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<b>1 Important warning for safety .....</b>	<b>3</b>
<b>2 Introduction .....</b>	<b>4</b>
<b>3 Identification and Order Code .....</b>	<b>6</b>
3.1 Identification of the unit	6
3.2 Order Code	7
<b>4 Technical Specifications .....</b>	<b>8</b>
4.1 General features:	8
4.2 Input features:	8
4.3 Output features(power device):	8
4.4 Environmental installation conditions	8
<b>5 Dimensions and Weight.....</b>	<b>9</b>
5.1 Fixing holes	9
<b>6 Wiring instructions.....</b>	<b>10</b>
6.1 Supply	11
6.2 Serial Communication	11
6.2.1 RS485 modbus RTU slave .....	11
6.3 Digital Input	11
6.3.1 Terminal block M1 for Analog dInput or SSR input with HB .....	11
6.4 Current Transformer Input	12
6.4.1 Terminal block M5-M6-M7.....	12
6.5 Digital Output	12
6.5.1 Terminal block M2-M3-M4.....	12
6.6 Connection Diagram	14
<b>7 Heater Break alarm and SCR short circuit (HB Option only) .....</b>	<b>16</b>
<b>8 Firing type.....</b>	<b>17</b>
8.1 Burst Firing (BF) with Analog Input	17
<b>9 Address Parameter .....</b>	<b>18</b>
<b>10 Maintenance .....</b>	<b>20</b>
10.1 Warranty condition	20



## 1 Important warning for safety



The Thyristor unit are integral part of industrial equipments.  
When it is supply, the Thyristor unit is subject to dangerous tensions. Don't remove the plastic cover.  
Don't use this unit in aerospace and nuclear application.

### **Electric Shock Hazard (Rischi di scosse elettriche, Risque de choque électrique)**

When thyristor unit has been connected to main supply voltage and is switched off, before to touch it be secure that the unit is isolated and wait at least one minute to allow discharging internal capacitors.

Thus be secure that:

- access to thyristor unit is only permitted to specialised personnel;
- the authorised personnel must read this manual before to have access to the unit;
- the access to the unit must be denied to unauthorised personnel.

### **Important warnings (Avvertenze importanti, attention)**

During the operations with units under tension, local regulations regarding electrical installation should be rigidly observed:

- Respect the internal safety rules.
- Don't bend components to maintain insulation distances.
- Protect the units from high temperature humidity and vibrations.
- Don't touch components to prevent electrostatic discharges on them.
- Verify that the size is in line with real needs.
- To measure voltage current etc. on unit, remove rings and other jewels from fingers and hands.
- Authorized personnel that work on thyristor unit under power supply voltage must be on insulated board

This listing does not represent a complete enumeration of all necessary safety cautions

### **Protection (Protezione, Protection)**

The unit have IP20 protection rating as defined by the specific international. Is necessary consider the place of installation.

### **Earth (Messa a terra, Terre)**

For safety, the Thyristor unit with isolated heat-sink must be connected to earth.

Earth impedance should be correspondent to local earth regulation. Periodically the earth efficiency should be inspected.

### **Electromagnetic compatibility (Compatibilità elettromagnetica, Compatibilité électromag.)**

Our thyristor units have an excellent immunity to electromagnetic interferences if all suggestions contained in this manual are respected. In respect to a good Engineering practice, all inductive loads like solenoids contactor coils should have a filter in parallel

### **Emissions (Emissioni, Emission)**

All solid-state power controllers emit a certain amount of radio-frequency energy because of the fast switching of the power devices. The CD Automation's Thyristor unit are in accord with the EMC norms, CE mark.

In most installations, near by electronic systems will experience no difficulty with interference. If very sensitive electronic measuring equipment or low-frequency radio receivers are to be used near the unit, some special precautions may be required. These may include the installation of a line supply filter and the use of screened (shielded) output cable to the load.



