CONTROL SYSTEM FOR EMS

µRUN_CRD

USER MANUAL

CONTENTS

GENERAL

- This Manual is an integral and essential part of the product. Please read carefully the instructions contained since they provide important information about safety in installation, use and maintenance.

- This equipment shall only be destined to the use it was expressly designed for . Any other use is to be considered incorrect and therefore dangerous.

- The Manufacturer shall not be held responsible for any damages caused by improper, incorrect or unreasonable use.

- Divisione ELCO srl shall be responsible of this equipment in its original configuration. Any action that modifies the structure or the operating cycle of this equipment shall be carried out or by the Technical Department of Divisione Elco srl or under their explicit authorisation.

- Divisione Elco srl shall not be held responsible for the consequences resulting from the use of non-original spare parts.

- Any repair shall be carried out by the authorised department of Divisione Elco srl. The Manufacturer shall not guarantee any repair carried out outside this department.

- The contents of this Manual are subject to modifications at any moment as it might be required and without prior notice from the Divisione ELCO srl

- If typing errors or any other errors are found, the rectification will be included in the new releases.

WARNING AND CAUTION NOTES

WARNING

- Tampering or modifications or repairs by unqualified personnel are not allowed.
- Divisione ELCO srl do not guarantee against any risks deriving from incorrect use of their products or from the installation, use and maintenance carried out by unqualified personnel.
- The products described in this Manual are powered. The risks associated to the use under such conditions are limited if all necessary safety measures are taken.
- Before attempting to service the system, cut power supply of from all circuits by means of the safety devices installed in the main control panels.
- Do not energise circuits with a higher voltage than specified.
- Higher or lower voltage supply than specified can result in serious damage to internal components.
- Do not connect wires other than described in the relevant electric diagrams.
- Do not operate without proper earth connections.

CAUTION

- Cable lengths should be calculated for compliance with the specified tolerances.
- All connectors should be suitably tightened. If terminal strips are fitted, terminal leads must be suitably tightened.
- Operating conditions: in a closed environment , do not install in an area exposed to corrosive gases.
- System electronic cards must be suitably fitted in the corresponding connectors on the rack bottom plate. Use provided guide rails for correct insertion.

IDENTIFICATION LABEL

Each card is provided with an identification label of the type shown below:

The label consists of three main fields: :

1 - logo of the associated µRun System

2 – main characteristics of the card

2.1 – name of the card ..... PAM, COM, AVGT, SPLY, RACK;

2.2 - family ..... CRD;

2.3 – card model ..... type of controls, operating voltage; (numerical identification code)

3 – serial number (0000 to 9999);

INTRODUCTION TO THE SYSTEM

The system consists of 5 main parts :

- RACK -
This is the aluminium housing with guides for card fitting.
A board is installed on the bottom of the metal frame with SLOTS housing a number of cards in cascade and connecting them to owner supply and interface signals. The bottom board also carries the connectors for system cards.

- SPLY -
Power supplier for the cards installed in the RACK.

- PAM -
Card for part presence detection and start signals:
- trolley present;
- direct lock/unlock;
- lock/unlock remote control (e.g. from. PLC);

- COM -
Control management card generating the signals to be transmitted to the moving units (trolley on overhead lines, etc.)

- AVGT -
Card for monitoring signal reading from moving units:
- failure 1 (general);
- failure 2 (no continuity to earth);

It is recommended to read thoroughly this Manual before attempting any operation of installation of the system.

Modulo RACK_CRD

The RACK_CRD card is the mother board gathering in a suitably designed mechanical frame the whole system for power supply and distribution to the installed cards (BUS system). 3 different types of RACK_CRD are available with a different number of slots : 7, 9 and 19 slots.

