas développées pour la conduite de charges capacitatives et inductives.
-  **WARNING!** The power controller's protection rating is IP20 with all covers installed and closed. It must be installed in an enclosure that provides all the necessary additional protections appropriate for the environment and application.
-  **AVERTISSEMENT!** L'indice de protection du régulateur de puissance est de IP20 lorsque les couvercles sont installés et fermés. L'appareil doit être installé dans une enceinte qui assure toute la protection supplémentaire nécessaire pour l'environnement et l'application.
-  **WARNING!** Ground the power controller via the provided protective earth grounding terminal. Verify ground is within impedance specifications. This should be verified periodically.
-  **AVERTISSEMENT!** Mise à la terre du régulateur de puissance par le biais de la borne de prise de terre de protection fournie. Vérifier que la prise de terre est conforme aux spécifications de l'impédance. Cela doit être vérifié périodiquement.
-  **WARNING!** Electric Shock Hazard: when the power controller has been energized, after shutting off the power, wait at least one minute for internal capacitors to discharge before commencing work that brings you in to contact with power connections or internal components.
-  **AVERTISSEMENT!** Risque de décharges électriques: lorsque le régulateur de puissance est mis sous tension, après avoir été éteint, attendre au moins une minute pour que les condensateurs internes se déchargent avant de commencer tout travail incluant le contact avec les connexions électriques ou les composants internes.
-  **WARNING!** The installation must be protected by electromagnetic circuit breakers or by fuses. The semiconductor fuses located inside the power controller are classified for UL as supplementary protection for semiconductor devices. They are not approved for branch circuit protection.
-  **AVERTISSEMENT!** L'installation doit être protégée par des disjoncteurs électromagnétiques ou des fusibles. Les fusibles pour semi-conducteurs situés à l'intérieur du régulateur de puissance sont classés UL comme protection supplémentaire pour les dispositifs pour semi-conducteurs. Ils ne sont pas approuvés pour la protection des circuits de dérivation.
-  **WARNING!** When making live voltage or current measurements, use proper personal protective equipment for the voltages and arc-flash potentials involved.

-  **AVERTISSEMENT!** Au moment de relever des mesures de tension ou de courant en direct, utiliser un équipement de protection individuelle approprié pour les tensions et les potentiels d'arc électrique concernés.
-  **WARNING!** Verify the voltage and current ratings of the power controller are correct for the application.
-  **AVERTISSEMENT!** Vérifier que les valeurs de tension et de courant du régulateur de puissance sont correctes pour l'application.
-  **CAUTION:** To avoid compromising the insulation, do not bend wire or other components beyond their bend radius specifications.
-  **ATTENTION:** Pour éviter de compromettre l'isolation, ne pas plier le fil ou tout autre composant au-delà de ses spécifications en matière de rayon de courbure.
-  **CAUTION:** Protect the power controller from high temperature, humidity and vibrations.
-  **ATTENTION:** Protéger le régulateur de puissance contre les températures élevées, l'humidité et les vibrations.
-  **CAUTION:** The power controller warranty is void if the tested and approved fuses are not used.
-  **ATTENTION:** La garantie du régulateur de puissance est nulle si aucun fusible testé et approuvé n'est utilisé.
-  **CAUTION:** Only trained and authorized personnel should access and handle the internal electronics and they must follow proper electro-static prevention procedures.
-  **ATTENTION:** Seul le personnel formé et autorisé peut accéder aux composants électroniques internes et les gérer, et il doit se conformer à des procédures de prévention électrostatique appropriées.
-  **CAUTION:** Install an appropriately sized RC filter across contactor coils, relays and other inductive loads.
-  **ATTENTION:** Installer un filtre RC de dimensions appropriées sur les bobines du contacteur, les relais et autres charges par induction.
-  **CAUTION:** The thyristor units here described have been designed for use with sinusoidal networks with nominal frequency 50-60 Hz. Any application with NON-SINUSOIDAL, distorted or disturbed networks could compromise the correct operation of the unit.
-  **ATTENTION:** Les unités de thyristors décrites ici ont été conçues pour être utilisées avec des réseaux sinusoïdaux d'une fréquence nominale de 50 à 60 Hz. Toute application utilisant des réseaux NON SINUSOÏDAUX, déformés ou perturbés peut compromettre le bon fonctionnement de l'appareil.
-  **NOTE:** Provide a local disconnect to isolate the power controller for servicing.
-  **REMARQUE:** Fournir une déconnexion locale afin d'isoler le régulateur de puissance pour l'entretien.
-  **NOTE:** The nominal current is specified for ambient temperatures at or below 40° C. Ensure the application design allows for adequate cooling of each power controller. The power controller must be mounted vertically. The cooling design must prevent air heated by one power controller from causing power controllers mounted above to exceed the ambient operating temperature limit. When power controllers are mounted side by side allow a minimum spacing of 15mm between them.
-  **REMARQUE:** Le courant nominal est précisé pour des températures ambiantes égales ou inférieures à 40°C. S'assurer que la conception de l'application permette le refroidissement adéquat de chaque régulateur de puissance. Le régulateur de puissance doit être monté verticalement. La conception de refroidissement doit empêcher l'air chauffé par le régulateur de puissance de dépasser la limite de température de fonctionnement ambiante de la part des régulateurs de puissance montés au-dessus. Lorsque les régulateurs de puissance sont montés côte à côte, il faut conserver un espacement minimal de 15 mm entre les deux.
-  **NOTE:** Use only copper cables and wires rated for use at 75°C or greater.
-  **REMARQUE:** N'utiliser que des câbles et des fils en cuivre pour l'utilisation à 75°C ou plus.



## Maintenance

In order to have a corrected cooling, the user must clean the heat-sink and the protective grill of the fans. The frequency of this servicing depends on environmental pollution.

Also check periodically if the screw for the power cables and safety earth are tightened correctly (See Connection Diagram).

### Warranty condition

Producer gives a 12 months warranty to its products.

The warranty is limited to repairing and parts substitution in our factory and does exclude products not properly used and fuses.

Warranty does not include products with serial numbers deleted. The faulty product should be shipped to Producer at customer's cost and our Service will evaluate if product is under warranty terms.

Substituted parts remain of Producer property.



## Return Material Authorization (RMA)

Customers wishing to return any items, whether they are incorrectly supplied, faulty or damaged in transit, must first complete a Return Material Authorisation (RMA) form to obtain an RMA number from the Service Department.

