Technical Specifications and Connections

RM850

RM851

The RM85x is an easy-to-handle Palmtop Terminal that allows simple manual commands to be sent to the machine to which it is connected.

The RM85x has an alphanumeric display, emergency button and "dead-man" button. The terminal has either two override knobs or an encoder wheel depending on the model.

The communications between the RM85x Palmtop Terminal and the machine takes place through an Enet-X Fieldbus or RS232 serial line.

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Revision	**Added**	**Deleted**	**Changed**
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01			Version not issued
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03			19-pin connector cable: figure and colour wires table
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Documentation office

Via Carpanelli, 24
40011 Anzola dell'Emilia (Bo) Italy
Tel. +39 051 6508911
Fax +39 051 6508912
Info@cnicnc.com
www.cnicnc.com

Registered offices

Via dell'Artigianato, 1
48011 Alfonsine (Ra) Italy
Tel. +39 0544 84277
Fax +39 0544 80635
P.I. e C.F. 02248390391

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1 INTRODUCTION

1.1 Warnings and basic safety precautions

1.1.1 Purpose of this manual

This manual is an integral part of the product and must accompany it at all times. Removal of this manual from the product constitutes removal of one of the product's essential safety requisites. Keep this manual safe, and make sure that it is distributed to and available to all persons involved with the product.
This manual contains safety precautions essential to safeguarding the health and safety of all persons exposed to residual risks.
The instructions in this manual provide essential information on how to operate the product correctly and in accordance with the manufacturer's requirements.
If you encounter any inconsistencies between the instructions in this manual and any applicable safety precautions, contact **CNI** to have the necessary corrections and/or modifications introduced.
Make sure that you have read and fully understood all the documentation supplied with the product to avoid operating it in ways that could cause injury to persons and/or damage to the product itself.
Keep this manual in a suitable place, where it is always readily available for consultation.

	**The information contained in this manual is essential for the safe and correct use of the product.**

1.2 Symbols used in this manual

WARNING 	This symbol identifies a procedure, instruction or precaution that, if ignored or performed incorrectly, may result in **personal injury**.
CAUTION 	This symbol identifies a procedure, instruction or precaution that, if ignored or performed incorrectly, may result in **damage to or destruction of the product**.
IMPORTANT 	This symbol identifies particularly important general information that must not be ignored.

1.3 Risks associated with the product

CNI does not and cannot know how end users will install the product. The installer or customer must therefore perform a separate risk assessment for each installation and application.

1.3.1 Risks associated with improper use and handling

Never impede the function of, remove, modify, or in any way interfere with any safety device, guard, or control of any individual parts or of the product as a whole.

- Do not use the product in atmospheres or environments where there is a risk of explosion.
- Unless you are qualified and authorised to do so, never attempt to repair faults or malfunctions and never interfere in any way with the product's operation or installation.
- Maintain all protection and safety devices in perfect working order. Also make sure that all warning labels and symbols are correctly positioned and perfectly legible.

1.4 Warranty

CNI declares and confirms that this product has passed all relevant Quality Control tests in the factory.

All work performed under the terms of the warranty shall be carried out at the premises of CNI, with carriage at the customer's expense. CNI cannot accept any responsibility for production losses incurred as a result of work performed under warranty.

CNI declines all responsibility for non-compliance of the product caused by failure to follow the precautions and instructions given in this manual or by improper use or handling of the product. **The customer has a right to the replacement of all parts shown to be defective, unless the said defects are caused by unauthorised tampering, including the fitting of non-original CNI spare parts and/or the replacement of parts not described or authorised in this manual unless authorised beforehand and in writing by CNI.**

In no case shall CNI or its suppliers accept any responsibility for damage (including damage to the unit, damage incurred through lost production and income, down-time in manufacturing, loss of information or other economic losses) deriving from the use of CNI products, even if CNI has been advised in advance of the risk of such damage.

The warranty becomes automatically null and void if the customer fails to notify CNI in writing of any faults found within 15 days of their occurrence. The warranty likewise becomes null and void if the customer fails to permit the seller to perform all necessary checks and tests, and if, when the seller requests the return of a defective part, the customer fails to do so within two weeks of the request.

Dimensioned drawings and photographs are provided only for information purposes and to facilitate the understanding of text.

CNI applies a policy of continuous development and improvement, and reserves the right to make functional and stylistic modifications to its products, to change the design of main or secondary parts, and to suspend manufacturing and supply without notice and without obligation to third parties. Furthermore, CNI reserves the right to make any structural or functional changes to the units, and to change the supply of spare parts and accessories without any prior notice.

2 PACKAGING, TRANSPORT AND STORAGE

Check that the packaging and the product itself are undamaged as soon as you open the box. Contact the supplier immediately if you notice any damage.

	**When you unpack the product, dispose of unwanted packaging material in compliance with applicable recycling and waste disposal standards and regulations.**

2.1 Transport

Given the product's small size, it can be easily carried.

