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Kinesys Mentor Series 4

Operating Manual
[ORIGINAL]

A safety controller for automation systems

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The contents of this manual are believed to be correct at the time of printing. In a commitment to a policy of continuous development and improvement, TAIT reserves the right to change the specification of the product or its performance, or the contents of this manual, without notice.

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1. Introduction

1.1 Product description

The Mentor Series 4 is an advanced safety controller that allows the connection of emergency stop switches, enabling switches, and other devices to a system of Kinesys motion controllers.

Mentor uses PROFIsafe over PROFINET safety communications to permit easy distribution of safety and motion control data using standard Ethernet cabling and data distribution, and to allow safe group halt actions based on axis load and position or device status.

When used with Kinesys safety input devices and suitable output devices, the emergency stop enabling switch system complies with requirements up to PLe (EN 13849) or SIL3 (EN 62061).

Mentor Series 4 is essential for Kinesys Apex systems to achieve a SIL3 safety rating.

1.2 Scope and purpose

This manual describes the key features, means of operation and maintenance operations of the Mentor Series 4.

This manual refers to features introduced in software version 22. Earlier software versions may not include all of the features described in this manual.

The equipment described in this manual may only be operated by personnel qualified to do so. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with this and associated equipment.

1.3 Model part numbers

This manual applies to the following Mentor models:

Model	Kinesys Part Number
Mentor M401	MEN-04-0010
Mentor M402	MEN-04-0020

The Mentor model number can be found on the rear panel or on the main display by accessing the System Setup menu.

1.4 Support requests

For support, please use the following contact details:

support@kinesys.com
Tel: +44(0) 20 8481 9850

To resolve your support request as quickly as possible, please provide the following information, if available, when contacting Kinesys:

- Site name, address, machine location details and your contact details.
- As much detail as possible on the behaviour observed, including any unusual changes in behaviour that are different from normal operation and any environmental conditions that may be a factor (e.g. fluctuations in temperature and water damage).
- Details on the behaviour that should have been expected.
- The exact steps required that produce the issue.
- Any solutions to fix the issue that you have already tried.
- Any workarounds that you have found.
- Equipment item numbers and serial numbers, such as those displayed on the identification plates/labels.
- Version numbers of any software being used.
- Any screen shots, photographs or videos of the issue.

2. Safety information

The following symbols are used to indicate specific items which require special attention by the user:

	**Warning: Instructions which relate to safety**
	**Warning: Instructions which relate to safety where there is a particular risk of electric shock**
	**Warning: Instructions which relate to safety where there is a particular overhead risk**
	**Danger: Prohibited actions which are forbidden under all circumstances**
	**Additional important information**

2.1 Safety regulations

The following regulations serve as the basis for assembly, installation, certification and maintenance of automation equipment within the area of the European community. For countries other than those mentioned, local legislation and directives may apply in addition to or in place of the European regulations as stated in this manual.

The manufacturer's guarantee depends on the consideration of these regulations and the operating instructions.

European regulations

2006/42/EC	EC - Machinery Directive
2014/30/EU	EC - Directive relating to electromagnetic compatibility
2014/35/EU	EC - Electrical equipment designed for use within certain voltage limits

BGV accident prevention regulations (Germany only)

DGUV Vorschrift 3 (BGV A1)	Principles of accident prevention
DGUV Vorschrift 3 (BGV A3)	Electrical facilities and equipment
DGUV Vorschrift 52 (BGV D6)	Accident prevention regulation for use in crane systems
DGUV Vorschrift 54 (BGV D8)	Accident prevention regulation for electric winches, lifting and pulling equipment
DGUV Regel 100-500 (BGR 500)	Hoisting accessories
DGUV Grundsatz 309-001 (BGG 905)	Principles for crane inspections