A full repair service is available for customers. Prior to submitting the RMA form and returning products, customers are recommended to contact the technical support team to determine whether the issue can be resolved with telephone support.

### How the RMA service works

The RMA form and details are available on our web sites:

<https://www.cdautomation.com/returns-material-authorisation/>

When completing the RMA form, please be as specific as possible about the problem, including any pertinent application details. The more information given, the more quickly and more thoroughly the problem can be solved. The minimum information required is:

1. The Full Model Number
2. Quantity of units being returned
3. The units Serial Number(s)
4. A description of the problem ("faulty" or "unknown" is not sufficient).



# Summary

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# 1 Basic Connections

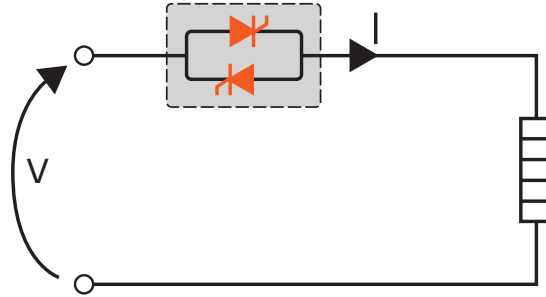
Wiring with resistive load

$$I = \frac{P}{V}$$

V = Nominal voltage of the load

I = Nominal current of the load

P = Nominal power of the load



# 2 Order Code

REVO SX	1	2	3	4	5	6	-	7	8	9	10	11	12	13	14	15	16
	R	S	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-

NUMBER OF ZONES X CURRENT RATING	4	5	6
description	code		
4 zones 3,5A each	4	0	3
3 zones 4,5A each	3	0	4
2 zones 7A each	2	0	7

MAX VOLTAGE	7
description	code
230V	2
480V	4

VOLTAGE SUPPLY AUX	8
description	code
No Auxiliary Voltage with 230V	0

INPUT	9
description	code
SSR	S

FIRING	10
description	code
Zero Crossing	Z
Random (used with REVO-PC)	R

CONTROL MODE	11
description	code
Open Loop	0

# 3 Technical Specifications

## General features

Cover and Socket material:	PolymericV2
Mounting:	DIN bar (thickness type 1mm Max)
Utilization Category:	AC-51 AC-55b
IP Code:	20
Method of Connecting:	Single Phase load
Delay switch ON/OFF time:	1/2 Period Max

## Input features

Logic input SSR: 4 ÷ 30Vdc 5mA Max (ON ≥4Vdc OFF <1Vdc)

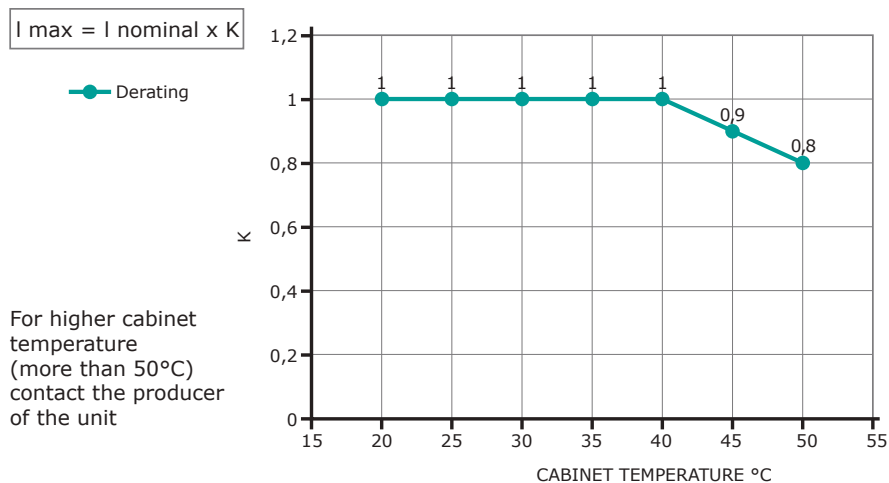
## Output features (power device)

Nominal current in continuous service:	4x3,5A - 3x4,5 - 2 x 7A
Max peak current (10ms):	350A
Nominal Voltage range <b>Ue</b> :	24÷480V
Repetitive peak reverse voltage <b>Uimp</b> :	1200V (480V)
Latching current:	250mA
Leakage current:	15mA eff
I <sup>2</sup> T value tp=10msec:	610 A <sup>2</sup> s
Frequency range:	47÷70Hz
Power loss (I=Inom):	4x4,2W - 3x5,4W - 2x8,4W
Isolation Voltage <b>Ui</b> :	2500Vac

## Environmental installation conditions

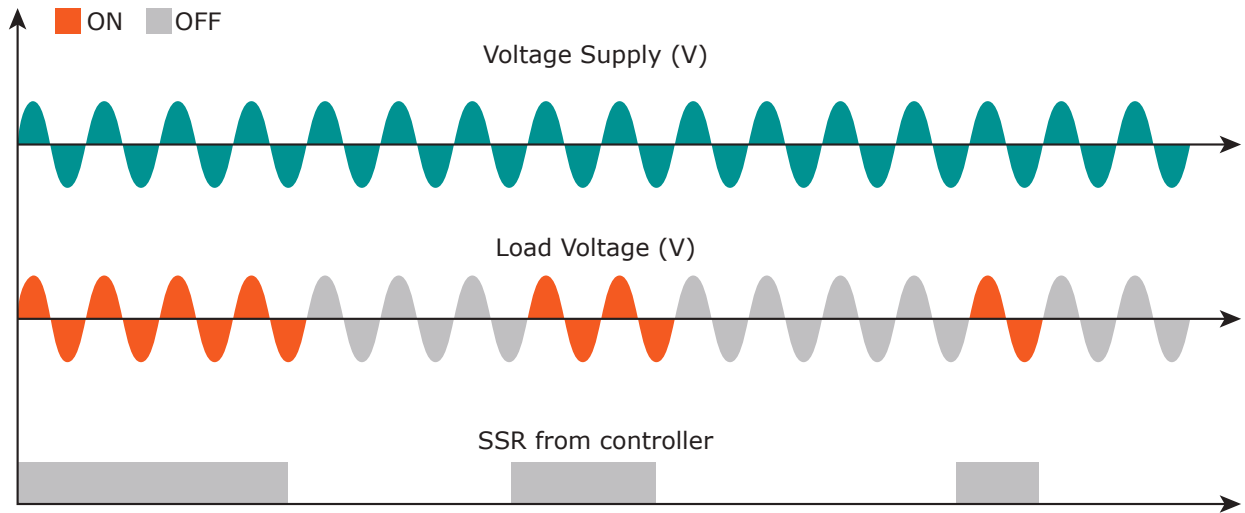
Ambient temperature	0-40°C (32-104°F) at nominal current. Over 40°C use the derating curve (max 50°C).
Storage temperature	-25°C to 70°C, -13°F to 158°F
Installation place	Don't install at direct sun light, where there are conductive dust, corrosive gas, vibration or water and also in salty environmental.
Altitude	Up to 1000 meter over sea level. For higher altitude reduce the nominal current of 2% for each 100m over 1000m
Humidity	From 5 to 95% without condense and ice
Pollution Level	Up to 2nd Level ref. IEC 60947-1 6.1.3.2