Electrical characteristics

Reference voltage	24 ⇔ 220 Vac
Operating frequency	50 / 60 Hz
Voltage supply to stabilised CMOS Logic	12 Vdc
Voltage supply to control interconnecting signals	24 Vdc
Separation voltage beetween potentials	2500 V RMS
Max. reference current	8 A
Max. supply current to CMOS Logic	2.5 A
Max. current of interconnecting signals	5 A
Available slots in a standard rack	7 or 9 or 19
Dimensions of a 7 slots RACK	240L x 132H x 240P mm
Dimensions of a 9 slots RACK	280L x 132H x 240P mm
Dimensions of a 19 slots RACK	482L x 132H x 240P mm

The rack can be installed on a rack-holder or on a board inside a cabinet.
On the internal bus, cards are connected via C32-series female connectors to I IEC 603 / DIN41612 standards. On the mother board, slots are numbered 1 to “n” . Card guides with card locks are fitted on the outside of the rack and a threaded bar is provided for power supplier in slot 1.

Should additional RACKs be fitted, this does not necessarily require a separate power supplier for each RACK. If the total power input, obtained by summing up each individual card input, does not exceed the capacity of one power supplier, than the µRun_SUPPLY-RR can be used to distribute power to the additional racks from the same supplier.

Recommended slots for the connection from power supplier to remote units:

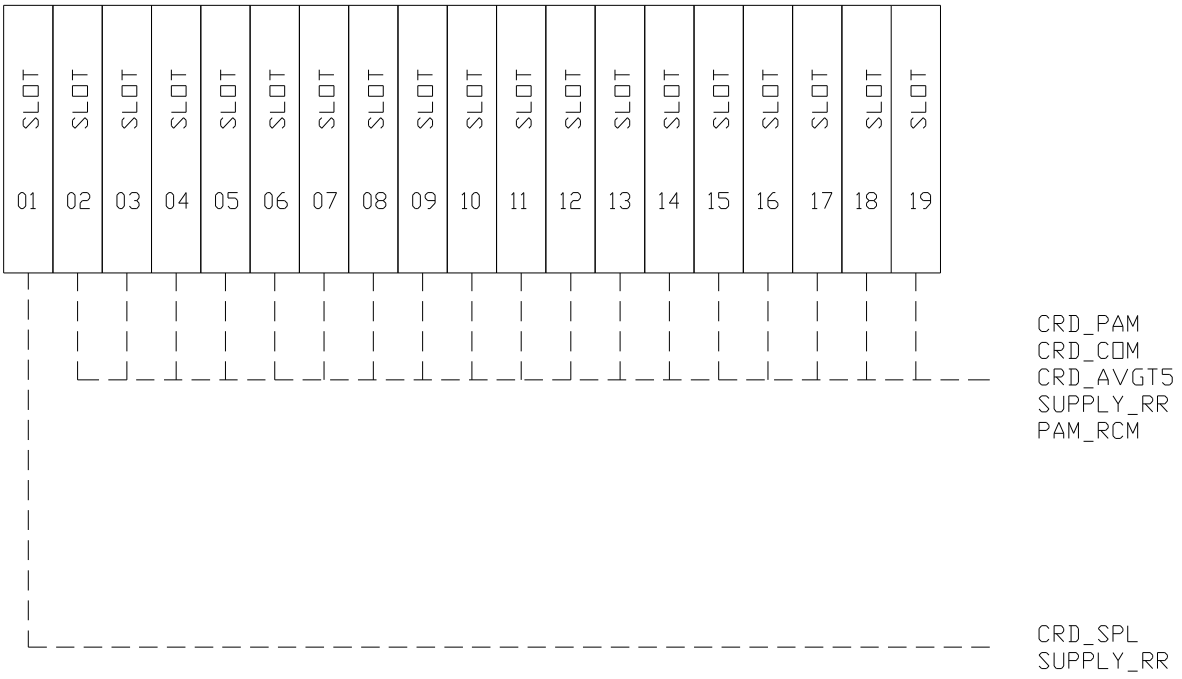
- Slot 1 for power supplier;
- Slot 2 for remote unit;

The maximum number of remote racks unit is 2 (two).