## 2 Introduction

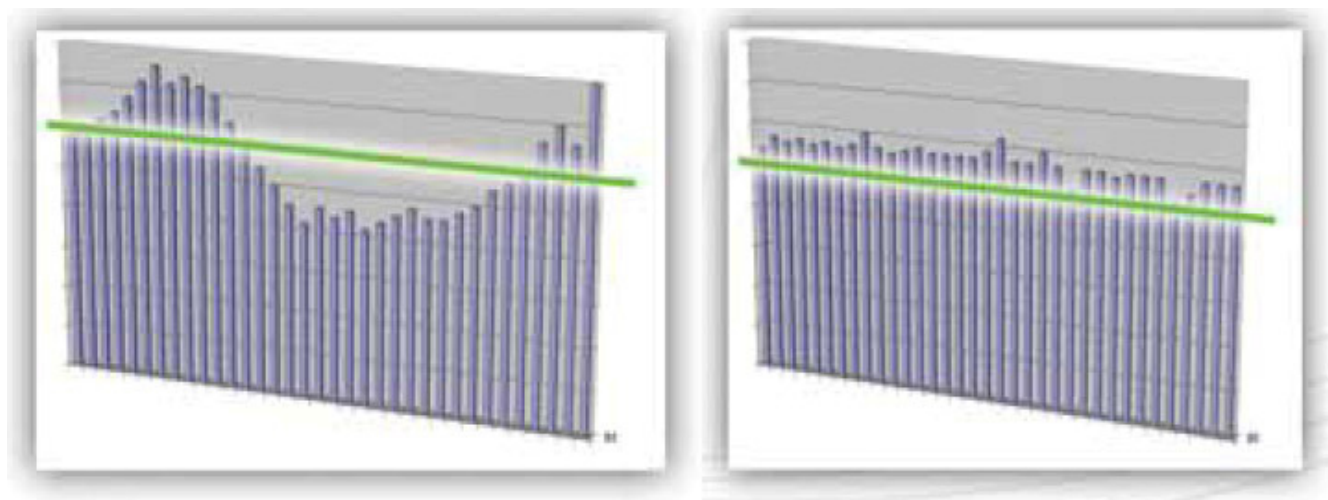
**REVO PC** was designed specifically to manage multizone systems. This powerful unit, with its unique algorithm, will minimize your energy costs by controlling synchronization and power limit of each zone. Benefits include:

- Elimination of power overshoot (see graph below).
- Power factor close to one due to zero crossing firing.
- REVO-PC keeps your instantaneous power within the limit of your electricity supply contract.
- Prevents increases in energy supply tariffs imposed by your electricity supplier.
- Quick return on your investment.

This powerful unit with high performance micro can drive simple thyristor unit Revo S with zero crossing firing.

By using the REVO PC, simple thyristor units can be used reducing the overall financial investment.

- Simultaneous fast full wave control of
  - 8-16-24 REVO S - 1PH
  - 8-16-24 REVO S - 2PH/3PH for 3 phase loads
  - 8-16-24 REVO S - 2PH/3PH for 3 phase load with current calculation for each phase.
- Each loop's process information is managed independently.
  - Calculation of instant current and RMS Voltage, Current and Power.
  - Calculation of load resistance with Heater Break Alarm.
  - Modbus Master, Modbus slave, Profibus DP, Modbus/TCP, Can-Open



## Easy to start REVO-PC

- Set the operative current of the heater zone.
- Set the Total Power Limit.
- Set the Power of each zone

The REVO-PC strategy is easy to implement. Do the same operation with a competitor's load management system and the operator must learn up to 15 pages of the manual and understand up to five models of synchronization.

## Synchronization

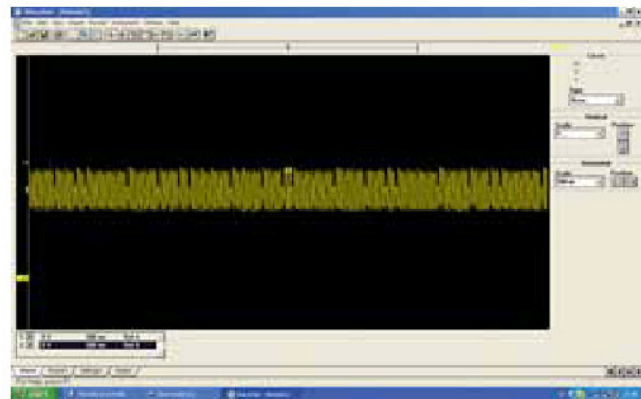
On all controlled zones, the Live Predictive Synchronization is automatic resulting in superior performance:

- Total current is equal to a sinusoidal wave form.
- Power factor > 0,9.
- Instantaneous current close to average value.
- Cancellation of harmonics.
- Power saving by harmonic reduction.
- Flickering effect removed.

Synchronization selection is available for normal resistive loads or short infrared.



WITHOUT POWER CONTROL OPTIMISATION



WITH POWER CONTROL OPTIMISATION

## Smart Power limitation

- Smart power limitation works together with synchronization. If this function is enabled, REVO-PC makes a live calculation of power at each period and generates the output values for the next period.
- If the calculated power is below the power limit value, the previous values remain with each channel using full power.
- If the power is above the power limit value, the setpoint of each channel is reduced proportionally to restrict power overshoot. This function significantly reduces disturbances on the main network compared to a full power system, preventing any increase in energy tariffs imposed by the electricity supplier.
- This function can be activated/deactivated and the limit value changed at any time.