## Derating Curve



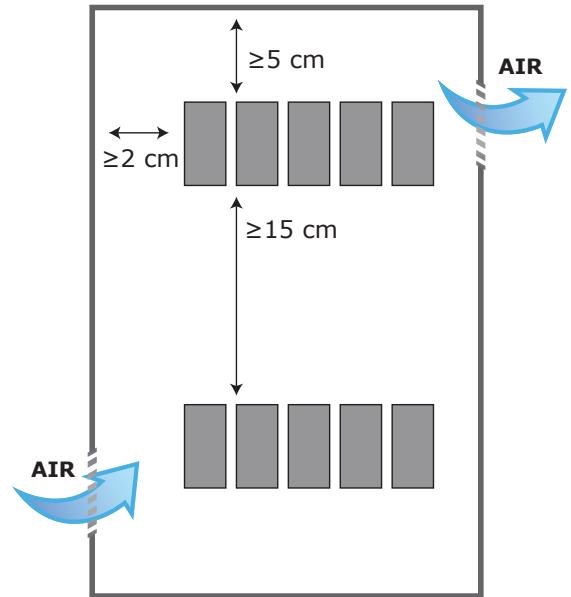
# 4 Firing Type

ZC firing mode is used with Logic Output from temperature controllers and the Thyristor operates like a contactor. The Cycle time is performed by temperature controller. ZC minimizes interferences because the Thyristor unit switches ON-OFF at zero voltage.

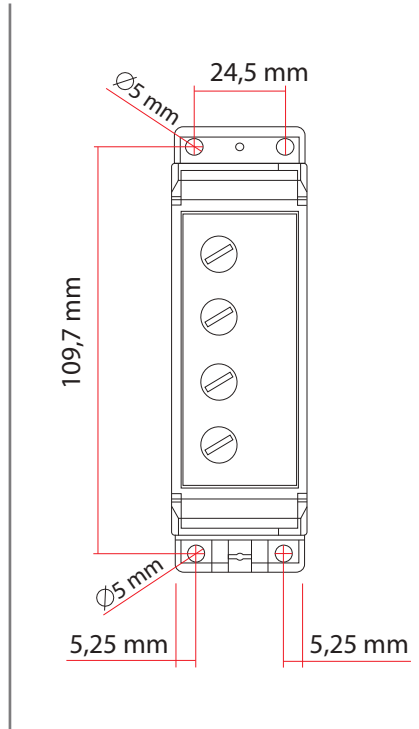
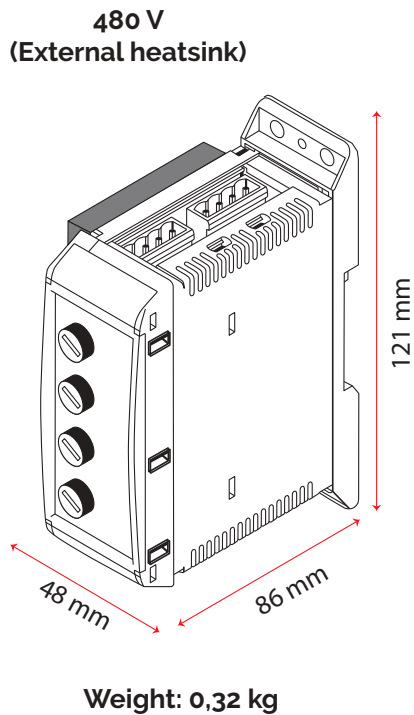
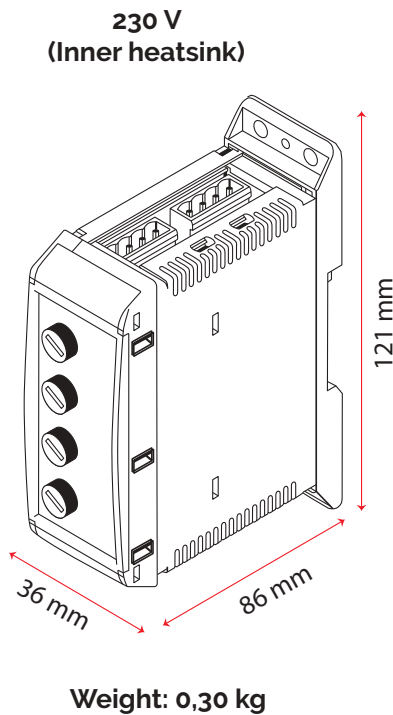


# 5 Installation

Before to install the thyristor unit examine for damages or deficiencies. If any is found, notify the carrier immediately. Check that the product features shown on unit cover corresponds to that ordered. The thyristor unit should be always mounted in vertical position to improve air cooling on heat-sink. Maintain minimum distances in vertical and in horizontal as represented. Don't install in proximity of hot elements and near units generating electromagnetic interferences. When more units are mounted in the same cabinet provide air circulation as represented. Sometimes it is necessary to provide a fan to have better air circulation.



## Dimensions and Fixing holes



## 6

## Wiring instructions

The Thyristor unit could be susceptible to interferences lost by near equipments or by the power supply, for this reason in accord to the fundamental practices rules is opportune take some precautions:

- The coil contactor, the relays and other inductive loads must be equipped with opportune RC filter.
- Use shielded bipolar cables for all the input and output signals.
- The signal cables must not be near and parallel to the power cables.
- Local regulations regarding electrical installation should be rigidly observed.

Use copper cables and wires rated for use at 90°C only.

