Tech-note

ePALM10 Product Manual

The ePALM10 is a state-of-the-art handheld HMI device with a graphic display and a keypad. The rugged polyamide enclosure offers a high level of shock and environmental resistance making the ePALM the ideal choice for use in the factory floor.

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1 Highlights

- Graphical display 120x64 pixels (up to 8 lines 20 characters)
- Highly visible transflective LCD display
- 27-keys keypad with tactile feedback
- Connection to industrial bus systems
- Large memory size (512 KB Flash)
- IP65 protection
- Includes Emergency Stop button
- Includes enabling switches, normal or 3-positions
- Available in version for connection to Ethernet and Profibus DP

The ePALM HMI panels are the handheld products of the UniOP family. All of the ePALM products support the rich common functionality of the UniOP operator panels:

- Versions available for connection to Ethernet and Profibus DP. Ethernet version allows connection to field devices as well as programming the HMI from Designer.
- Powerful and intuitive programming with the UniOP Designer 6 software
- Support of more than 130 communication drivers for industrial devices
- Transflective LCD display ensures readability under the most critical light conditions
- Display dynamic data in numerical, text, bargraph and graphic image formats
- Recipe data storage. Recipe data can be transferred to a host computer using the Ethernet connection.
- Multilanguage applications. The number of runtime languages is limited only by the available memory. All text information in the application can be exported in Unicode format for easier translation.
- Powerful macro editor to configure keypad operation
- Alarms and historical alarm list. Alarm and event information can be printed or transferred to a host computer using the Ethernet connection.
- Eight level password protection.
- Report printing to serial printer. Reports are freely configurable using Designer.
- Ethernet-based UniNet network to share data between UniOP HMIs and to serve data using UniNet OPC Server.

In addition some unique features make the ePALM10 a perfect fit for handheld operation.

- Emergency Stop button. Hardwired.
- Enabling switches. Hardwired.
- High-quality polyurethane cable for mobile applications.

2 Technical data

Display	
Type	Transflective LCD monochrome
Resolution	120x64 pixel
Active display area	66x33 mm
Backlight	LED
Dimming	-
Contrast	Software
Memory	
User memory	512 KB Flash
User memory expansion	-
Front panel	
Touch screen	-
Function keys	9
System keys	18
User LED's	20
System LED's	5
Interfaces	
PC/Printer port	See below
PLC port	See below
Aux port (fieldbus and Ethernet)	See below
Serial programming speed	9600 – 38400 bps
Functionality	
Vector graphics	-
Dual driver capability	-
Data acquisition and trends	-
Recipe memory	16 KB
UniNet network	Client/Server
Alarms	1024
Event list	256
Password	Yes
Hardware RTC	Yes, battery backed
Screen saver	-
Buzzer	-
Battery	3 V 270 mA Lithium, non rechargeable, user replaceable, model CR2430. Replace with same component or equivalent compatible with the operating temperature of the product.

Ratings	
Power supply voltage	18 - 30 VDC
Current consumption	~ 300 mA at 24 VDC
Fuse	Automatic
Weight	~ 0.5 Kg (not including cable)
Min thickness of cable	7 mm diameter
Max thickness of cable	11 mm diameter
Environmental Conditions	
Operating temperature	0 to 50 °C EN 60068-2-14
Storage temperature	-20 to +70 °C EN 60068-2-14
Operating and storage humidity	5 – 85 % RH non-condensing EN 60068-2-30
Vibrations	10 ÷ 57 Hz, 0,075 mm peak 57 ÷ 150 Hz, 1 G EN 60068-2-6
Shock	50 g, 11 ms, 3 pulses per axis EN 60068-2-27
Protection class	IP65 EN 60529
Keyboard reliability	> 3 million operations EN 60529
Electromagnetic Compatibility (EMC)	
Emitted interference	Class A EN 55011
Immunity to radiated radiofrequency electromagnetic field	80 MHz ÷ 1 GHz, 10 V/m EN 61000-4-3 900 MHz, 10V/m ENV 50204
Immunity to conducted disturbances inducted by radiofrequency field	0.15 ÷ 80 MHz, 10 V EN 61000-4-6
Fast transient	2 KV power supply 1 KV signal lines EN 61000-4-4
Electrostatic discharge	8 KV in air EN 61000-4-2
Dimensions	
A	116 mm (4.56")
B	86 mm (3.38")
C	102 mm (4.01")
D	239 mm (9.41")

The product is designed for installation in industrial environments in compliance with the regulations:
Emitted interference EN 61000-6-4, 2001
Noise immunity EN 61000-6-2, 2001
All circuits in this handheld product, including the wiring of the emergency stop button and the enabling switches, must be considered SELV circuits. They will have to be wired in compliance with EN 60950.

