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# Declaration of conformity

## Declaration of conformity - Dichiarazione di Conformità

### PRODUCT MANUFACTURER / PRODUTTORE:



**CD Automation S.R.L.**  
Controllers, Drives & Automation

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

**CD3000S 3PH 15-90A**

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<br>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<br>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

## Quick Start

### 1.1 Standard version



**Attention:** this procedure must be carried out by skilled people only.

If the Order Code of the Thyristor unit is in line with what you really need, then CD3000S has been already configured in Factory and you just need to do the following steps:

1. Verify CD3000S Sizing. Be sure that:
  - The load current is equal or less than the Max current of CD3000S.
  - The load voltage is equal or less than the Max voltage of CD3000S
2. Verify the Order Code
3. Verify the Installation
4. Verify the Diagram of control connection:
  - verify that there isn't a short circuit on the load
  - verify the Fan Power Supply (only for sizes S6 and S8)
5. Supply the Power unit

***The CD3000S is ready to start***

2

## Basic Connections and sizing

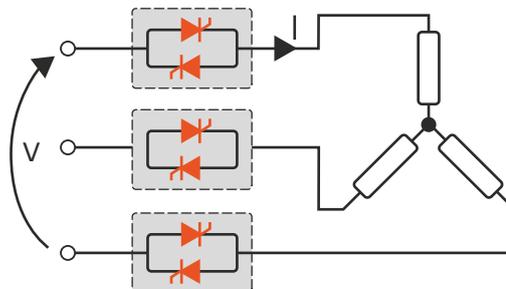
### Star Wiring with resistive Load

$$I = \frac{P}{1,73V}$$

V = Nominal load voltage phase to phase

I = Nominal current of the load

P = Nominal power of the load



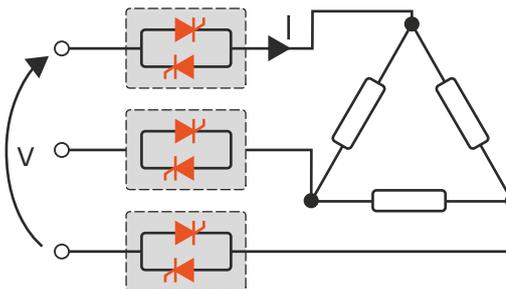
### Delta Wiring with resistive Load

$$I = \frac{P}{1,73V}$$

V = Nominal load voltage phase to phase

I = Nominal current of the load

P = Nominal power of the load



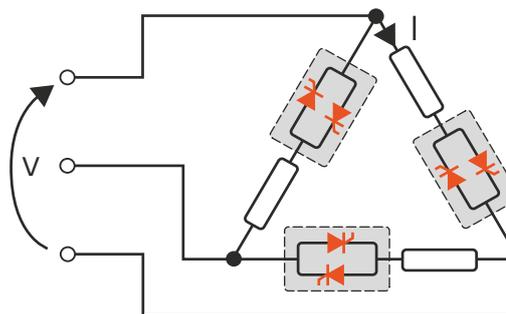
### Open Delta Wiring with resistive Load

$$I = \frac{P_{tot}}{3V}$$

V = Nominal load voltage phase to phase

I = Nominal current of the load

P = Nominal power of the load



# 3 Identification and Order Code

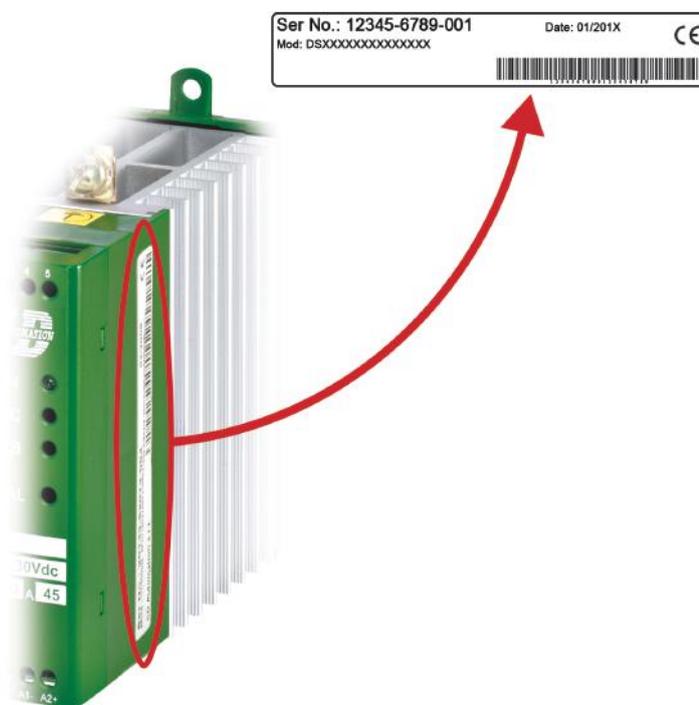
## 3.1 Identification of the Unit



**Caution:** Before to install, make sure that the Thyristor unit have not damages. If the product has a fault, please contact the dealer from which you purchased the product.

The identification label give all the information regarding the factory settings of the Thyristor unit, this label is on the unit, like represented in figure.

Verify that the product is the same thing as ordered.



