User Guide

MCh040

MCh070

HMI Series Touchscreen Products

eSMART04-MCh040

eSMART07M-MCh070

Part Number: 0478-0593-02 Issue: 2

1 Safety guide

This User Manual contains safety standards that must be respected for personal safety and to avoid damage. Indications of attention are divided into three levels of severity:

	DANGER: Indicates a failure to observe safety rules and such failure may cause death or serious injuries.
	ATTENTION: Indicates a failure to observe safety rules and that deficiency may cause damage.
	CAUTION: Indicates a failure to observe safety rules and that deficiency may cause defects to the equipment or inconsistencies.
	WARNING: Indicates information which is essential for avoiding a safety hazard

2 Introduction

The operational guidelines provide information on device technical data, installation, transportation, storage, assembly, use and maintenance for the MCh series HMI products.

This User Manual refers to the following models:

eSMART04-MCh040 - Operator interface with TFT colour 4.3” widescreen touchscreen display .

eSMART07M-MCh070 - High performance operator interface with TFT colour 7” widescreen touchscreen display.

2.1 Product Identification

The product may be identified through a plate attached to the rear cover. You will have to know the type of unit you are using for correct usage of the information contained in the guide.

An example of this plate is shown in the figure below:

Figure 2-1 Unit label

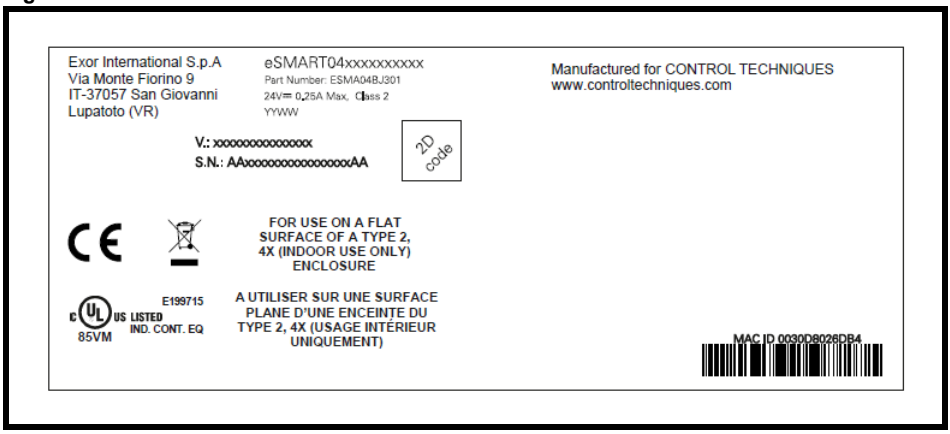
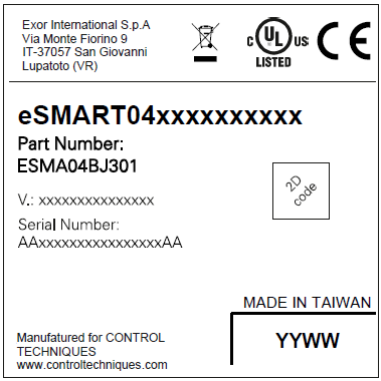


Figure 2-2 Packaging label



Product model name and CT Part Number	eSMART04-MCh040
Manufacturer part number	+ESMA04BJ301
Year/week of production	1641
Serial number	AA4001002000000001AA
Version ID of the product	100201A07006000
Manufacturers address and read instruction warning	Exor International S.p.A. Via Monte Fiorino 9 IT-37057 San Giovanni Lupatoto (VR)

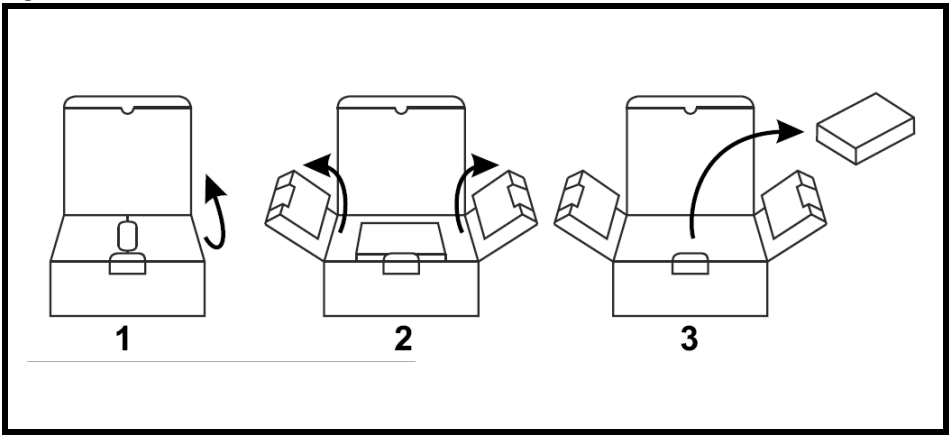
Manufactured for Control Techniques

2.2 Product comparison

Model	eSMART04-MCh040	eSMART07M-MCh070
Display / Backlight	TFT Colour / LED	TFT Colour / LED
Colours	64K	64K
Resolution	480X272	800x480
Diagonal (inches)	4.3” widescreen	7” widescreen
Dimming	yes	yes
User memory	60 MB Flash	60 MB Flash
RAM	256 MB DDR	512 MB DDR
Serial Port	RS-232,RS-485, RS-422, DB9 female software configurable	RS-232,RS-485, RS-422 DB9 female software configurable
Ethernet port	10/100 Mbit/s	10/100 Mbit/s
USB port	Host interface V2.0 max. 500 mA	Host interface V2.0 max. 500 mA
Real Time Clock	yes	yes
Voltage	24 Vdc	24 Vdc
Current rating (at 24 VDC)	0.25 A	0.30 A
Weight	0.4 kg	0.6 kg

3 Unpacking and packing instructions

Figure 3-1



To repack the unit following the instructions in reverse order.