## 3 Identification and Order Code

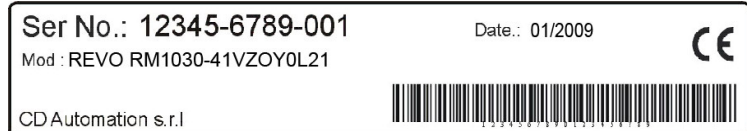
### 3.1 Identification of the unit



**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's label give all the information regarding the factory settings of the 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

REVO-PC															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
R	P	C	-	-	-	-	-	0	0	0	0	0	0	0	0
4,5 Channels			6 Current Sensor			7 Communication			8 Transformer						
Description code	Numeric code		Description code	Numeric code		Description code	Numeric code		Description code	Numeric code					
8 Channels	0 8		N. 1 CS 200 Amps	1		Ethernet	1		Transformer 24V	1					
16 Channels	1 6		N. 2 CS 200 Amps	2		ModBus Slave	2								
24 Channels	2 4		N. 3 CS 200 Amps	3		ModBus Master	3								
			N. 1 CS 400 Amps	4		Profibus	4								
			N. 2 CS 400 Amps	5		Profinet	5								
			N. 3 CS 400 Amps	6		CANopen	6								
			N. 1 CS 600 Amps	7		EtherCAT	7								
			N. 2 CS 600 Amps	8											
			N. 3 CS 600 Amps	9											

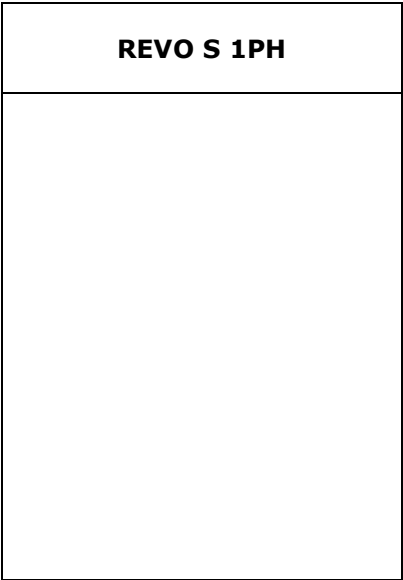
## 4 Technical Specifications

<b>4.1 General features:</b>	
Cover and Socket material:	PolymericV2
IP Code	20
Auxiliary voltage:	12÷21V ac (max 70mA) If requested
<b>4.2 Input features:</b>	
Current Transormer Input	max 50mA
Configurable Digital Input calib.	12 ÷ 24V dc/ac (max 4mA)
<b>4.3 Output features(power device):</b>	

### 4.4 Environmental installation conditions

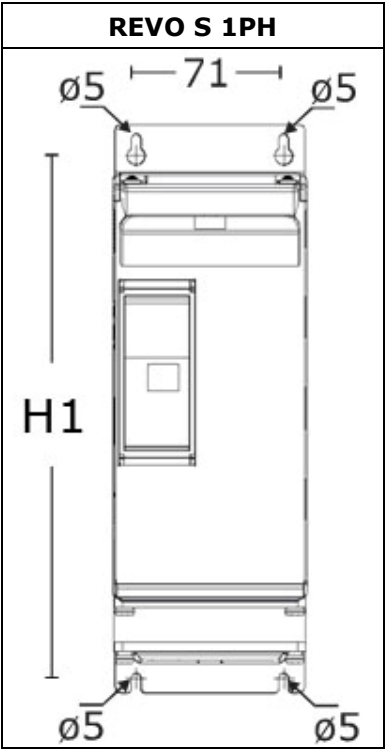
Ambient temperature	0-40°C at nominal current. Over 40°C use the derating curve.
Storage temperature	-25°C a 70°C
Installation place	Don't install at direct sun light, where there are conductive dust, corrosive gas, vibration or water and also in salty environmental.
Altitude	Up to 1000 meter over sea 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

5 Dimensions and Weight



Size	W(mm)	D(mm)	H(mm)	Weight (kg)
1PH (60-90A no Fan)	93	170	269	3,4
1PH (120-210A with Fan)	93	170	273	3,6

5.1 Fixing holes



	1PH (60-90A no Fan)
<b>H1</b>	256

## 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 75°C only.

**TOP VIEW**



**FRONT VIEW**



## 6.1 Supply



**Warning:** Before connecting or disconnecting the unit check that power and control cables are isolated from voltage sources.