### 3.2 Order Code

|                    |          |          |          |          |          |          |   |          |          |          |           |           |           |           |           |           |           |
|--------------------|----------|----------|----------|----------|----------|----------|---|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                    | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b> |   | <b>7</b> | <b>8</b> | <b>9</b> | <b>10</b> | <b>11</b> | <b>12</b> | <b>13</b> | <b>14</b> | <b>15</b> | <b>16</b> |
| <b>CD3000S 3PH</b> | D        | S        | 3        | -        | -        | -        | - | -        | -        | -        | -         | -         | -         | -         | -         | -         | -         |

| CURRENT (A) | 4    | 5 | 6        |      |
|-------------|------|---|----------|------|
| description | Code |   | OLD code | Note |
| 15A         | 0    | 1 | 5        | 15A  |
| 30A         | 0    | 3 | 0        | 30A  |
| 45A         | 0    | 4 | 5        | 45A  |
| 60A         | 0    | 6 | 0        | 60A  |
| 75A         | 0    | 7 | 5        | 75A  |
| 90A         | 0    | 9 | 0        | 90A  |

| OPERATING VOLTAGE (V)        |                 |          |      |
|------------------------------|-----------------|----------|------|
| description                  | Code            | OLD code | Note |
| From 24V to Max Load Voltage | not in the code | __ _V    |      |

| MAX LOAD VOLTAGE (V) | 7    |          |      |
|----------------------|------|----------|------|
| description          | Code | OLD code | Note |
| 480V                 | 4    |          |      |
| 600V                 | 6    |          |      |

| AUXILIARY VOLTAGE (V)       | 8    |          |      |
|-----------------------------|------|----------|------|
| description                 | Code | OLD code | Note |
| NO Auxiliary Voltage supply | 0    | NO /     |      |

| INPUT       | 9    |          |      |
|-------------|------|----------|------|
| description | Code | OLD code | Note |
| SSR         | S    | SSR /    |      |

| FIRING        | 10   |          |      |
|---------------|------|----------|------|
| description   | Code | OLD code | Note |
| Zero Crossing | Z    | ZC /     |      |

| CONTROL MODE | 11   |                 |      |
|--------------|------|-----------------|------|
| description  | Code | OLD code        | Note |
| Open loop    | 0    | not in the code |      |

| FUSES & OPTION              | 12   |          |      |
|-----------------------------|------|----------|------|
| description                 | Code | OLD code | Note |
| No Fuse                     | 0    | NF / -   |      |
| External Fuse & Fuse Holder | F    | EF / -   |      |

| FAN VOLTAGE                              | 13   |                 |      |
|--|------|-----------------|------|
| description                              | Code | OLD code        | Note |
| No Fan for unit <45A                     | 0    | - /             |      |
| Fan 110V Option - for 45A to 90A units   | 1    | 110VFAN /       |      |
| Fan 220V Standard - for 45A to 90A units | 2    | not in the code |      |

| APPROVALS                  | 14   |          |      |
|----------------------------|------|----------|------|
| description                | Code | OLD code | Note |
| CE EMC for European Market | 0    | - /      |      |
| CE EMC + cUL us listed     | L    | UL /     |      |

| MANUAL      | 15   |          |      |
|-------------|------|----------|------|
| description | Code | OLD code | Note |
| None        | 0    | NM       |      |
| Italian     | 1    | IM       |      |
| English     | 2    | EM       |      |
| German      | 3    | GM       |      |
| French      | 4    | FM       |      |

| IP PROTECTION                                     | 16   |          |          |
|---|------|----------|----------|
| description                                       | Code | OLD code | Note     |
| Standard IP20 (all unit excluded 45A to 90A)      | 0    | - /      |          |
| External IP20 protection for size S8 (45A to 90A) | P    | EP /     | <b>1</b> |

(1) IP20 is standard on all units with exception of S8 size (45-90A). To complain IP20 use "P" option at digit 16

#### New Code (example):

|                    |          |          |          |          |          |          |   |          |          |          |           |           |           |           |           |           |           |
|--------------------|----------|----------|----------|----------|----------|----------|---|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                    | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b> |   | <b>7</b> | <b>8</b> | <b>9</b> | <b>10</b> | <b>11</b> | <b>12</b> | <b>13</b> | <b>14</b> | <b>15</b> | <b>16</b> |
| <b>CD3000S 3PH</b> | D        | S        | 3        | 0        | 9        | 0        | - | 4        | 0        | S        | Z         | 0         | F         | 2         | L         | 2         | P         |

#### Old Code (example):

| Model         | Current (A) | Operating Voltage (V) | Max Load Voltage (V) | Aux Voltage (V) | Input | Firing | Fuses | Fan | EP Option | Approvals | Manual |
|---------------|-------------|-----------------------|----------------------|-----------------|-------|--------|-------|-----|-----------|-----------|--------|
| CD3000S 3PH / | 90A /       | 400V /                | 480V /               | NO /            | SSR / | ZC /   | EF /  | - / | EP /      | UL /      | EM     |

## 4

## Technical Specification

### 4.1 General features

|                                   |                                  |
|-----------------------------------|----------------------------------|
| Cover and Socket material:        | PolymericV2                      |
| Heat-sink:                        | Anodized aluminum                |
| Delay switch ON time:             | 0.5 period Max                   |
| Delay switch OFF time:            | 0.5 period Max                   |
| Auxiliary Voltage:                | 12÷24V dc/ac (max 70mA)          |
| Fan Voltage<br>(only for Size S8) | 220Vac ± 15%<br>(110 Vac option) |

### 4.2 Input features

|  |  |
|--|--|
| Analog Input:<br>(Loop Powered)                  | 4 - 20mA<br>(6,5Vdc Min)                       |
| Logic input SSR:<br>(Standard for size S2)       | 4 - 30Vdc 20mA Max<br>(ON ≥ 4Vdc - OFF < 1Vdc) |
| Logic input SSR:<br>(Standard for size S4-S7-S8) | 4 - 30Vdc 15mA Max<br>(ON ≥ 4Vdc - OFF < 1Vdc) |
| Logic input SSR:<br>(low current)                | 5 - 30Vdc 12mA Max<br>(ON ≥ 5Vdc - OFF < 1Vdc) |