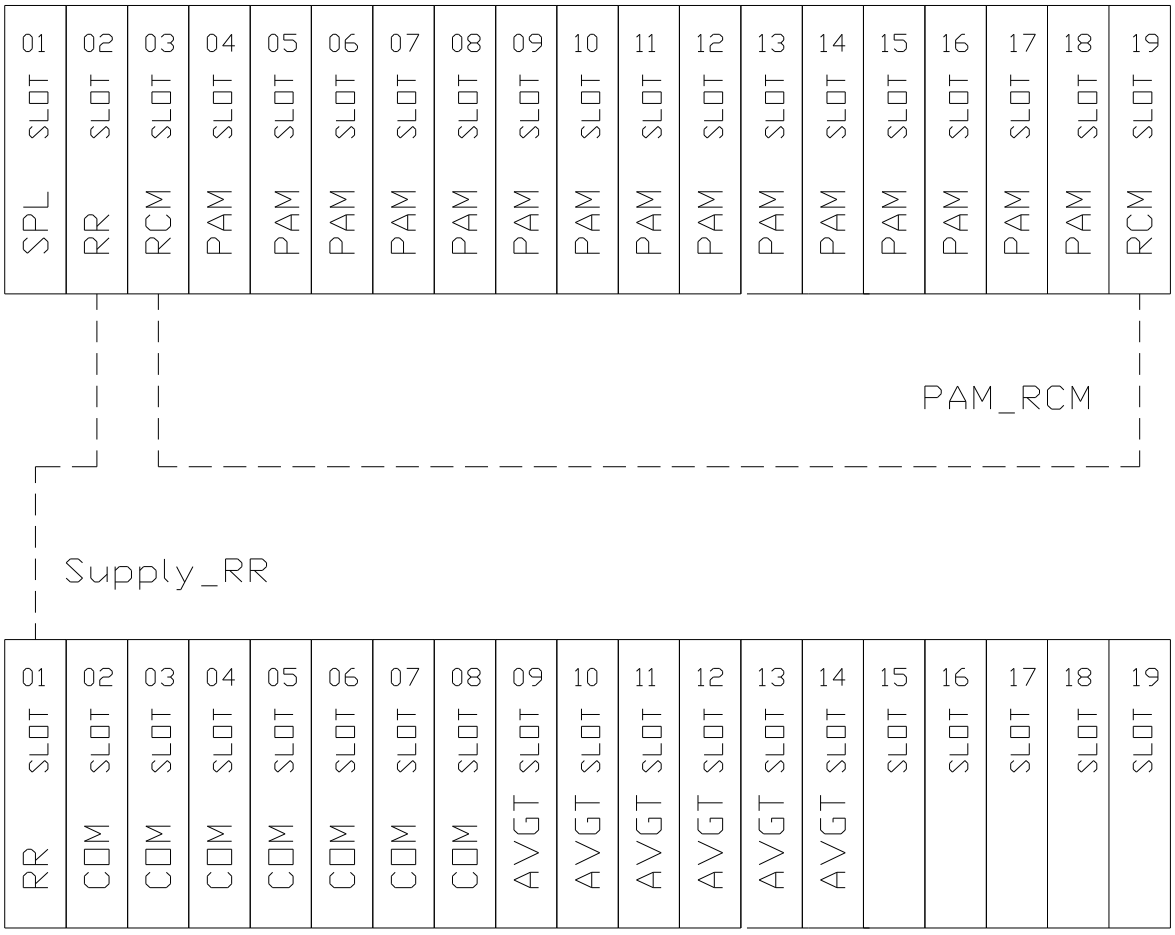
Assegnazione slots

With the exception of Slot 01 that is dedicated to the power supplier and the consequent need for installing the PAM_CRD cards (with special functions that shall be described later in this Manual) in adjacent slots, all remaining slots are available to house any type of card: therefore any card can be installed in any available location.

The most suitable arrangement of the cards depends on the need to optimise the installation (wiring, cable routing, ease of inspection, etc.).