### Command cable dimensions (suggested)

0.5mm<sup>2</sup> (AWG 18).

### Power cable dimensions (suggested)

Each terminal can reach 12A using a wire with 1.5mm<sup>2</sup> of diameter, if you use all the 4 zones in the ON condition at the same time, connecting more terminals (13-14-15-16) at the line power.

### Power cable torque (suggested)

MAX Current Each terminal	Connector Type	Torque Lb-in (Nm)	Wire Range mm <sup>2</sup> (AWG)	Wire Terminal
12A	Estraibile Connectors	4.42 (0.5)	0.5-1.5 (18-14)	Rigid / Flexible Wire Pin

## Terminals 230V

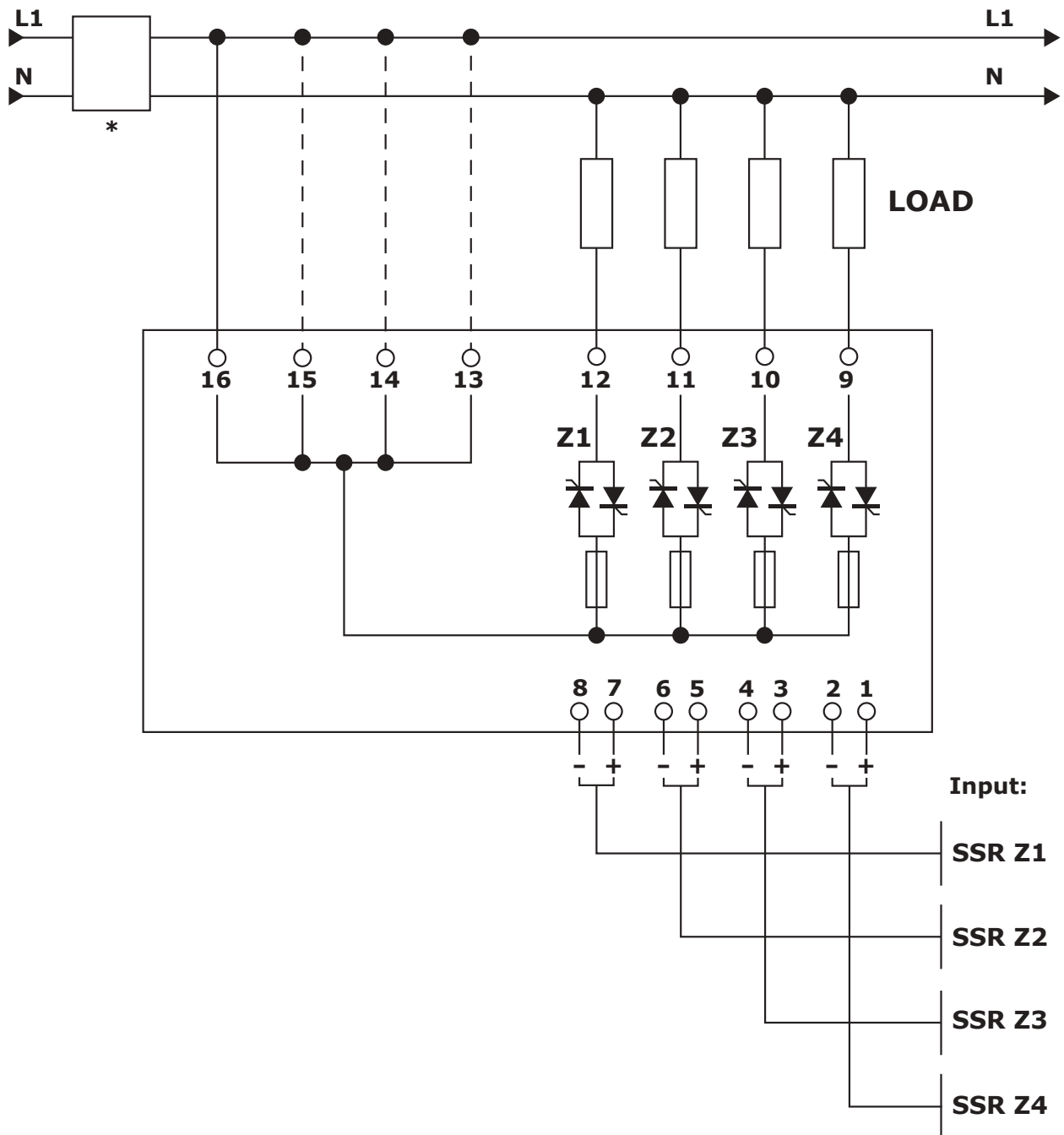
Terminal	Description
1	Z4 (+) Control Input (SSR/0-10Vdc/4-20mA)
2	Z4 (-) Control Input (SSR/0-10Vdc/4-20mA)
3	Z3 (+) Control Input (SSR/0-10Vdc/4-20mA)
4	Z3 (-) Control Input (SSR/0-10Vdc/4-20mA)
5	Z2 (+) Control Input (SSR/0-10Vdc/4-20mA)
6	Z2 (-) Control Input (SSR/0-10Vdc/4-20mA)
7	Z1 (+) Control Input (SSR/0-10Vdc/4-20mA)
8	Z1 (-) Control Input (SSR/0-10Vdc/4-20mA)
9	Load Output Z4
10	Load Output Z3
11	Load Output Z2
12	Load Output Z1
13	Line Input *
14	Line Input *
15	Line Input *
16	Line Input *

## Terminals 480V

Terminal	Description
1	Z4 (+) Control Input (SSR/0-10Vdc/4-20mA)
2	Z4 (-) Control Input (SSR/0-10Vdc/4-20mA)
3	Z3 (+) Control Input (SSR/0-10Vdc/4-20mA)
4	Z3 (-) Control Input (SSR/0-10Vdc/4-20mA)
5	Z2 (+) Control Input (SSR/0-10Vdc/4-20mA)
6	Z2 (-) Control Input (SSR/0-10Vdc/4-20mA)
7	Z1 (+) Control Input (SSR/0-10Vdc/4-20mA)
8	Z1 (-) Control Input (SSR/0-10Vdc/4-20mA)
9	Not connected
10	Not connected
11	Aux - Voltage Supply for electronic boards 12-24V AC/DC
12	Aux - Voltage Supply for electronic boards 12-24V AC/DC
13	Load Output Z4
14	Load Output Z3
15	Load Output Z2
16	Load Output Z1
17	Line Input *
18	Line Input *
19	Line Input *
20	Line Input *

\* All inputs have inner connection in parallel.

