AMI5000 Series - EtherCAT Remote Pendant - User Manual

D-000065– Issue V13

AMI5000 Series - EtherCAT Remote Pendant - User Manual

Some Important Links

Related Manuals and Brochures	*Related Documentation*
Sales and Support Contact Information	*Product, Sales and Service Enquiries*
For the latest copy of the manual visit us online	*Manuals*

Document Reference: D-000065– Issue V13

Effective:

Table of Contents

1. Notices

1.1 General Safety

Warning: The Remote Pendant contains 3 permanent magnets in the back of the case to hold the Pendant into the mounting cradle. People with pacemakers or similar medical implant devices should not hold the Pendant closer than 50mm (2 inches) from the medical device.

This manual and the warnings attached to the Remote Pendant only highlight hazards that can be predicted by ANCA Motion. Be aware they do not cover all possible hazards.

ANCA Motion shall not be responsible for any accidents caused by the misuse or abuse of the device by the operator.

Safe operation of these devices is your own responsibility. By taking note of the safety precautions and warnings in this manual you can help to ensure your own safety and the safety of those around you.

The following points must always be applied:

- Equipment operators must read the user manual carefully and make sure of the correct procedure before operating the Remote Pendant.
- If two or more persons are working together, establish signals so that they can communicate to confirm safety before proceeding to another step.
- Always make sure there are no obstacles or people near the devices during installation and operation. Be aware of your environment and what is around you.
- Take precautions to ensure that your clothing, hair, or personal effects (such as jewellery) cannot become entangled in the equipment.
- Do not remove the cover to access the inside of the Remote Pendant unless authorized
- Do not turn on any of the equipment without all safety features in place and known to be functioning correctly.
- Never touch any exposed wiring, connections, or fittings while the equipment is in operation.
- Do not apply any excessive mechanical force to the Remote Pendant, which may cause malfunction or failure.
- Keep the vicinity of the Remote Pendant clean and tidy.
- Never attempt cleaning or inspection during machine operation.
- Only suitably qualified personnel should install, operate, repair and/or replace this equipment.
- Be aware of the closest First Aid station.
- Ensure all external wiring is clearly labelled. This will assist you and your colleagues in identifying possible electrical safety hazards.
- Clean or inspect the equipment only after isolating all power sources.
- Install cables according to local legislation and regulations as applicable.

1.2 Terms and Abbreviations

EMC	Electromagnetic Compatibility
I/O	Input / Output
N/A	Not Applicable
GND	Ground
AC / DC	Alternating Current / Direct Current
CNC	Computer Numerical Control
OPB	Output Physical Boolean
IPB	Input Physical Boolean
IPI	Input Physical Integer
N/C	Pin is not connected
PD2	Pollution Degree 2

Table 1 Terms and Abbreviations

1.3 Trademarks

EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

2. Introduction

2.1 Purpose

This manual provides the required information for installing, commissioning, and operating the AMI5000 Remote Pendant. It has been written specifically to meet the needs of qualified Engineers and Machine Operators.

2.2 Features

The Remote Pendant has the following features:

- Compact and ergonomic design
- 16 tactile switches with LED indicators.
- Manual Pulse Generator (MPG).
- Feedrate Control Dial
- Dual channel Emergency Stop Switch
- EtherCAT® connectivity.
- Firmware Upgradeable.
- Dual channel Hold-To-Run switch. (Pendant Standard only)
- Warning Buzzer (Pendant Standard only)

2.3 Remote Pendant Product Label Explanation

The Remote Pendant has an identification label on the rear of the case. The label configuration is shown in Figure 2-1.

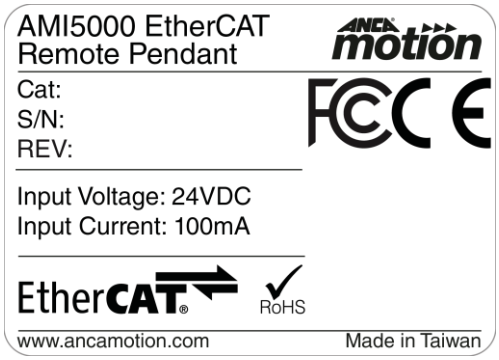


Figure 2-1 Remote Pendant Label

For any warranty work to be undertaken these labels must be readable and undamaged.

2.4 Product Order Code

The Remote Pendant Product Code is shown in Figure 2-2.

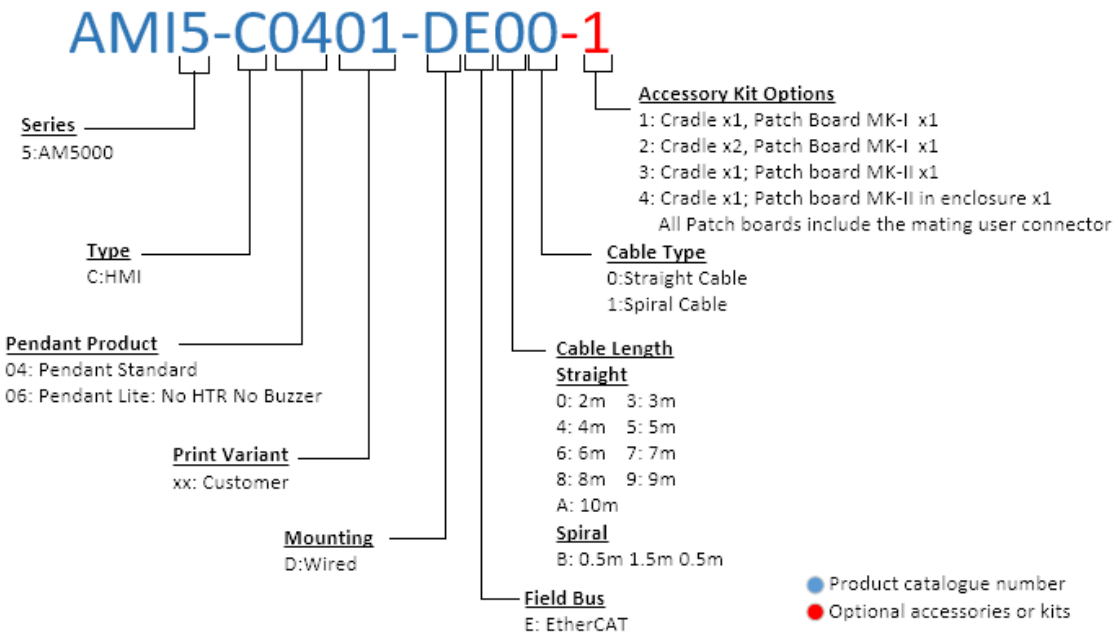


Figure 2-2 Remote Pendant Product Code

The order code suffix indicates optional accessory kits that can be ordered with the Remote Pendant. Leave this field blank if kits are not required.

3. Remote Pendant

3.1 Overview

The Remote Pendant has many useful features as shown in Figure 3-1. The figure shows the Pendant Standard features. The Pendant Lite does not include the Hold-to-run switch.

The front panel can be custom printed to meet the specific requirements of the user. For example, the following options are available.

a) Switches can be labelled with text or graphic symbols,

b) Custom colour choice for the switches and background,

c) Customer logo printed across the top for personalization

Contact sales for a customer order form if custom artwork is required.

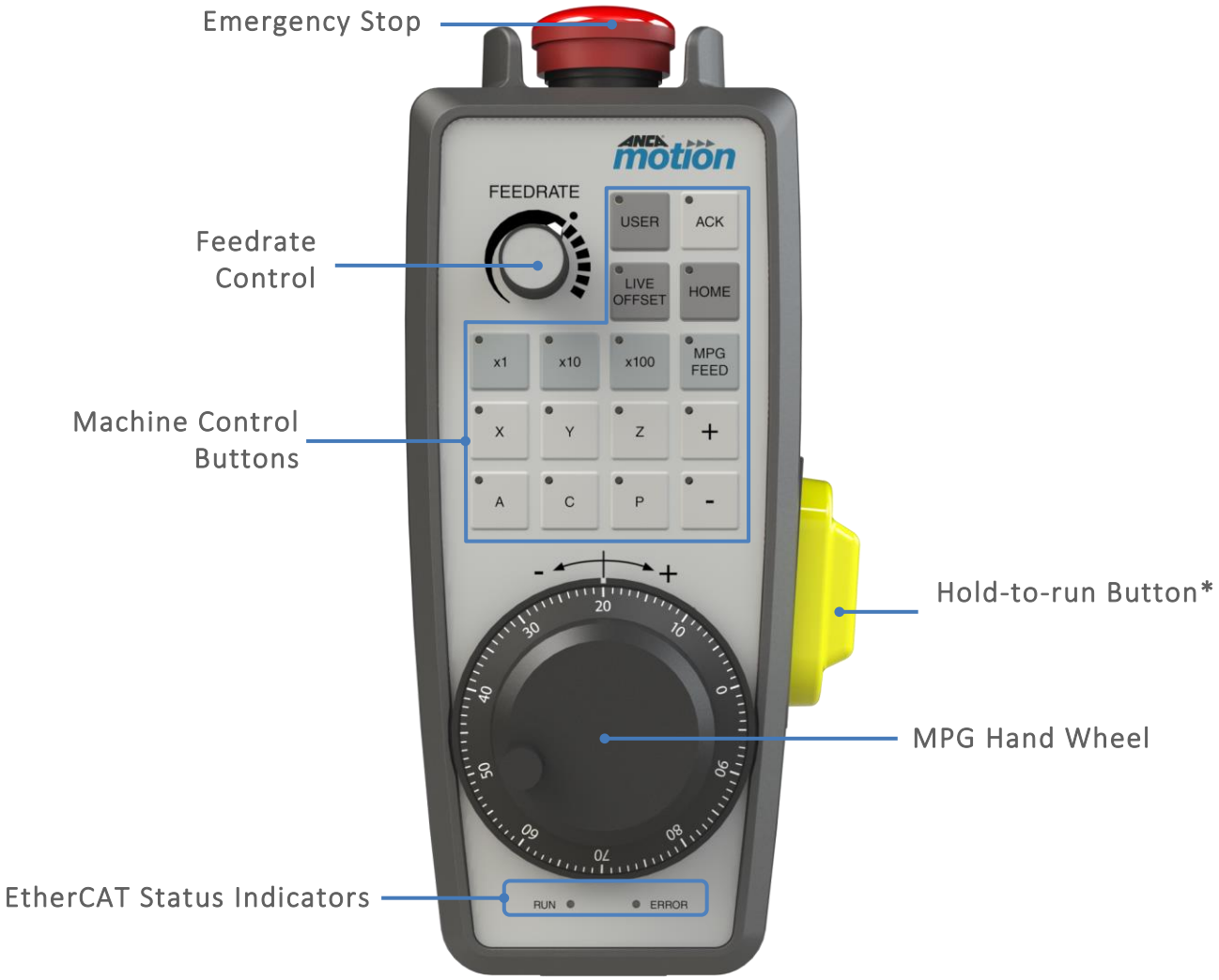


Figure 3-1 Overview Image of Remote Pendant

*Pendant Standard Only

3.2 Pendant (Standard and Lite) Versions

The Remote Pendant is a Human Machine Interface (HMI) which uses EtherCAT® to communicate to the control system allowing fast and flexible access for real-time control. It available in Standard or Lite configurations. The Standard version contains all the Pendant features and functions. The Lite version does not include the Hold-To-Run switch and Warning Buzzer.