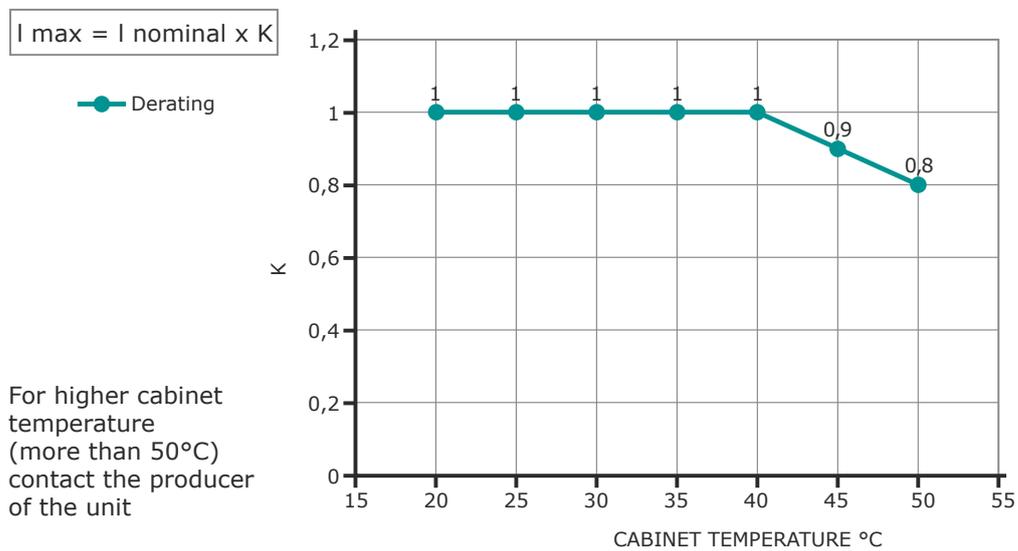
### 4.3 Power output features

| Size     | Voltage range | Repetitive peak reverse Voltage |      | Latching current | Max peak one cycle | Leakage current | I <sup>2</sup> t value thyristor | Frequency range | Power loss | Isolation Voltage |
|----------|---------------|---------------------------------|------|------------------|--------------------|-----------------|----------------------------------|-----------------|------------|-------------------|
|          |               | 480V                            | 600V |                  |                    |                 |                                  |                 |            |                   |
| (A)      | (V)           | 480V                            | 600V | (mAeff)          | (10ms) (A)         | (mAeff)         | tp=10msec                        | (Hz)            | I=Inom (W) | Vac               |
| 15A (S2) | 24÷480        | 1200                            | 1200 | 150              | 230                | 15              | 610                              | 47÷70           | 54         | 2500              |
| 30A (S4) | 24÷480        | 1200                            | 1600 | 250              | 600                | 15              | 1800                             | 47÷70           | 108        | 2500              |
| 45A (S6) | 24÷600        | 1200                            | 1600 | 250              | 600                | 15              | 1800                             | 47÷70           | 162        | 2500              |
| 60A (S8) | 24÷600        | 1200                            | 1600 | 450              | 1000               | 15              | 4750                             | 47÷70           | 216        | 2500              |
| 75A (S8) | 24÷600        | 1200                            | 1600 | 450              | 1540               | 15              | 11300                            | 47÷70           | 270        | 2500              |
| 90A (S8) | 24÷600        | 1200                            | 1600 | 450              | 2000               | 15              | 19100                            | 47÷70           | 324        | 2500              |

### 4.4 Environmental installation conditions

|                     |  |
|---------------------|--|
| Ambient temperature | 0-40°C (32-104°F) at nominal current.<br>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,<br>where there are conductive dust, corrosive gas,<br>vibration or water and also in salty environmental. |
| Altitude            | Up to 1000 meter over sea level.<br>For higher altitude reduce the nominal current<br>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   |

### 4.5 Derating curve



5

Installation

Before to install, make sure that the Thyristor unit have not damages.

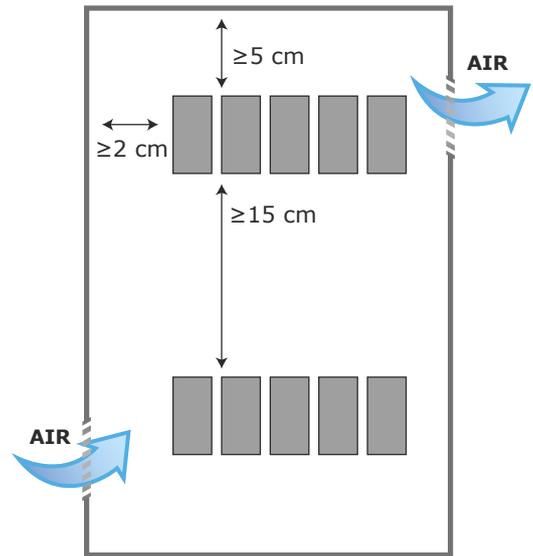
If the product has a fault, please contact the dealer from which you purchased the product. Verify that the product is the same thing as ordered.

The Thyristor unit must be always mounted in vertical position to improve air cooling on heat-sink.

Maintain the minimum distances in vertical and in horizontal as represented.