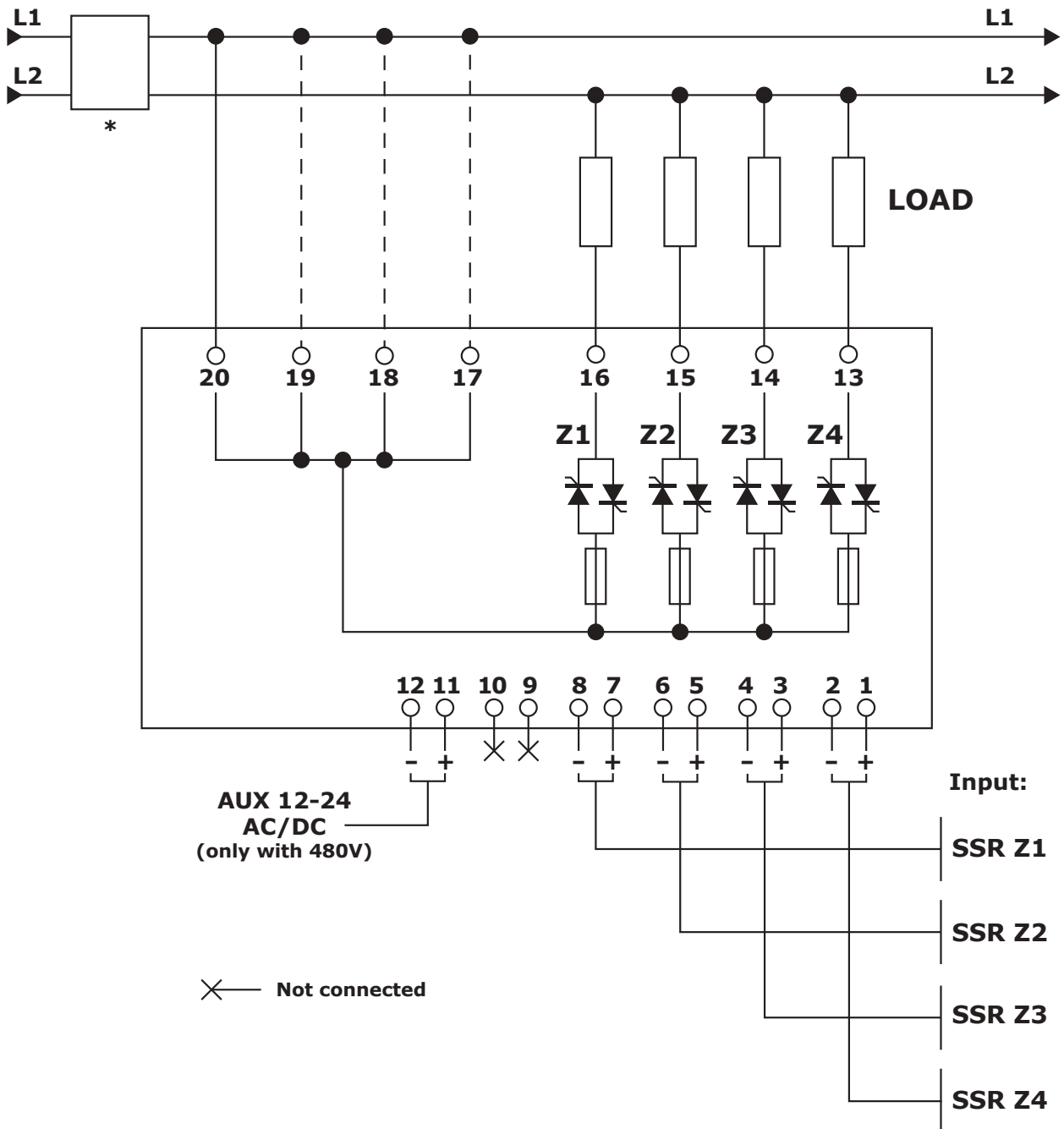
Diagram of control connection 4x3,5A - 230V



**Note:**

- A suitable device must ensure that the unit can be electrically isolated from the supply, this allows the qualified people to work in safety (\*).
- Before connecting or disconnecting the unit check that power and control cables are isolated from voltage sources.