Figure 3-2 shows the Hold-to-Run Switch on the “Standard” Pendant model and omitted on the “Lite” Pendant.

Figure 3-2 Remote Pendant Standard (left) and Remote Pendant Lite (right)

3.3 Remote Pendant Dimension Drawings

3.3.1 Pendant Standard

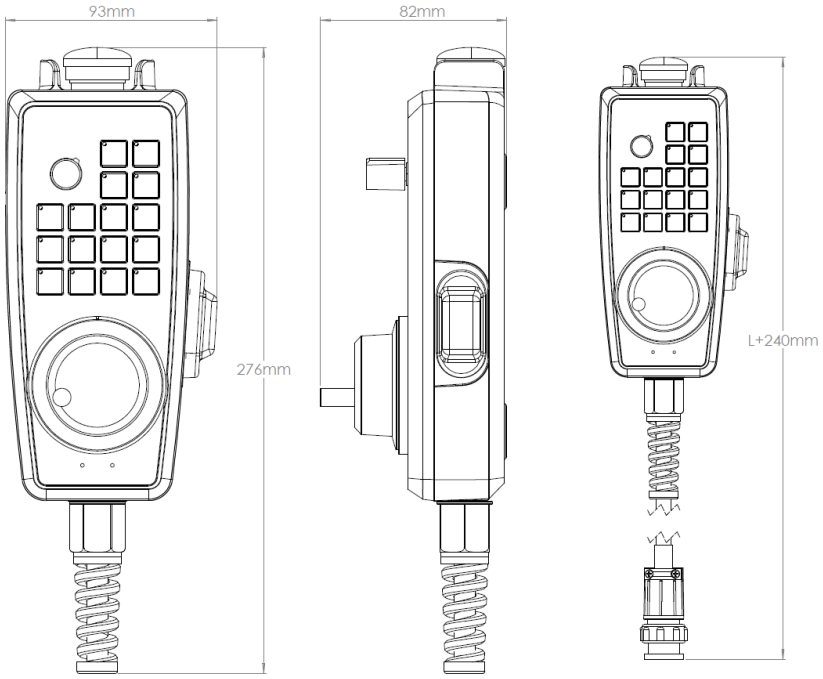


Figure 3-3 Remote Pendant Standard Dimensions (mm)

3.3.2 Pendant Lite

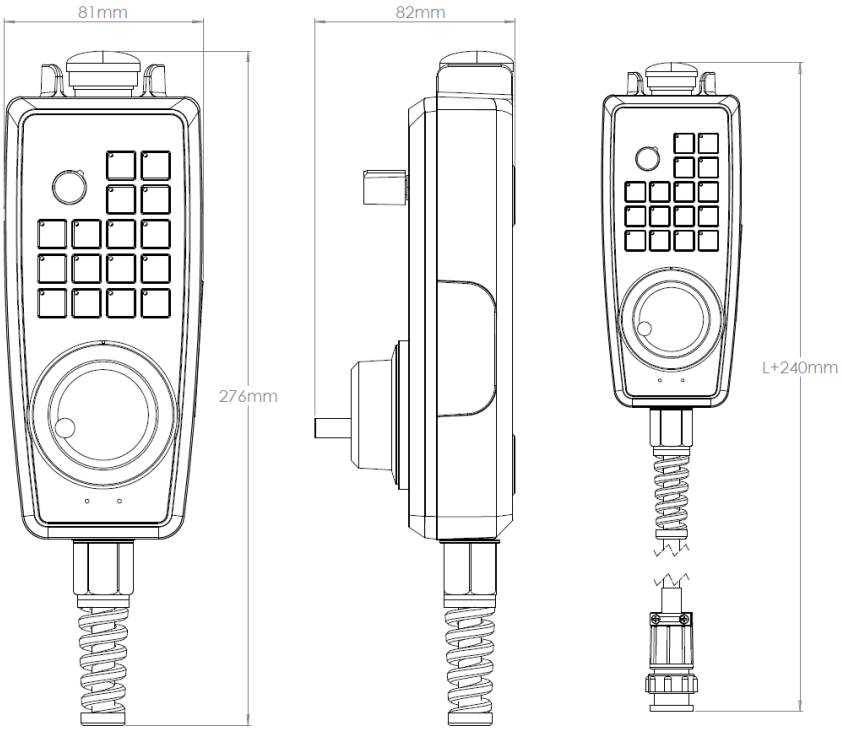


Figure 3-4 Remote Pendant Lit Dimensions (mm)

3.3.3 Pendant Standard (with cradle)

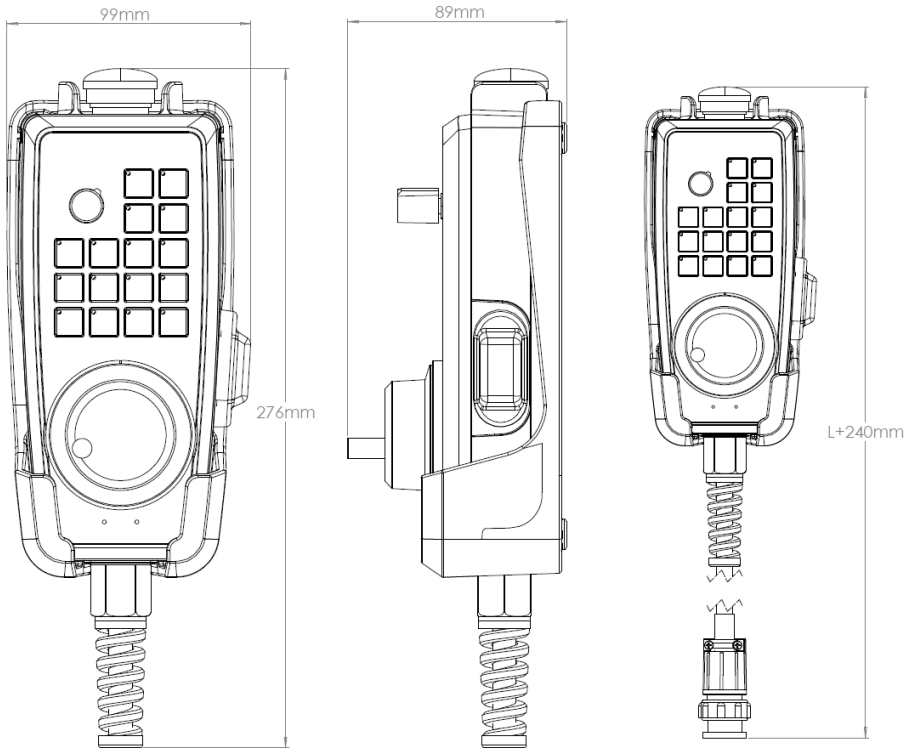


Figure 3-5 Remote Pendant Standard with Cradle Dimensions (mm)

3.3.4 Pendant Lite (with cradle)

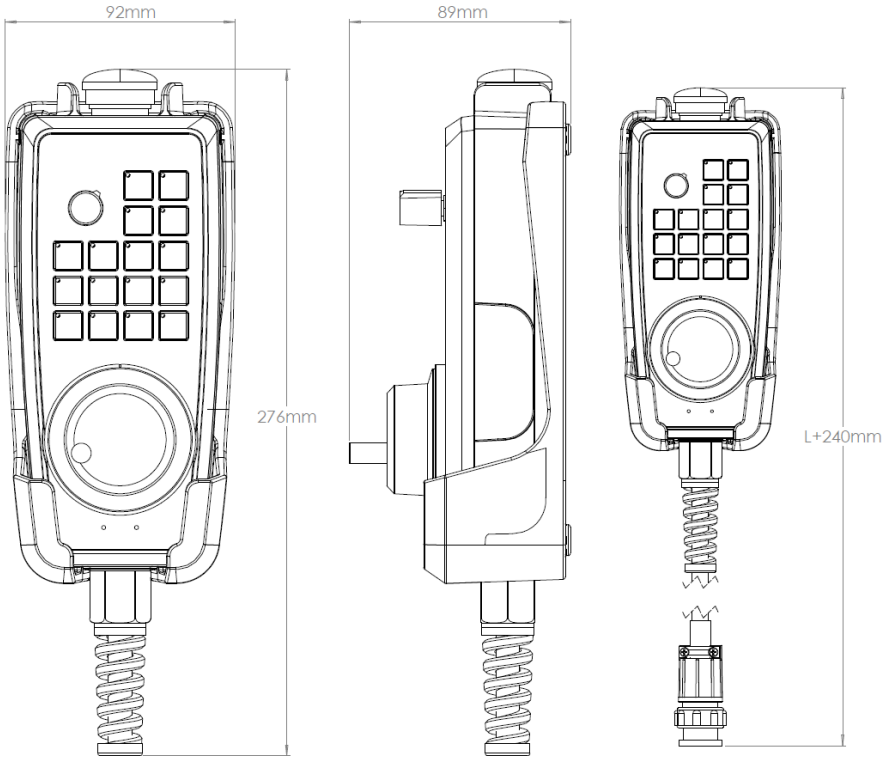


Figure 3-6 Remote Pendant Lite with Cradle Dimensions (mm)

4. Remote Pendant Patch Board

4.1 Overview

The Pendant interfaces with the Host System through the Pendant Patch Board. The Pendant connects to an 18-pin circular connector, X1. The patch board provides connectivity to customer 24Vdc power and safety actuators via X2. EtherCAT communications is via X3.

The Patch board is available with two system wiring options (Mk1 or Mk2). The Mk1 and Mk2 are available in direct mount and the Mk2 can be supplied in an enclosure with DIN rail mounts.

The difference between Mk1 and Mk2 is the system wiring for the Safe Actuators (Emergency Stop and Hold-to-Run). The system level wiring for these options is shown in Section 7.4.

4.2 Patch Board Mk1

The Patch Board Mk1 is shown in Figure 4-1. It is an open PCBA for panel mounting inside a sealed electrical enclosure. The Mk1 is designed for use with a safety PLC using test pulses for diagnostic coverage of the safe actuators. The electrical interface is shown in section 7.

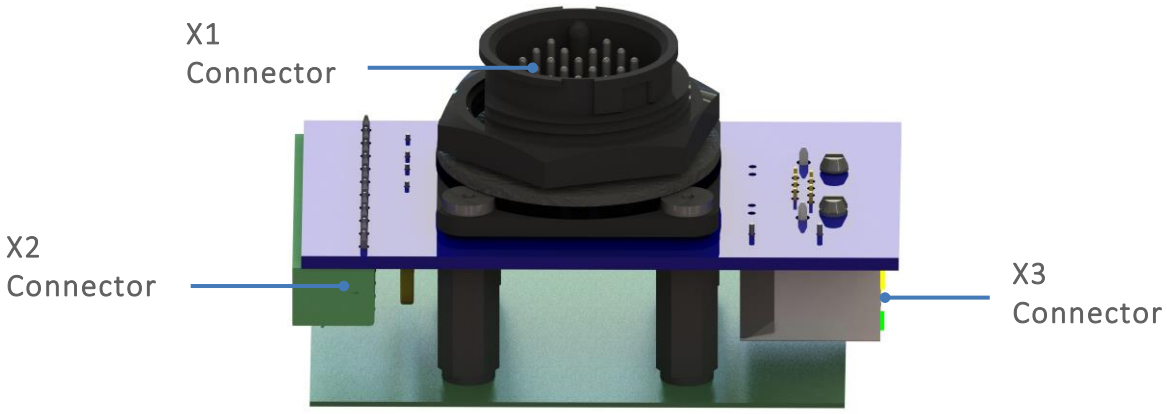


Figure 4-1 Pendant Patch Board Mk1

.