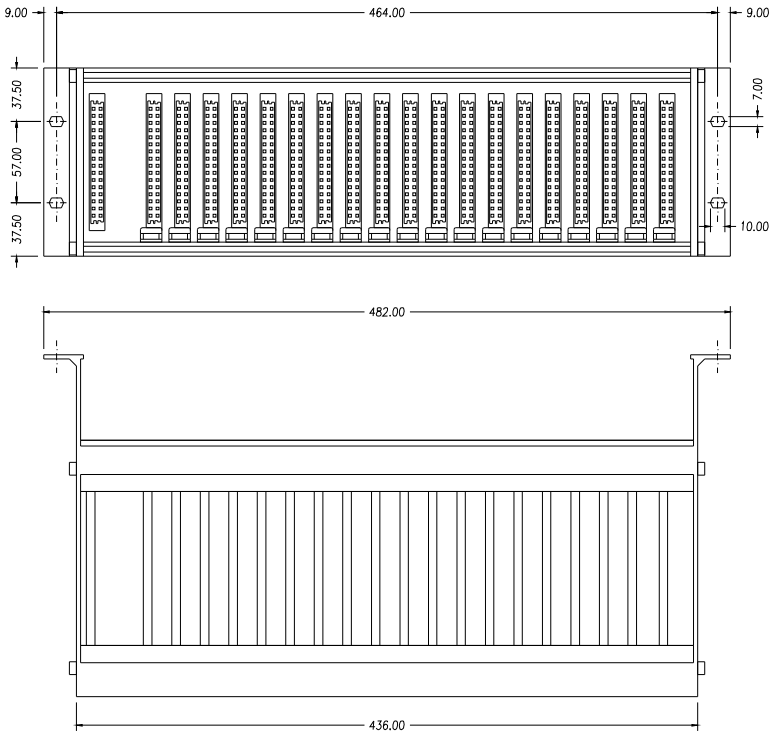


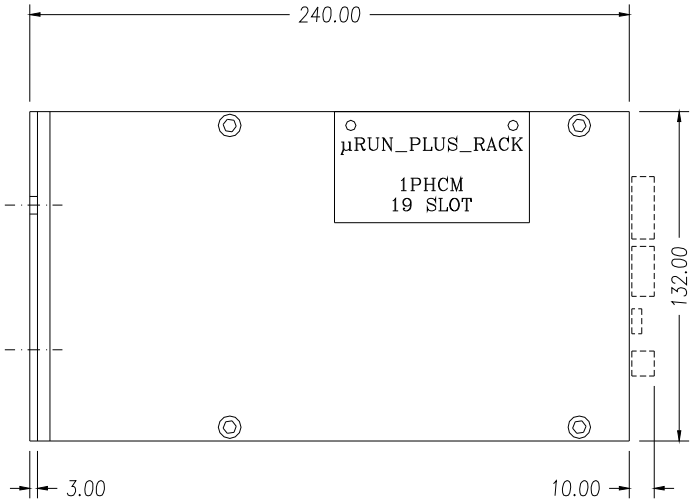
An example of two-rack configuration with one single power supplier and two “RR” and “RCM” cables.



Dimensioni

In the next figures dimensions and quote for the fixing holes for a 19 slots rack are showned.





SPLY_CRD card

The SPLY_CRD card is the system power supplier.
It is supplied by the same alternated voltage used for control reference signal and generates the stabilised voltage to the PAM_CRD and AVGT_CRD card CMOS Logic in switching mode.

Terminal strip and connectors

The front panel houses three (3) connectors:

- 5-pole 5mm-pitch screw connector (**J2**) for power supply and earth connection.

  Pin addressing:

Pin number	Description
1	GND chassis
2	L1 phase
3	L1 phase
4	L2 phase
5	L2 phase

L1 = Ref. phase on board of the rack and referrement for signals
L2 = Ref. phase on board of the trolley

- 4-pole 5mm-pitch screw connector (**J3**) for power supply connection to interconnecting signals (PLC; wired logic, etc.)

  Pin addressing :

Pin number	Description
1	common 0 Vdc
2	common 0 Vdc
3	common +24 Vdc
4	common +24 Vdc

- 2-pole 5mm-pitch screw connector (**J5**) for power supply clean contact to CMOS-OK.

  Pin addressing :

Pin number	Description
1	N.O.
2	N.O.

The connections on bus are made via C32-series female connectors to IEC 603 / DIN41612 standards.
A fuse-holder with 3.15A fuse protecting the CMOS Logic power supply is fitted on the front panel.
A green led shows good working conditions of the power supply unit.