Harmonized regulations	
EN 17206	Machinery for stages and other production areas; Safety requirements and inspections
EN ISO 12100	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN 14492-2	Cranes - Power driven winches and hoists
EN 818-7	Short link chain for lifting purposes; Fine tolerance hoist chain, Grade T
EN ISO 13849-1 & 2 / BS EN 62061	Safety of machinery - Safety-related parts of control systems; General principles for design
EN 60034-1	Rotating electrical machines; Rating and performance
EN 60034-5	Rotating electrical machines; Degrees of protection provided by the integral design of rotating electrical machines
EN 60204-1	Electrical equipment of machines, General requirements
EN 60204-32	Electrical equipment of machines; Requirements for hoisting machines
EN 60529	Degrees of protection provided by enclosures (IP-Code)
EN 60947-1	Low-voltage switchgear and control gear
EN 61000-6-2	Electromagnetic compatibility; Immunity for industrial environments
EN 61000-6-4	Electromagnetic compatibility; Emission standard for industrial environments
EN 82079-1	Preparation of instructions for use - Structuring, content and presentation
UL 508A	Construction of Industrial Control Panels

Regulations and technical specifications	
FEM 9.511:1986	Rules for the design of series lifting equipment; Classification of mechanisms
FEM 9.683:1995	Series lifting equipment; Selection of hoisting and travelling motors
FEM 9.751:1998	Series lifting equipment; Power driven series hoist mechanisms; Safety
FEM 9.755:1993	Serial hoist units; Measures for achieving safe working periods

2.2 Safety warnings

IF IN DOUBT ABOUT ANY ASPECT OF MOVING OBJECTS, ALWAYS SEEK PROFESSIONAL ADVICE BEFORE OPERATION.

Make sure this Operating Manual is always kept in a complete and fully readable condition and that it is always accessible to all operators of the equipment.

Prohibitions of operation

- **Do not install the Mentor or do maintenance to the Mentor in an area that is accessible to children or other unqualified persons.**
- **Do not use the Mentor in an aggressive environment. An aggressive environment is defined as an environment which contains hazardous substances that may degrade equipment.**
- **Do not use the Mentor if it does not appear to be in 100% working order.**
- **Do not modify or attempt to repair the Mentor if it is not in working order.**

Safety precautions before operation

- **Do a full risk assessment of the location where the Mentor and its connected devices are intended to be used.**
- **Do not start movement operations until a qualified person has inspected the Mentor and all other connected equipment, and confirmed that is in 100% working order.**
- **Make sure all machine stop buttons, emergency stop buttons and enabling switches in the system have been tested and are functioning correctly.**
- **Make sure all operators know the locations of the machine stop buttons, emergency stop buttons and enabling switches in the system.**
- **Make sure all attached loads are unobstructed and will not come into contact with other static or moving objects during movement.**
- **Make sure all attached loads are always visible to the operator where possible. If this is not possible, make sure the operator has reliable communication with a person who can clearly see the attached loads.**
- **Make sure all persons in the hazard zone underneath the lifting equipment are aware of the potential for movement.**
- **For SIL 3 applications, the emergency stop button on the front of the Mentor must be covered to prevent unauthorised operation**
- **Test all safety devices on a regular basis, and following each new installation of a temporary system.**

Safety instructions during operation

- **If you notice any unexpected or dangerous movement during operation, press the machine stop button on the front panel of the Mentor to bring all movement to an immediate stop. Note that not all stop buttons in the system necessarily stop the movement an individual lifting device.**
- **If an enabling switch is used in your system to initiate movement of the connected lifting device, be aware that releasing it may cause movement to stop unexpectedly.**
- **After a stop button has been pressed, the reason for its actuation must be found, and all possible failures in the system removed by trained personnel. The stop button must then be reset before continuing operation. Note that the stop button reset procedure may be different for different devices - refer to individual product manuals for more details.**

2.3 Visible damages

If any damage or breakages are detected during operation or during tests, do not operate the Mentor Series 4 until it has been repaired and a qualified person has checked and approved it.