4 Product Overview

The Control Techniques MCh HMI products combine state-of-the-art features and top performance with an outstanding design.They have been designed to offer an outstanding price/performance ratio for challenging applications. They are the ideal choice for HMI applications including factory and building automation.

The HMI products have been designed to run the MChMobile software.

- Compatible with MChMobile Studio.
- Full vector graphic support. Native support of SVG graphic objects, transparency and alpha blending.
- Screen object dynamics: control visibility and transparency, move, resize, rotate any object on screen. Change properties of basic and complex objects.
- Multilanguage applications with TrueType fonts. Easily create, install and maintain applications in multiple languages to meet global requirements.
- Data display in numerical, text, bar graph, analog gauges and graphic image formats.
- Rich set of state-of-the-art HMI features: data acquisition and logging, trend presentation, alarm handling, scheduler and timed actions (daily and weekly schedulers, exception dates), recipes, security and user management, email and RSS feeds.
- Wide selection of communication drivers available with multiple-driver communication capability. Modbus RTU, Modbus RTU Server, Modbus TCP, Modbus TCP Server, CT Modbus TCP, OPC UA Client.
- Remote monitoring and control with Client-Server functionality.
- On-line and Off-line simulation with MChMobile Studio.
- Powerful scripting language for automating HMI applications. Efficient script debugger improves productivity in application development.
- Rich gallery of vector symbols and objects.

5 Getting started

HMI products must be programmed with the software MChMobile Studio (starting from v2.00). MChMobile Studio is a software tool that must be properly installed on a computer running Microsoft Windows.

There are two options to transfer a MChMobile application project to a HMI device:

Table 5-1

Ethernet	Connect the HMI device to the computer with an Ethernet network connection. From MChMobile Studio choose the command Run/Download to target. You may have to ensure that the proper firewall policy has been configured in the computer to allow MChMobile Studio to access the network.
USB	Create an Update Package using MChMobile Studio and copy it to a USB Flash drive.

6 Standards and approvals

The products have been designed for use in an industrial environment in compliance with the 2014/30/EU EMC Directive.

The products have been designed in compliance with:

EN 61000-6-4	EN 55011 Class A
EN 61000-6-3	EN 55022 Class B
EN 61000-6-2	EN 61000-4-2
EN 61000-6-1	EN 61000-4-3
	EN 61000-4-4
	EN 61000-4-5
	EN 61000-4-6
	EN 61000-4-8

The installation of these devices into the residential, commercial and light-industrial environments is allowed only in the case that special in measures are taken in order to ensure conformity to EN 61000-6-3.

The products are in compliance with the Restrictions on Certain Hazardous Substances (RoHS) Directive 2011/65/EU.

In compliance with the above regulations the products are CE marked.

Special instructions for use

- The equipment shall only be used in an area of not more than pollution degree 2, as defined in IEC/EN 60664-1.
- The equipment shall be installed in an enclosure that provides a degree of protection not less than IP 54 in accordance with IEC/EN 60079-7.
- Transient protection shall be provided that is set at a level not exceeding 140 % of the peak rated voltage value at the supply terminals to the equipment.

7 Specifications

7.1 General

Table 7-1

Touchscreen technology	Resistive
RTC backup	Supercapacitor
Fuse	Automatic
Serial Port	RS-232, RS-485, RS-422 software configurable
Recipe memory	Flash
Hardware clock	Clock/Calendar with supercapacitor back-up
Accuracy RTC (at 25 °C)	<100 ppm

7.2 Environmental conditions

Table 7-2

Operating temperature (surrounding air temperature)	0 to +50 °C	EN 60068-2-14
Storage temperature	-20 to +70 °C	
Operating and storage humidity	5 to 85 % RH not-condensing	EN 60068-2-14
Vibrations	5 to 9 Hz, 7 mm p-p 9 to 150 Hz, 1 g	EN 60068-2-30
Shock	± 50 g, 11 ms, 3 pulses per axis	EN 60068-2-6
Protection class	IP66 front panel *	EN 60068-2-27
Pollution degree environment	2	EN 60529

*The front face of the HMI unit, installed in a solid panel, has been tested using conditions equivalent to the standards shown in the “Environmental conditions”. Even though the level of resistance HMI unit is equivalent to these standards, oils that should have no effect on the HMI can possibly harm the unit. This can occur in areas where either vapourised oils are present, or where low viscosity cutting oil are allowed to adhere to the unit for long periods of time. If the front face protection sheet on the HMI becomes peeled off, these conditions can lead to the ingress of oil into the unit and separate protection measures are suggested.

If the installation gasket is used for a long period of time, or if the unit and its gasket are removed from the panel, the original level of the protection cannot be guaranteed.