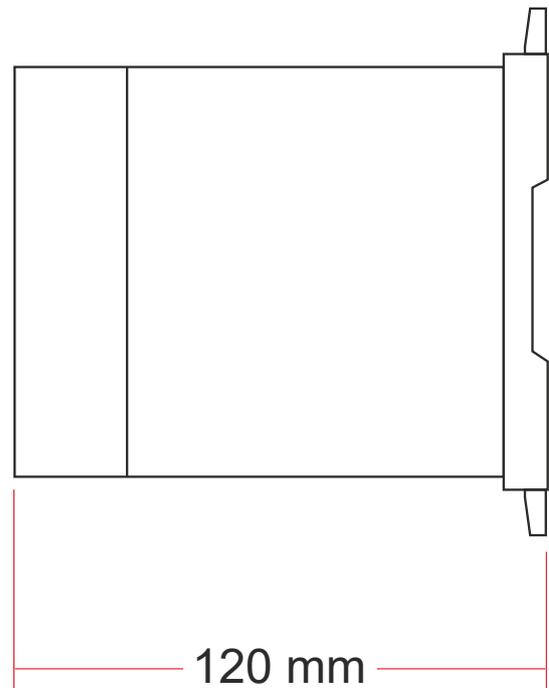
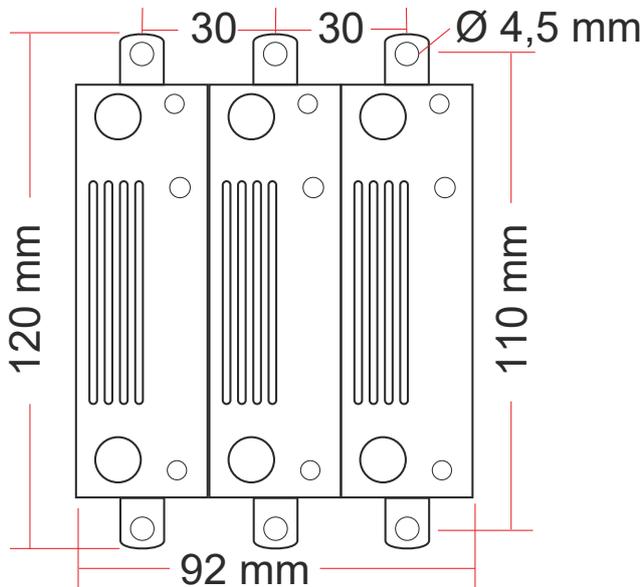
When more unit has mounted inside the cabinet maintain the air circulation like represented in figure.

Sometimes is necessary installing a fan to have better air circulation.

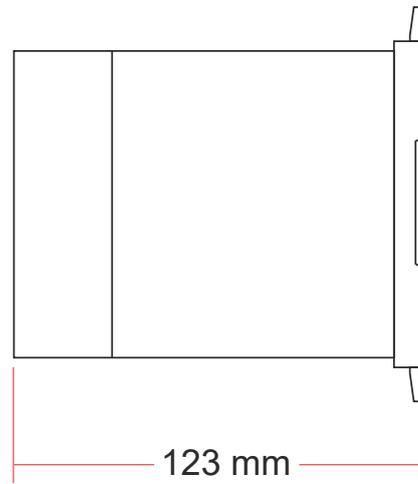
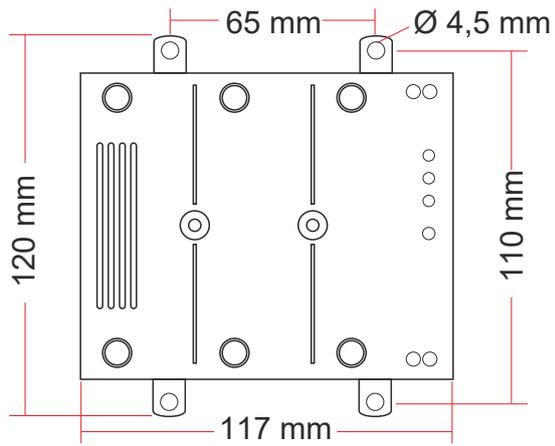


5.1 Dimensions and fixing holes

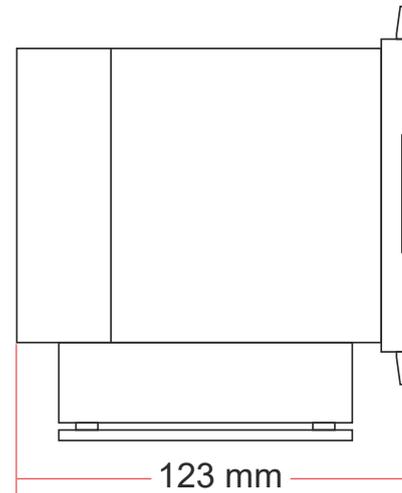
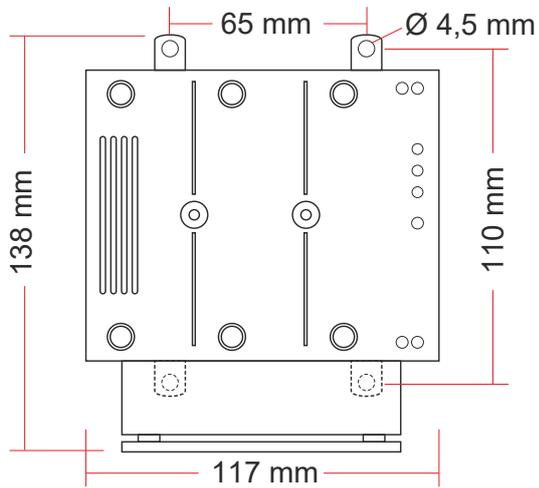
Size: S2



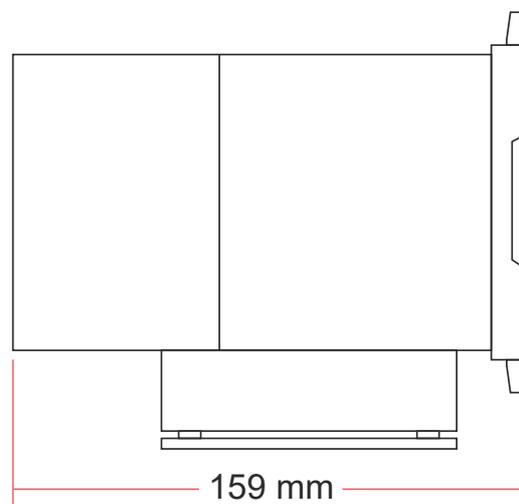
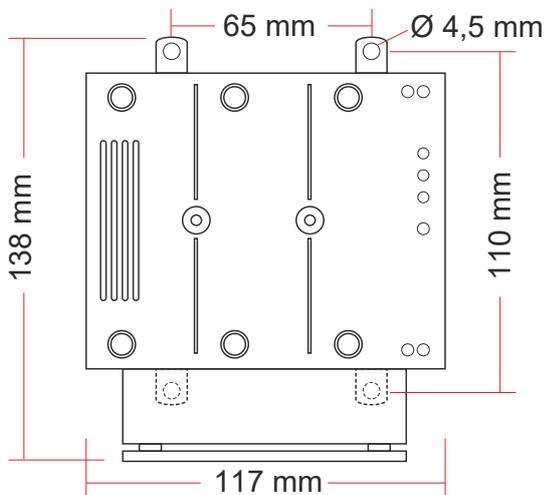
Size: S4