The thermal overload protections for the reference voltage and the interconnection supply voltage shall be calculated by summing up the power inputs of all CRD_PAM, CRD_COM, CRD_AVGT cards installed in the system.

Electrical characteristics

Power supply xx Vac 50/60Hz ±10%	[xx = 16,24,42,110,220 a richiesta]
Input power	30 VA
Power supply to CMOS Logic	12 Vdc
Supply current to CMOS Logic	2,5 A [max. direct current with electronic protection and fuse]
Interconnecting voltage	24 Vdc [with protection against inversion of polarity]
Reference current	8 A [max direct]
Interconnecting current	5 A [max continuous]

Failures or improper operations

Failure	***action***
- power failure	- check input power supply; - check fuse and replace if blown; - replace with new power supplier;

Note : the power supply green led must be always on to show proper operation of the power supplier.

PAM_CRD card

PAM_CRD card governs the EMS trolley start/stop command and detects trolley presence on the line section.
The line section (TR) is a portion of the EMS route where busbars are separated from the rest of the route and limit a well-specified area.
Part presence detecting system is a fully static system and the galvanic separation from the outside system is made via photo-couplers.
Through the PAM_CRD card, the moving units can be instructed to stop on request at specified locations (sections) and restart when desired by means of a 24 Vdc voltage supplied from external devices such as a system management PLC or from other PAM_CRD cards via the common bus of the RACK (lock/unlock signal).

The functions of this card are :
1. direct control of the sections through an “intelligent” control system of the switches, dropping sections, etc.
2. creating accumulation zones independently controlled by the trolleys without any intervention of external devices.

The trolley unlock system operates through a high-current minirelay.
All input and output signals from the PAM_CRD card are opto-isolated . The potential used for data exchange is the 24 Vdc of the interconnecting voltage.

PAM_CRD operating modes

Accumulation control selection

- Remote accumulation (rear section with front section)
  [connect jumper in A position];

- Buffer accumulation (via proximity switch on board of the trolley)
  [connect jumper in B position];

This selection of commands is obtained by connecting the jumpers located near J1 connector, that are listed below:

jumper code	Channel reference
W01	Ch. 05
W02	Ch. 04
W03	Ch. 03
W04	Ch. 02
W05	Ch. 01

Block/Unblock control selection

- Unlock with external enabling (PLC control) [connect jumper in A position];
- Direct unlock (control from HW card) [connect jumper in B position];

This selection of commands is obtained by connecting the jumpers located besides the opto-insulator bank, that are listed below:

jumper code	Channel reference
W06	Ch. 05
W07	Ch. 04
W08	Ch. 03
W09	Ch. 02
W10	Ch. 01

The Accumulation function can be combined with any of the Unlock functions.

WARNING

The PAM_CRD cards controlling consecutive remote accumulation sections must be installed into adjacent slots. In case of gaps, use the **µRun_PAM-RCM** cable.

Terminal strips and connectors

Two different connectors are fitted in the front panel: a 5-pole screw connector and a connector for 16-core flat cable.

- J2 connector : 5-pole 5mm screw connector used to connect the 5 sections to the card.

Pin number	*Description*
1	Section input/output channel 01
2	Section input/output channel 02
3	Section input/output channel 03
4	Section input/output channel 04
5	Section input/output channel 05

- J3 connector : for 16-pole insulation-cutting sockets used for card input/output signals:

  - 5 outputs for trolley present on section;
  - 5 inputs for trolley unlock enabling (EMS start);
  - 5 aux. lock inputs;

Pin number	*Description*
1	Output: EMS present channel 01
2	Input : EMS unlock channel 01
3	Output: EMS present channel 02
4	Input: EMS unlock channel 02
5	Output: EMS present channel 03
6	Input: EMS unlock channel 03
7	Output: EMS present channel 04
8	Input: EMS unlock channel 04
9	Output: EMS present channel 05
10	Input: EMS unlock channel 05
11	Input: EMS lock channel 01
12	Input: EMS lock channel 02
13	Input: EMS lock channel 03
14	Input: EMS lock channel 04
15	Input: EMS lock channel 05
16	spare