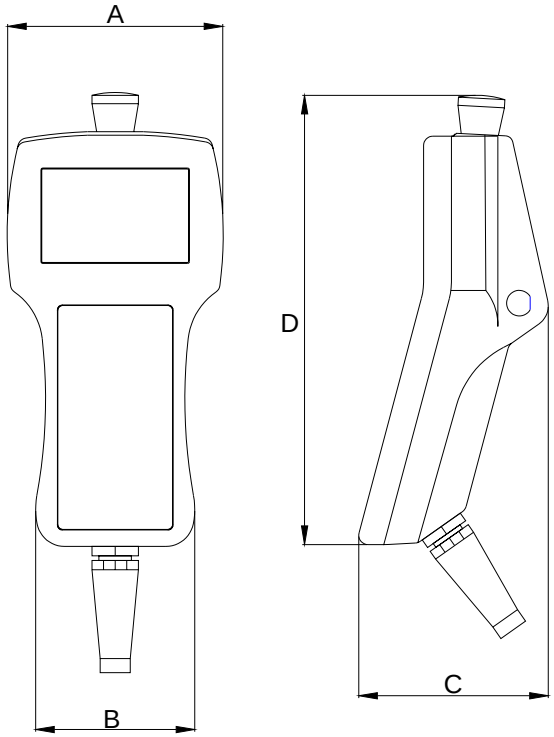


Figure 1 – Side and front view

Model	Cable Type/Length	PC/Printer Port	PLC Port	Module	Enabling switches
ePALM10-0061	Serial/5m	Yes	Yes	-	two normal
ePALM10-0062	Serial/10m	Yes	Yes	-	two normal
ePALM10-3P61	Serial/5m	Yes	Yes	-	one 3-position
ePALM10-3P62	Serial/10m	Yes	Yes	-	one 3-position
ePALM10-0066	Ethernet/5m	-	-	SCM11	one 3-position
ePALM10-0068	Ethernet/10m	-	-	SCM11	one 3-position
ePALM10-0067	Profibus DP/10m	Yes	-	TCM08	one 3-position
ePALM10-0069	Profibus DP/5m	Yes	-	TCM08	one 3-position

3 Operation

3.1 Enabling Switches

Enabling switches are implemented in two different solutions in the various ePALM models:

Two independent 2-positions switches with NO contacts
One 3-positions switch with two NO contacts

The operator must operate the two independent 2-positions switches simultaneously. The two normally open contacts are wired directly to the controller.

The 3-positions switch must be operated as described in the table.

Position	Button status	Contacts	Function
1	Released	Open	Not enabled
2	Pressed	Closed	Enabled
3	Pressed completely	Open	Panic

The switch provides two normally open contacts to be wired directly to the controller.

3.2 Indicators and Keypad

The standard keypad of the ePALM panels is shown in the figure below.
Custom artwork may be designed and produced on request. Please inquire for more information.

Figure 2 – Keypad layout

There are several dedicated LED indicators on the front panel of the unit. Functions are described in the table below.

LED	Color	Status	Meaning
	Red	OFF	No hardware problems detected
		BLINK	Battery low
		ON	Hardware fault
	Green	OFF	No key pressed
		ON	While any key is pressed (visual feedback)
	Green	OFF	Hardware fault
		ON	Unit in operation
	Green	BLINK	Communication error
		ON	Communication OK
	Red	OFF	No alarms
		BLINK	Alarm requires acknowledgment
		ON	Alarm active
	Green		May be user controlled as LED number 65 using the Macro Editor. Turns ON when recipe/event backup is being performed.

The RDA mapping of LED indicators is shown in the table below.

RDA Bit	LED on Key		RDA Bit	LED on Key
L1	F1		L17	
L2	F2		L18	1
L3	F3		L19	2
L4	F4		L20	3 /
L5	F5		L21	4
L6	F6		L22	5
L7	F7		L23	6 /
L8	F8		L24	7
L9	F9		L25	8
L10			L26	9 /
L11			L27	.
L12			L28	+/-
L13			L29	
L14			L30	
L15			L31	
L16			L32	

The RDA mapping of the keypad is standard.

3.3 Battery Replacement

A Lithium battery is required for data back-up. The battery maintains the following data:

- Hardware real time clock
- Event list
- Recipe data

***Note**: replacing the battery will cause the loss of the data maintained by the battery.*

To replace the battery follow the procedure listed below:

1) turn off the power to the device
2) using a screwdriver loose the 6 screws securing the plastic enclosure
3) open the handheld; the battery is located on the CPU subsystem
4) remove the battery

***Warning**: danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.*

5) replace the battery with a new one
6) close the handheld and tighten the six screws
7) apply power to the handheld and check that the battery good status is reported.