7.3 Electromagnetic compatibility (EMC)

Table 7-3

Radiated disturbance test	Class A	EN 55011
Electrostatic discharge immunity test	8 kV (air electrostatic discharge) 4 kV (contact electrostatic discharge)	EN 61000-4-2
Radiated, radio-frequency, electromagnetic field immunity test	80 MHz to 1 GHz, 10 V/m 1.4 GHz to 2 GHz, 3 V/m 2 GHz to 2.7 GHz, 1 V/m	EN 61000-4-3
Burst immunity test	± 2 kV dc power port ± 1 kV signal line	EN 61000-4-4
Immunity to conducted disturbances inducted by radio frequency field	0.15 to 80 MHz, 10 V	EN 61000-4-6
Voltage dips, short interruptions and voltage variations immunity test	Port: AC mains; Level: 100 % duration: 1 cycle and 250 cycles (50 Hz); 40 % duration: 10 cycles (50 Hz); 70 % duration: 25 cycles (50 Hz); Phase: 0°-180°	EN 6100-4-11

Test executed on the 230 Vac side of the EXOR International S.p.A. Power Supply

7.4 Durability information

Table 7-4

Backlight service life (LED type)	20000 Hrs. or more (Time of continuous operation until the brightness of the backlight reaches 50 % of the rated value when the surrounding air temperature is 25 °C) - Extended use in environments where the surrounding air temperature is 40 °C or higher may degrade backlight quality / reliability / durability.
Front foil (without direct exposure to sunlight or UV)	10 years if the surrounding air temperature is 25 °C
UV Resistance	Indoor applications: After 300 hours cycled humidity in QUV accelerated weathering, some yellowing and brittleness may be present.
Solvent resistance	Contact for 1/2 hour at 21 °C, No visible effect: Acetone, Butyl Cellosolve, Cyclohexanone, Ethyl Acetate, Hexane, Isopropyl Alcohol, MEK, Methylene Chloride, Toluene, Xylene Contact for 24 hours at 49 °C, No visible effect: Coffee, Ketchup, Lemon Juice, Mustard (slight yellow stain), Tea, Tomato juice.
Touchscreen reliability	>1 million operations

8 Installation

8.1 Installation environment

In order to meet the front panel protection classifications, proper installation procedure must be followed:

- The borders of the cutout must be flat
- Screw in each fixing screw until the plastic bezel corner is in contact with the panel
- The cutout for the panel must be of the dimensions indicated in this manual

The equipment is not intended for continuous exposure to direct sunlight. This might accelerate the aging process of the front panel film.

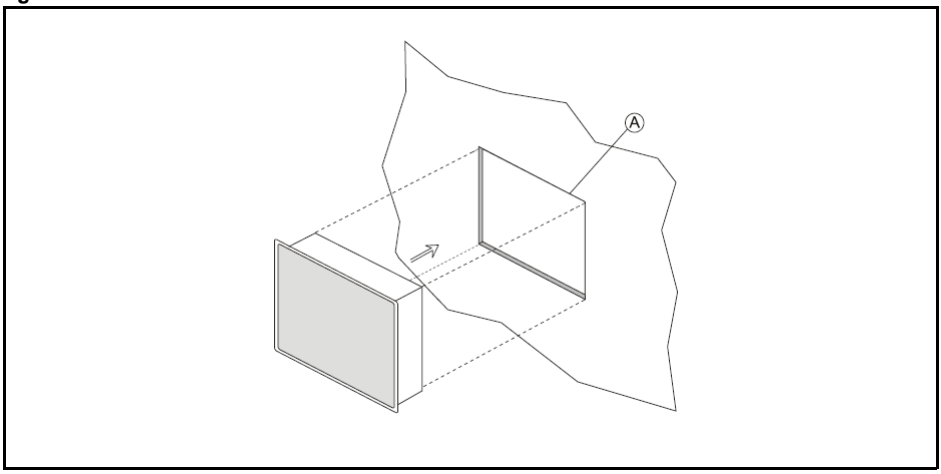
The equipment is not intended for installation in contact with corrosive chemical compounds. Check the resistance of the front panel film to a specific compound before installation.

Do not use tools of any kind (screwdrivers, etc.) to operate the touch screen of the panel.4

The IP66 is guaranteed only if:

- Max. deviation from the plane surface to the cutout: =<0.5 mm
- Thickness of the case where the equipment is mounted: 1.5 mm to 6 mm
- Max. surface roughness where the gasket is applied: =<120 µm

Figure 8-1



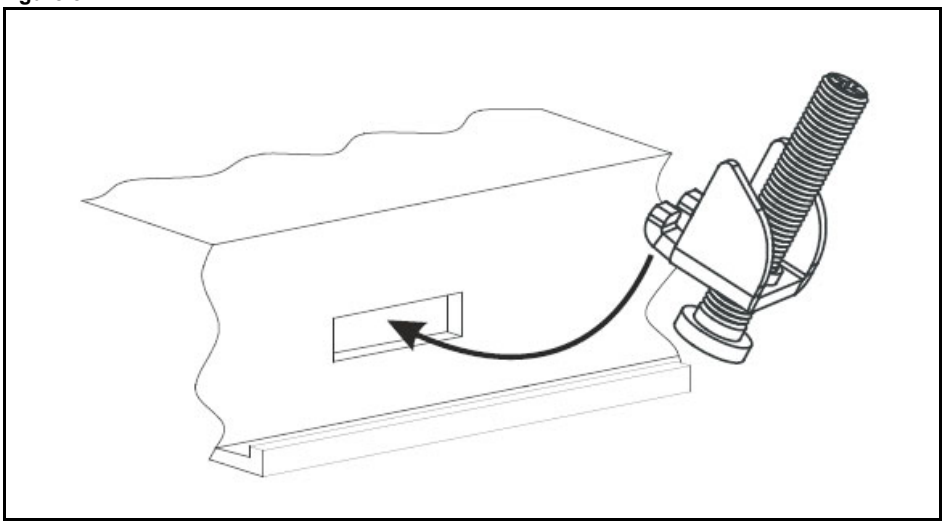
A. Installation cutout

To prevent injury to persons and damage to the product or enclosure, the installation information contained within this document must be adhered to

8.2 Installation procedure

Place the fixing brackets contained in the fixing kit as shown in Figure 8-2

Figure 8-2



CAUTION

Tightening torque: 75 Ncm or screw each fixing screw until the bezel corner is in contact with the panel.