Diagram of control connection 4x3,5A - 480V

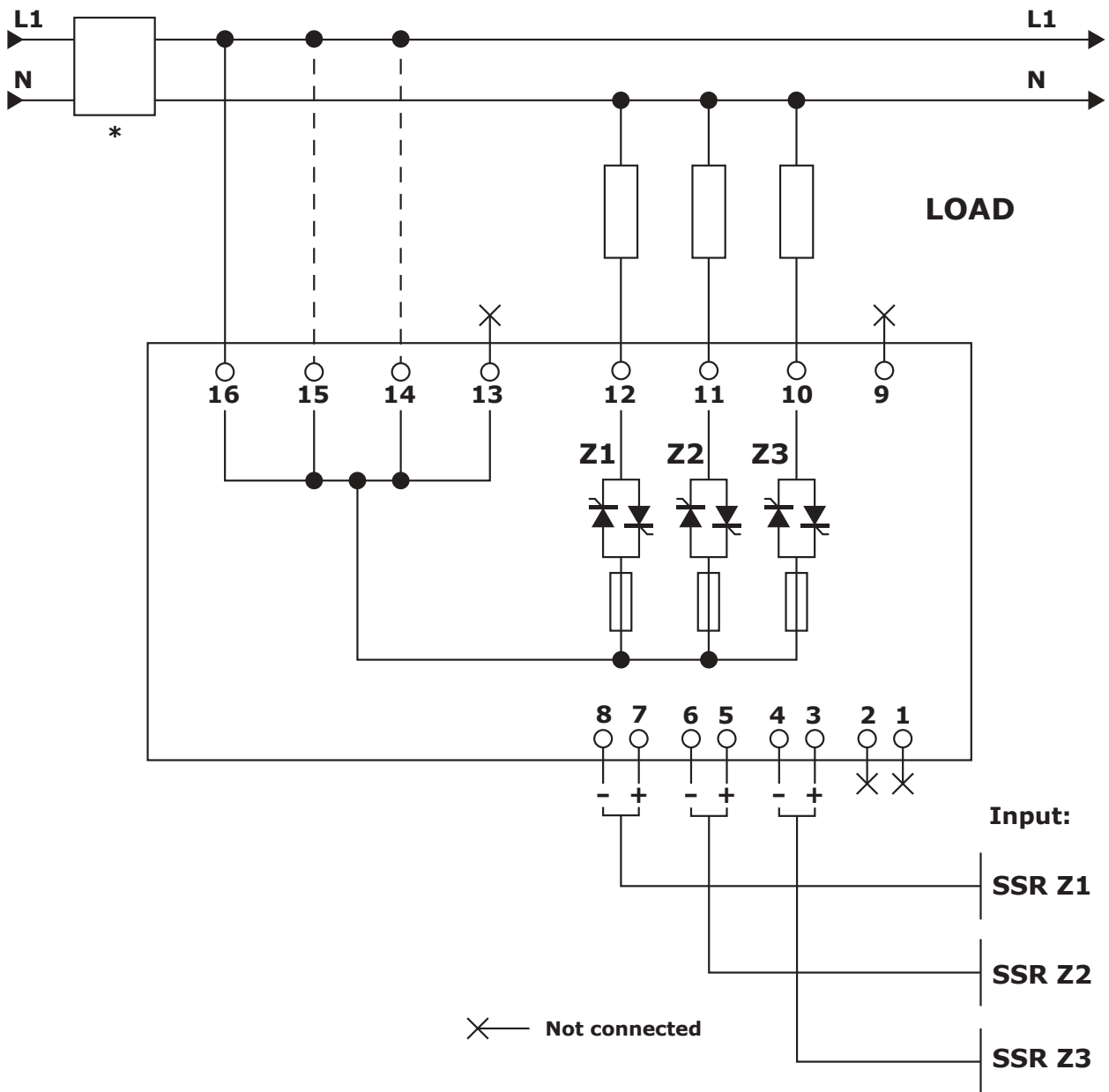


Note:

- A suitable device must ensure that the unit can be electrically isolated from the supply, this allows the qualified people to work in safety (\*).
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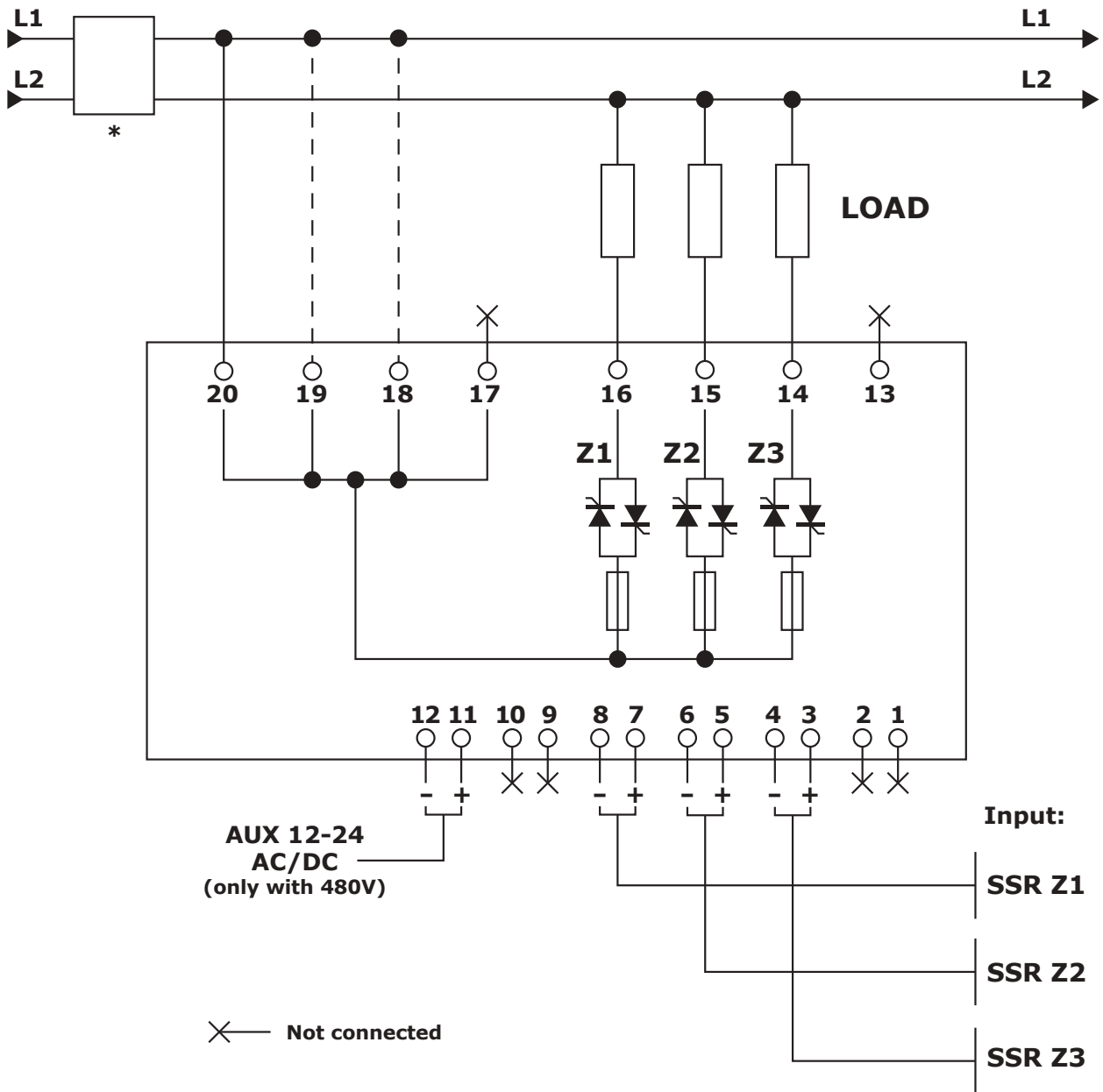
Diagram of control connection 3x4,5A - 230V



Note:

- A suitable device must ensure that the unit can be electrically isolated from the supply, this allows the qualified people to work in safety (\*).
- Before connecting or disconnecting the unit check that power and control cables are isolated from voltage sources.