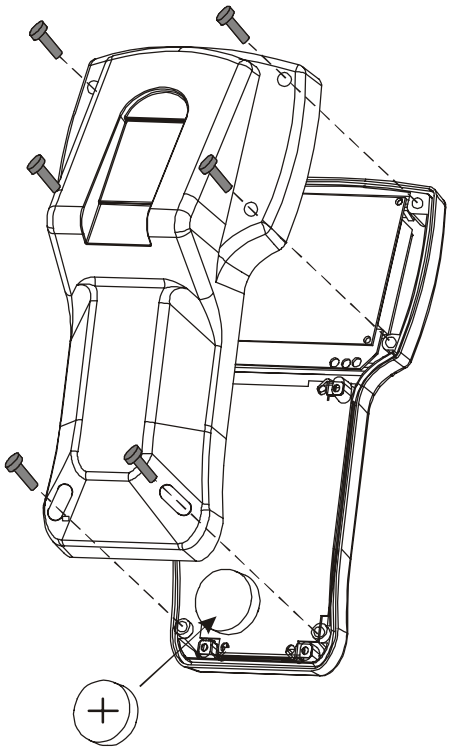


Figure 3 – Battery replacement

3.4 Power Supply and Grounding

The unit must always be grounded to protection earth (PE). Grounding helps limit the effects of noise due to electromagnetic interference on the control system.
The power supply circuit may be floating or grounded. In the latter case connect to ground the power source common as shown in figure 4 with a dashed line.
When using the floating power scheme, note that the panels internally connect the power common to ground with a 1 MΩ resistor in parallel with a 3,3 nF capacitor.
The power supply must have double or reinforced insulation
The suggested wiring for the power supply is shown in figure 4.

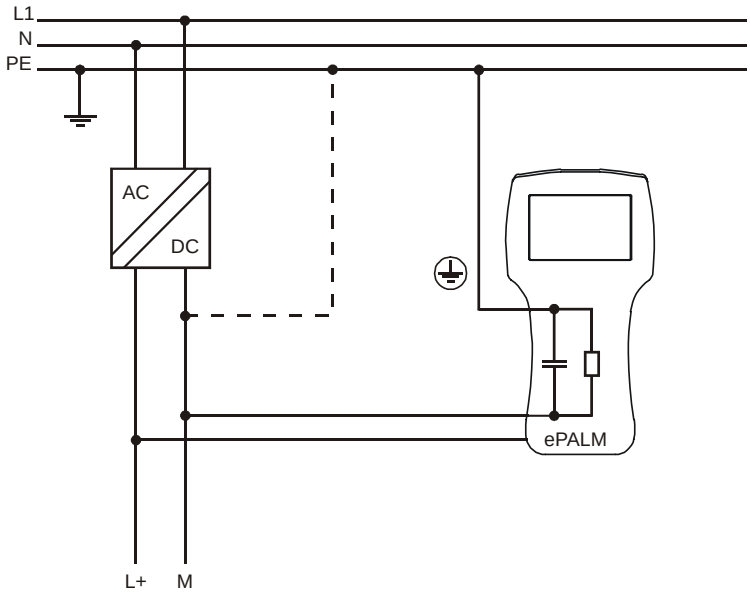


Figure 4 - Power supply

All the electronic devices in the control system must be properly grounded. Grounding must be performed according to applicable regulations.

3.5 Applicable Regulations

Regulations and recommendations have been issued in Europe covering the main safety-related issues in control systems, which include operator interfaces.
EN 60204-1 lists some important guidelines applicable when using operator interfaces.

9.2.4	Suspension of safeguards
9.2.5.3	Stop
9.2.5.4	Emergency stop
9.2.5.6	Hold-to-run controls
9.2.5.7	Two-hand controls
9.4	Control function in case of failure

Do not use operator interface to directly command motors, valves or other actuators not equipped with safeguards and potentially harmful to persons or equipment in case of fault to the unit.

The service personnel, when operating directly on the powered unit, must be electrostatically discharged.
All safety related regulations must be observed.

***Warning**: do not open the rear cover of the device when power is on.*

3.6 Installation Environment

The equipment is not intended for continuous exposure to direct sunlight. This might accelerate the aging process of the front panel film.
The equipment is not intended for installation in contact with corrosive chemical compounds. Check the resistance of the front panel film to a specific compound before installation.

Do not use tools of any kind (screwdrivers, etc.) to operate the keyboard.

3.7 Cleaning Faceplates

The equipment must be cleaned only with a soft cloth and neutral soap product. Do not use solvents.

3.8 Getting Started

ePALMs must be programmed with the Designer software.
To program an ePALM you will have to connect it to a personal computer running the Designer software; the ePALM must be in Configuration mode to be programmed.

3.8.1 Serial Communication

Make sure that Designer is correctly configured to communicate with the communication port to which the cable attached.
The serial communication parameters between the panel and the personal computer are:

speed:	9600/38400 baud
parity:	None
stop bit:	1

The Designer software defaults to the correct parameters.

3.8.2 Ethernet Communication

When applicable, Designer can use Ethernet to connect to the panel. Make sure all network parameters are properly set to ensure communication between Designer and the panel.

The version of Designer software must be compatible with the firmware version of the panel to be programmed. Call technical support for more information on compatibility between firmware and programming software.

3.9 Troubleshooting

In the case it might be impossible to switch the handheld to Configuration Mode due to problems in the start-up phase, follow the procedure described below:

1. Switch off the unit
2. Press and hold any 3 keys
3. Turn on the unit and hold the keys pressed until Configuration Mode will be shown on the screen.

4 Connections

The ePALM10 is available in several versions, featuring different communication cables and different solutions for the enabling switches.