When lifting and moving the product, take great care to avoid dropping it and also avoid any unnecessary impact that could cause malfunctioning or damage to delicate parts.

2.2 Storage

If the product is going to be warehoused or stored for an extended period of time, make sure that it is adequately protected against the weather and any potential sources of damage in the storage environment (rain, humidity, dust, chemicals, etc.).

Temperature range in storage	-25°C ÷ +60°C (-13°F ÷ +140°F)
Maximum storage altitude	2000 m (6500 ft)
Relative humidity in storage	10% to 95%

3 TECHNICAL DESCRIPTION

3.1 Versions available

RM850

RM851

Table 1 Versions available

Code	Bus	RM850 Potentiometer	Encoder RM851	Keys	Output connection	Dead man button
H0102D850A0	Enet-X	2	-	12	10-pin male connector	YES
H0102D850A1	Enet-X	-	1	9	10-pin male connector	YES
H0102D850A2 *	RS-485	2	-	12	10-pin male connector	YES
H0102D850A3 *	RS-485	-	1	9	10-pin male connector	YES
H0102D850A4 *	CAN	2	-	12	10-pin male connector	YES
H0102D850A5 *	CAN	-	1	9	10-pin male connector	YES
H0102D850A6	RS232	2	-	12	10-pin male connector	YES
H0102D850A7	RS232	-	1	9	10-pin male connector	YES
H0102D850A8	Enet-X	2	-	12	14-pin male connector / cable L=16,5 m	YES
H0102D850A9	Enet-X	2	-	12	10-pin male connector	NO
H0102D850AA	Enet-X	2	-	12	14-pin male connector / cable L=16,5 m	YES
H0102D850B0	Enet-X	2	-	12	19-pin male connector	YES
H0102D850B1	Enet-X	-	1	9	19-pin male connector	YES
H0102D850B2 *	RS-485	2	-	12	19-pin male connector	YES
H0102D850B3 *	RS-485	-	1	9	19-pin male connector	YES
H0102D850B4 *	CAN	2	-	12	19-pin male connector	YES
H0102D850B5 *	CAN	-	1	9	19-pin male connector	YES
H0102D850B6	RS232	2	-	12	19-pin male connector	YES
H0102D850B7	RS232	-	1	9	19-pin male connector	YES
H0102D850B8	Enet-X	2	-	12	19-pin male connector	YES
H0102D850B9	Enet-X	2	-	12	19-pin male connector	NO

N.B. (*) Contact CNI to check availability

INFORMATION	Code numbers H0102D850Ax ARE ONLY AVAILABLE AS SPARE PARTS.

3.2 The RM850 hand-held terminal

3.2.1 Description

Figure 1 Front view

Legend:

1 Alphanumeric display (4 rows of 20 characters)
2 Emergency stop button
3 Dead man button
4 2 override knobs (potentiometers)
5 12-key keyboard (configurable)
6 5 keys with led (configurable)
7 Red power on led
8 Green ready led

INFORMATION	The machine's PLC program manages the signals coming from the Emergency and "Dead Man" buttons and from the override knobs, keyboard and the various leds assigned to the buttons.

3.2.2 Physical dimensions

Figure 2 Side view

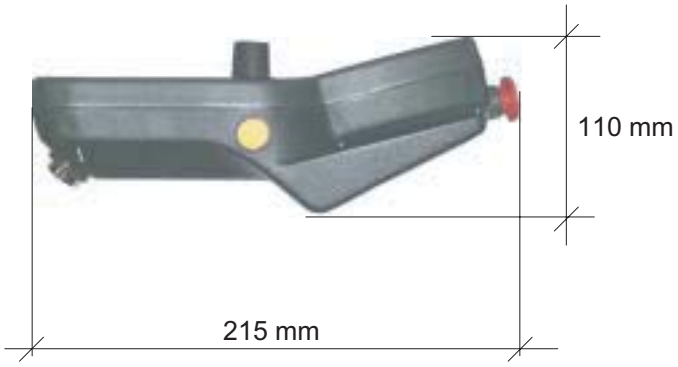


Figure 3 Fron view

3.2.3 Connection cable

RM850 is available in various configurations (see Table 1) according to the type of communications protocol supported. Consequently, refer to Table 2 for the appropriate cable for the model chosen.