Size: S6



Size: S8



## 6

## Wiring instructions

CD3000S unit has isolated heatsink. For safety connect the heatsink to earth using its terminal with earth symbol.

CD3000S can be susceptible to airborne interferences from near equipment or from interferences on main supply, so a number of precautions must be taken.

- Contactors coils and chokes must have in parallel a RC filter and must be supplied with a different voltage line.
- All input/output signals must use screened bifilar wires.
- Signal input and output must not route in same cable try and must not be parallel.
- Local regulations regarding electrical installation should be rigidly observed

Use copper cables and wires rated for use at 75 °C only.

Use wire terminal UL Listed (ZMVV).

## Power cable torque (suggested)

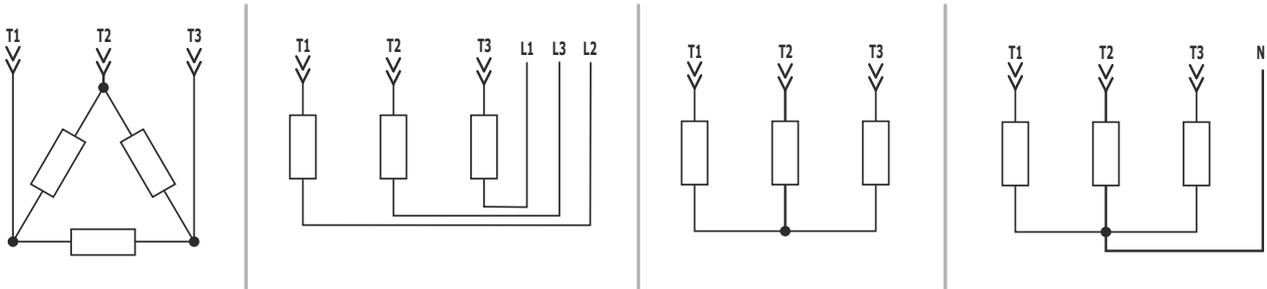
| Current       | Connector Type | Torque Lb-in (N-m) | Wire Range AWG/kcmil | Wire Terminal UL listed (ZMVV)                |
|---------------|----------------|--------------------|----------------------|---|
| 15A, 30A, 45A | M5 Screw       | 26.6 (3.0)         | 8                    | Wire Pin                                      |
| 60A, 75A, 90A | M6 Screw       | 70.8 (8.0)         | 1                    | Fork/Spade terminal<br>Copper Tube Crimp. Lug |