4.1 Serial Communication - Types –0061 and –0062

ePALM types –0061 and -0062 include all standard UniOP connections and are suitable for all common serial communication links.
The ePALM10-0061 includes a communication cable with a length of 5 meters.
The ePALM10-0062 includes a communication cable with a length of 10 meters.
The cable does not have a connector at its loose end as it is intended to be wired directly in the control cabinet.
The following groups of signals are available in the cable:

PC/Printer Port
PLC Port
Aux Port
Power
Emergency Stop button – two NC contacts
Two 2-positions enabling switches – NO contacts

In all the most common configurations, the signals are wired to the cable and there will be no need to open the unit to access the terminal blocks.

***Note**: the ePALM10 unit does not include a current loop (20 mA) interface in the PLC port. The communication modules TCM04 (Interbus), TCM07 (Simatic S7 MPI without optical insulation), TCM08/TCM18 (Profibus DP) and TCM10/SCM11 (Ethernet) are **not** supported.*

Internally to the product all signals, excluding emergency stop, are wired to a detachable interface board with five terminal blocks.
The position of the terminal blocks and the numbering of the contacts are shown in the figure below.

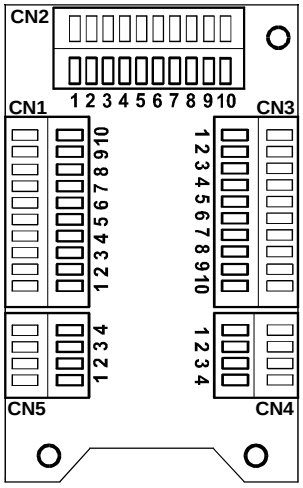


Figure 5 – Interface Board

The assignment of the signals on the terminal blocks is shown in the tables below. Terminals indicated as 'Reserved' should not be connected.

CN1 Aux Port			CN2 PC/Printer Port	
1	Aux Port pin 5		1	Reserved
2	Aux Port pin 9		2	Reserved
3	Aux Port pin 4		3	Reserved
4	Aux Port pin 8		4	Reserved
5	Aux Port pin 3		5	+5V output (max 100 mA)
6	Aux Port pin 7		6	GND
7	Aux Port pin 2		7	RXD
8	Aux Port pin 6		8	CTS
9	Aux Port pin 1		9	TXD
10	Reserved		10	RTS

The terminal assignment in CN1 refers to the corresponding assignment in the Aux Port of the standard panel-mount version of the product. This correspondence will be useful to adapt the normal cable drawings for use with the handheld device.

CN3 PLC Port			CN4 Power	
1	CHA+		1	+24 VDC
2	CHA-		2	Common
3	CHB+		3	Reserved
4	CHB-		4	PE
5	+5V output (max 100 mA)			
6	GND		CN5 Additional Signals	
7	RXD		1	Enabling switch R (NO contact)
8	CTS		2	Enabling switch R (NO contact)
9	TXD		3	Enabling switch L (NO contact)
10	RTS		4	Enabling switch L (NO contact)

The Emergency Stop button is hardwired directly to the cable: the corresponding signals are not available in the connectors.

The wires in the cable are color-coded according to the table below.

Signal	Color	S mm^2	AWG (approx)
Power			
+24 VDC	Red	0.5	20
Common	Black	0.5	20
PC/Printer Port			
GND	Grey	0.14	26
RXD	Orange	0.14	26
CTS	Brown	0.14	26
TXD	White	0.14	26
RTS	Pink	0.14	26
+5V Output	Green	0.14	26
PLC Port			
CHA+	Blue-Red	0.14	26
CHA-	Blue-Black	0.14	26
CHB+	Violet-Red	0.14	26
CHB-	Violet-Black	0.14	26
+5V Output	Red	0.14	26
GND	Black	0.14	26
RXD	Brown-Pink	0.14	26
CTS	Green-Pink	0.14	26
TXD	Orange-Pink	0.14	26
RTS	Yellow-Pink	0.14	26
Additional Signals			
ES Right (NO)	Cyan-Black	0.35	22
ES Right (NO)	Cyan	0.35	22
ES Left (NO)	Blue-Black	0.35	22
ES Left (NO)	Blue	0.35	22
Emergency Stop			
E-Stop 1 (NC)	Green	1	17
E-Stop 1 (NC)	Yellow	1	17
E-Stop 2 (NC)	Brown	1	17
E-Stop 2 (NC)	Orange	1	17

***Note**: the wiring of the Emergency Stop button is to be considered a SELV circuit and it is intended **only** for connection to low voltage circuits (below 48 VDC).*

The standard cable layout of the ePALM10-0061 and ePALM10-0062 includes the signals of the PC/Printer Port and the signals of the PLC Port. Without modifications it allows to connect to the handheld device for programming and to set-up a connection to a field device using RS-232, RS-422 or RS-485.
If connection to the Aux Port is required, signals normally wired to the PLC port will have to be manually moved to the Aux Port. You will have to open the product to perform this operation.
When the RS-422 or RS-485 communication is used, it is recommended not to leave the RXD and the CTS signals floating, even if they are not used in this configuration. The RXD signal should be connected to GND; the CTS signal should be connected to the +5V Output.