Table 2 Connection cable

Cable code	Applicability			Characteristics
H0414D0145	H0102D850A0	H0102D850A1	H0102D850A9	10-pin female conn. L=5m
H0414D0137	H0102D850A0	H0102D850A1	H0102D850A9	10-pin female conn. L=10m
H0414D0141	H0102D850A0	H0102D850A1	H0102D850A9	10-pin female conn. L=16,5m
H0414D0159	H0102D850A2 H0102D850A7	H0102D850A3	H0102D850A6	10-pin female conn. L=16,5m
H0414D0148	H0102D850A8	H0102D850AA		14-pin female conn. L=16,5m
H0414D0165	H0102D850B0 H0102D850B3 H0102D850B8	H0102D850B1 H0102D850B6 H0102D850B9	H0102D850B2 H0102D850B7	19-pin female conn. L=5m
H0414D0164	H0102D850B0 H0102D850B3 H0102D850B8	H0102D850B1 H0102D850B6 H0102D850B9	H0102D850B2 H0102D850B7	19-pin female conn. L=10m
H0414D0163	H0102D850B0 H0102D850B3 H0102D850B8	H0102D850B1 H0102D850B6 H0102D850B9	H0102D850B2 H0102D850B7	19-pin female conn. L=16,5m

Accessories

RM850 can be equipped with a magnetic hook (H0412D0158). This is standard on all Enet-X versions and is available as an optional extra for other versions.

3.3 The RM851 hand-held terminal

3.3.1 Description

Figure 4 Front view

Legend:

1 Alphanumeric display (4 rows of 20 characters)
2 Emergency stop button
3 Dead man button
4 Encoder control knob
5 9-key keyboard (configurable)
6 5 keys with led (configurable)
7 Red power on led
8 Green ready led

INFORMATION	The machine's PLC program manages the signals coming from the Emergency and "Dead Man" buttons and from the override knobs, keyboard and the various leds assigned to the buttons.

3.3.2 Physical dimensions

Figure 5 Side view

Figure 6 Front view

3.3.3 Connection cable

RM850 is available in various configurations (see Table 1) according to the type of communications protocol supported. Consequently, refer to Table 2 for the appropriate cable for the model chosen.

Accessories

RM850 can be equipped with a magnetic hook (H0412D0158). This is standard on all Enet-X versions and is available as an optional extra for other versions.

3.4 CE marking

Palmtop Terminals RM850 and RM851 have been designed, produced and tested in accordance with the "Electromagnetic Compatibility Directive 89/336/CEE" and its subsequent amendments (92/31/CEE, 93/68/ CEE, 93/97/CEE).

The Emergency button complies with standard IEC 60947-5-1.

The “Dead Man” button complies with standard IEC 60204-5-1.

3.5 Specifications

OPERATING ENVIRONMENT	
Temperature	0° ÷ 50°C
Maximum operating altitude	2000m (6500ft)
Relative humidity	10% ÷ 95%
EMC immunity zone	Zone A
Pollution degree	2
Overvoltage class	II
IP protection rating	IP54

This module is designed for use in industrial environments. It is the responsibility of the user to ensure that the specified environmental conditions are met. Contact the manufacturer if the conditions in the operating environment differ from those specified.

Dimensions and mounting	
Body	Beluga 220 body with (optional) magnetic hook
Overall dimensions (mm)	110x110x215

ELECTRICAL SPECIFICATIONS	
Nominal power supply voltage for the logic component	Backup power source 24V DC ± 15% (SELV o PELV)
Maximum voltage applicable to buttons *Emergency (10-pin connector)* *“Dead man ” (10-pin connector)* *Emergency (2) (14-pin connector)* *“Dead man” (2) (14-pin connector)*	50V DC (SELV o PELV)
Maximum voltage applicable to buttons	Itot. < 250 mA
Maximum switchable current at buttons *Emergency (10-pin connector)* *“Dead man” (10-pin connector)* *Emergency stop (2) (14-pin connector)* *“Dead man” (2) (14-pin connector)*	Itot. < 500 mA
Configuration	DIP Switch (sw1 - sw8)

Keyboard characteristics	
Number of keys	12 keys software-configurable (RM850) 9 keys software-configurable (RM851)

Keyboard LEDs	
Number of key LEDs	5 keys software-configurable
Communication ready LED	1
Power on LED	1

Display characteristics	
LCD	4 rows by 20 characters, +5 V power
Override knobs (RM850)	
Number of override	2 potentiometers, 8 bits resolution (0-255 step)
Encoder knob (RM851)	
Number of encoder knobs	1
Resolution	128 (32 pulses/revolution with x4 multiplier)

Dead man button	
Type	3 position, on RH side
Number of contacts	2
Contact type	see description “”Dead Man” button operation”
Max voltage	50 V DC
Max current	500mA

Emergency stop button	
Type	Red mushroom head
Number of contacts	2
Contact type	Normally open
Max voltage	50 V DC
Max current	500mA

Enet-X field bus interface	
Type of interface	Enet-X RS485 half-duplex
Transmission speed	3/6 Mbit/s.
Max. distance from master (Enet-X)	200m a 3Mbit/s, 100m a 6Mbit/s
Number of selectable addresses	Max 32, selected by DIP switch

RS232 serial interface	
Transmission speed	max 57,6 kbit/s.
Max. distance from master	20m

4 INSTALLATION

4.1 Electrical connections

	**Never attempt to service, connect or disconnect modules or connectors while the system is powered up.**

	**Incorrect connections (power, Fieldbus, or I/O) can cause irreparable damage to the device itself and to other devices connected to it.**

Instructions for using connectors

Connectors are not designed to withstand significant torsional or axial forces and must therefore be handled with care and never manipulated with tools.
Before attempting to plug in or unplug a connector, make sure that you can clearly see both connector sections. This is important because incorrect handling can twist or compress the connectors and damage the connectors and their pins.