8.2.1 Dimensions (eSMART04-MCh040)

Figure 8-3

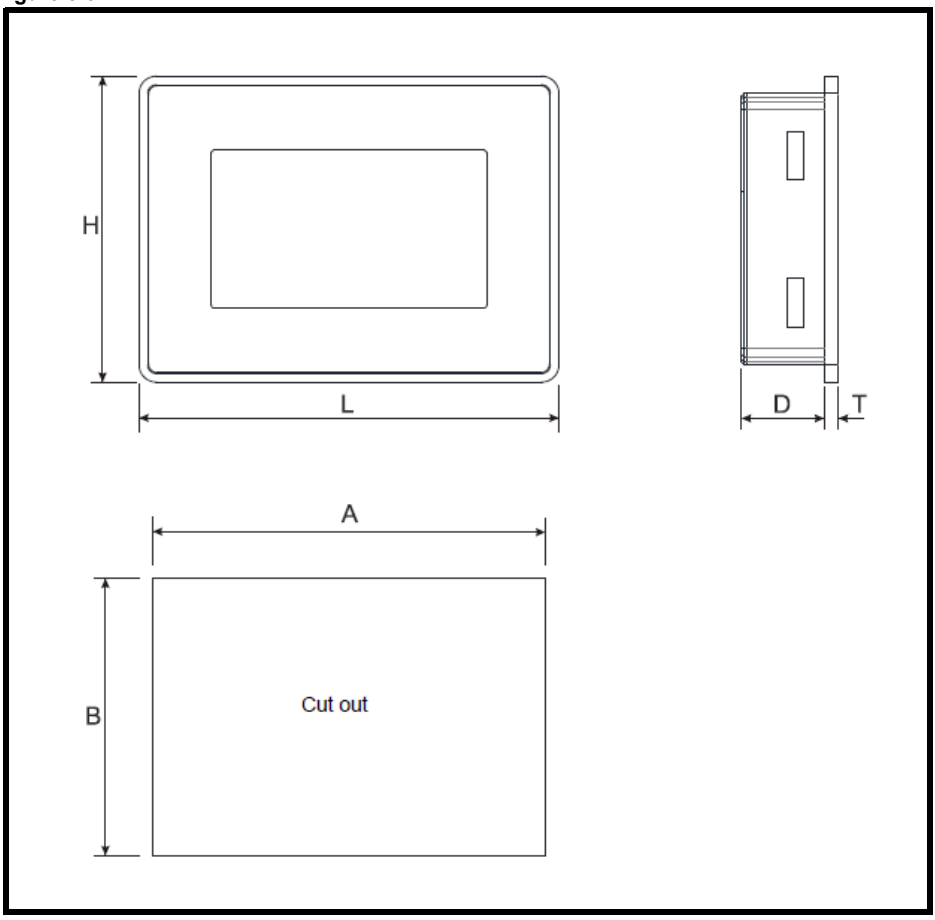


Table 8-1

Model	A	B	L	H	D	T
eSMART04-MCh040	136 mm 5.35 in	96 mm 3.78 in	147 mm 5.78 in	107 mm 4.21 in	29 mm 1.14 in	5 mm 0.19 in