2.4 Spare parts

Only original fixing components, spare parts, and accessories listed in manufacturer's spare parts catalogue are acceptable for use. The manufacturer's guarantee is given for those spare parts only. The manufacturer cannot be held responsible for any damages due to the use of non-original parts or accessories.

2.5 Operating environment

The Mentor is designed for indoor use only and to work in ambient temperatures between 5°C and 40°C (41°F and 104°F). The humidity of the environment must not exceed 90%.

2.6 Handling and storage

Condensation

The Mentor is designed for indoor use only. If the product has been exposed to temperature fluctuations, for example during transport, there may be risk of condensation which may result in damage. Do not connect the Mentor to a power source immediately. Leave the unit disconnected until it has reached a safe temperature

Shocks

Do not shake, knock or drop the Mentor. Avoid excessive force when installing and operating the product.

Handling

Do not lift the Mentor by any of its cables or connectors as this may cause damage to the unit and/or the cables; use the transportation handles instead.

Packaging

Where possible, use the original packaging to transport the Mentor. Alternatively, a purpose-made flight case may be used (available separately).

3. Product overview

3.1 Front panel overview

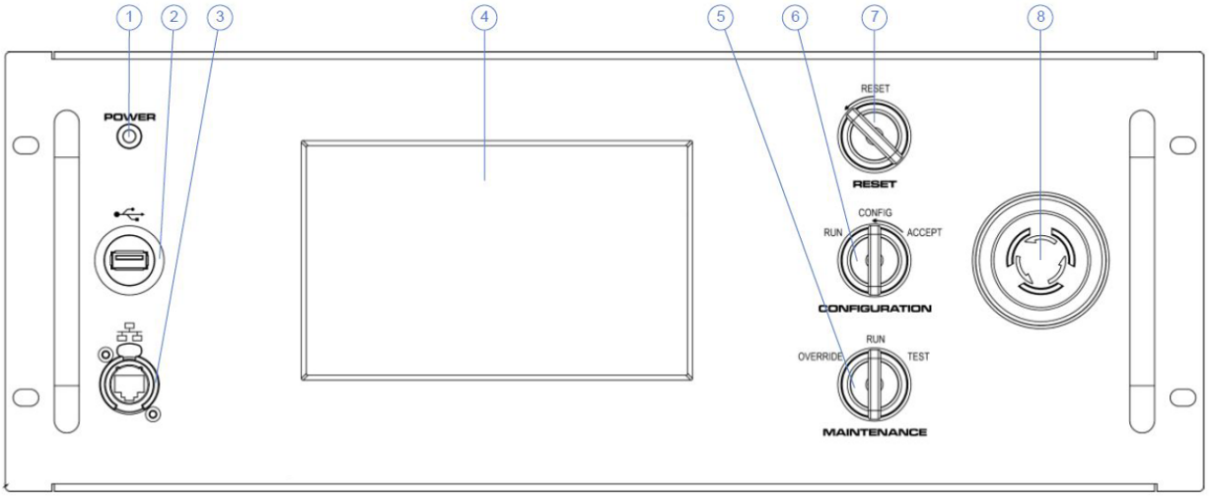


Figure 1. Front panel

Item #	Description	Notes
1	Power indicator	Illuminates blue when the Mentor is connected to the mains supply and turned on.
2	USB port	Used for connecting a mouse and keyboard if required, or to allow connection of a storage device for program updates and configuration storage.
3	Ethernet port	For connection to the internal Ethernet switch for Ethernet motion control and PROFIsafe data.
4	Touchscreen display	Shows the system status and allows configuration of the Mentor.
5	Maintenance keyswitch	Allows safety functions to be overridden for diagnostic or rescue purposes and allows functions of the connected drives (such as brakes and load cells) to be tested.
6	Configuration keyswitch	Switches between RUN and CONFIGURATION modes.
7	Reset keyswitch	Allows various error conditions to be reset and acknowledges changes to the connected equipment.
8	Emergency stop button	Initiates an emergency stop on all connected devices.