Proceed as follows to plug in a connector:

- Before making the connections, examine the connectors closely and note the exact layout of the pins (the connectors are polarised) and identify the reference lug on the male connector and the corresponding cutout on the female connector.
- Align the notch and the slot before you start to push the male connector in.
- Gently push the male connector into the female socket. If you encounter any resistance, gently rotate the male connector in both directions (clockwise and anti-clockwise) until you feel the notch on the male connector engage with the slot in the female connector or socket.
- Push the male connector in as far as it will go.
- After checking to make sure that the connectors are perfectly coupled, use one hand to hold the inserted connector in place and the other hand to tighten the ring nut.
- Do not over-tighten the ring nut and never use tools to tighten it

Proceed as follows to unplug a connector:

- Hold the connector steady with one hand and unscrew the ring nut with the other hand.
- Do not use tools to loosen the connector. Likewise avoid applying any transverse or rotational force to it.

General information regarding the power supply circuit

It is recommended that the following measures are adopted for the RM85x module:

- It is the user’s responsibility to ensure safe isolation between all SELV (or PELV) type cables and components and those of a type other than SELV (or PELV).
- The power supply to the logic component must be of the SELV/PELV type, protected by a suitably rated fuse of not more than 2A.
- For the power supply to the emergency and ?ead man?buttons, use SELV/PELV type circuits protected by a suitably rated fuse of not more than 2A.
- Furthermore, all the circuits and earths must be kept separate.

Connection to the NC

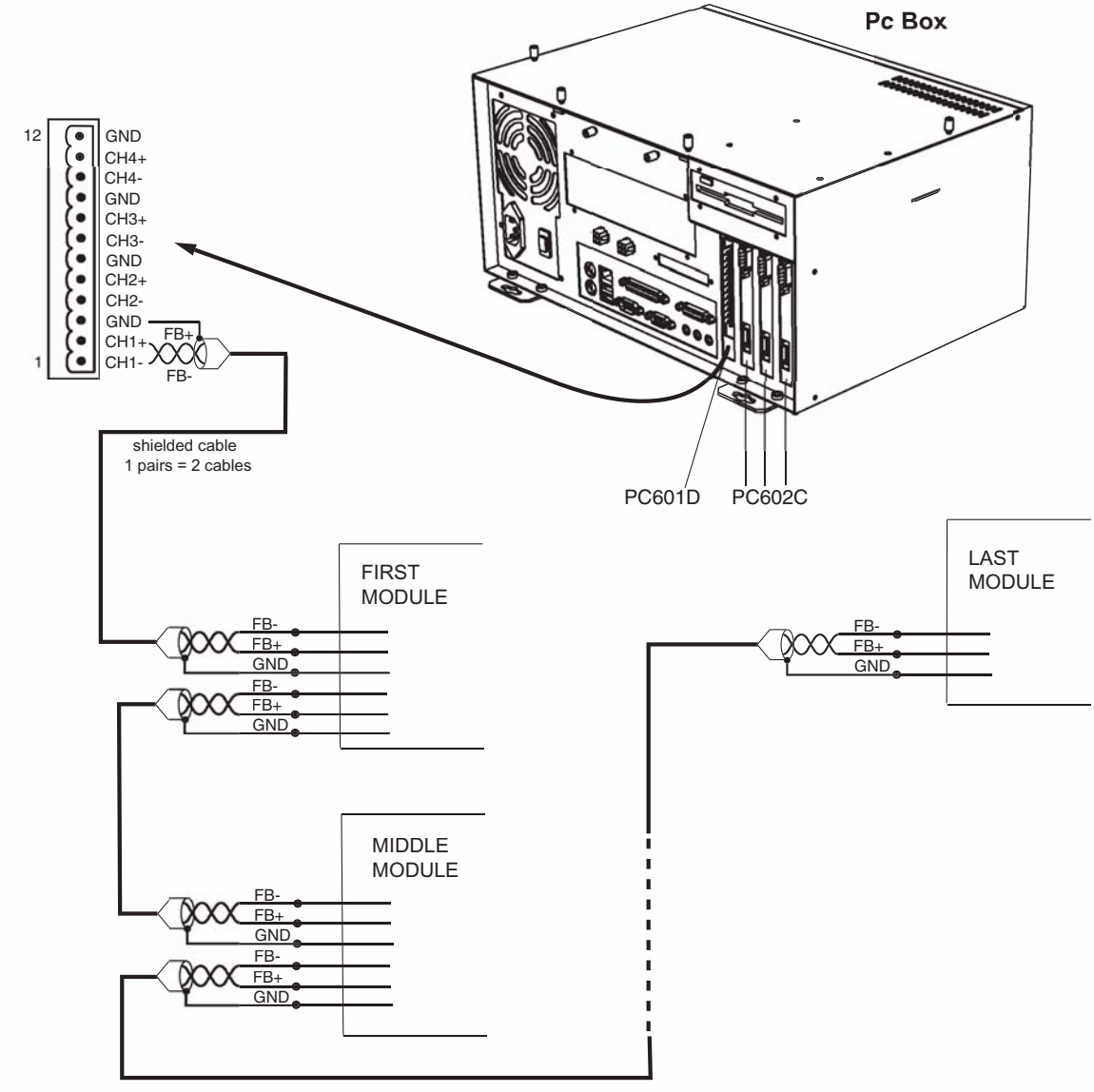
The RM85x Palmtop Terminal can be connected to a machine by an RS232 serial line or Enet-X Fieldbus. The number of serial modules connected does not have any effect on the access times.