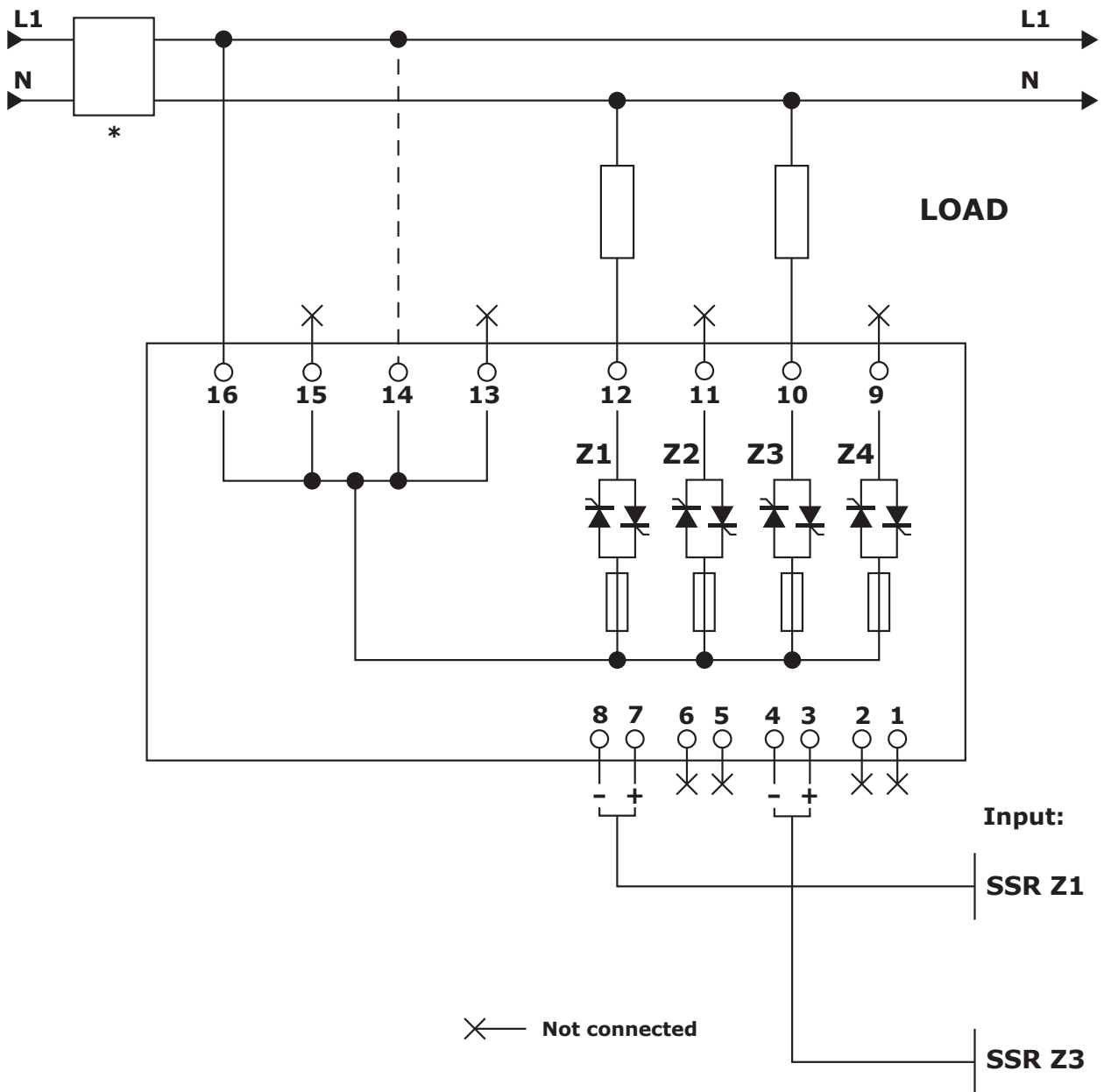
Diagram of control connection 3x4,5A - 480V



**Note:**

- A suitable device must ensure that the unit can be electrically isolated from the supply, this allows the qualified people to work in safety (\*).
- Before connecting or disconnecting the unit check that power and control cables are isolated from voltage sources.

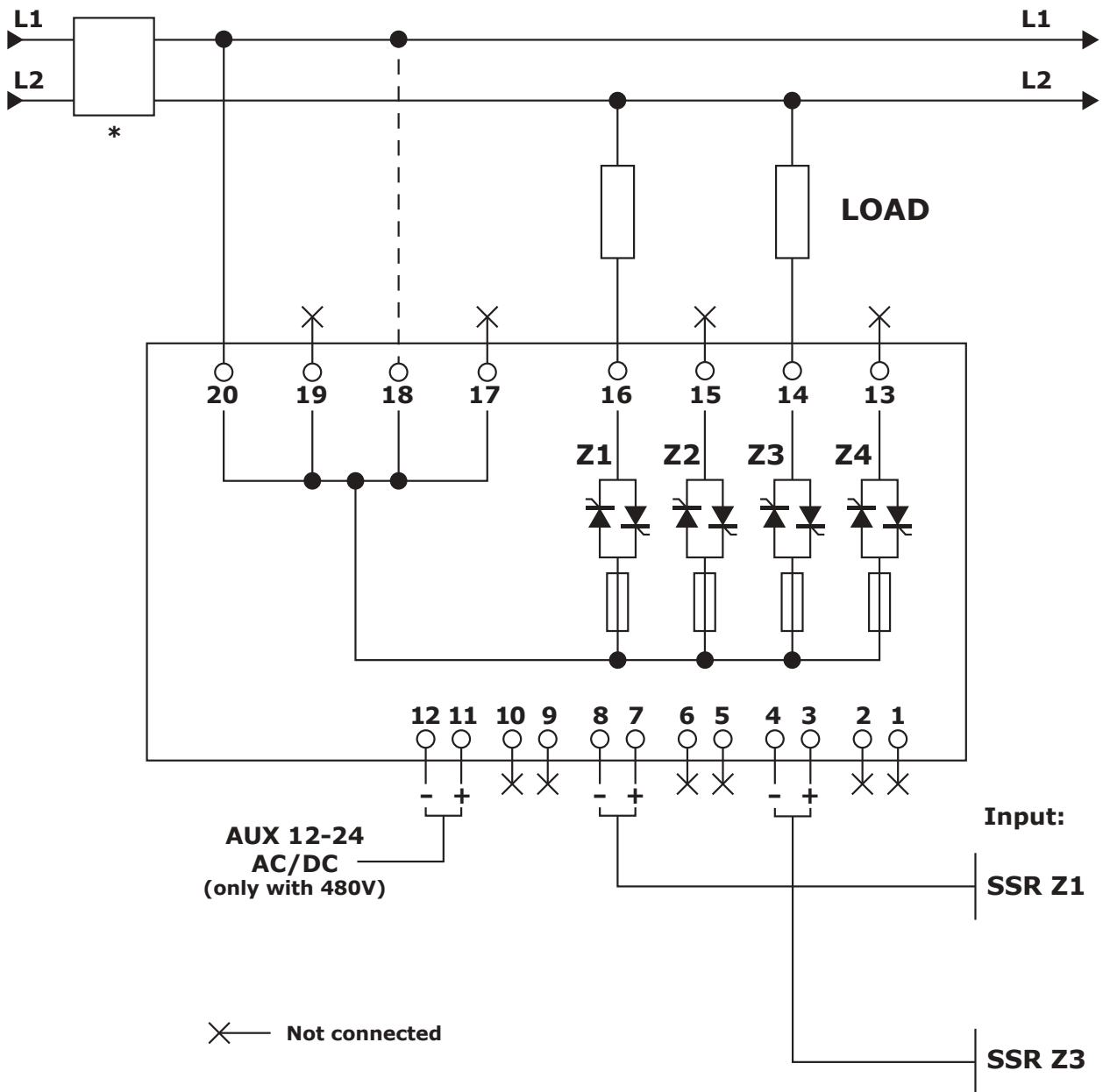
Diagram of control connection 2x7A - 230V