8.2.2 Dimensions (eSMART07M-MCh070)

Figure 8-4

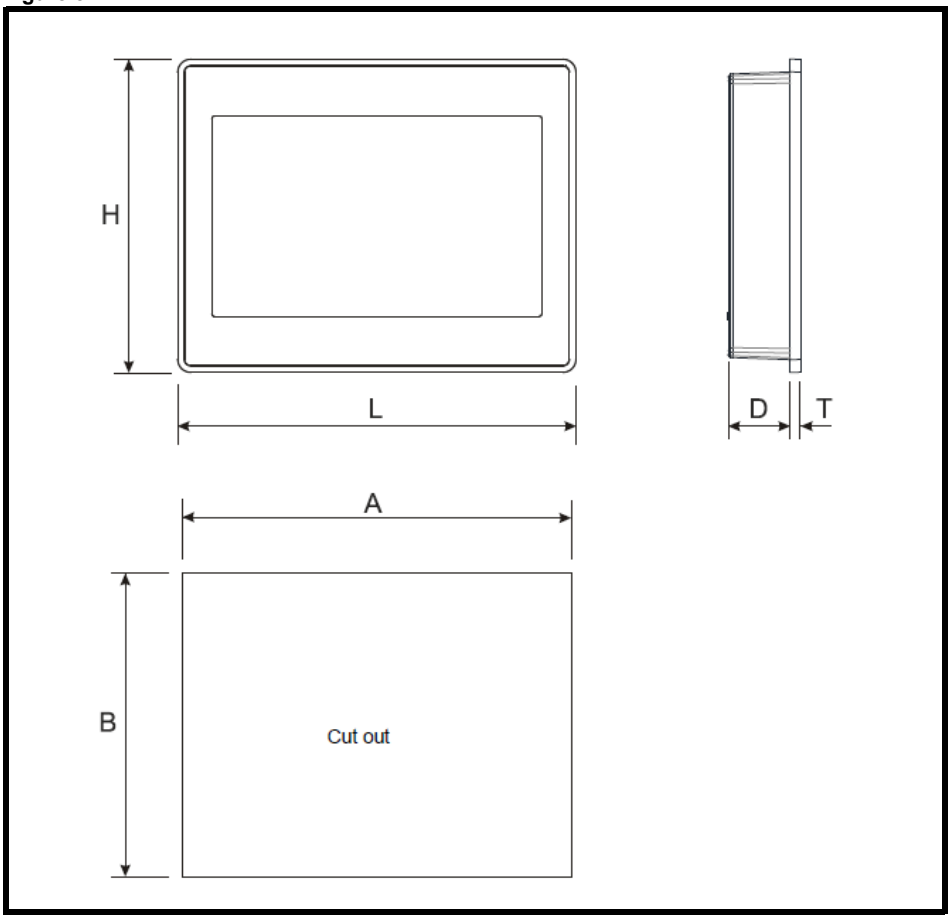


Table 8-2

Model	A	B	L	H	D	T
eSMART07M-MCh070	176 mm 6.90 in	136 mm 5.35 in	187 mm 7.36 in	147 mm 5.79 in	29 mm 1.14 in	5 mm 0.19 in

9 Cleaning faceplates

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

10 Connections

1. Serial Port
2. Ethernet Port
3. USB Port
4. Power Supply

Figure 10-1 - eSMART04-MCh040

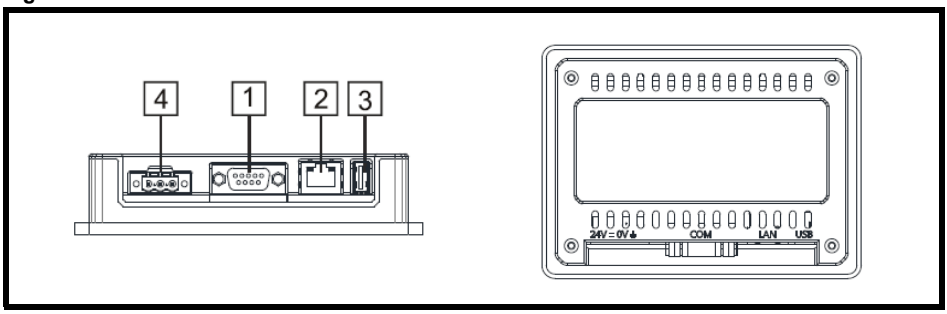
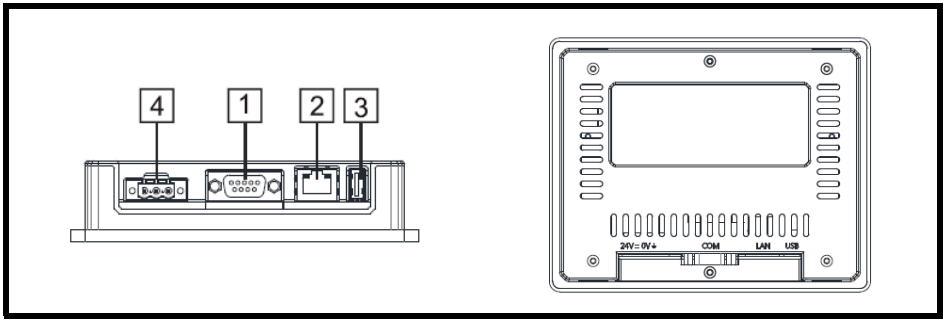


Figure 10-2 - eSMART07M-MCh070



10.1 Serial port

The serial port is used to communicate with the PLC or with another type of controller. Standards available for the signals in the PLC port connector are: RS-232, RS-422, RS-485.

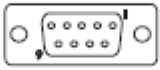
The serial port is software programmable. Make sure you select the appropriate interface in the programming software.

Figure 10-3

RS-232

Pin	Description
1	GND
2	
3	TX
4	RX
5	
6	+5V output
7	CTS
8	RTS
9	

SERIAL PORT



RS-422, RS-485

Pin	Description
1	GND
2	
3	CHA-
4	CHB-
5	
6	+5V output
7	CHB+
8	CHA+
9	

To operate in RS485 pins 4-3 and 8-7 must be connected externally.