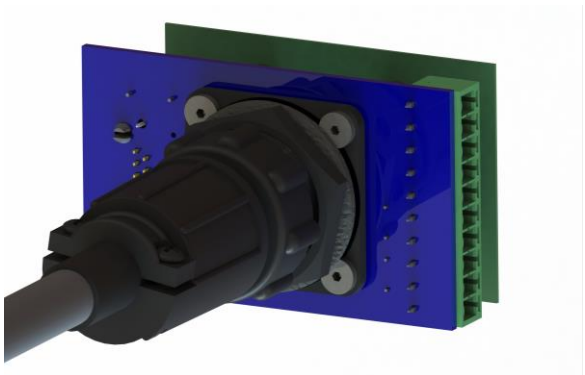


Figure 4-2 Patch Board with Wiring Plug

4.2.1 Patch Board Mk1 Dimensions

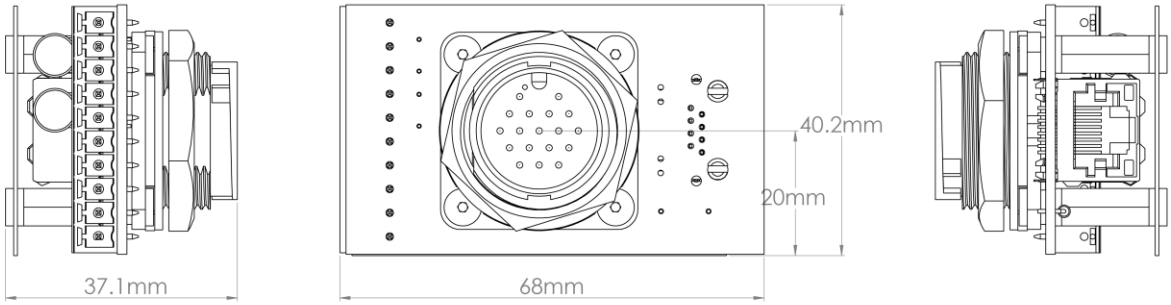


Figure 4-3 Patch Board Mk1 Dimensions (mm)

4.3 Patch Board Mk2

The Patch Board Mk2 is shown in Figure 4-4. It is designed for use with a safety PLC which requires individual connections to all terminals of the safe actuators. The electrical interface is shown in section 7. The Patch board Mk2 can be ordered in two versions.

a) An open PCBA for panel mounting inside a sealed electrical enclosure, or

b) A DIN-rail mount enclosure

Figure 4-4 Pendant Patch Board Mk2 and Mk2 enclosure

4.3.1 Patch Board Mk2 Dimensions

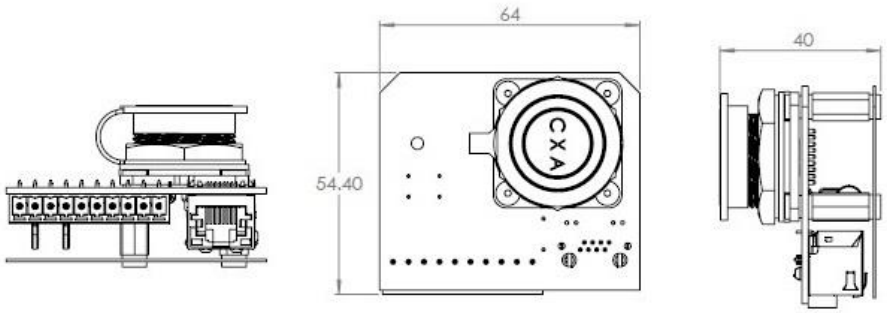


Figure 4-5 Patch Board Mk2 Dimensions (mm)

4.3.2 Patch Board Mk2 Enclosure Dimensions

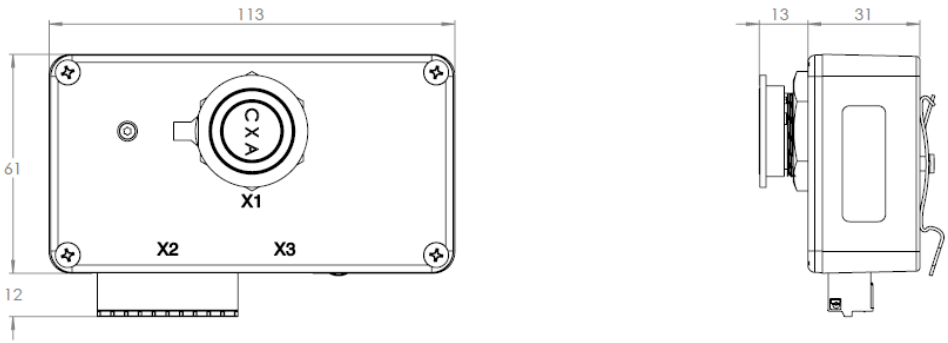


Figure 4-6 Patch Board Mk2 Enclosure Dimensions (mm)

4.4 Patch Board Mounting

4.4.1 Patch Board Mk1 and Mk2 Cut-out Pattern

The Mk1 and Mk2 Patch boards (non-enclosure type) must be mounted through a flat panel with a hole pattern as shown in Figure 4-7.

NOTE

This is not applicable to the Mk2 enclosure mounting.

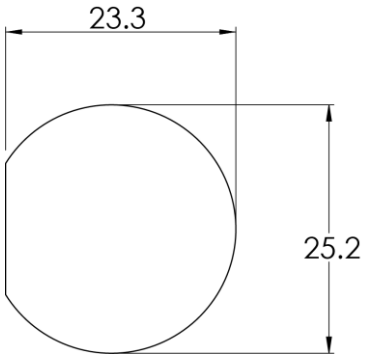


Figure 4-7 Remote Pendant Patch Board Mounting Hole Dimensions (mm)

4.4.2 Patch Board Mk2 Enclosure

The Mk2 Patch board enclosure is intended for DIN rail mounting using the clips on the rear of the enclosure.

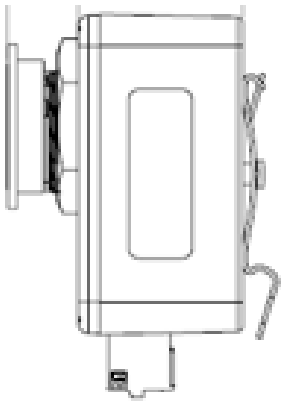


Figure 4-8 Remote Pendant Patch Board Mk2 DIN rail mount

5. Remote Pendant Cradle

5.1 Overview

The Pendant is **intended** to be mounted in the Pendant cradle when not in use to minimises the risk of accidental damage caused by dropping or kicking the Pendant cable to dislodge it when it is left outside of the cradle.

The cradle provides a feature to securely hold the base of the Pendant so that it cannot slide out but still allow for easy removal when required. Simply lift the Pendant slightly so it is clear of the bottom retaining feature.

The cradle has been designed for simple mounting to any flat surface by the 3 screws provided with the kit.

Figure 5-1 Remote Pendant Cradle

Figure 5-2 Pendant Standard (left) and Pendant Lite (right) located in the Cradle

5.1.1 Pendant Cradle Mechanical Drawing

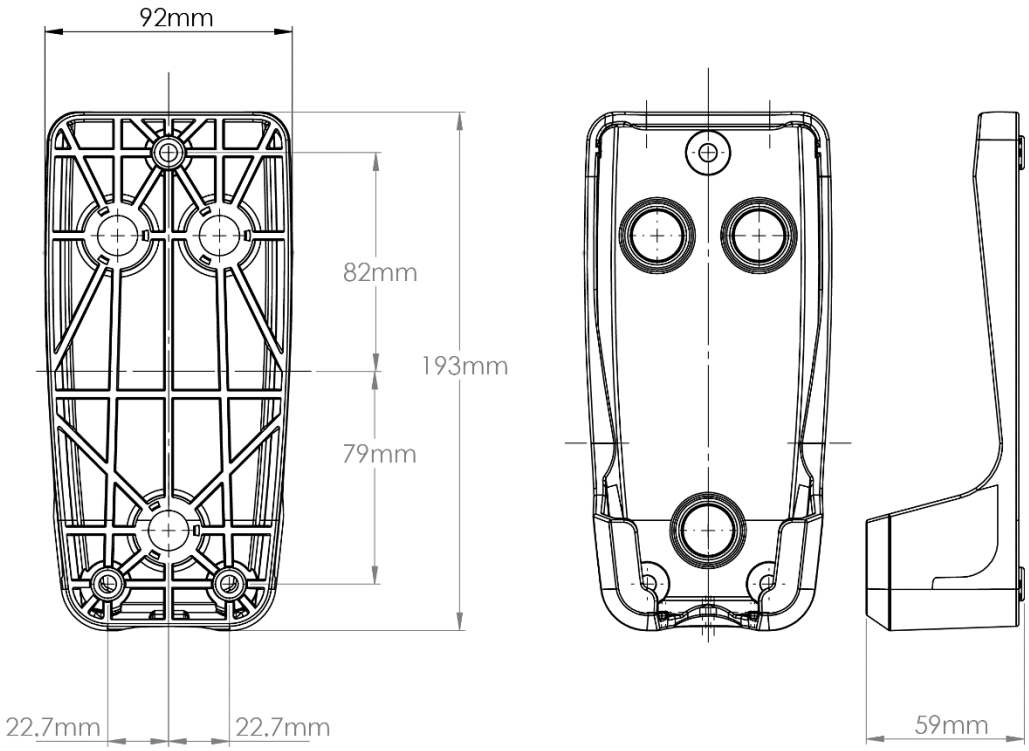


Figure 5-3 Remote Pendant Cradle Dimensions (mm)

5.1.2 Pendant Cradle Mounting Hole Pattern

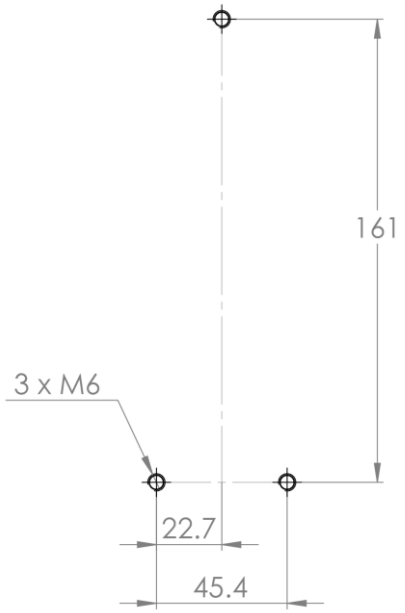


Figure 5-4 Remote Pendant Cradle Mounting Hole Pattern (mm)

6. Mechanical Installation

6.1.1 Mounting

- The Remote Pendant must be installed vertically as shown in Figure 6-1 or tilted backwards as shown in Figure 6-2. It must not be mounted tilted forward.
- Ensure 50mm of free air around the Remote Pendant.