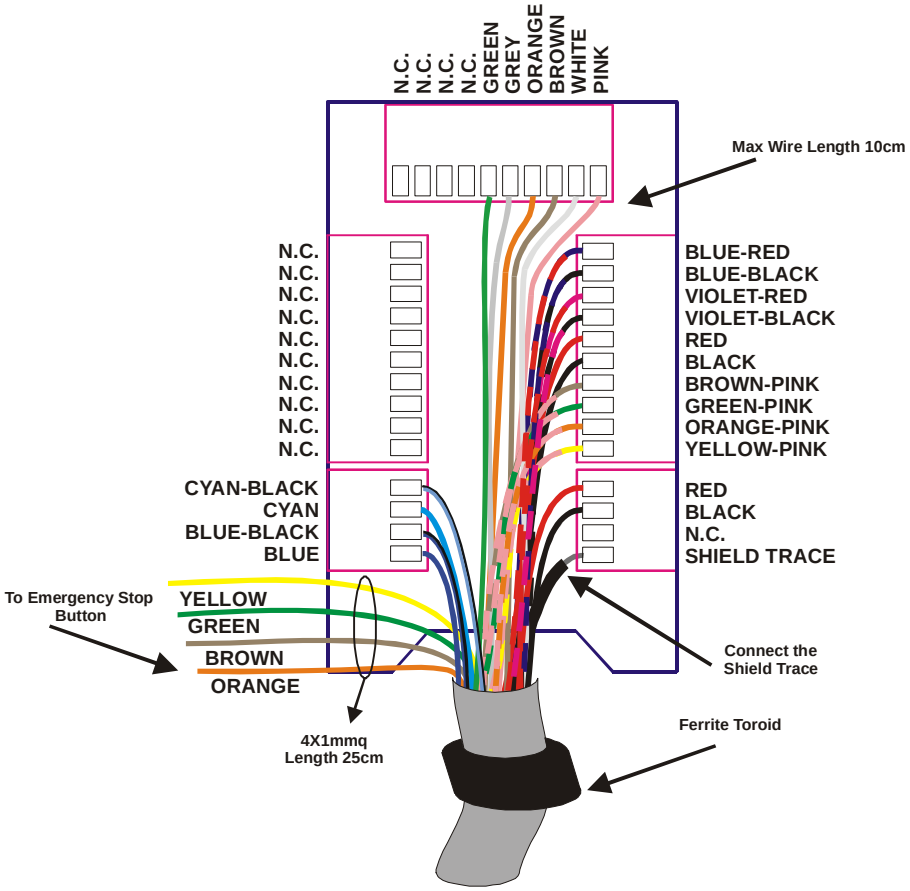


Figure 6 – Wiring layout

The figure shows the standard assembly of the communication cable.
Please note that the ferrite toroid is required for proper operation and should not be removed.

To program the ePALM10 you will need to wire at least the power supply and the programming port connections. Connect the ePALM10 to the COM port of a PC as indicated in the figure below.

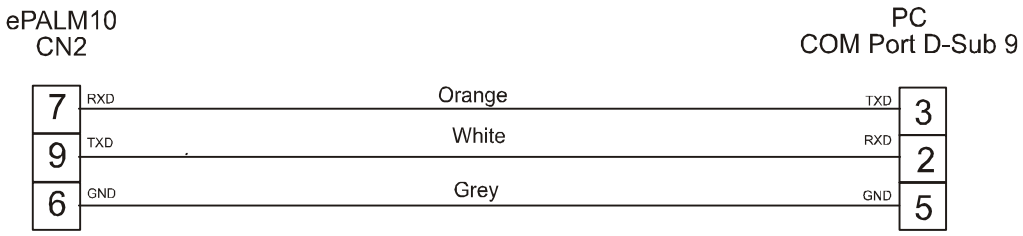


Figure 7 – Programming cable

4.1.1 Using Optional Fieldbus Modules

The ePALM versions –0061 and –0062 are compatible with some of the standard TCM communication modules for connection to fieldbus systems.
The list of the TCM module currently supported by the ePALM product is the following:

TCM module	Fieldbus	Notes
TCM01	Siemens Simatic S7 MPI	Suitable for a point-to-point configuration at the speed of 187 Kb
TCM02	Moeller Suconet K	Suitable for a point-to-point configuration at the maximum speed of 375 Kb
TCM03	DeviceNet	There are limitations in the bus speed and network configuration that can be used
TCM09	CANopen	There are limitations in the bus speed and network configuration that can be used

Other TCM modules are currently not supported for use in these versions of the ePALM product.

The following notes are important:

- The TCM module must be plugged into the unit in the slot available for this purpose. The ePALM must be opened to allow for the insertion of the TCM module. After plugging the module the ePALM product must be carefully closed to ensure proper sealing.
- The default wiring of the Aux Port CN1 must be **manually** changed to connect the appropriate signals. Fieldbus topologies do not allow long (5-10 meters) drop segments; the wiring must include incoming and outgoing segments for all bus signals.
- The CA01 interface board does not allow adding terminator resistors to the bus lines. The ePALM cannot be used a final node in the network topology unless termination resistors are applied externally.