In the case of a Enet-X type connection:

- the RM85x terminal must be connected as a Slave module.
- If there are a number of modules connected in cascade formation, the RM85x must be inserted as the t**erminal element of the Fieldbus line**. (Fig. 7, LAST MODULE).

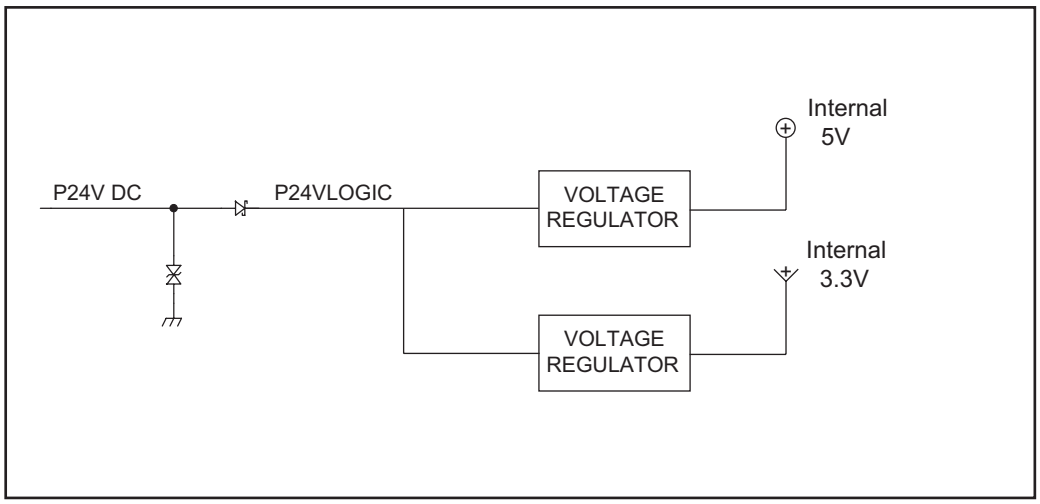
For more detailed information, refer to the E-NETx Communications Protocol manual.

Figure 7 A typical connection scheme



Power supply to the logic component

Figure 8 Logic power supply circuit block diagram



“Dead Man” button operation

The button has three positions:

- Position 1: the switch is off (button not pressed)
- Position 2: the switch is on (the button is activated in the intermediate position)
- Position 3: the switch is off (the button has been pushed beyond the intermediate position)

When the button returns to position 3 from position 2, the function must remain disabled.

Electrical connections

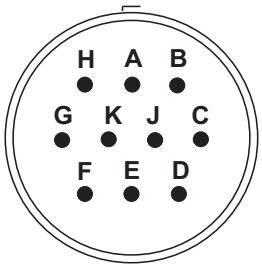
The RM85x Palmtop Terminal has a circular connector mounted on the back of the box with either 10, 14 or 19 male poles (depending on the version). The connectors are wired as follows (Fig.9, Fig.10, Fig.6 e Fig. 14):

- power,
- communication line
- Emergency stop button
- Dead man button

Figure 9 Position of the connector for connecting the RM85x Palmtop terminal

Figure 10 Description of the circular 10-pole metal male connector

Pin	Signal		
B	P24V DC		
H	GND		
D	FB+	CANH	TX232
E	FB-	CANL	RX232
F	FB Shield	GND	GND
C	Emergency stop button		
J	Emergency stop button		
K	Dead man button		
G	Dead man button		
A	NC		



front view
Contact side

Figure 11 Block diagram of the emergency and dead man buttons (10-pole male connector)

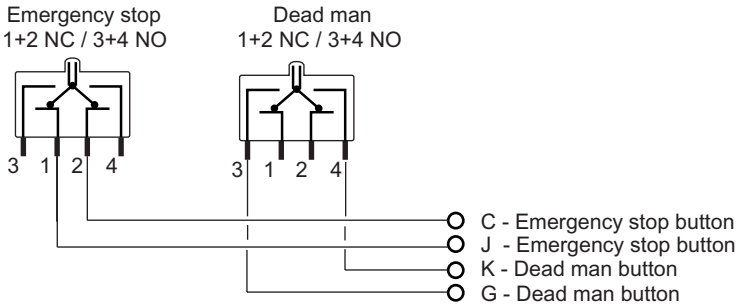
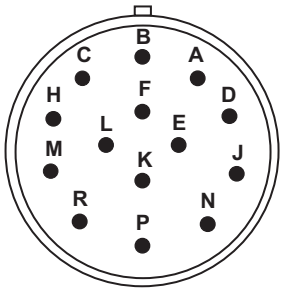