Terminal M8	Description
1	Aux – Voltage Supply for electronic boards 21 V ac
2	n.c.
3	Aux – Voltage Supply for electronic boards 21 V ac

## 6.2 Serial Communication

### 6.2.1 RS485 modbus RTU SLAVE

Terminal M9	Description
1	RS485 B-
2	RS485 A+

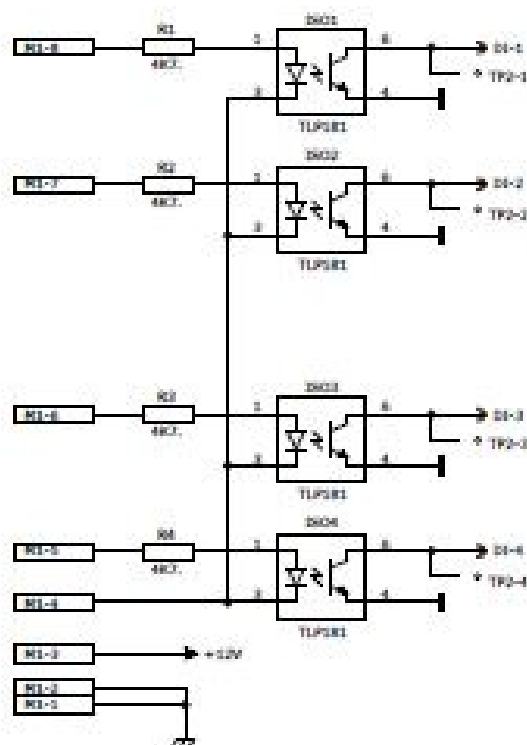
### 6.2.2 modbus RTU MASTER

Terminal M10	Description
1	RS485 B-
2	RS485 A+

## 6.3 Digital Input

### 6.3.1 Terminal block M1 for Analog dInput or SSR input with HB

Terminal M1	Description
1	GND
2	GND
3	+12 Vdc
4	- Common Digital Input
5	+ Digital Input 4
6	+ Digital Input 3
7	+ Digital Input 2
8	+ Digital Input 1



## 6.4 Current Transformer Input

### 6.4.1 Terminal block M5-M6-M7

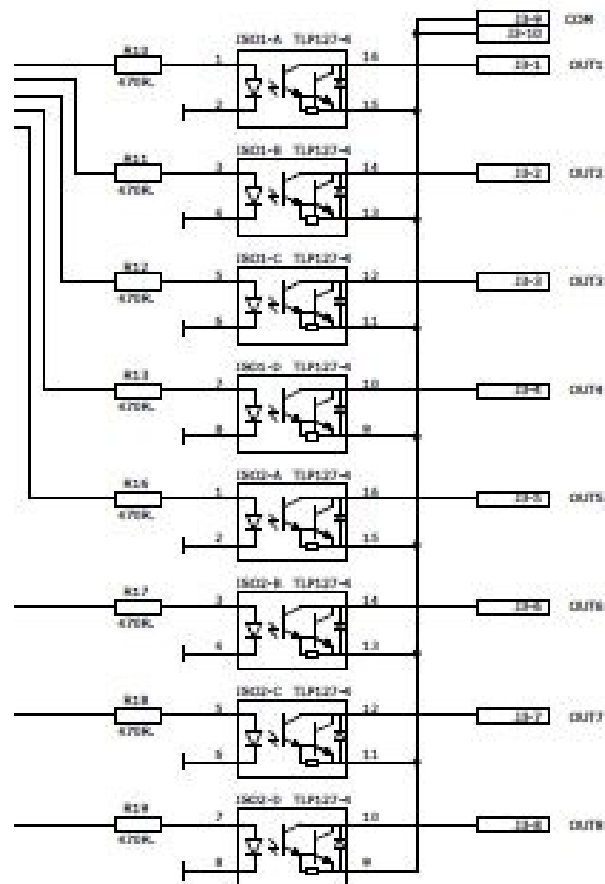
Terminal M5-M6-M7	Description
1	CTI 1 - Current Transformer Input
2	CTI 2 - Current Transformer Input
3	+12 Vdc
4	GND
5	-12 Vdc

## 6.5 Digital Output

### 6.5.1 Terminal block M2-M3-M4

Terminal M4	Description
1	GND
2	+12 Vdc
3	+ Common Digital Output
4	- Digital Output 1
5	- Digital Output 2
6	- Digital Output 3
7	- Digital Output 4
8	- Digital Output 5
9	- Digital Output 6
10	- Digital Output 7
11	- Digital Output 8
12	N.C.