The Remote Pendant must not be installed in the vicinity of other heat generating equipment which may cause the temperature applied to the Pendant to exceed the product rating.

6.2 Installation

6.2.1 Mounting the Remote Pendant Cradle

STEP 1

Drill three M6 holes to suit the mounting hole pattern for the cradle as shown in Figure 5-4.

STEP 2

Place the cradle so that the holes line up with the 3 drilled holes.

STEP 3

Secure the cradle to the equipment by fitting M6 screws into the mounting holes to complete the mounting. Tighten the three mounting screws to 4Nm.

STEP 4

Place the Pendant into the cradle. It will be held securely by 3 magnets.

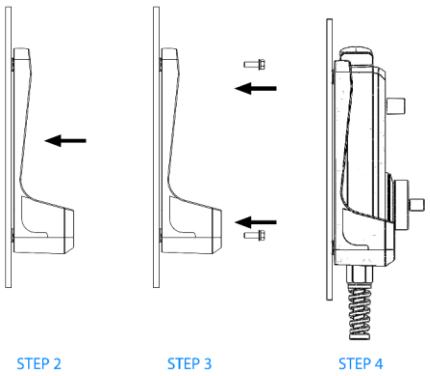


Figure 6-1 Mechanical Mounting of Remote Pendant Cradle

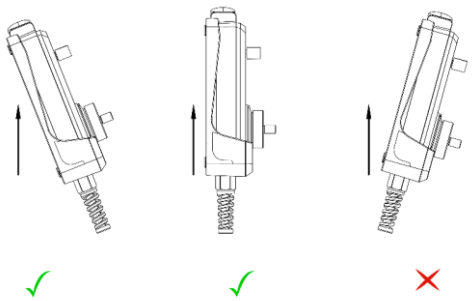


Figure 6-2 Allowable Mounting Angle is vertical or tilted backwards only

7. Electrical Installation

7.1 Introduction

This chapter contains information that is useful in planning the electrical installation for the Remote Pendant:

- Connector Overview
- Connection and wiring diagrams
- Communications wiring

The Remote Pendant should be installed by a person with the necessary skills and qualifications relating to the installation and commissioning of control equipment.

7.2 Connector Overview

7.2.1 Remote Pendant Patch Board Mk1

The Patch Board Mk1 connector designators are shown in Figure 7-1.

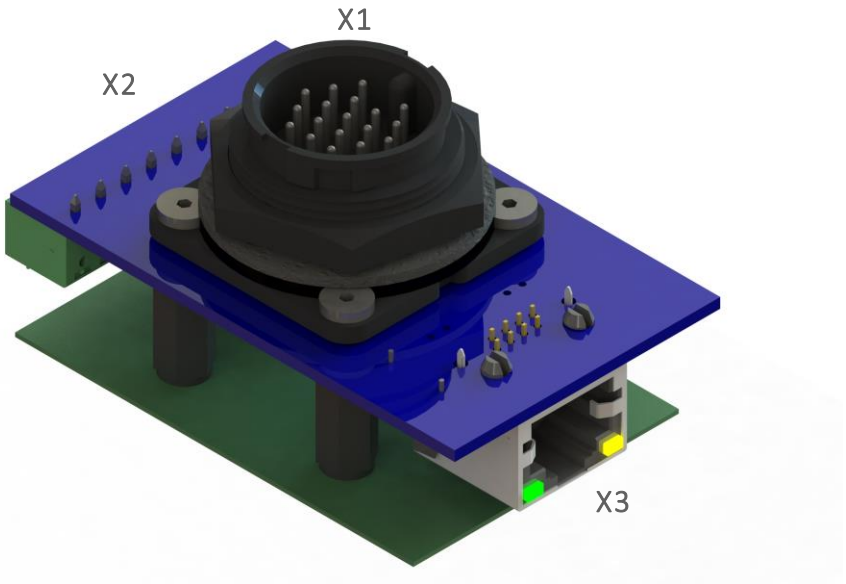


Figure 7-1 Pendant Patch Board Mk1 Connectors

7.2.2 Remote Pendant Patch Board Mk2

The Patch Board Mk2 connector designators are shown in Figure 7-2.

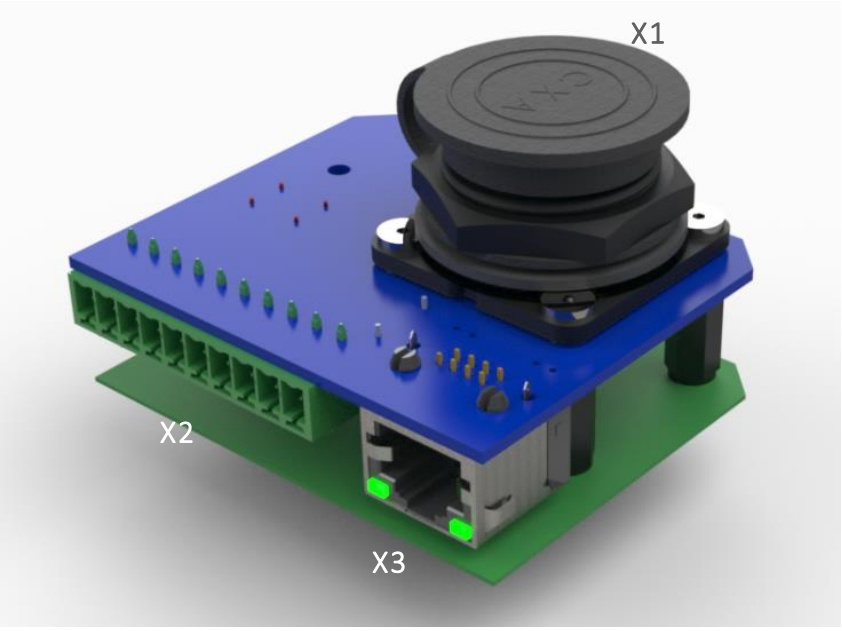


Figure 7-2 Pendant Patch Board Mk2 Connectors

The Mk2 Patch Board is also available in an optional DIN rail mounted enclosure. Note the engraving on the top shows the connector pin numbers for X2, pin 1 on left, to pin 10 on the right.

Figure 7-3 Pendant Patch Board Mk2 Enclosure Connectors

7.3 Connector Descriptions

The connectors for the Mk1 and Mk2 Patch boards are shown below.

7.3.1 X1 - Pendant Circular Connector

Connector	Designator	Function	Mating Connector
18 Pin Circular Connector	X1	Connects Pendant to Pendant Patch Board	Supplied with Pendant

Table 2 Connector X1

7.3.2 X2 - Power Supply and Safety Interface Connector

Connector	Designator	Function	Mating Connector
Phoenix Socket MC 1,5/10-G-3,81	X2	Provides Power and Safety Wiring to the Pendant	Phoenix FK-MCP 1,5/10-ST-3,81

Table 3 Connector X2

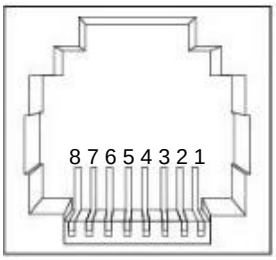
Figure 7-4 Pin location of X2 on Patch Board Mk1

Figure 7-5 Pin location of X2 on Patch Board Mk2

7.3.3 X3 – EtherCAT Connector

Connector	Designator	Function	Mating Connector
RJ45	X3	EtherCAT Cable	8P8C modular connectors

Table 4 Connector X3

Connector	Pin Number	Label
X3 	1	TX+
	2	TX-
	3	RX+
	4	N/C
	5	N/C
	6	RX-
	7	N/C
	8	N/C

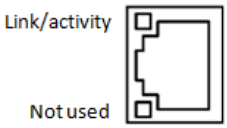


Table 5 EtherCAT connector Pin Assignment

The EtherCAT connector provides a green LED for EtherCAT Link/Activity to show the device has been linked or is active (receiving or transmitting data).

7.3.4 EtherCAT Cable

Standard EtherCAT cables are used to connect the Remote Pendant to other EtherCAT devices. The following types of cables must be used with 8P8C modular connectors. They are commonly referred to as “RJ45 shielded patch leads”.

Cable	Name	Cable Shield	Pair Shielding
Cat 5e or Above	F/UTP	Foil	None
	SF/UTP	Screen and Foil	None

- TP = Twisted pair
- U = Unscreened pairs
- F = Foil
- S = Screened (Braid type)

Either straight or crossover cables may be used. Recommended cables are listed in the accessories section of this manual.

7.4 Wiring Diagram

The Pendant cable is pre-wired with an 18-pin plug to connect to the Patch board, X1. The user must connect a 24VDC power supply and safety wiring to X2. The EtherCAT cable connects to X3.

Figure 7-6 shows a typical wiring diagram for the Remote Pendant with a Mk1 Patch board configured for safety PLC Test Pulses (TP1, TP2).

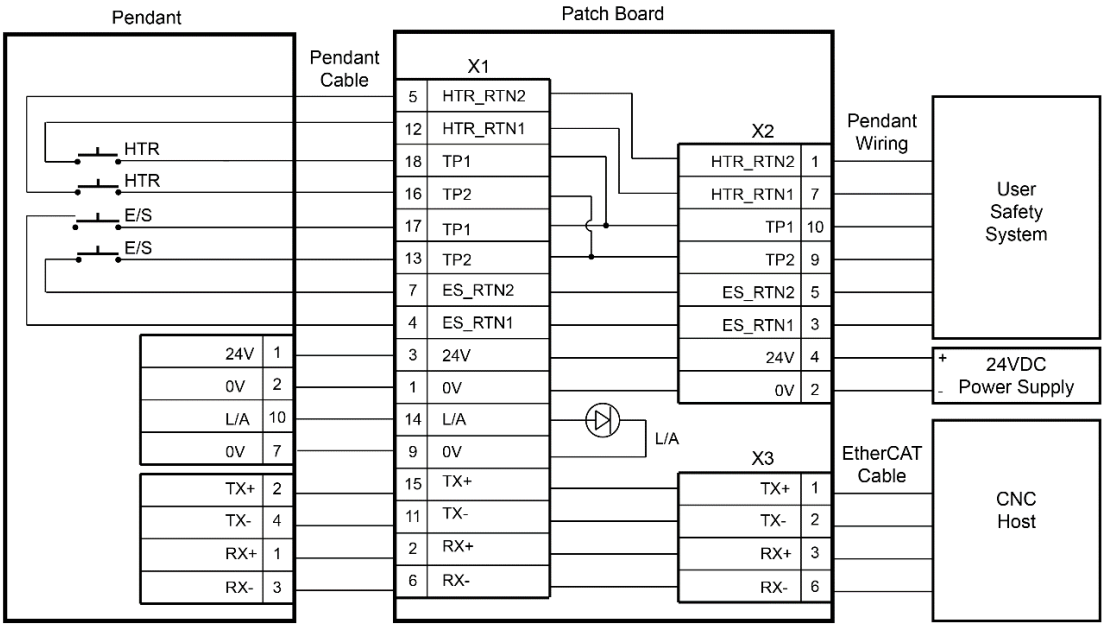


Figure 7-6 Wiring of the Remote Pendant Patch Board Mk1

Figure 7-7 shows the typical wiring diagram for the remote pendant system with a Mk2 Patch board with the Emergency Stop and Hold-to-run switches wired to a safety PLC