## Cable dimensions (suggested)

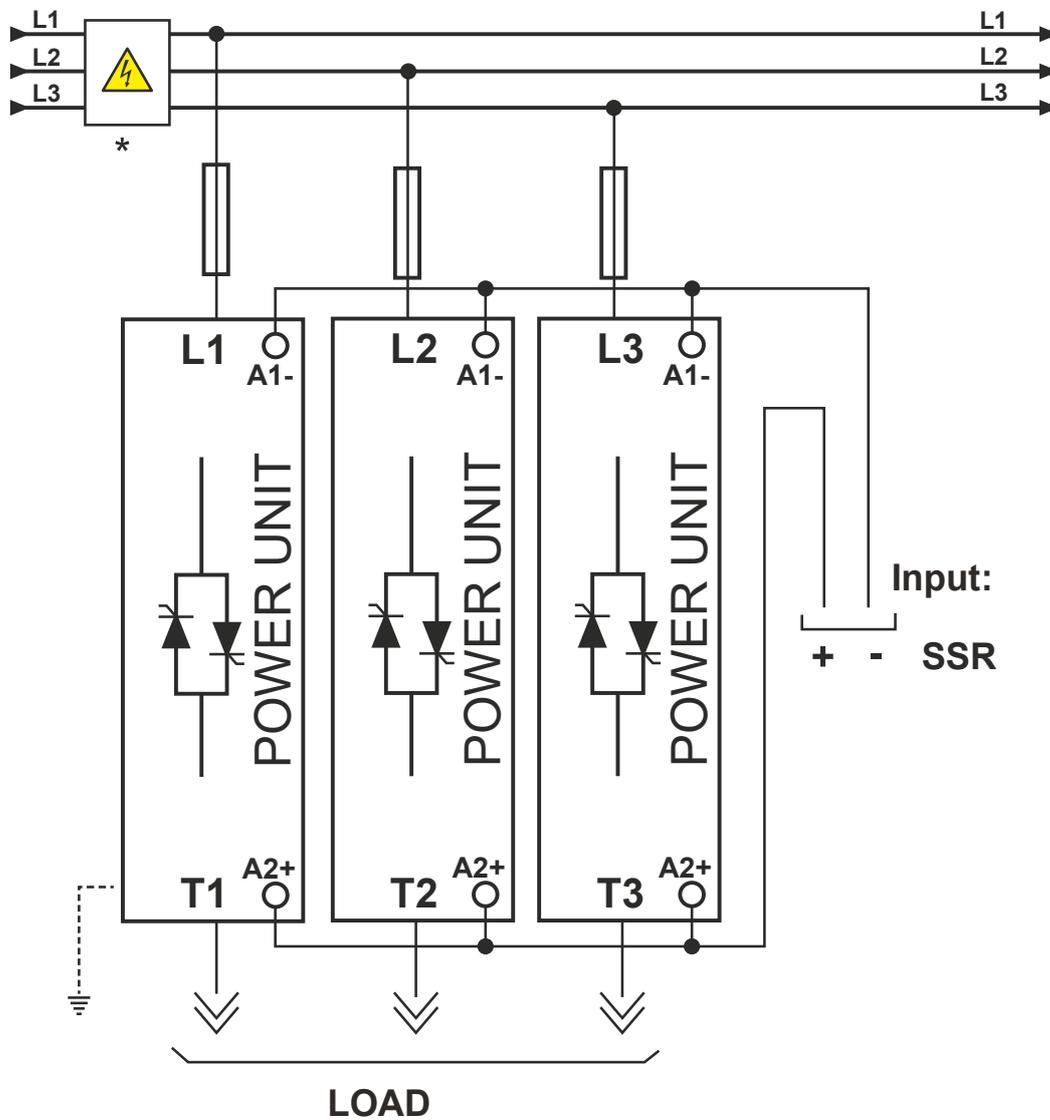
| Current  | Supply          |     |            | Load            |     |            | Earth           |     |            | Auxiliary Supply |     |
|----------|-----------------|-----|------------|-----------------|-----|------------|-----------------|-----|------------|------------------|-----|
|          | Cable           |     | Screw<br>M | Cable           |     | Screw<br>M | Cable           |     | Screw<br>M | Cable            |     |
|          | mm <sup>2</sup> | AWG |            | mm <sup>2</sup> | AWG |            | mm <sup>2</sup> | AWG |            | mm <sup>2</sup>  | AWG |
| 15A (S2) | 4               | 12  | M5         | 4               | 12  | M5         | 4               | 12  | M5         | 0,50             | 18  |
| 30A (S4) | 6               | 10  | M5         | 6               | 10  | M5         | 6               | 10  | M5         | 0,50             | 18  |
| 45A (S6) | 10              | 8   | M5         | 10              | 8   | M5         | 6               | 10  | M5         | 0,50             | 18  |
| 60A (S8) | 16              | 6   | M6         | 16              | 6   | M6         | 6               | 10  | M5         | 0,50             | 18  |
| 75A (S8) | 25              | 4   | M6         | 25              | 4   | M6         | 6               | 10  | M5         | 0,50             | 18  |
| 90A (S8) | 35              | 3   | M6         | 35              | 3   | M6         | 6               | 10  | M5         | 0,50             | 18  |