3.2 Rear panel overview

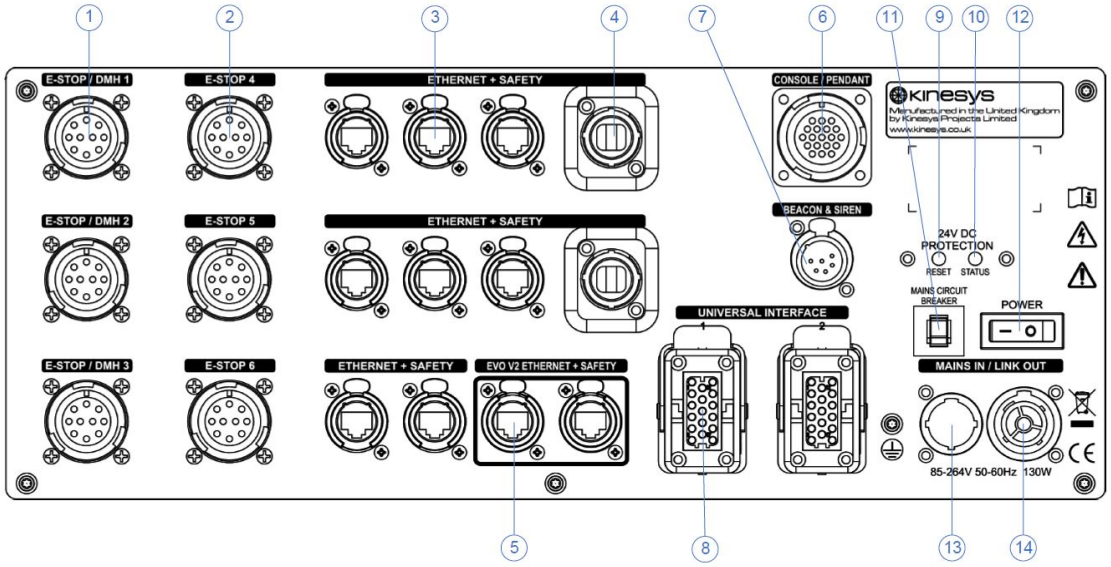


Figure 2. Rear panel

Shorting plugs MEN-98-2010 must be fitted to all emergency stop connections, the console / pendant connection, and the two universal device interface connections when not in use.

Always switch the Mentor off before connecting or disconnecting emergency stop switches or shorting plugs.

Item #	Description	Notes
1	Emergency stop switch & enabling switch (dead man's handle) inputs	Shorting plugs must be fitted to unused inputs.
2	Emergency stop switch inputs	Shorting plugs must be fitted to unused inputs.
3	Ethernet & safety outputs	Connections for Ethernet devices, including devices using PROFIsafe such as apexDRIVE.
4	Ethernet & safety outputs (optionall fibre optic connection)	Connections for Ethernet devices, including devices using PROFIsafe. Optionally configured at manufacture with 100MB or 1GB copper or fibre optic connectors.
5	EVO V2 Ethernet & safety outputs	Connection for Ethernet devices requiring an EVO V2 safety system.
6	Console power & data connection	24V power supply, safety signalling and data connection for a console or remote pendant.
7	Beacon & siren output	
8	Universal device interface connections	Connection to legacy Kinesys devices or third party automation and safety systems.
9	24V DC power supply reset button	Resets the electronic circuit protection for the 24V power supply. See section 8.2 for details.
10	24V DC power supply status indicator	Shows the status of the electronic circuit protection of the 24V power supply. See section 3.2.1 for details.

Item #	Description	Notes
11	Mains input circuit breaker	
12	Power switch	
13	Mains input connector	
14	Mains link out connector	

3.2.1 24V DC power supply status indicator

The status indicator on the rear panel exists in one of three states:

- OFF: supply fault
- GREEN: supply OK
- YELLOW: at least one supply is loaded to 80% capacity

4. Installation

Although it may be used freestanding the Mentor Series 4 is designed to be installed in a standard 19" rack.