**Note:**

- A suitable device must ensure that the unit can be electrically isolated from the supply, this allows the qualified people to work in safety (\*).
- Before connecting or disconnecting the unit check that power and control cables are isolated from voltage sources.

Diagram of control connection 2x7A - 480V

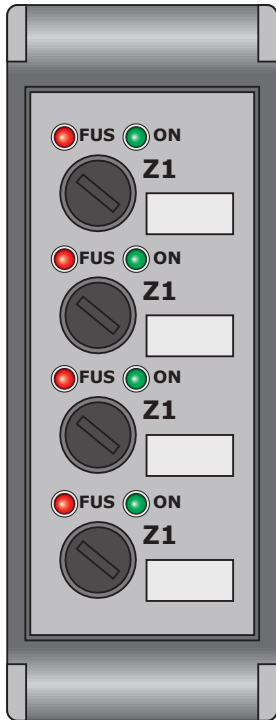


Note:

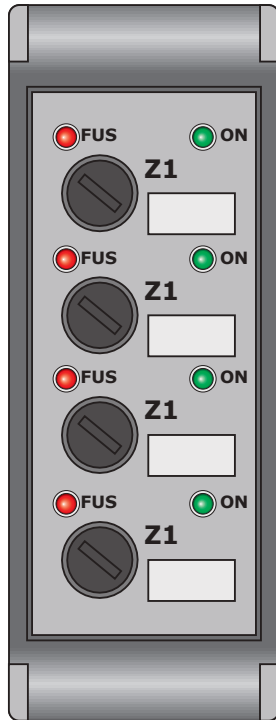
- A suitable device must ensure that the unit can be electrically isolated from the supply, this allows the qualified people to work in safety (\*).
- Before connecting or disconnecting the unit check that power and control cables are isolated from voltage sources.

# 7 Led status and Alarms

**230V**



**480V**



**RED**



<input type="radio"/> OFF	Fuse OK
<input checked="" type="radio"/> ON	Fuse Fault

**GREEN**

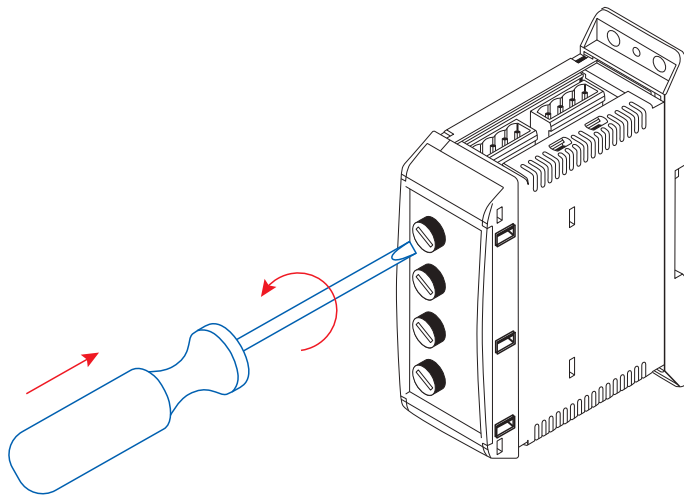


<input type="radio"/> OFF	Loas is NOT powered
<input checked="" type="radio"/> ON	Loas IS powered

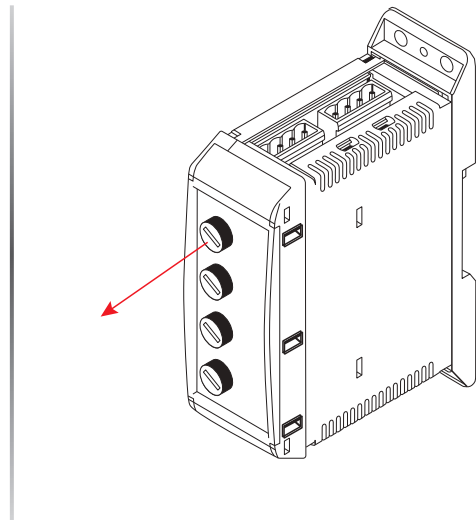
# 8 Internal Fuse

The thyristor unit must be protected against short circuit by High speed fuses.  
 The Fuses must have I<sup>2</sup>t 20% less than thyristor's I<sup>2</sup>t.  
 The warranty of thyristor is null if no proper fuses are used.

### Change the Fuses:



Press, turn in counter-clockwise and release



Extract the fuse



**Caution:** High speed fuses are used only for the thyristor protection and can not be used to protect the installation.



**Caution:** The warranty of thyristor is null if no proper fuses are used (see table).

### Spare Fuse Order Code:

REVO 4x3,5A	FU5X20-4	Only one pcs.	Type 5x20 4A 250V fast 0324004
REVO 3x4,5A	FU5X20-5	Only one pcs.	Type 5x20 6A 250V fast 0324005
REVO 2x7A	FU5X20-8	Only one pcs.	Type 5x20 10A 250V fast 0325008



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