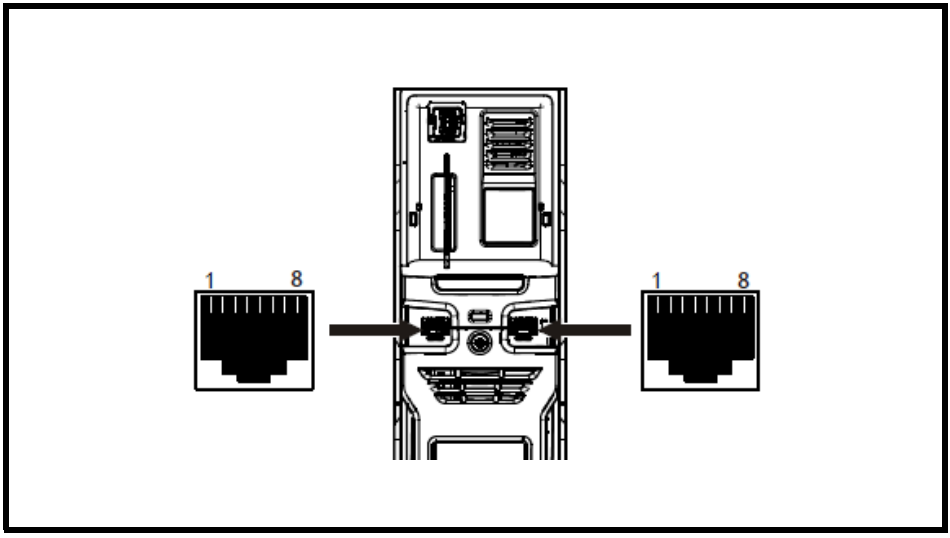
The communication cable must be chosen for the type of device being connected.

The following information is provided to assist the user in making a serial connection to a Control Techniques drive using the onboard serial interface or AI-485 serial adapter.

10.1.1 MCh Serial Connections to Unidrive M701

The Unidrive M701 provides two parallel RJ45 connectors.

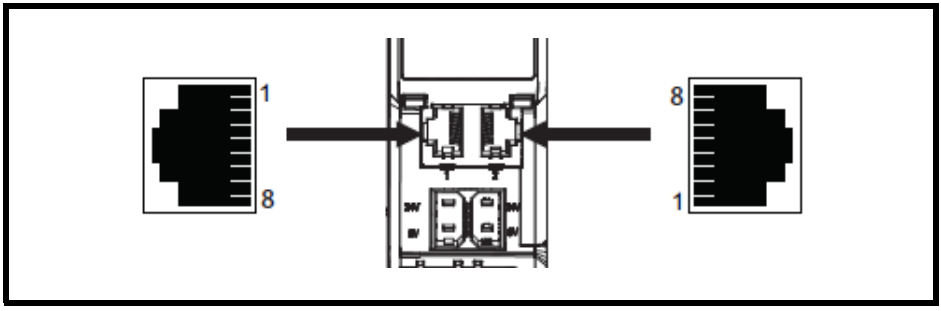
Figure 10-4



10.1.2 MCh Serial Connections to Digitax HD M751

The Digitax HD M751 provides two parallel RJ45 connectors.

Figure 10-5



10.1.3 MCh Serial Connections to Unidrive M400 and Commander C200/C300

The Unidrive M400 and Commander C200/C300 do not provide any serial communications as standard, instead an AI-485 serial interface adapter is available for 2-wire EIA-485 serial communications.

All Control Techniques drives have the same pin configuration for the RJ45 serial interface port, the following diagram can be used to connect the MCh to a Control Techniques drive using the serial interface connection.

Please note that a 24 V signal is provided on the RJ45 serial interface port (pin 6) and AI-485 24 V adapter (pin 5) which indicates when the Drive's transmit buffers are active, this signal can be used when an EIA-232 to EIA-485 adapter is used which relies on the Drive to control the transmission direction. Many adapters now do not require this signal and control the transmission automatically. For simplicity, this pin is not used in the following connection diagram.

Figure 10-6

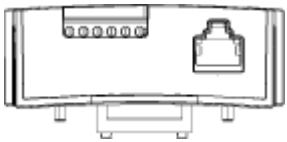
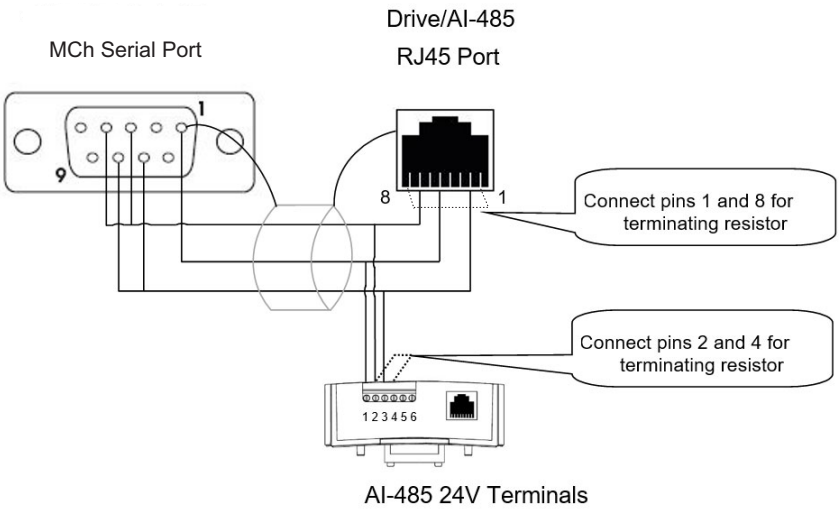


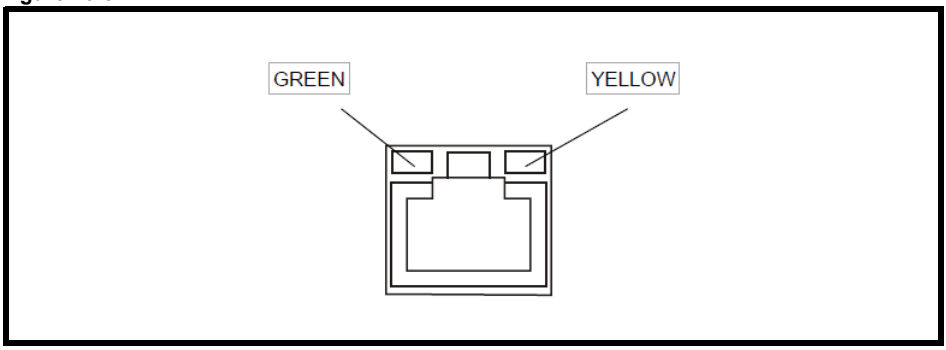
Figure 10-7



10.2 Ethernet port

The Ethernet port has two LED indicators to indicate the connection status. Please see description below.