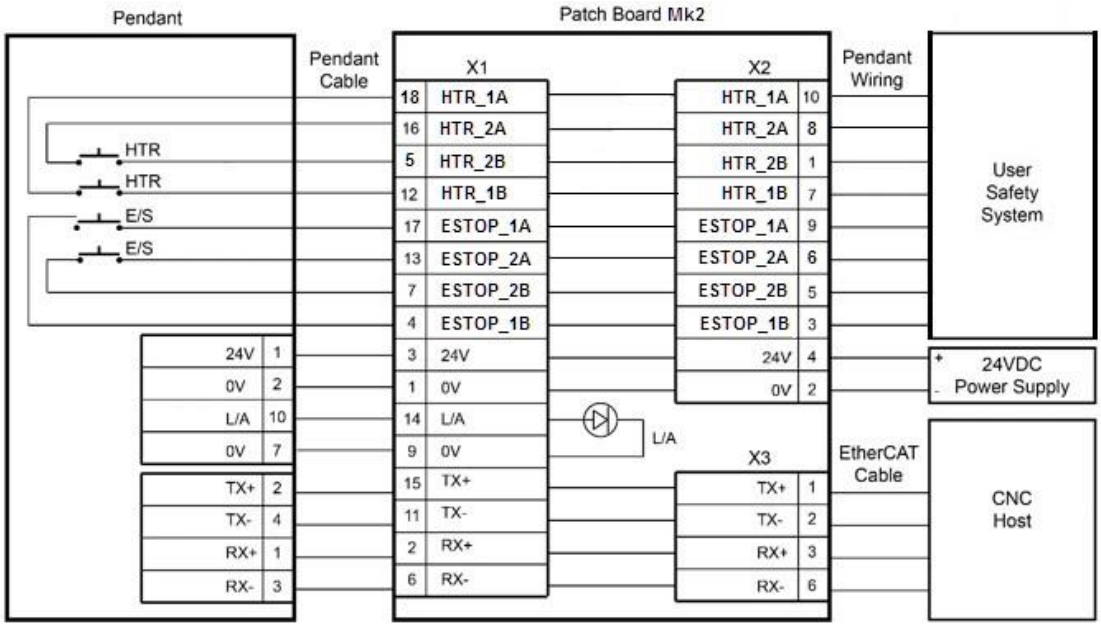


Figure 7-7 Wiring of the Remote Pendant Patch Board Mk2

8. Communication

8.1 EtherCAT®1

The Remote Pendant supports communication using the EtherCAT protocol. This protocol provides deterministic communication over a standard 100Mbit/s (100Base-TX) Fast Ethernet (IEEE802.3) connection.

The Remote Pendant functions as an EtherCAT slave device with an INPUT port (RJ45) located on the Patch Board. Note that there is no OUTPUT port (RJ45) and hence, it is intended to be the last EtherCAT slave in the network to minimise ethernet wiring and connections.

The Remote Pendant can operate in an EtherCAT system with a minimum Master update rate of 1ms.

8.2 Third Party EtherCAT Masters

The Remote Pendant has been tested with 3rd party EtherCAT Masters. However, special attention is required when a Master other than ANCA Motion's Master is used.

According to the EtherCAT standard [2], an EtherCAT Master should not check the device Revision Number matches the configured Revision Number unless the ESI-file explicitly requests it. As the Remote Pendant ESI-file does not contain this request, the EtherCAT Master should not raise an error when there is a Revision Number mismatch between the configuration and the connected device.

8.3 ESI File

The Remote Pendant ESI file can be downloaded from the ANCA Motion website.

https://motion.anca.com/Products/User-Interface/User-Interface/Remote-Pendant

1 EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH.
2 Page 28 in ETG.2000 S (R) V1.0.12

9. Safety Devices

9.1 Safety Devices on the Pendant

The Remote Pendant ***Standard*** contains two safety actuators.

- Emergency stop switch is located at the top of the pendant, and
- Hold to run switch is located on the side of the pendant.

The Remote Pendant ***Lite*** contains only one safety actuator.

- Emergency stop switch is located at the top of the pendant.

The safety actuators are pre-wired from the Pendant to the patch board via the Pendant cable. The user can connect to these devices at the connector marked X2 on the patch board. The Pendant does not monitor or have any connections to these safety switches. They are hard-wired to the Patch Board without any other connectivity.

9.2 Safety Standards and Risk Assessment

When using the Emergency Stop and Hold-to-Run Switch in a safety related part of a control system, use these actuators properly in accordance with the safety standards and regulations of the actual machine, system, and application, of the country or region where the Pendant is used. Also, perform a risk assessment prior to using these safety actuators on the Pendant.

Do not disable the safety functions of the Emergency Stop and Hold-to-Run Switch by using tape, elastic band, or other method otherwise the loss of the safe function may cause serious accidents.

9.3 B10d and MTTFd

The machinery safety standard ISO 13849 is driving the need to determine either MTTFd values or B10d values for equipment and components. MTTFd is the mean time to dangerous failure, and this value is needed for all equipment that is part of a safety-related control system in accordance with ISO 13849.

The B10d value for the Emergency-Stop and Hold-to-run actuators is provided in the product specifications section of this user manual.

If multiple safety components are wired in series, the Performance Level to EN ISO 13849-1 will be reduced due to the restricted error detection under certain circumstance. The entire concept of the control system, in which the safety component is integrated, must be validated to EN ISO 13849-2.

9.4 Emergency Stop Application Information

The Emergency Stop switch is shown in Figure 9-1Figure 9-1. The manufacturer is OMRON, model A165E-S-03U. The switch conforms to IEC 60947-5-5.

Two switch contacts are provided so that if one contact fails, the other contact will still allow the safety PLC to disable machine operation.

Figure 9-1 Emergency Stop Switch

To ensure a high level of system safety, connect the two contacts of the Emergency Stop switch to a disagreement detection circuit (e.g. safety relay module). (ISO 13849-1/EN954-1).

Perform a risk assessment for the shape and structure of the mounting area, where the enabling switch is installed, to prevent unintended operation of the enabling switch.

The model number detail is shown in Figure 9-2. The model A165E-S-03U is a one-piece construction which is suitable for normal and low current applications. The ratings are shown in Table 6.

Model Number Legend (Completely Assembled).....

1 2 3

A165E-LS-24D-02

IP65 (Oil-resistant)

1. Operation Unit Shape and Functions

Code	Functions		Pushbutton
S	Non-lighted	Push-lock, turn-reset	30 dia.
LS	Lighted		
M	Non-lighted		40 dia.
LM	Lighted		

2. Light Source

Code	Type	Operation voltage	Rated voltage
None	Non-lighted	---	---
24D	LED	24 VAC/ VDC±5%	24 VAC/ VDC

Note: Models with separate construction (SPST-NC and DPST-NC) are for normal loads only. One-piece models (TPST-NC) are for either normal loads or microloads.

3. Contacts

Code	Description
01	SPST-NC
02	DPST-NC
03U	TPST-NC ✻

✻ TPST-NC models have one-piece construction with the contact unit. Only non-lighted models are available.

Figure 9-2 Emergency Stop Switch – Model Details

Specifications

Certified Standard Ratings

UL508, CSA C22.2 No.14, CCC(GB14048.5)

Models with One-piece Construction

Rated voltage	Resistive load
125 VAC 250 VAC 30 VDC	1 A 0.5 A 1 A

TÜV(EN60947-5-1)

Models with One-piece Construction

Rated voltage	Resistive load
250 VAC 30 VDC	0.5 A 1 A

Certified Standards

Certification body	Standards	File No.
UL ✻	UL508, CSA C22.2 No.14	E41515
TÜV SÜD	EN60947-5-1 (certified direct opening), EN60947-5-5	Consult your OMRON representative for details.
CQC (CCC)	GB14048.5	2003010303070678

✻ Certification for CSA C22.2 No. 14 has been obtained. Separate construction models have been certified for the Switch Unit.

Switch Ratings

Models with One-piece Construction

Rated voltage	Resistive load
125 VAC 250 VAC 30 VDC	1 A 0.5 A 1 A

Note: Minimum applicable load: 5 VDC, 1 mA

Table 6 Emergency Stop Switch – Specifications and Ratings

9.5 Hold-to-Run Application Information

The Hold-To-Run switch is shown in Figure 9-3. The manufacturer is IDEC, model HE6B-M211Y. This is a 3-position enabling switch designed for OFF-ON-OFF operation. The switch does not turn ON while returning from position 3 (OFF) to position 1 (OFF). IEC 60204-1 (2005), 10.9 and IEC 60947-5-8 (2006), 7.1.9, Note 2.

Two contacts are provided in this 3-position enabling switch so that if one contact fails, the other contact will still allow the safety PLC to disable machine operation.

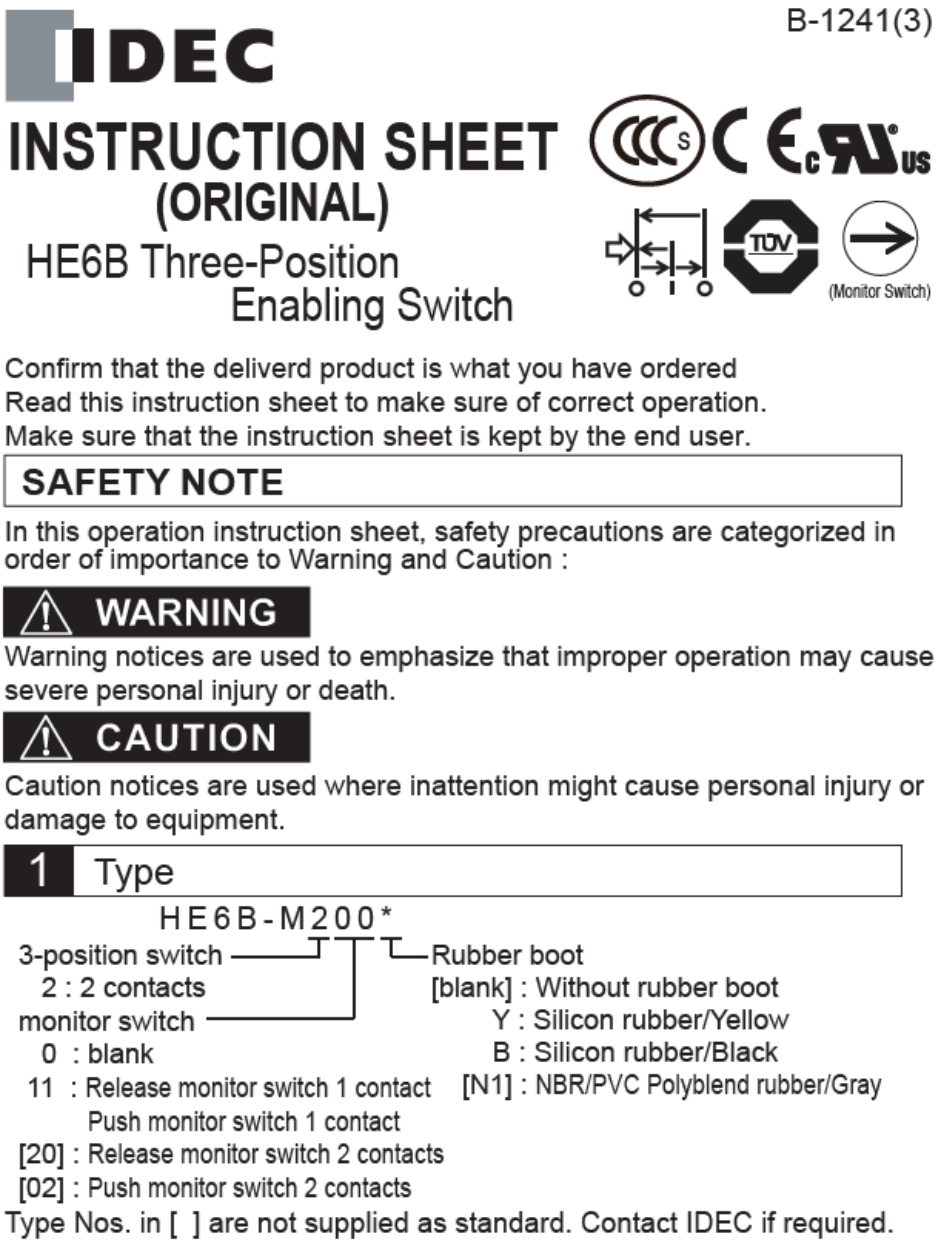
Figure 9-3 Hold-To-Run Switch

The Hold-to-Run, 3 position enabling switch on the Remote Pendant is used to enable the machine operation in a hazardous area only when pressed to position 2 (i.e. pressed for 3 mm). Systems must be designed to enable machine operation when the enabling switch is in position 2 only.