### 6.1 Diagram of control connection

#### Load type



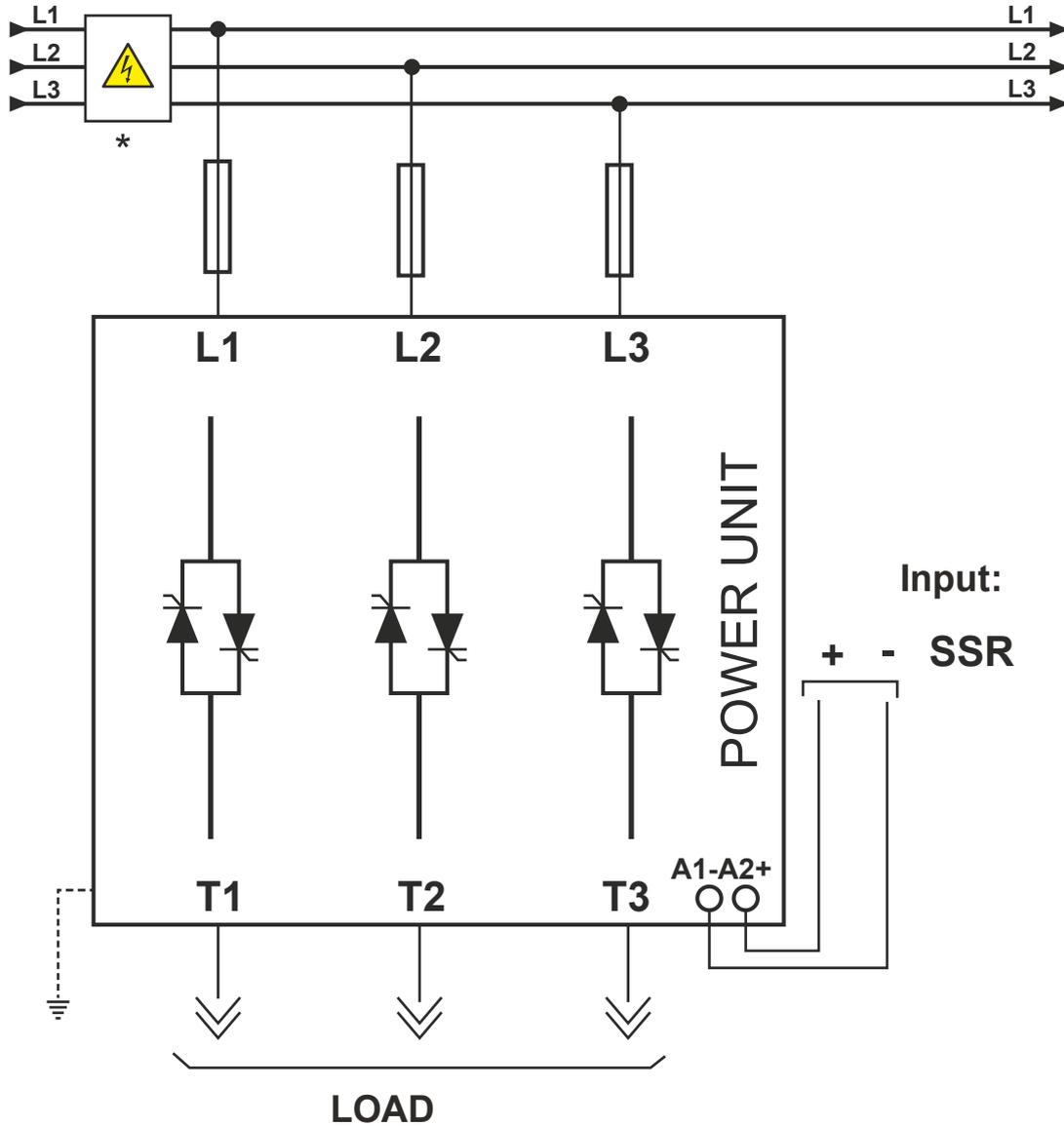
#### Size S2 - 15A



**Note:**

The user installation must be protected by electromagnetic circuit breaker or by fuse isolator.

Size S4 - 30A

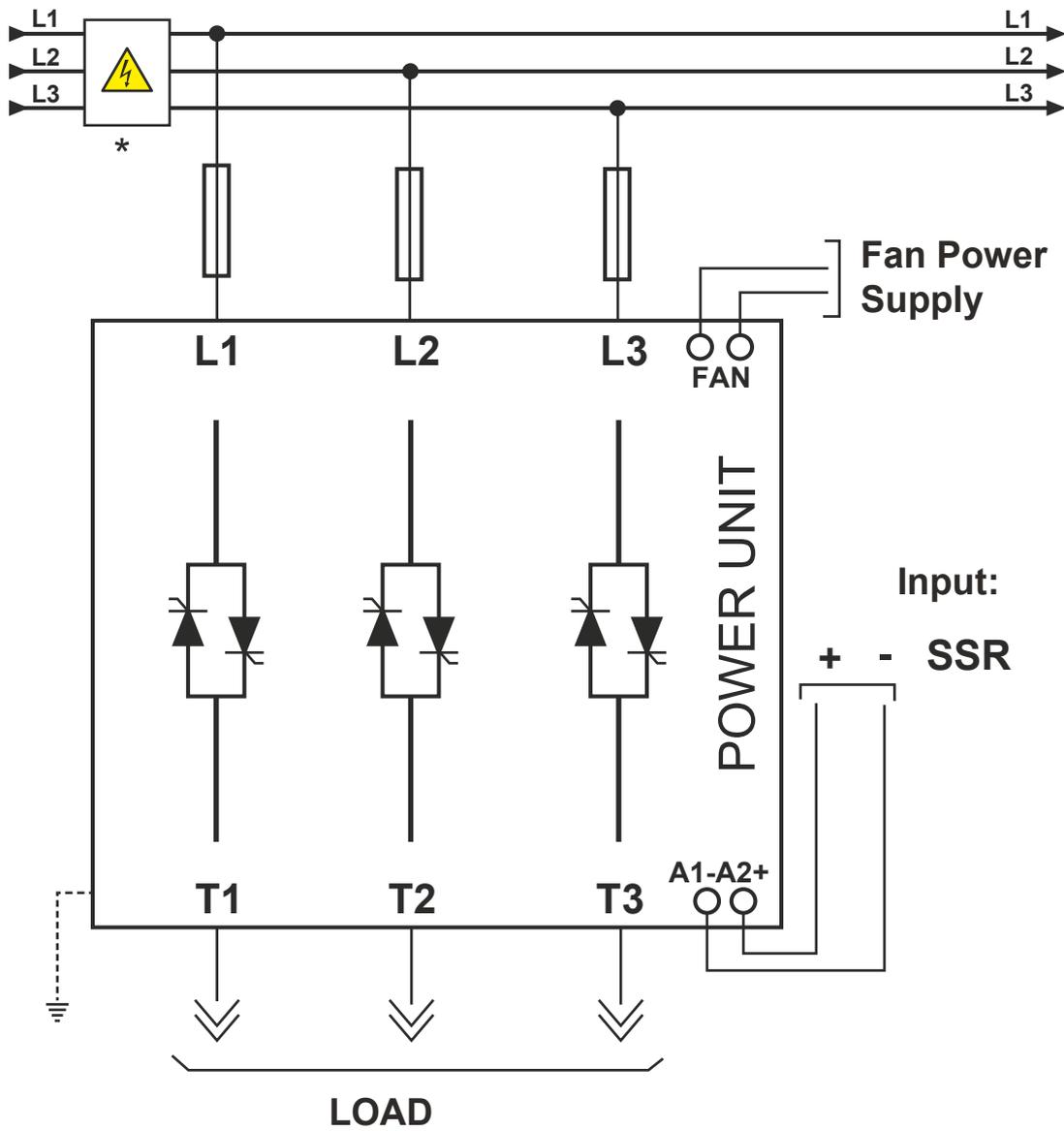


**Note:**

The user installation must be protected by electromagnetic circuit breaker or by fuse isolator.

Size S6 - 45A

Size S8 - 60A, 75A, 90A



**Note:**

The user installation must be protected by electromagnetic circuit breaker or by fuse isolator.

## 7

## Fuses and Fuse holder



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

CD3000S unit must be protected against short circuit by High speed fuses.  
The Fuses must have  $I^2t$  20% less than thyristor's  $I^2t$ .  
The warranty of thyristor is null if no proper fuses are used. See tab.