Figure 12 Description of the circular 14-pole metal male connector

Pin	Signal		
C	P24V DC		
A	GND		
R	FB+	CANH	TX232
P	FB-	CANL	RX232
N	FB Shield	GND	GND
H	Emergency stop button		
M	Emergency stop button		
D	Emergency stop button		
J	Dead man button		
A	NC		
E	Dead man button (2)		
F	Dead man button (2)		
L	Emergency stop button (2)		
K	Emergency stop button (2)		



Front view
Contact side

Figure 13 Block diagram of the emergency and dead man buttons (10-pole male connector)

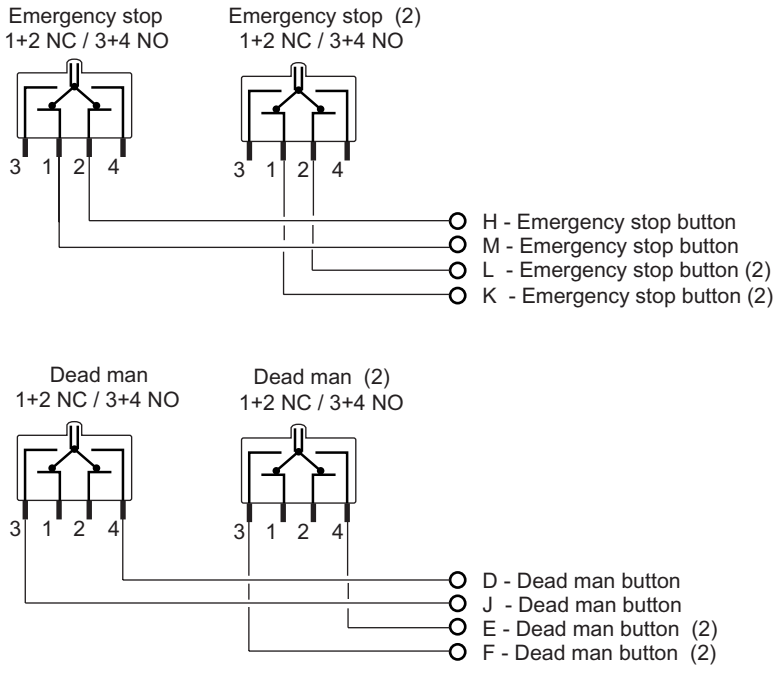
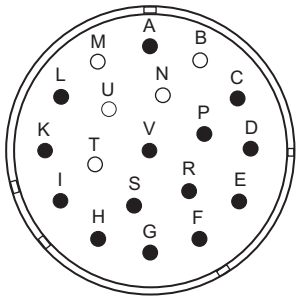


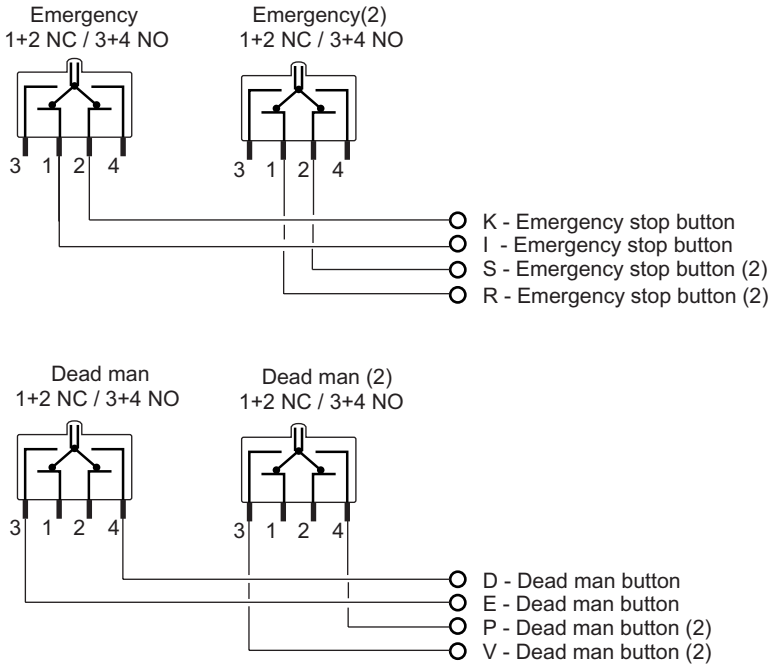
Figure 14 Description of the circular 10-pole plastic male connector

Pin	Signal		
L	P24V DC		
C	GND		
H	FB+	CANH	TX232
G	FB-	CANL	RX232
F	FB Shield	GND	GND
K	Emergency stop button		
I	Emergency stop button		
D	Dead man button		
E	Dead man button		
A	Terra		
P	Dead man button (2)		
V	Dead man button(2)		
S	Emergency stop button (2)		
R	Emergency stop button (2)		
B	Contact not present		
M	Contact not present		
N	Contact not present		
T	Contact not present		
U	Contact not present		



Front view contact side

Figure 15 Block diagram of the emergency and dead man buttons (19-pole male connector)



4.1.1 Connection cables

Refer to Table 2 for the cable to use to connect the particular model of RM85x module.