Figure 10-8



LED Indicators (connection status)

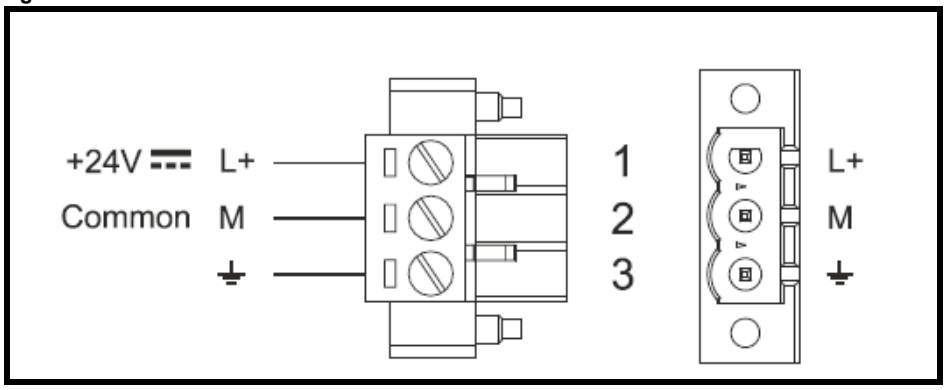
Table 10-1

Green	Yellow	
ON	OFF	No LAN cable connected
BLINK (link active)	ON	LAN cable connected with 100 Mbit/s link
BLINK (link active)	OFF	LAN cable connected with 10 Mbit/s link

10.3 Power supply, grounding and shielding

The power supply terminal block is shown in the figure below.

Figure 10-9



DC power connector - AWG24 wire size - R/C terminal blocks (XCFR2), female pitch 5.08 mm, torque 4.5 lb-in.

3 conductor 1.5 mm^2 wire size minimum, minimum temperature conductor rating 105 °C.

NOTE Ensure that the power supply has enough power capacity for the operation of the equipment

The unit must always be grounded to earth with 1.5 mm^2 wire size minimum. Grounding helps limit the effects of noise due to electromagnetic interference on the control system.

Earth connection will have to be done using either the screw or the faston terminal located near the power supply terminal block. A label helps identify the ground connection. Also connect to ground the terminal 3 on the power supply terminal block.

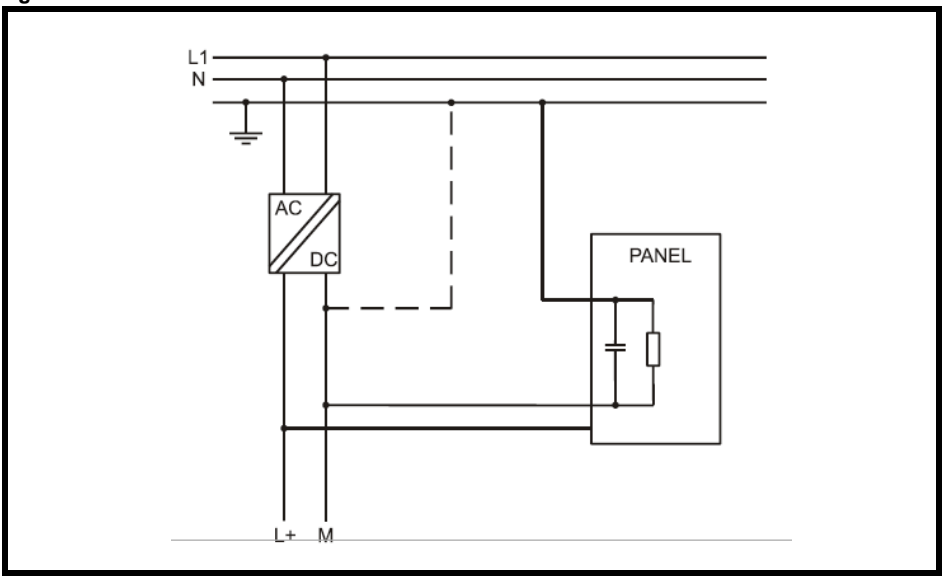
The power supply circuit may be floating or grounded. In the latter case, connect to ground the power source common as shown in Figure 10-10 (see below) with a dashed line.

When using the floating power scheme, note that the HMI devices internally connects the power common to ground with a 1 MΩ resistor in parallel with a 4.7 nF capacitor.

The power supply must have double or reinforced insulation.