The most common wiring layouts will be described in detail in this chapter.

4.1.2 Connecting the ePALM to the Simatic S7 MPI network

It is recommended that the signals needed for this connection be moved from the CN3 connector (PLC Port) to the CN1 connector (Aux Port) as shown in the table below.
The table indicates the wires that must be moved from CN3 to CN1. The signals A and B will have to be connected to the MPI network.
Please note that it is not possible to connect the termination resistors in the ePALM.

CN1 Connector (Aux Port)			CN3 Connector (PLC Port) Wires to be removed	
Pin	**Signal**	**Color**	**Pin**	**Signal**
4	A	Blue-Red	1	CHA+
5	B	Blue-Black	2	CHA-
1	GND	Black	6	GND

4.2 Ethernet Communication - Type –0066 and –0068

ePALM type –0066 and –0068 have been designed exclusively for connection to the Ethernet network. The products include a special cable suitable for Ethernet communication.

The cable does not have a connector at its loose end as it is intended to be wired directly to the control cabinet.
The following groups of signals are available in the cable:

Ethernet 10base/T
Power
Emergency Stop button – two NC contacts
One three-positions enabling switch – two independent NO contacts

Please note that this product does not include connections for the following standard ports:
PC/Printer Port,
PLC Port,
Aux Port.

***Note**: this version of the product does not include the conventionalPC/Printer Port; programming can be done only via Ethernet.*

Internally to the product all signals, excluding emergency stop, are wired to a detachable interface board with five terminal blocks.
The position of the terminal blocks and the numbering of the contacts are shown in the figure below.

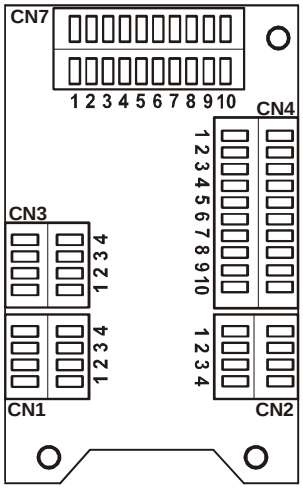


Figure 8 – Interface board

The assignment of the signals on the terminal blocks is shown in the tables below. Terminals indicated as ‘Reserved’ should not be connected.

CN3 Ethernet port	
1	RX-
2	RX+
3	TX-
4	TX+

CN1 Additional Signals			CN2 Power	
1	Enabling switch A (NO contact)		1	+24 VDC
2	Enabling switch A (NO contact)		2	Common
3	Enabling switch B (NO contact)		3	Reserved
4	Enabling switch B (NO contact)		4	PE

The Emergency Stop button is hardwired directly to the cable: the corresponding signals do not appear listed in the connectors.

***Note**: the wiring of the Emergency Stop button is to be considered a SELV circuit and it is intended **only** for connection to low voltage circuits (below 48 VDC).*

CN4 PLC Port	
1	CHA+
2	CHA-
3	CHB+
4	CHB-
5	+5V output (max 100 mA)
6	GND
7	RXD
8	CTS
9	TXD
10	RTS

***Note**: the signals in CN4, although fully functional, are not wired to the connection cable and are not available for applications. The information on CN4 is provided for reference only. The signals wired to the cable are listed in the table below.*

The wires in the cable are color-coded as shown in the table below.

Signal	Color	S mm^2	AWG (approx)
Power			
+24 VDC	Red	0.75	20
Common	Black	0.75	20
Ethernet Port			
TX+	White-Orange	0.5	24
TX-	Orange	0.5	24
RX+	White-Green	0.5	24
RX-	Green	0.5	24
Additional Signals			
Enabling Switch A	Blue-Black	0.75	22
Enabling Switch A	Blue	0.75	22
Enabling Switch B	Cyan-Black	0.75	22
Enabling Switch B	Cyan	0.75	22
Emergency Stop			
E-Stop 1 (NC)	Green	1	17
E-Stop 1 (NC)	Yellow	1	17
E-Stop 2 (NC)	Brown	1	17
E-Stop 2 (NC)	Orange	1	17

The internal layout of the communication cable is shown in the figure. Please note that the ferrite toroid is required for proper operation and should not be removed.