The cables available are reported in Table 2 together with the relative order codes.

Each cable is fitted with either a 10-pole female (Fig.16), 14-pole female (Fig.17) or 19-pole female (Fig.18) circular connector at one end. The other end has free wires with capped terminals

Figure 16 Circular 10-pole female connector for soldering

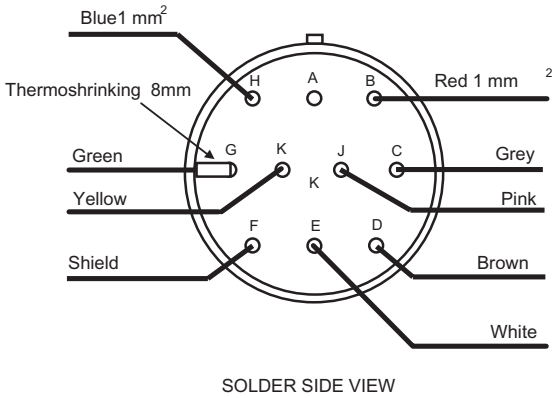


Figure 17 Circular 14-pole female connector for soldering

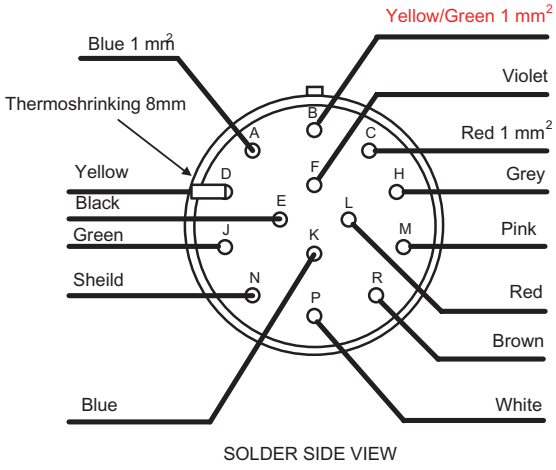
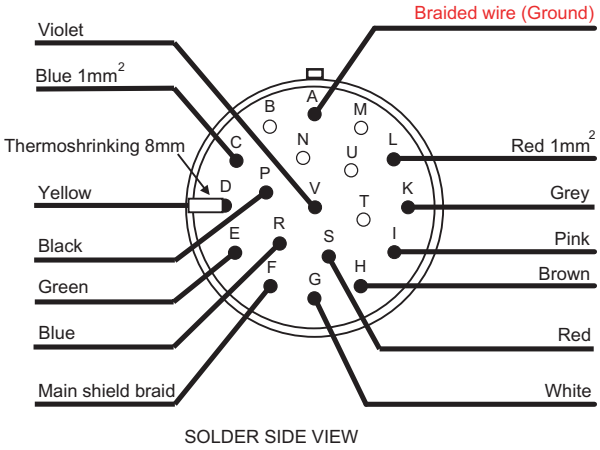


Figure 18 Circular 19-pole female connector for crimping



4.1.2 Connection cable specifications

10 and 14-pin connector cable

Wire cross-section (mm2)	Wire colour	Signal	10 Pin	14 Pin	Notes
1	Red	P24V DC	B	C	
1	Blue	GND	H	A	
0.34	Brown	FB+ | CANH | TX232	D	R	
0.34	White	FB- | CANL | RX232	E	P	
0.34	Twisted pair shield braid	FB Shield | GND | GND	F	N	
0.34	Grey	Emergency stop button	C	H	
0.34	Pink	Emergency stop button	J	M	
0.34	Yellow	Dead man button	K	D	
0.34	Green	Dead man button	G	J	
0.34	Red	Emergency stop button (2)	-	L	
0.34	Blue	Emergency stop button (2)	-	K	
0.34	Black	Dead man button (2)	-	E	
0.34	Violet	Dead man button (2)	-	F	
	Yellow/Green	Braided wire (Ground)		B	
0.34	Main shield braid	Control panel ground			
0.34	Grey/Pink		-		NC
0.34	Red/Blue		-		NC
0.34	White/Green		-		NC
0.34	Brown/Green		-		NC

Each cable carries:

- 2 wires for power supply to the logic section
- 3 wires (1 shielded twisted pair) for Field bus communications
- 4 wires (2 twisted pairs) for connection to the emergency stop button
- 4 wires (2 twisted pairs) for connection to the dead man button
- 4 wires (2 twisted pairs) unused

For RM85x models without a connector on the external cable, the wire colour – signal association remains the same. It is advisable to terminate the wires with suitable caps.