Terminal M3	Description
1	GND
2	+12 Vdc
3	+ Common Digital Output
4	- Digital Output 9
5	- Digital Output 10
6	- Digital Output 11
7	- Digital Output 12
8	- Digital Output 13
9	- Digital Output 14
10	- Digital Output 15
11	- Digital Output 16
12	N.C.

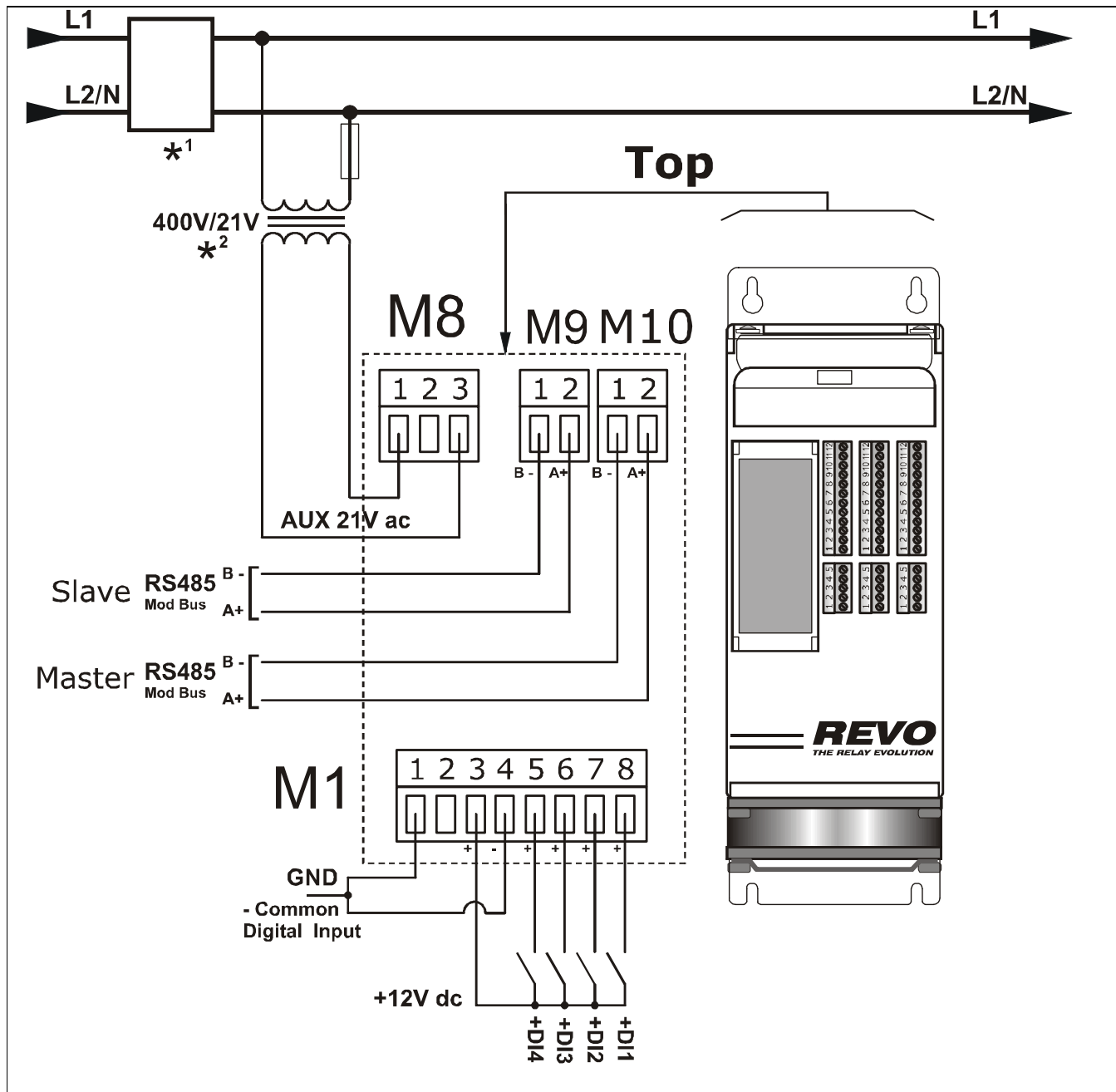


<b>Terminal M2</b>	<b>Description</b>
1	GND
2	+12 Vdc
3	+ Common Digital Output
4	- Digital Output 17
5	- Digital Output 18
6	- Digital Output 19
7	- Digital Output 20
8	- Digital Output 21
9	- Digital Output 22
10	- Digital Output 23
11	- Digital Output 24
12	N.C.