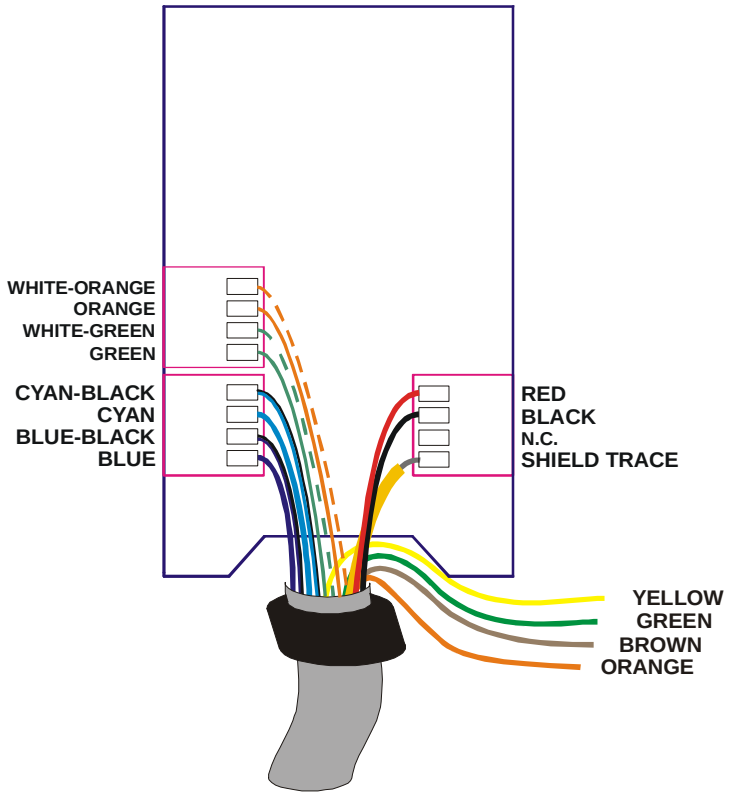


Figure 9 – Wiring layout

4.3 Profibus DP Communication - Type –0067 and –0069

ePALM type –0067 and –0069 have been designed exclusively for connection to the Profibus DP fieldbus. The products include a special cable suitable for Profibus DP communication.

The cable does not have a connector at its loose end as it is intended to be wired directly in the control cabinet.
The following groups of signals are available in the cable:

Profibus DP
Power
Emergency Stop button – two NC contacts
One three-positions enabling switch – two independent NO contacts

Please note that this product does not include connections for the following standard ports:
PLC Port,
Aux Port.

***Note**: this version of the product has a special connector for programming. See below for description*

Internally to the product all signals, excluding emergency stop, are wired to a detachable interface board with six terminal blocks.
The position of the terminal blocks and the numbering of the contacts are shown in the figure below.

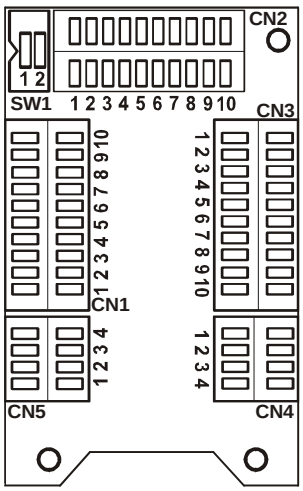


Figure 10 – Interface board

The assignment of the signals on the terminal blocks is shown in the tables below. Terminals indicated as ‘Reserved’ should not be used.

CN1	Profibus DP
1	Reserved
2	Reserved
3	Reserved
4	A
5	B
6	Reserved
7	Reserved
8	Reserved

9	Reserved
10	Reserved

CN5 Additional Signals			CN4 Power	
1	Enabling switch A (NO contact)		1	+24 VDC
2	Enabling switch A (NO contact)		2	Common
3	Enabling switch B (NO contact)		3	Reserved
4	Enabling switch B (NO contact)		4	PE

The Emergency Stop button is hardwired directly to the cable: the corresponding signals do not appear listed in the connectors.

***Note**: the connection of the Emergency Stop button is intended **only** for connection to low voltage circuits (below 48 VDC).*

The wires in the cable are color-coded according to the table below.

Signal	Color	S mm^2	AWG (approx)
Power			
+24 VDC	Red	0.75	21
Common	Black	0.75	21
Aux Port (Profibus)			
A	Green	0.5	24
B	Red	0.5	24
Additional Signals			
Enabling switch A	Blue-Black	0.75	21
Enabling switch A	Blue	0.75	21
Enabling switch B	Cyan-Black	0.75	21
Enabling switch B	Cyan	0.75	21
Emergency Stop			
Emergency Stop 1	Green	1	17
Emergency Stop 1	Yellow	1	17
Emergency Stop 2	Brown	1	17
Emergency Stop 2	Orange	1	17

The internal layout of the communication cable is shown in the figure below. Please note that the ferrite toroid is required for proper operation and should not be removed.