To ensure a high level of system safety, connect the two contacts of the Hold-to-Run Switch to a disagreement detection circuit (e.g. safety relay module). (ISO 13849-1/EN954-1) because the two contacts are designed to operate independently, pressing the edge of a button turns on one contact earlier than the other contact causing a delay in operation. To avoid this, always press the centre of the button.

Perform a risk assessment in actual applications as strong force may be applied to a 3-position enabling switch when depressed to position 3.

Perform a risk assessment for the shape and structure of the mounting area, where the enabling switch is installed, to prevent unintended operation of the enabling switch.



B-1241(3)

IDEC

INSTRUCTION SHEET
(ORIGINAL)

HE6B Three-Position
Enabling Switch

(Monitor Switch)

Confirm that the deliverd product is what you have ordered
Read this instruction sheet to make sure of correct operation.
Make sure that the instruction sheet is kept by the end user.

SAFETY NOTE

In this operation instruction sheet, safety precautions are categorized in order of importance to Warning and Caution :

⚠ WARNING

Warning notices are used to emphasize that improper operation may cause severe personal injury or death.

⚠ CAUTION

Caution notices are used where inattention might cause personal injury or damage to equipment.

1 Type

HE6B-M200*

3-position switch
2 : 2 contacts

monitor switch
0 : blank
11 : Release monitor switch 1 contact
Push monitor switch 1 contact
[20] : Release monitor switch 2 contacts
[02] : Push monitor switch 2 contacts

Rubber boot
[blank] : Without rubber boot
Y : Silicon rubber/Yellow
B : Silicon rubber/Black
[N1] : NBR/PVC Polyblend rubber/Gray

Type Nos. in [ ] are not supplied as standard. Contact IDEC if required.

Figure 9-4 Hold-To-Run Switch – Model Details

2 Specifications and Ratings

Applicable Standards		IEC60947-5-1, EN60947-5-1 IEC60947-5-8, EN60947-5-8, GS-ET-22 (TÜV approved) UL508,CSA C22.2 No.14,GB14048.5			
	Standards for Use	ISO12100/EN ISO12100,IEC60204-1/ EN60204-1, ISO11161/EN ISO11161, ISO10218-1/EN ISO10218-1, ANSI/RIA/ISO10218-1, ANSI/RIA R15.06, ANSI B11.19, ISO13849-1/EN ISO13849-1			
Applicable Directives		Low Voltage Directive (2006/95/EC) Machinery Directive (2006/42/EC)			
Operating Condition	Operating Temperature	-25 to +60°C(no freezing) (rubber boot material: without rubber boot/ silicon rubber) -10 to +60°C(no freezing) (rubber boot material: NBR/PVC polyblend)			
	Operating Humidity	45 to 85%RH (no condensation) (IEC60068-2-30)			
	Storage Temperature	-40 to +80℃ (no freezing)			
	Pollution Degree	2 (inside the panel/ terminal side) 3 (outside the panel/ operator side)			
	Altitude	2000m maximum			
Impulse Withstand Voltage (Uimp)		1.5kV(3-position Switch)/2.5kV(Monitor Switch)			
Rated Insulation Voltage		125V(3-position Switch)/250V(Monitor Switch)			
Thermal Current <Ith>		3A(3-position Switch/Monitor Switch)			
Contact Ratings (Reference Values) < Ue , Ie >			30V	125V	250V
	3-position Switch	AC	Resistive load(AC-12)	-	0.5A	-
			Inductive load(AC-15)	-	0.3A	-
		DC	Resistive load(DC-12)	1A	-	-
			Inductive load(DC-13)	0.7A	-	-
	Release/Push Monitor Switch	AC	Resistive load(AC-12)	-	2.5A	1.5A
			Inductive load(AC-15)	-	1.5A	0.75A
		DC	Resistive load(DC-12)	2.5A	1.1A	0.55A
			Inductive load(DC-13)	2.3A	0.55A	0.27A
Operation Frequency		1200 operations/hour			
B_{10d}		2,000,000 (EN ISO 13849-1 Annex C Table C.1)			
Mechanical Durability		Position 1⇒2⇒1：1,000,000 operations min Position 1⇒2⇒3⇒1：100,000 operations min			
Electrical Durability		100,000 operations min. (Rated operating load) 1,000,000 operations min. (AC/DC 24V 100mA)			

Shock Resistance	Operating Extremes：150m/s²	
	Damage Limits：500m/s²	
Vibration Resistance	Operating Extremes：5 to 55 Hz, half amplitude 0.5 mm	
	Damage Limits：16.7 Hz, half amplitude 1.5 mm	
Degree of Protection	IP40	Without rubber boot (IEC60529)
	IP65	With rubber boot (IEC60529)
Direct Opening Force	40N minimum (Release/Push monitor switch)	
Direct Opening Travel	Release monitor switch : 0.9mm minimum	
	Push monitor switch : 4.0mm minimum	
Conditional short-circuit Current	50A (125V) : 3-position switch 50A (250V) : monitor switch	
Short-Circuit Protective Device	125V AC,10A Fuse (IEC60127-4) : 3-position switch 250V AC,10A Fuse (IEC60127-4) : monitor switch	
Actuator Strength	250 N minimum (when pressing the entire surface of the botton)	
Weight	Approx. 14g (without rubber boot) Approx. 17g (with a rubber boot)	

Ratings approved by safety agencies

(1) TÜV rating	3-position switch	AC-12 125V / 0.5A DC-12 30V / 1A DC-13 30V / 0.7A
	Monitor switch	AC-15 250V / 0.75A DC-13 125V / 0.22A DC-13 30V / 2.3A
(2) UL , c-UL rating	3-position switch	AC 125V / 0.5A Resistive DC 30V / 1A Resistive DC 30V / 0.7A Pilot Duty
	Monitor switch	AC 250V / 0.75A Pilot Duty AC 250V / 0.5A General Use DC 30V / 2.3A Pilot Duty DC 30V / 1A General Use
(3) CCC rating	3-position switch	AC-12 125V / 0.5A DC-12 30V / 1A DC-13 30V / 0.7A
	Monitor switch	AC-15 250V / 0.75A DC-13 125V / 0.22A DC-13 30V / 2.3A

* For use on a flat surface of a Type 1 Enclosure
* For use in Pollution Degree 2 Environment
* Maximum Surrounding Air Temperature Rating 60℃

Table 7 Hold-To-Run Switch – Specifications and Ratings

10. Installation checklist for the Remote Pendant

10.1 Introduction

This chapter contains a checklist for the end user to implement and refer too before powering up the pendant.

10.2 Installation Checklist

	The installation location satisfies the requirements in chapter 6.
	The supply voltage is within the operating limits of operation of the Remote Pendant.
	The wiring is connected to the appropriate terminals and the conductors are secured.
	The appropriate power supply fuses have been installed.
	All wiring conforms to applicable regulations and standards
	No physical damage is present to any component within the system
	All equipment connected to the Remote Pendant is ready for start-up
	A risk assessment has been completed on the entire machine and is considered by the user to be safe enough for operation.

Table 8 Installation checklist

11. Configuring the Remote Pendant

11.1 Introduction

This chapter contains configuration data for the Remote Pendant. It also includes information on the Frame Packet Mapping.

11.2 Frame Packet Mapping

11.2.1.1 Inputs

The following table describes the input frame mapping from the Remote Pendant to an EtherCAT master:

INPUT TYPES	ACTIVATED	NOT ACTIVATED	DESCRIPTION	UNIT	SIZE
Tactile Switches	Press -1 (logic)	Release -0 (logic)	n/a	n/a	16 bits
Temperature	n/a	n/a	Internal temperature	C°	8 bits
Analog (Pot)	n/a	n/a	Feedrate control	n/a	8 bits
MPG	n/a	n/a	Quadrature encoder	n/a	32 bits

Table 9 Input Types

The Input Frame Packet for the Remote Pendant is detailed in the following table:

Remote Pendant Input Frame Packet (Slave→ Master)							
0	1	2	3	4	5	6	7
IPB 1 - 8	IPB 9 - 16	IPI1	IPI2	IPI3		IPI3	
SW1-SW8	SW9-SW16	Temperature	Analog (Pot)	MPG (lowest byte)	MPG (2nd low byte)	MPG (2nd high byte)	MPG (highest byte)

Table 10 Input Types

11.2.1.1.1 Booleans Inputs

IP#	Remote Pendant Button Label	Frame Packet (Boolean Inputs)
IPB1 - SW1	USER	Boolean Base + 1
IPB2 - SW2	ACK	Boolean Base + 2
IPB3 - SW3	LIVE OFFSET	Boolean Base + 3
IPB4 - SW4	HOME	Boolean Base + 4
IPB5 - SW5	x1	Boolean Base + 5
IPB6 - SW6	x10	Boolean Base + 6
IPB7 - SW7	x100	Boolean Base + 7
IPB8 - SW8	MPG FEED	Boolean Base + 8
IPB9 - SW9	X	Boolean Base + 9
IPB10 - SW10	Y	Boolean Base + 10
IPB11 - SW11	Z	Boolean Base + 11
IPB12 - SW12	+ (Plus)	Boolean Base + 12
IPB13 - SW13	A	Boolean Base + 13
IPB14 - SW14	C	Boolean Base + 14
IPB15 - SW15	P	Boolean Base + 15
IPB16 - SW16	- (minus)	Boolean Base + 16

Table 11 Boolean inputs from Remote Pendant micro controller to the EtherCAT master.

Example:

If the base for a Remote Pendant is 700, COLLET Button Press = IPB701. Note the Button Label text provided in this manual is one example and other options are available.

11.2.1.1.2 Integers Inputs

IP#	Remote Pendant Integer Output	Frame Packet (Integer)
IPI1	Temperature	Integer Base + 1
IPI2	Feedrate (Pot)	Integer Base + 2
IPI3	MPG	Integer Base + 3

Table 12 Integer Inputs from Remote Pendant micro controller to the EtherCAT master.