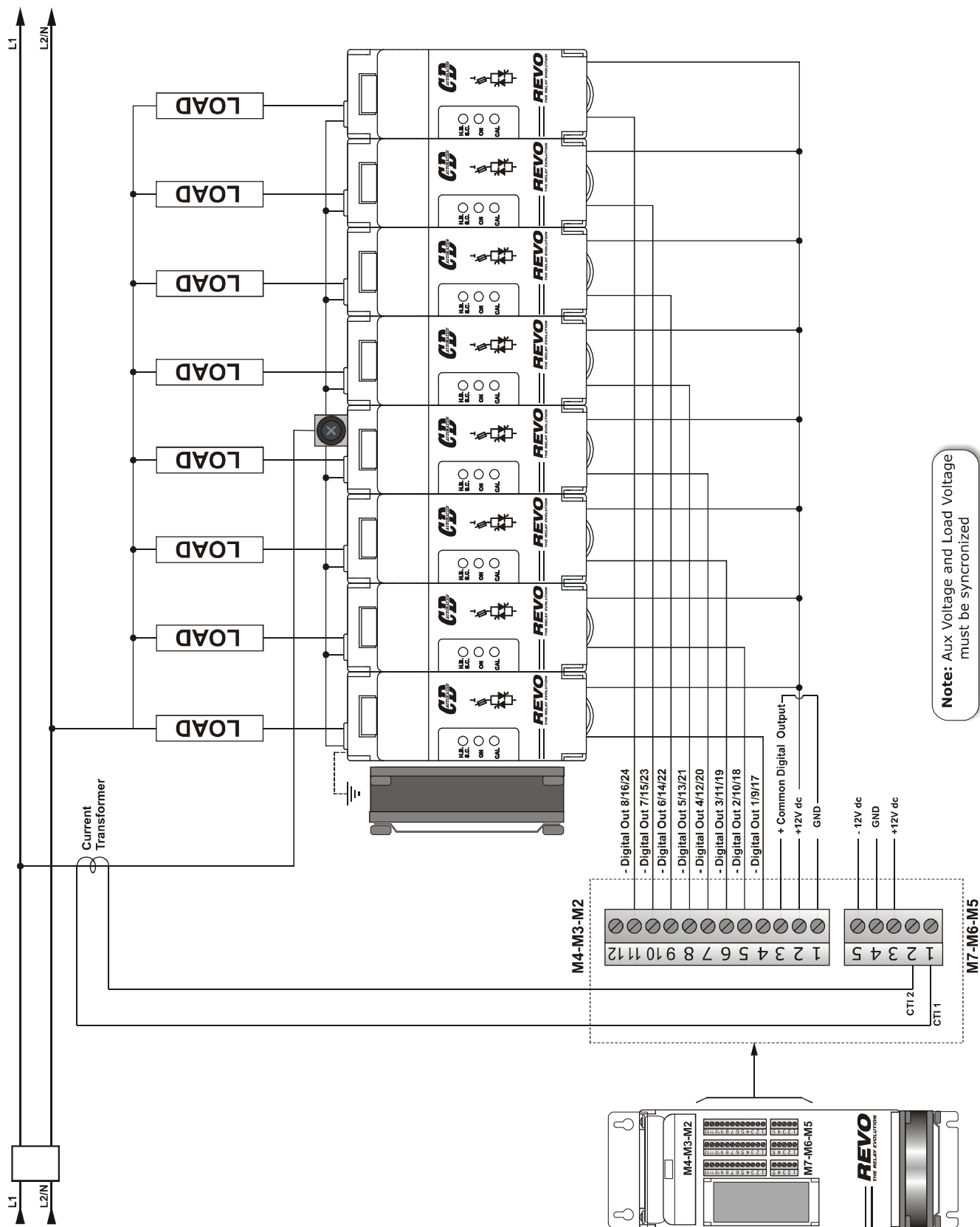
**Caution:** this procedure must be performed only by qualified persons.

## 6.6 Connection Diagram



### NOTE:

- \*1 The user installation must be protecting by electromagnetic circuit breaker or by fuse isolator. The semiconductor I2t should be 20% less than power controller I2t. Semiconductor fuses are classified for UL as supplementar protection for semiconductor. They are note approved for branch circuit protection.
- \*2 The auxiliary voltage supply must be synchronized with load voltage power supply. If the Auxiliary Voltage (written on the identification label) is different from Supply Voltage (to the load), use an external transformer as designated.



## 7 Heater Break alarm and SCR short circuit (HB Option only)



**Caution:** to work properly the load must be powered at least about 160msec.

The Heater Break circuit read the load current with an Internal current transformer (C.T.). Minimum current is 10% of the current transformer size.  
If load current is below this value the Heater Break Alarm doesn't work properly.