## Fuses and Fuse holder Code for CE

| Size     | Fuse Holder Code | Fuse Code   | Total Current ( $A_{RMS}$ ) | $I^2t$ ( $A^2 \text{ sec.}$ ) | Quantity for each phase |
|----------|------------------|-------------|-----------------------------|-------------------------------|-------------------------|
| 15A (S2) | FFH1038          | FU1038/16A  | 16                          | 150                           | 1                       |
| 30A (S4) | FFH1451          | FU1451/40A  | 40                          | 1650                          | 1                       |
| 45A (S6) | FFH1451          | FU1451/50A  | 50                          | 2000                          | 1                       |
| 60A (S8) | FFH2258          | FU2258/80A  | 80                          | 6550                          | 1                       |
| 75A (S8) | FFH2258          | FU2258/100A | 100                         | 13500                         | 1                       |
| 90A (S8) | FFH2258          | FU2258/125A | 125                         | 14000                         | 1                       |

## Fuses and Fuse Holder Code for UL

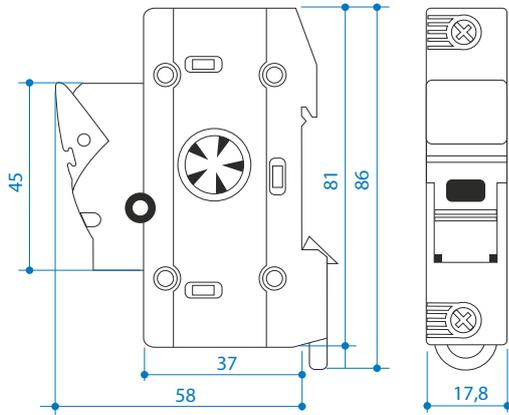
| Size     | 200 $kA_{RMS}$ Symmetrical A.I.C. |               |                             |                               |     | Quantity for each phase |
|----------|-----------------------------------|---------------|-----------------------------|-------------------------------|-----|-------------------------|
|          | Fuse Holder Code                  | Fuse Code     | Total Current ( $A_{RMS}$ ) | $I^2t$ ( $A^2 \text{ sec.}$ ) | Vac |                         |
| 15A (S2) | FFH1038                           | FU1038/16AUL  | 16                          | 150                           | 600 | 1                       |
| 30A (S4) | FFH1451                           | FU1451/40AUL  | 40                          | 750                           | 700 | 1                       |
| 45A (S6) | FFH1451                           | FU1451/50AUL  | 50                          | 1800                          | 700 | 1                       |
| 60A (S8) | FFH2258                           | FU2258/80AUL  | 80                          | 6600                          | 700 | 1                       |
| 75A (S8) | FFH2760                           | FU2760/100AUL | 100                         | 3210                          | 660 | 1                       |
| 90A (S8) | FFH2760                           | FU2760/125AUL | 125                         | 6970                          | 660 | 1                       |

**Note:**

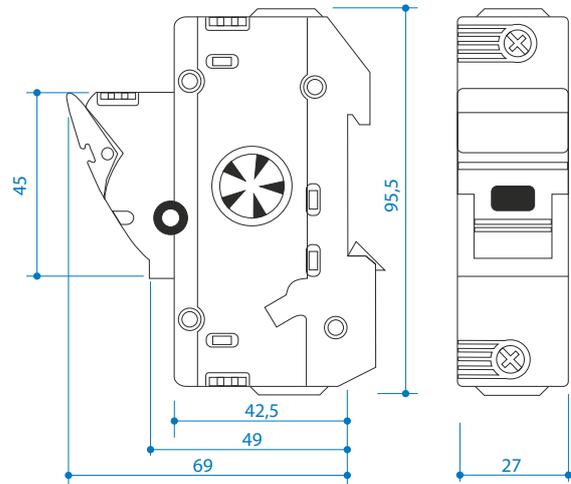
The Thyristor Switch Modules "CD3000S Series" may be protected by any equivalent UL Listed or UL Recognized External Semiconductor Fuses, on condition that these fuses have the same ratings of the above fuses evaluated during the Short Circuit Test and in particular with  $I^2t$  equal or lower than tested fuse.

Fuse Holder size

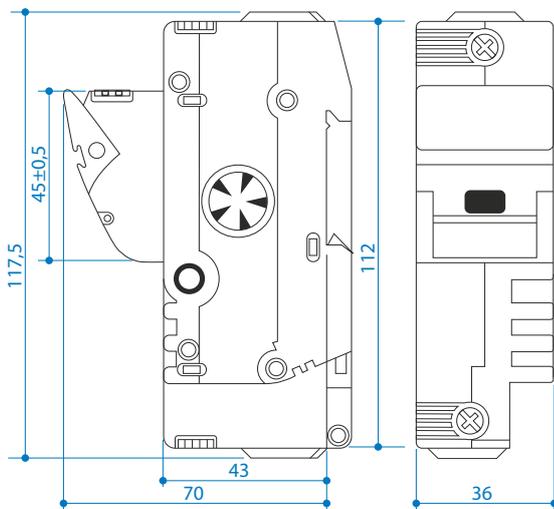
15A



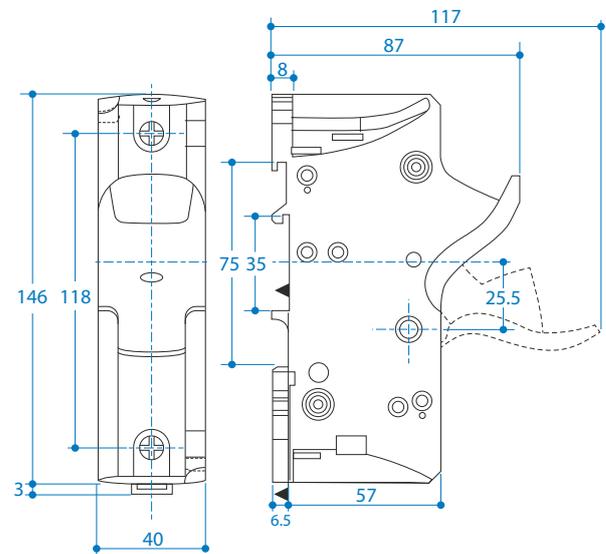
30A, 45A



60A, 75A (CE), 90A (CE)



75A (UL), 90A (UL)





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