Example:

If the base for a Remote Pendant is 700, Feedrate Pot = IPI702

11.2.1.2 Outputs

The following table details the output frame mapping from the EtherCAT master to the Remote Pendant.

OUTPUT TYPES	ACTIVATED	NOT ACTIVATED	DESCRIPTION	SIZE
LEDS	LIGHT ON-1 (logic)	LIGHT OFF-0 (logic)	n/a	bit
Buzzer	BUZZER ON-1 (logic)	BUZZER OFF-0 (logic)	Activate/Deactivate buzzer	bit

Table 13 Output Types

The Output Frame packet for the Remote Pendant is shown in the following table:

Remote Pendant Output Frame Packet (Master→Slave)		
0	1	2
OPB 1 - 8	OPB 9 - 16	OPB17-OPB24
LEDs		Buzzer, LEDs

Table 14 Output Frame Packet from Master to Slave.

11.2.1.2.1 Boolean Outputs

OP#	Front Panel Label	Frame Packet (Boolean Output)
OPB1	USER LED	Boolean Base + 1
OPB2	ACK LED	Boolean Base + 2
OPB3	LIVE OFFSET LED	Boolean Base + 3
OPB4	HOME LED	Boolean Base + 4
OPB5	x1 LED	Boolean Base + 5
OPB6	x10 LED	Boolean Base + 6
OPB7	x100 LED	Boolean Base + 7
OPB8	MPG FEED LED	Boolean Base + 8
OPB9	X LED	Boolean Base + 9
OPB10	Y LED	Boolean Base + 10
OPB11	Z LED	Boolean Base + 11
OPB12	+ (Plus) LED	Boolean Base + 12
OPB13	A LED	Boolean Base + 13
OPB14	C LED	Boolean Base + 14
OPB15	P LED	Boolean Base + 15
OPB16	- (minus) LED	Boolean Base + 16
OPB17	Buzzer	Boolean Base + 17
OPB18	All LEDs	Boolean Base + 18
OPB19	Reserved	Boolean Base + 19
OPB20	Reserved	Boolean Base + 20
OPB21	Reserved	Boolean Base + 21
OPB22	Reserved	Boolean Base + 22
OPB23	Reserved	Boolean Base + 23
OPB24	Reserved	Boolean Base + 24

Table 15 Boolean Outputs from ECAT Master to Remote Pendant.

12. Commissioning and Testing

12.1 Introduction

The software tools provided within ANCA Motion AMCORE will provide for commissioning and diagnosis. An XML file will be provided to the end user or it can be download from the ANCA motion web site.

12.1.1 Testing/ Power-On Checks

The following procedure must be adhered too during start up to ensure safe operation and functionality:

1. Ensure all wiring is secure and there are no short circuits at the user installed connectors.
2. Plug in all connectors.
3. All equipment connected to the Remote Pendant is ready for start-up
4. Start-up of the Remote Pendant will not result in any hazards in the current machine state of loading and accessibility
5. Ambient temperature is within the product limits.
6. A machine risk assessment has been performed and the machine has been assessed as safe to use.
7. Ensure the 24V input is within the specification limits for the product.

13. Pendant EtherCAT Fault Diagnostics

13.1 Introduction

This chapter contains information that will guide the user in trouble shooting AMI5000 Series Remote Pendant communications errors. The following items will be discussed.

- Remote Pendant EtherCAT LED Indicator States
- Remote Pendant EtherCAT LED Indicator Blink Rates
- Remote Pendant Patch Board LED Indicator States

13.2 Fault Diagnosis

13.2.1 Remote Pendant Status LED Indicators

As shown in *Figure 13-1*, two LED indicators are located on the Remote Pendant; EtherCAT Run and Error. The LEDs are Green (RUN) and Red (ERROR) in colour. The LED state and LED blink rates are detailed in *Table 16* and *Table 17.*

The normal (working) state of the RUN and ERROR LEDs is On (RUN) and Off (ERROR) respectively.

Figure 13-1 EtherCAT Indicators

13.2.2 EtherCAT Run Indicator

State of LED	Description
On	The Remote Pendant is Operational
Flickering	The Remote Pendant is booting or downloading Firmware
Blinking	The Remote Pendant in the Pre-Op state
Single Flash	The Remote Pendant is in a Safe- Operational State
Off	The Remote Pendant is Off or is in an Initialisation State

Table 16 EtherCAT RUN LED Indicator states

13.2.3 EtherCAT Error Indicator

State of LED	Description
On	A critical communication or application error has occurred
Flickering	A booting error had been detected
Blinking	A general configuration error has occurred
Single Flash	A local error has occurred
Off	No error

Table 17 EtherCAT ERROR LED Indicator states

13.2.4 EtherCAT RUN and ERROR Indicator Blink Rates

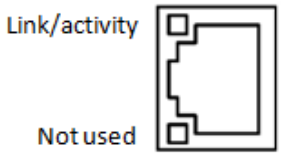
State of LED	Frequency
On	Constantly On
Flickering	10Hz, On for 50ms and off for 50ms
Blinking	2.5Hz, On for 200ms and off for 200ms
Single Flash	On for 200ms and off for 1000ms
Off	Constantly Off

Table 18 EtherCAT Indicator Blink Rates for RUN and ERROR

13.2.5 Pendant Patch Status LED Indicators

The EtherCAT Link/Activity (L/A) LED for the IN Port is located on the Remote Pendant Patch board as required by the EtherCAT standard. The states of the L/A LED are detailed in the following table. The L/A LED is green in colour.

The normal (working) state of the L/A LED is flickering.



State of LED	Activity	Link
On	No	Yes
Flickering	Yes	Yes
Single Flash	No	No
Off	N/A	No

Table 19 EtherCAT Link/Activity LED Indicator Blink Rates

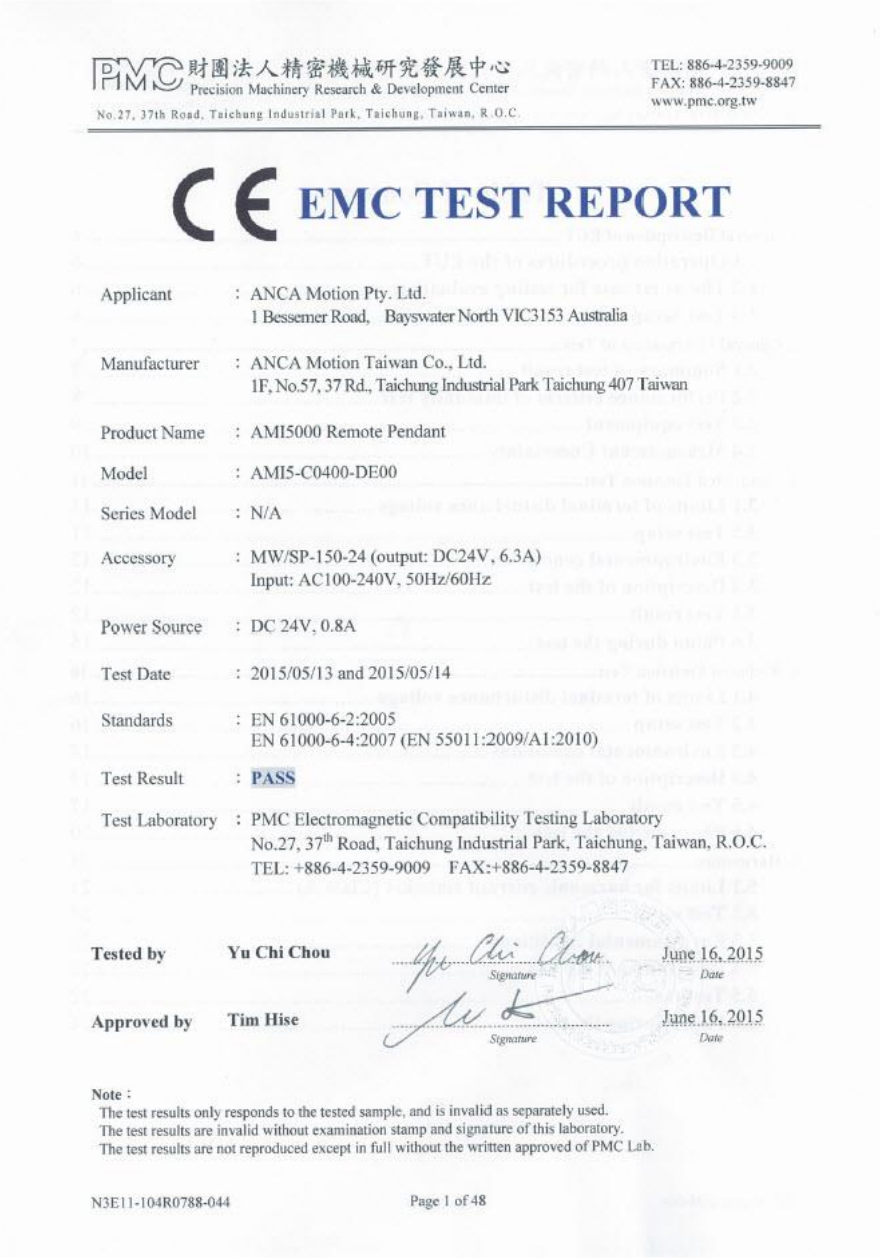
14. Standards Conformity

14.1 EtherCAT®[3] Conformance Marking

An EtherCAT device conformance mark is attached to the Product Label to verify that the unit has been tested for compliance with the EtherCAT marking, indicator and performance guidelines covered by the relevant ETG standards.

14.2 CE Marking

A CE mark is attached to the Product Label to verify that the product meets the relevant Electromagnetic Compliance (EMC) directives of the European Union.



PMC 財團法人精密機械研究發展中心
Precision Machinery Research & Development Center
No.27, 37th Road, Taichung Industrial Park, Taichung, Taiwan, R.O.C.
TEL: 886-4-2359-9009
FAX: 886-4-2359-8847
www.pmc.org.tw

CE EMC TEST REPORT

Applicant	: ANCA Motion Pty. Ltd. 1 Bessemer Road, Bayswater North VIC3153 Australia
Manufacturer	: ANCA Motion Taiwan Co., Ltd. 1F, No.57, 37 Rd., Taichung Industrial Park Taichung 407 Taiwan
Product Name	: AMI5000 Remote Pendant
Model	: AMI5-C0400-DE00
Series Model	: N/A
Accessory	: MW/SP-150-24 (output: DC24V, 6.3A) Input: AC100-240V, 50Hz/60Hz
Power Source	: DC 24V, 0.8A
Test Date	: 2015/05/13 and 2015/05/14
Standards	: EN 61000-6-2:2005 EN 61000-6-4:2007 (EN 55011:2009/A1:2010)
Test Result	: PASS
Test Laboratory	: PMC Electromagnetic Compatibility Testing Laboratory No.27, 37th Road, Taichung Industrial Park, Taichung, Taiwan, R.O.C. TEL: +886-4-2359-9009 FAX:+886-4-2359-8847

Tested by Yu Chi Chou — Signature — June 16, 2015 Date

Approved by Tim Hise — Signature — June 16, 2015 Date

Note :
The test results only responds to the tested sample, and is invalid as separately used.
The test results are invalid without examination stamp and signature of this laboratory.
The test results are not reproduced except in full without the written approved of PMC Lab.