The suggested wiring for the power supply is shown in Figure 10-10

Figure 10-10



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

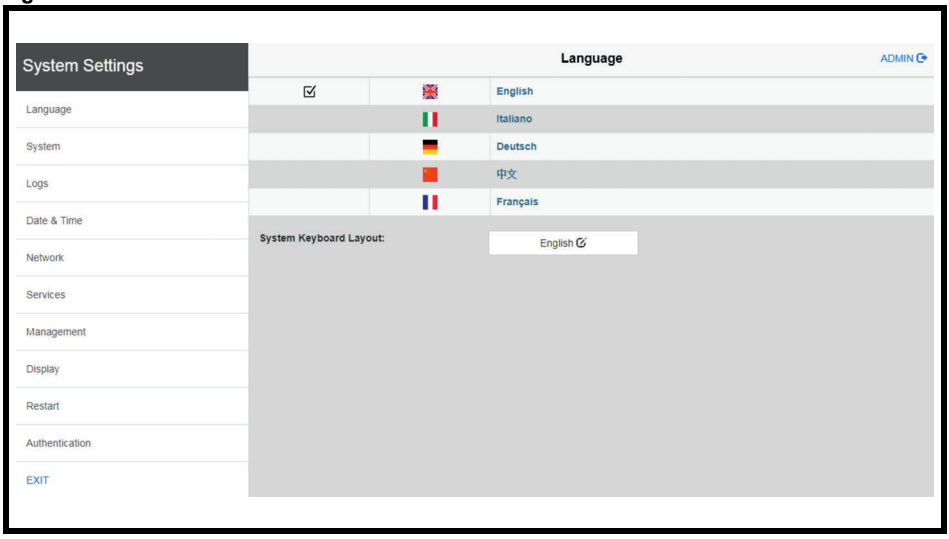
11 System settings

MCh HMI products have a system settings interface to allow configuration of system options.

The user interface of System Settings is based on HTML pages accessible locally on the HMI or remotely using a Web browser Chrome v44 or higher on port 443 (https://[*IP*]/machine_config). Where [*IP*] represents the Ethernet IP address of the HMI product. The default IP address is 169.254.8.246 with DHCP enabled.

Default username is “admin”, default password is “admin”. Use the navigation menu on the left side of the screen to browse through the available options.

Figure 11-1



The available settings menu categories are shown on the left side. The right side shows related information and settings for the selected menu category. Based on the size of the HMI screen, both menu and content of selected item may be shown on screen or not.

System Settings has two modes of operation:

User Mode - MChMobile runtime is running or the HMI device is in “factory default” status.

System Mode - MChMobile runtime is not running or the HMI device has a software failure. System Mode includes all options available in User Mode and offers additional commands dedicated to system upgrade and recovery not available when running in User Mode.

Activation of System Settings in User Mode:

MChMobile runtime not running	Press “System Setting” button on the HMI screen
MChMobile runtime running	Recall context menu and select “System Settings”. To recall the context menu click and hold any unused area of the touchscreen for a few seconds. Default hold time is 2 seconds.

Activation of Systems Settings in System Mode:

Table 11-1

Normal operation	If MChMobile runtime is not running: Press “System Setting” button on the HMI screen to enter in System Settings in User mode. Select “Restart” -> “Config OS” to reboot in System Mode. If MChMobile runtime is running: recall context menu and select “System Settings”. To recall the context menu click and hold any unused area of the touchscreen for a few seconds. Default hold time is 2 seconds to enter in System Settings in User Mode. Select “Restart” -> “Config OS” to reboot in System Mode.
Recovery operation	If panel is not responsive, use the so-called “tap-tap” procedure. This procedure consists of tapping the surface of the touchscreen during the device power-up phase. Tapping frequency must be high. You have to start tapping the touchscreen as soon as power has been applied to the device. When the sequence has been recognised, the system shows the message: “TAP-TAP DETECTED”. At this point release touch to boot in User Mode without running MChMobile runtime or press and hold for a few seconds (selecting “RESTART: CONFIG OS”) to boot in System Mode.

System Settings includes options for the basic setting of the device - see table below
Table 11-2

Language	Configure language used for System Setting menu only.
System	Shows information about platform, status and timers (e.g. System on time, backlight on time).
Logs	Enable persistent log for BSP and allows to export it.
Date & Time	Change the device date and time, including time zone and NTP server.
Network	Configure IP address of Ethernet interface and the other network settings like DNS, gateway, DHCP, hostname.
Services	Enable/disable services. Examples of services are OpenSSH server, cloud services, SNMP and logging.
Management	Update of BSP components (Main OS, Config OS, Boot loader, XLoader), check for partitions consistence, update of splash screen, information about usage and size of partitions. The update of Main OS is available only in System Mode, the update of Config OS is only in User Mode.
Display	Adjust brightness, configure automatic backlight turnoff and select HMI orientation (90°, 180°, 270° and 360°).
Restart	Restart the device. “Main OS” option restarts as per default in User Mode, “Config OS” option restart panel directly into System Settings in System Mode.
Authentication	Configure password for administrator (“admin”) and for the standard user (“user”). Administrator has full access to System Settings (updates of BSP and other system components). Standard user has some limitations.

NOTE The System Settings tool also includes other options, not described and not documented at this moment

11.1 Touchscreen calibration

MCh HMI products support calibration of the interface. To start calibration proceed as follows:

1. Use the “tap-tap” procedure at boot (this procedure consists of tapping the surface of the touchscreen during the device power-up phase. Tapping frequency must be high. You have to start tapping the touchscreen as soon as power has been applied to the device). When the sequence has been recognised, the system shows the message: “TAP-TAP DETECTED”.
2. Release touch and wait for a few seconds until the message “ENTERING SYSTEM SETTINGS” appears.
3. Press and hold touch for a few seconds for selecting “TOUCHSCREEN CALIBRATION”.

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CONTROL TECHNIQUES

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