19-pin connector cable

Wire cross-section	Wire colour	Signal	19 Pin	Notes
1	Red	P24V DC	L	
1	Blue	GND	C	
	Braided wire	Ground	A	
0.34	Brown	FB+ | CANH | TX232	H	
0.34	White	FB- | CANL | RX232	G	
0.34	Twisted pair shield braid	FB Shield | GND | GND	F	
0.34	Grey	Emergency stop button	K	
0.34	Pink	Emergency stop button	I	
0.34	Red	Emergency stop button (2)	S	
0.34	Blue	Emergency stop button (2)	R	
0.34	Yellow	Dead man button	D	
0.34	Green	Dead man button	E	
0.34	Black	Dead man button (2)	P	
0.34	Violet	Dead man button (2)	V	
			B	NC
			M	NC
			N	NC
			U	NC
			T	NC

Each cable carries:

- 2 wires for power supply to the logic section
- 1 earth wire
- 3 wires (1 shielded twisted pair) for Field bus communications
- 4 wires (2 twisted pairs) for connection to the emergency stop button
- 4 wires (2 twisted pairs) for connection to the dead man button

4.2 Configuring connection protocol

To re-configure the connection protocol of RM85x hand-held terminals, remove the push-fit rubber cover over the configuration DIP-switch on the rear of the body (Fig.19) and set switches sw1-sw8 as required.

Only remove the rubber cover if you actually need to change the default protocol configuration.

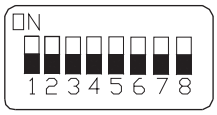
Figure 19 Location of the protocol configuration DIP-switch on RM85x hand-held terminals

Switches sw1- sw8 set:

- the RM85x unit's address (excluding RS232 protocol)
- the connection parameters

4.2.1 Enet-X protocol configuration

CONFIGURING THE DIP SWITCH		
DIP	**SIGNAL**	
1	Address bit A0	
2	Address bit A1	
3	Address bit A2	
4	Address bit A3	
5	Address bit A4	
6	3 Mbit/sec = OFF, 6 Mbit/sec = ON	
7	Field-Bus termination =ON	
8	Field Bus termination = ON	



There are seven address switches for setting the Fieldbus address.
To set the address, configure the switches so that they form the binary number identifying the required address. A0 is the least significant bit and A4 is the most significant bit.
Dip-Switches 7 and 8 are used for line termination (necessary to prevent signal scattering on the line). For the correct line termination methods to adopt, refer to the "E-NETx Communications Protocol" operating manual.

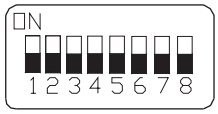
Examples:

ADDRESS		DIP SWITCH SETTING				
Hexadecimal	**Binary**	**A4**	**A3**	**A2**	**A1**	**A0**
01	00001	OFF	OFF	OFF	OFF	**ON**
05	00101	OFF	OFF	**ON**	OFF	**ON**
0A	01010	OFF	**ON**	OFF	**ON**	OFF

The terminal leaves the factory with a preset Enet-X address of 29 decimal.

	**On completion of the configuration, make sure that the press-fit rubber plug on the back is correctly inserted.**

4.2.2 RS232 protocol configuration

CONFIGURING THE DIP SWITCH		
DIP	**SIGNAL**	
1	OFF	
2	OFF	
3	OFF	
4	OFF	
5	Baud rate encoding	
6	Baud rate encoding	
7	--	
8	--	

	**Switches Sw1, Sw2, Sw3 and Sw4 must be OFF to configure an RS232 connection correctly.**

The following table lists the possible baud rate settings.

Baudrate (kbaud)	SW5	SW6
9.6	OFF	OFF
19.2	ON	OFF
38.4	OFF	ON
57.6	ON	ON

	**On completion of the configuration, make sure that the press-fit rubber plug on the back is correctly inserted.**

4.3 Diagnostics

RM850

RM851

SYMBOL	LED	MEANING
1	**GREEN READY LED**	The green READY LED lights to show that the module is operating over the Fieldbus.
2	**RED POWER ON LED**	The red POWER ON LED lights to show that the module is receiving power.
3	Keys led	5 configurable leds

4.4 Using the module

Refer to the E-NETx Communications Protocol manual distributed by CNI for any information you need concerning:

- use of the module
- connections
- the maximum number of units that can be connected
- what cables to use
- the need for modems and/or repeaters

5 MAINTENANCE

5.1 Scheduled maintenance

The RM850 and RM851 modules do not require any special maintenance.

	**Users should not attempt any operations on the module other than those described in Installati on.**

5.2 Customer service

CNI technical assistance service is at your disposal to solve any problems that might occur with any of the company's products.