N3E11-104R0788-044 Page 1 of 48

[3] EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany

14.3 FCC Marking

An FCC mark is attached to the Product Label to verify that the product meets the relevant Electromagnetic Compliance (EMC) standards of the Federal Communications Commission.

PMC 財團法人精密機械研究發展中心
Precision Machinery Research & Development Center
No.27, 37th Road, Taichung Industrial Park, Taichung, Taiwan, R.O.C.
TEL: 886-4-2359-9009
FAX: 886-4-2359-8847
www.pmc.org.tw

FC EMC TEST REPORT

Applicant	:	ANCA Motion Pty. Ltd. 1 Bessemer Road, Bayswater North, Melbourne, Victoria 3153 Australia
Manufacturer	:	ANCA Motion Taiwan Co., Ltd. 1F, No.57, 37 Rd., Taichung Industrial Park Taichung 407 Taiwan
Product Name	:	AMI5000 Remote Pendant
Model Name	:	AMI5-C0401-DEA0
Series Model	:	See the Section 1.4
Accessory	:	MW/SP-150-24 (output: DC24V, 6.3A) Input: AC100-240V, 50Hz/60Hz
Power Source	:	DC 24V, 0.8A
Test Standards	:	FCC CFR Title 47 Part 15 Subpart B: 2005 Class A
Test Date	:	2017/02/03
Test Result	:	**PASS**
Test Laboratory	:	PMC Electromagnetic Compatibility Testing Laboratory No.27, 37th Road, Taichung Industrial Park, Taichung, Taiwan, R.O.C. TEL: +886-4-2359-9009 FAX:+886-4-2359-8847

Tested by **Yu Chi Chou** Signature Mar., 02, 2017 Date

Approved by **Tim Hise** Signature Mar., 02, 2017 Date

Note：
The test results only responds to the tested sample, and is invalid as separately used.
The test results are invalid without examination stamp and signature of this laboratory.
The test results are not reproduced except in full without the written approved of PMC Lab.

15. Specifications

15.1 Control Functions

Attribute	*Qualification*
15.1.1 User Interface	
Switches with LED indicators	16
Feedrate Potentiometer	Yes
MPG	Yes
Emergency stop	Yes
Hold-to-Run	Yes (Pendant Only)
15.1.2 Feedrate Potentiometer	
Mechanical Travel	300° +/-5°
Resistance	470 ohm +/-20%
Variation Law	Linear
15.1.3 MPG	
Supply Voltage	5 VDC +/- 10%
Max Supply Current	70 mA
Output Voltage	$V_H > 4V$ / $V_L < 0.5$ V
Maximum Output Current	20 mA
Maximum Frequency Response	5 kHz
Pulse Per Rotation (PPR)	100
15.1.4 Emergency Stop	
Position	Mounted to top of Remote Pendant
Number normally closed contacts	2
Mechanism	Latching positive action
Actuating force	Approximately 15 N
Reset Mechanism	Rotary
Rated Voltage	30 VDC
Rated Current	1 A
Applicable Standards	EN 60947-5-1
	UL 508
	CSA C22.2 No.14
	GB14048.5

15.1.5 Hold-to-Run (Pendant Standard Only)	
Position	Mounted to Right Hand Side of Remote Pendant
Number normally closed contacts	2
Rated Voltage	30 VDC
Rated Current	1 A
Applicable Standards	EN 60947-5-1
	EN 60947-5-8
	GS-ET-22 (HE6B TDS)
	UL 508
	CSA C22.2 No.14
15.1.6 Tactile Switches	
Activate Force	160g
15.1.7 Buzzer (Pendant Standard Only)	
Frequency	2.9 kHz (Nominal)

15.2 Interface Specifications

Attribute	***Qualification***
15.2.1 Ethernet Interface	
Protocol	EtherCAT
Baud Rate	100 Mb/s
Connector	Ethernet RJ-45 (on Patch Board)
EtherCAT Master Cycle Time	1ms

15.3 Environmental Specifications

Attribute	***Qualification***
15.3.1 Storage	
Ambient Temperature	-20 to +55° C
Relative Humidity	5 to 95%
15.3.2 Installation and Operation	
Permissible Ambient Temperature at rated continuous current I_{aN}	0 to +50° C

Relative Humidity	5 to 85% non-condensing
Mechanical vibration	Within class 3M1 (IEC 60721-3-3)
Ingress Protection Rating	IP53

15.4 Electrical Specifications

15.4.1 Power Supply

Parameter	Specification			Units
	Min	Type	Max	
Voltage	20.4	24	28.8	V
Current	-	-	100	mA

Attribute	*Qualification*
15.4.2 Power Supply Protection	
Input Transient Protection	Yes
Reverse Polarity Protection	Yes

15.5 Mechanical Specifications

Attribute	*Qualification*
15.5.1 Physical Characteristics	
Mounting position in Operation	Vertical Preferred
Device Weight	1kg
Membrane	MaxDermid, Autotex® XE Fine: F200
Materials	
Case	Nylon + 30%GF
LED Light Pipe	TPU
15.5.2 Pendant Standard Dimensions	
Pendant Standard Dimensions Including Cradle	
Height (mm)	276mm
Width (mm)	99mm
Depth (mm)	89mm
Pendant Standard Dimensions Excluding Cradle	
Height (mm)	276mm
Width (mm)	93mm
Depth (mm)	82mm
15.5.3 Pendant Lite Dimensions	
Pendant Lite Dimensions Including Cradle	
Height (mm)	276mm
Width (mm)	92mm
Depth (mm)	89mm
Pendant Lite Dimensions Excluding Cradle	
Height (mm)	276mm
Width (mm)	81mm
Depth (mm)	82mm
15.5.4 Cable Characteristics	
Length	2m
Diameter	9.5mm
15.5.5 Patch Board Connectors	
Connector - EtherCAT	EtherCAT IN (RJ45)
Connector - I/O	10 Way 3.81mm Phoenix Connector

16. Accessories

16.1 Introduction

This chapter contains summarized information on accessories options available for this Remote Pendant

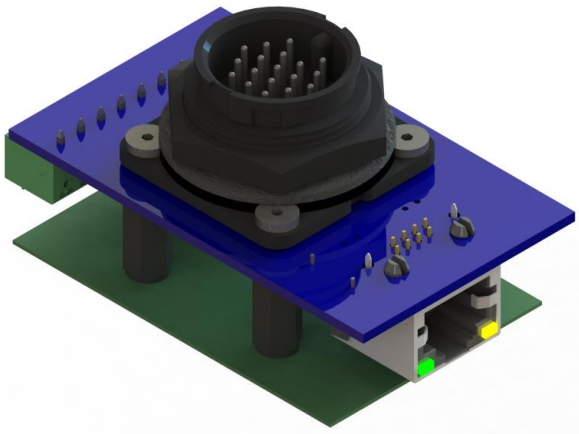
- Ordering Information
- Details of Accessories

For additional details, please refer to full catalogue and information available via *16.8 Product, Sales and Service Enquiries*.

16.2 Pendant Cradle

Part Number	Description
646-0-01-8367	Cradle Assembly

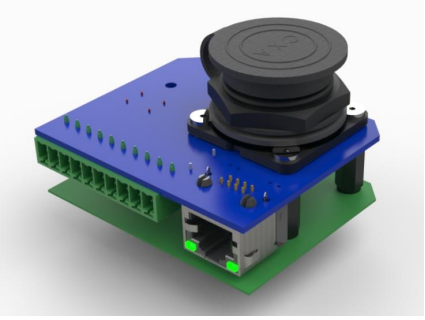
16.3 Pendant Patch Board Mk1



Part Number	Description

646-0-00-8874	Patch Board Assembly Mk1

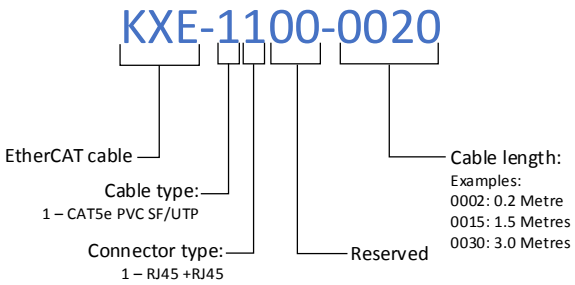
16.4 Pendant Patch Board Mk2



Part Number	Description
619-0-00-2183	Patch Board Assembly Mk2
619-0-00-2203	Patch Board Assembly Mk2 in enclosure

16.5 EtherCAT Cables

Product code



Examples

Catalogue Number	Description
KXE-1100-0002	Ethernet Cable, Cat 5e, SF/UTP, 0.2m
KXE-1100-0015	Ethernet Cable, Cat 5e, SF/UTP, 1.5m
KXE-1100-0030	Ethernet Cable, Cat 5e, SF/UTP, 3.0m

16.6 Accessory Kits

The Remote Pendant is available in the following accessory kits as shown in the order code.

Pendant Catalogue Number	Part Number	Description	Quantity
AMI5-C0XXX-DEXX-1	646-0-00-8601	Remote Pendant Cradle	1
	646-0-00-8874	Patch Board Mk1	1
AMI5-C0XXX-DEXX-2	646-0-00-8601	Remote Pendant Cradle	2
	646-0-00-8874	Patch Board Mk1	1
AMI5-C0XXX-DEXX-3	646-0-00-8601	Remote Pendant Cradle	1
	619-0-00-2183	Patch Board Mk2	1
AMI5-C0XXX-DEXX-4	646-0-00-8601	Remote Pendant Cradle	1
	619-0-00-2203	Patch Board Mk2 enclosure	1

16.7 Maintenance and Repairs

There are no user serviceable parts inside the Remote Pendant. If the polyester is soiled, it can be wiped with a moist cloth and detergent. Do not use abrasive cleaners. For any repairs please contact our nearest office or agent.

.

16.8 Product, Sales and Service Enquiries

If you require assistance for installation, training, or other customer support issues, please contact the closest ANCA Motion Customer Service Office in your area for details.

ANCA Motion Pty. Ltd.
1 Bessemer Road
Bayswater North
VIC 3153
AUSTRALIA
Telephone: +613 9751 8900
Fax: +613 9751 8901
www.ancamotion.com/Contact-Us
Email: sales.au@ancamotion.com
support.au@ancamotion.com

ANCA Motion Taiwan
4F., No.63, Jingke Central Rd., Nantun Dist.,
Taichung City 40852,
TAIWAN
Telephone: +886 4 2359 0082
Fax: +886 4 2359 0067
http://www.ancamotion.com/Contact-Us
Email: sales.tw@ancamotion.com
support.tw@ancamotion.com

ANCA Motion (Tianjin) Co., Ltd.
No. 102, Building F1
XEDA Emerging Industrial Park
Xiqing Economic-technological Development Area
Tianjin, P.R.
CHINA
Telephone: +86 22 5965 3760
Fax: +86 22 5965 3761
www.ancamotion.cn/Contact-Us
Email: sales.cn@ancamotion.com

16.9 Feedback

This Manual is based on information available at the time of publication. Reasonable precautions have been taken in the preparation of this Manual, but the information contained herein does not purport to cover all details or variations in hardware and software configuration. Features may be described herein which are not present in all hardware and software systems. We would like to hear your feedback via our website:
www.ancamotion.com/Contact-Us