Five green leds are installed In the adjacent area to J3 connector, to show that the trolley is present on the corresponding line section :

Led number	*Description*
LD9	EMS present on section channel 01
LD7	EMS present on section channel 02
LD5	EMS present on section channel 03
LD3	EMS present on section channel 04
LD1	EMS present on section channel 05

Five red leds are installed in the area below the set of jumpers for **Unlock functions** (W06 to W10) to show that the trolley on the corresponding section of line is unlocked :

Led number	*Description*
LD10	EMS present on section channel 01
LD8	EMS present on section channel 02
LD6	EMS present on section channel 03
LD4	EMS present on section channel 04
LD2	EMS present on section channel 05

At the backside, via J1 male connector, the connections are made to the C32-series bus to IEC 603 / DIN41612 standard.

Electrical characteristics

Number of channels	5 (five)

Comandi

Voltage xx Vac	xx = 16,24,42,110 e 220
Input current	30 mA [max per channel]
Chargeability	100%
Insulating voltage	2500 V RMS
Protection	900 mA a 40°C [with self-restoring fuse]
CMOS supply	12 Vac
CMOS current input	75 mA max

Unlock Inputs

Interconnecting voltage	24 Vdc
Input current	20 mA typical for channel

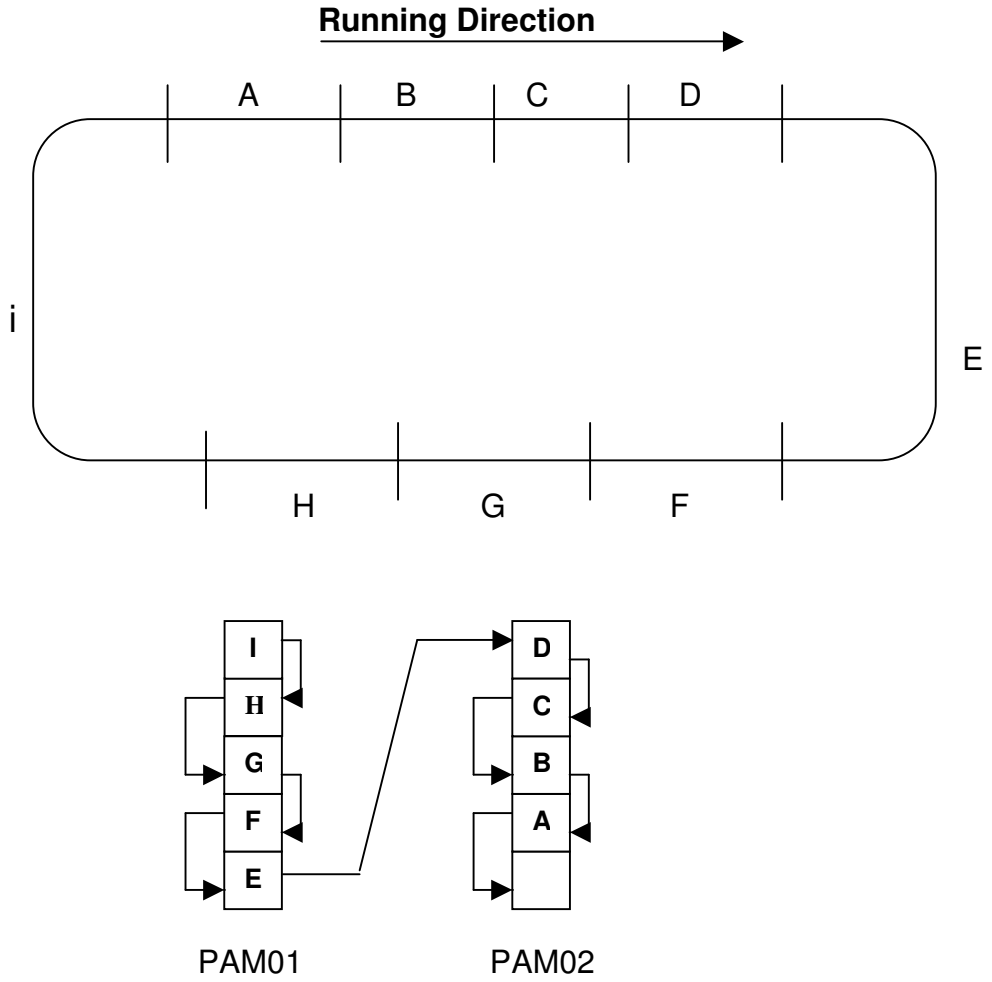
Lock Inputs

Interconnecting voltage	24 Vdc
Input current	10 mA typical for channel

Outputs

Interconnecting voltage	24 Vdc
output current	250 mA max
Chargeability	100%

PAM CARD - Project help



PAM01: I blocks H, H blocks G, G blocks F, F blocks E
→ PAM02: E blocks D, D blocks C, C blocks B, B blocks A

Single PAM card block order: superior section blocks inferior section

PAM cards block order: the last section of the card at LEFT blocks the first section of the nearest card at RIGHT

To mantein this order, PAM cards must be placed in the nearest slots of a rack from LEFT to RIGHT. Placing the PAM_RCM cable in the nearest slot at the LEFT of the PAM01 card and in the nearest slot at the RIGHT of the PAM02, section A will block section I.

COM_CRD card

The COM_CRD card controls the type of command that the EMS must perform on a well defined section of the line. The line section (TR) is a portion of the EMS route where busbars are separated from the rest of the route and limit a well-specified area.