### Heater break Calibration procedure

An automatic function sets the Heater Break Alarm.

The auto setting function can be activated using the "CAL" button on front unit, or supply with 12-24Vdc the digital input "Cal Ext." (See Connection Diagram).

The Heater Break calibration procedure is performed in this way:

- The Unit gives the maximum voltage output
- all LEDS are on, this means that calibration procedure is active
- The current value is stored in memory
- After about 15 second the unit comes back to the initial situation

If load current decreases for partial or total load failure (sensitivity 20%) the yellow LED HB become ON and alarm relay change status.

If the unit is still in conduction with no input signal (LED green OFF) it means that there is a short circuit on thyristors and red LED (SC) become ON.

If the load has been changed the Heater Break calibration procedure must be done again

## 8 Firing type

Choose a correct firing type allows to optimize the thyristor unit for the installed load.

The firing type has already configured in line with customer requirements, Zero Crossing for SSR input and Burst firing for Analog Input.



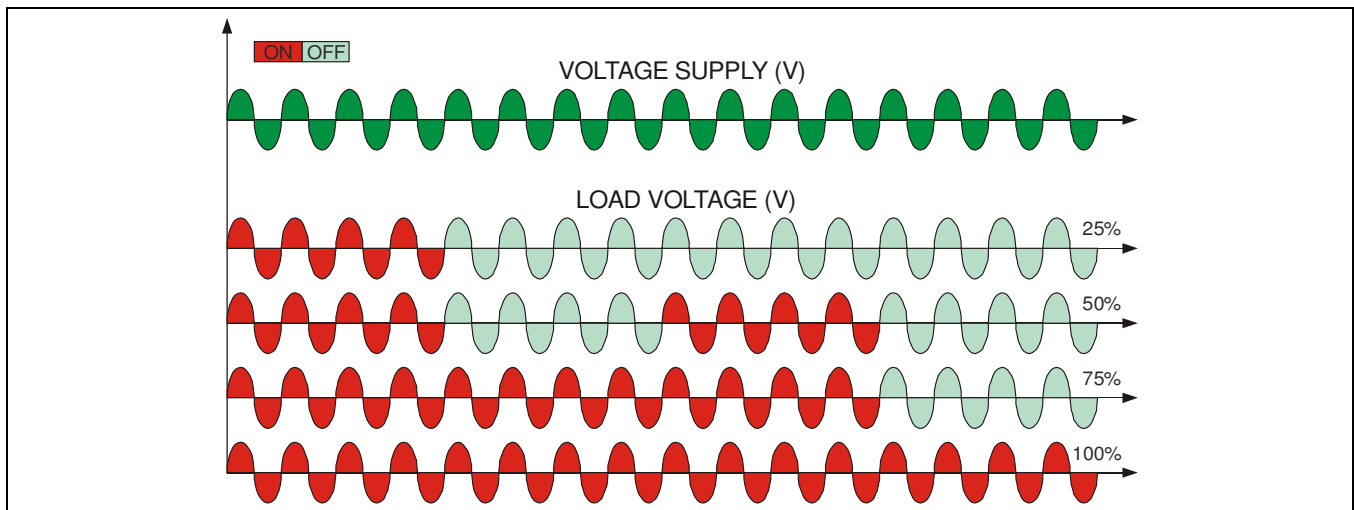
**Caution:** this procedure must be performed only by qualified persons.

### 8.1 Burst Firing (BF) with Analog Input

The Burst Firing is similar to the Single Cycle, but consecutive cycles ON are selectable between 2 and 255, with input signal equal at 50%.

Burst Firing is a method zero crossing that it reduces the electromagnetic interferences because the thyristor switches at zero voltage crossing.