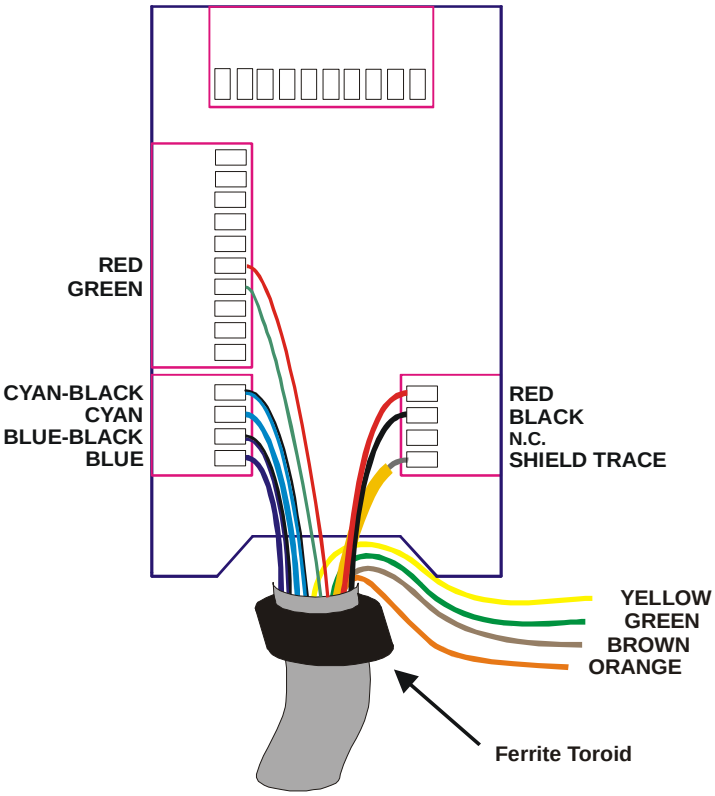


Figure 11 – Wiring layout

4.3.1 Termination switch

The ePALM has been designed only for connection at one of the two ends of the Profibus DP network.

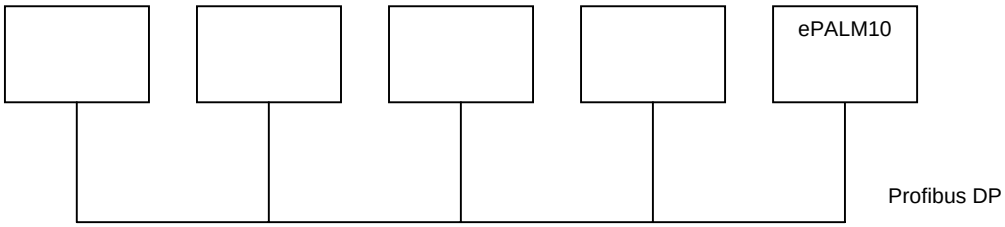


Figure 12 – Network topology

Profibus-DP requires termination of the bus at both end points; see the Profibus-DP specifications for details. The ePALM includes the bus terminator resistors. Make sure they are always switched on.

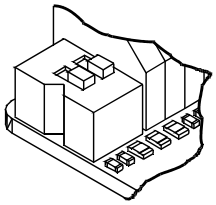
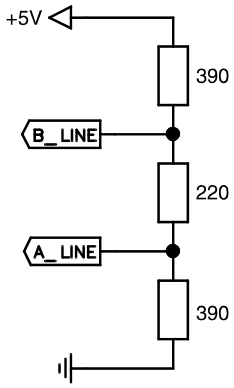
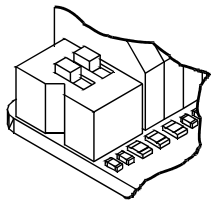
Termination	Setting	Switch Position
Open (not used)	Off	
	On (Default)	

Figure 13 – Termination resistors

4.3.2 Programming connector

On the back of the ePALM a RS-232 serial port is available for programming the device; the drawing below shows the position and the pin-out of the connector.

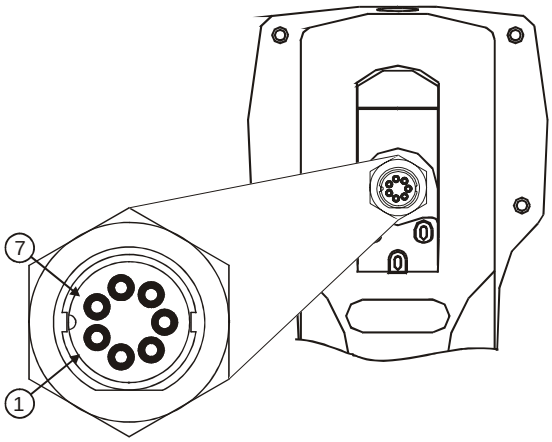


Figure 14 – Programming connector

Pin	Signal
1	NC
2	+5VDC out
3	RX
4	TX
5	RTS
6	CTS
7	GND

Use cable CA234 to connect the ePALM to a Personal Computer for programming. The cable diagram is shown in the figure below.

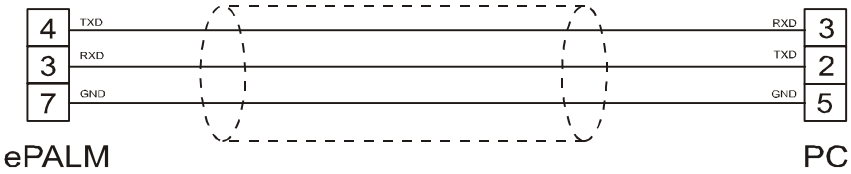


Figure 15 – Programming cable

5 Accessories

The following accessories are currently available for the ePALM10 products:

- hooks for hanging the handheld device. Hooks are available in two versions, AHOOK01 without magnet and AHOOK02 with a magnet.

The hook with the magnet is shown in the figure below.

Figure 16 – Hook with magnet

The hook with magnet cannot be used with type –0067.