The control system can work both in association with PAM_CRD card or independently when checking the presence of the EMS trolley is not necessary.
For each channel it is possible to set the type of command in direct or autonomous; besides, the control may be enabled by an external device, by means of an 24Vdc input. Galvanic insulation is provided on all inputs and outputs signals to and from the COM_CRD ; the potential used for data exchange is the 24 Vdc of the interconnecting voltage.

COM_CRD operating modes

Suitable operative commands:

- Command with positive signal
- Command with negative signal

This selection of commands is obtained by connecting the jumpers adjacent to J3 connector located in the areas marked with “CHANNEL 01 ..... 10” , listed below :

Jumper code	Channel reference
W11	Channel 10
W12	Channel 09
W13	Channel 08
W14	Channel 07
W15	Channel 06
W16	Channel 05
W17	Channel 04
W18	Channel 03
W19	Channel 02
W20	Channel 01

Type of operating command :

- Positive reference ……..... [jumper inserito pos. A]
- Negative reference ……... [jumper inserito pos. B]
- Alternate reference ……... [jumpers inseriti pos. A e B]

Above listed jumpers are found in the box of each channel :

E.g. : CHANNEL 01 ..... jumpers W05

This command selection can be obtained configuring the jumpers placed in the areas named “CHANNEL 01 ,.....CHANNEL 10”.

Table of correspondence JUMPER ➔ CHANNEL

jumper code	Channel reference
W1	CHANNEL 05
W2	CHANNEL 04
W3	CHANNEL 03
W4	CHANNEL 02
W5	CHANNEL 01
W6	CHANNEL 10
W7	CHANNEL 09
W8	CHANNEL 08
W9	CHANNEL 07
W10	CHANNEL 06

To enable the direct function mode it is necessary to insert the jumper from W11 to W20. To enable the external function mode it is necessary to de-insert the jumpers. It is possible to configure the function modo for each channel.
This command selection is obtained configuring the jumpers placed near the J3 connector, following the correspondence table listed below.

jumper code	Channel reference
W11	Ch. 10
W12	Ch. 09
W13	Ch. 08
W14	Ch. 07
W15	Ch. 06
W16	Ch. 05
W17	Ch. 04
W18	Ch. 03
W19	Ch. 02
W20	Ch. 01

Terminal strips and connectors

Two different connectors are installed in the front panel : a 10-pole screw connector and a 10-core flat cable connector:

- J2 connector : 10-pole 5mm screw connector used to connect the 5 line sections to the card:

pin number	*description*
1	Section output channel 01
2	Section output channel 02
3	Section output channel 03
4	Section output channel 04
5	Section output channel 05
6	Section output channel 06
7	Section output channel 07
8	Section output channel 08
9	Section output channel 09
10	Section output channel 10

- J3 connector : for 10-pole insulation-cutting sockets used for input signals from the card:

pin number	*description*
1	Input command channel 01
2	Input command channel 02
3	Input command channel 03
4	Input command channel 04
5	Input command channel 05
6	Input command channel 06
7	Input command channel 07
8	Input command channel 08
9	Input command channel 09
10	Input command channel 10

- Ten leds are fitted next to J3 connector to show the status of the command for each channel:

led number	*description*
LD10	command channel 01 present
LD09	command channel 02 present
LD08	command channel 03 present
LD07	command channel 04 present
LD06	command channel 05 present
LD05	command channel 06 present
LD04	command channel 07 present
LD03	command channel 08 present
LD02	command channel 09 present
LD01	command channel 10 present

At the backside, via J1 male connector, the connections are made to the C32-series bus to IEC 603 / DIN41612 standard.

Electrical characteristics

Number of channels	10 (ten)

Commands

Voltage	xx Vac [optional 16,24,42,110 and 220]
Input current	30 mA [max per channel]
Chargeability	100%
Insulating voltage	2500 V RMS
Protection	900 mA @ 40°C with self-restoring fuse

Inputs

Interconnecting voltage	24 Vdc
Input current	15 mA typical per channel

AVGT_CRD card

The AVGT_CRD card manages signals from control boxes in the line section concerned. Galvanic insulation is provided on all inputs and outputs signals to and from the "AVGT" card; the potential used for data exchange is the 24 Vdc of the interconnecting voltage. Operating signals received on the section may be a maximun of 2 (two); the meaning is associated with the configuration set in the EMS central unit.

An example is provided here after:

- negative signal ..... GENERAL FAILURE
- positive signal ..... EARTH CONNECTION FAILURE

Another example is provided here after:

- negative signal ..... GENERAL FAILURE
- positive signal ..... PRESENCE

At the backside, via J1 male connector, the connections are made to the C32-series bus to IEC 603 / DIN41612 specifications.

Terminal strips and connectors

Two different connectors are installed in the front panel : a 5-pole screw connector and a 10-core flat cable connector:

- J2 connector : 5-pole 5mm screw connector used to connect the 5 line sections to the card:

Pin number	***Description***
1	Input section channel 01
2	Input section channel 02
3	Input section channel 03
4	Input section channel 04
5	Input section channel 05

- J3 connector : for 10-pole insulation-cutting sockets used for ouput signals from the card

  - 5 outputs for positive signal on the line section;
  - 5 outputs for negative signal on the line section;

Pin number	*Description*
1	Negative output channel 01
2	Positive output channel 01
3	Negative output channel 02
4	Positive output channel 02
5	Negative output channel 03
6	Positive output channel 03
7	Negative output channel 04
8	Positive output channel 04
9	Negative output channel 05
10	Positive output channel 05

- adiacenti al connettore J3 ci sono 10 leds indicanti lo stato del comando ricevuto per ciascuno dei canali :

Led number	*Description*
LD10	positive signal channel 01 present (red)
LD09	negative signal channel 01 present (green)
LD08	positive signal channel 02 present (red)
LD07	negative signal channel 02 present (green)
LD06	positive signal channel 03 present (red)
LD05	negative signal channel 03 present (green)
LD04	positive signal channel 04 present (red)
LD03	negative signal channel 04 present (green)
LD02	positive signal channel 05 present (red)
LD01	negative signal channel 05 present (green)

Electrical characteristics

Number of channels	5 (five)

Commands

Voltage	xx Vac [optional 16,24,42,110 and 220]
Input current	30 mA [max per channel]
Insulating voltage	2500 V RMS
Protection	900 mA @ 40°C with self-restoring fuse
CMOS supply	12 Vdc
CMOS current input	75 mA max per channel

Outputs

Interconnecting voltage	24 Vdc
Output current	250 mA maximum per channel