The example show the Burst Firing with Burst cycles: 4



## 9 Address Parameter

100	ADDR_OUT1_VAL	% Out (in tenths) canal 1 (SP)
101	ADDR_OUT2_VAL	
102	ADDR_OUT3_VAL	
103	ADDR_OUT4_VAL	
104	ADDR_OUT5_VAL	
105	ADDR_OUT6_VAL	
106	ADDR_OUT7_VAL	
107	ADDR_OUT8_VAL	
108	ADDR_OUT9_VAL	
109	ADDR_OUT10_VAL	
110	ADDR_OUT11_VAL	
111	ADDR_OUT12_VAL	
112	ADDR_OUT13_VAL	
113	ADDR_OUT14_VAL	
114	ADDR_OUT15_VAL	
115	ADDR_OUT16_VAL	
116	ADDR_OUT17_VAL	
117	ADDR_OUT18_VAL	
118	ADDR_OUT19_VAL	
119	ADDR_OUT20_VAL	
120	ADDR_OUT21_VAL	
121	ADDR_OUT22_VAL	
122	ADDR_OUT23_VAL	
123	ADDR_OUT24_VAL	% Out (in tenths) canal 24 (SP)
124	ADDR_OUT1_PWR	Power Rating (in 0.1 KW) canal 1
125	ADDR_OUT2_PWR	
126	ADDR_OUT3_PWR	
127	ADDR_OUT4_PWR	
128	ADDR_OUT5_PWR	
129	ADDR_OUT6_PWR	
130	ADDR_OUT7_PWR	
131	ADDR_OUT8_PWR	
132	ADDR_OUT9_PWR	
133	ADDR_OUT10_PWR	
134	ADDR_OUT11_PWR	
135	ADDR_OUT12_PWR	
136	ADDR_OUT13_PWR	
137	ADDR_OUT14_PWR	
138	ADDR_OUT15_PWR	
139	ADDR_OUT16_PWR	
140	ADDR_OUT17_PWR	
141	ADDR_OUT18_PWR	
142	ADDR_OUT19_PWR	
143	ADDR_OUT20_PWR	
144	ADDR_OUT21_PWR	
145	ADDR_OUT22_PWR	
146	ADDR_OUT23_PWR	
147	ADDR_OUT24_PWR	Power Rating (in 0.1 KW) canal 24
247	ADDR_PLIMIT	Limit Value PWR
252	ADDR_STSALL_GRP1	Presence of group 1 alarms (bit 0 = alarm L canal 1 bit 7 = alarm L canal 8 bit 8 = alarm H canal 1 bit 15 = alarm H canal 8)
253	ADDR_STSALL_GRP2	Presence of group 2 alarms (bit 0 = alarm L canal 9 bit 7 = alarm L canal 16 bit 8 = alarm H canal 9 bit 15 = alarm H canal 16)

254	ADDR_STSALL_GRP3	Presence of group 3 alarms (bit 0 = alarm L canal 17 bit 7 = alarm L canal 24 bit 8 = alarm H canal 17 bit 15 = alarm H canal 24)
255	ADDR_STSINPUT	Digital Input Status (bit 0 = status I1 bit 3 = status I4)
300	ADDR_STS_LOCREM3	Local Remote Status
301	ADDR_SYNC_MODE	Synchronism Type (Half Double)
302	ADDR_OUT1_DEV	Modbus Address master device 1
526	ADDR_I_CHN1	Canale 1 Current
527	ADDR_I_CHN2	
528	ADDR_I_CHN3	
529	ADDR_I_CHN4	
530	ADDR_I_CHN5	
531	ADDR_I_CHN6	
532	ADDR_I_CHN7	
533	ADDR_I_CHN8	
534	ADDR_I_CHN9	
535	ADDR_I_CHN10	
536	ADDR_I_CHN11	
537	ADDR_I_CHN12	
538	ADDR_I_CHN13	
539	ADDR_I_CHN14	
540	ADDR_I_CHN15	
541	ADDR_I_CHN16	
542	ADDR_I_CHN17	
543	ADDR_I_CHN18	
544	ADDR_I_CHN19	
545	ADDR_I_CHN20	
546	ADDR_I_CHN21	
547	ADDR_I_CHN22	
548	ADDR_I_CHN23	
549	ADDR_I_CHN24	Canale 24 Current
550	ADDR_P_CHN1	Canal 1 Power
551	ADDR_P_CHN2	
552	ADDR_P_CHN3	
553	ADDR_P_CHN4	
554	ADDR_P_CHN5	
555	ADDR_P_CHN6	
556	ADDR_P_CHN7	
557	ADDR_P_CHN8	
558	ADDR_P_CHN9	
559	ADDR_P_CHN10	
560	ADDR_P_CHN11	
561	ADDR_P_CHN12	
562	ADDR_P_CHN13	
563	ADDR_P_CHN14	
564	ADDR_P_CHN15	
565	ADDR_P_CHN16	
566	ADDR_P_CHN17	
567	ADDR_P_CHN18	
568	ADDR_P_CHN19	
569	ADDR_P_CHN20	
570	ADDR_P_CHN21	
571	ADDR_P_CHN22	
572	ADDR_P_CHN23	
573	ADDR_P_CHN24	Canal 24 Power

## 10 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)

### 10.1 Warranty condition

CD Automation 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 CD Automation at customer's cost and our Service will evaluate if product is under warranty terms.

Substituted parts remain of CD Automation property.