4.1 Installation precautions

When considering the location to install the Mentor, make sure the device will not be exposed to extremes of heat, cold, moisture, humidity, or dust.

When rack mounting, make sure there is enough space within the rack to allow for cables and connections at the rear and the switches and controls at the front.

Make sure there is adequate ventilation when installing the Mentor to a rack.

4.2 Rack mounting

The Mentor can be mounted in a standard 19" equipment rack or flight case. A shock-mounted flight case is recommended for touring use.

It is recommended that the Mentor enclosure is supported at the rear to prevent stress on the front panel and rack structure caused by the weight of the unit and the cables connected to the rear panel.

The Mentor may also be supported in the rack using Accuride 3307 telescopic rack slides (available separately).

Cage nuts and bolts (available separately) may be used to secure the front of the unit in the rack.

4.3 Cooling

The Mentor does not require any clear space above or below the rack case, but avoid mounting the Mentor near other equipment which may generate a large amount of heat.

The Mentor has two cooling fans mounted on the right side panel (as viewed from the front). Cool air is drawn in through the ventilation slots on the left side panel and blown out by the cooling fans.

When mounting several types of equipment in a rack make sure there is always a supply of cool air to the ventilation inlet slots on the left side panel of the Mentor. Do not obstruct the warm air outlets on the right side panel or allow the warm exhaust air to enter the cooling intake of other equipment.

4.4 Connections

Always switch the Mentor off before connecting and disconnecting any equipment.

The dual-channel error checking used on all safety devices requires both channels of a safety circuit to be made and broken simultaneously. An error may result if connections are not made and broken simultaneously when inserting or removing connectors.

All safety input and output devices must be tested following each new installation or change to the configuration.

4.4.1 Mains In / Link Out connection

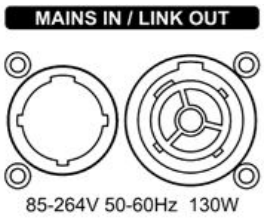


Figure 3. Mains In/ Link Out connection

The mains connection is via a Neutrik powerCON TRUE1 type connector. An unprotected link connector is provided for connection to other equipment. The total load of all connected equipment must not exceed the total capacity of the supply.

The Mentor mains supply must be earthed.

The mains input to the Mentor is protected by a 2A thermal circuit breaker mounted on the rear panel.

Connector:	Neutrik powerCON TRUE1 appliance inlet-outlet NAC3PX
Mating Connector:	Mains in: Neutrik powerCON TRUE1 female cable connector NAC3FX-W
	Mains link out: Neutrik powerCON TRUE1 male cable connector NAC3MX-W

4.4.2 Emergency stop / enabling switch connections

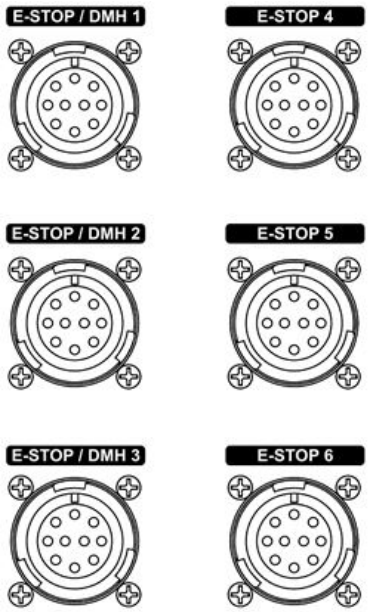


Figure 4. E-Stop / enabling switch connections

Six connectors are provided on the rear panel of the Mentor for connecting emergency stop switches. Additionally, enabling switches (dead man's handles) may be connected to inputs 1 to 3.

Emergency stop switches, enabling switches, foot switches, and other safety devices are available separately. Contact Kinesys or your supplier for details.

Connector:	MIL-C-5015 reverse bayonet 18-19 female receptacle e.g. Van-System CVBS 03 18-19S
Mating Connector:	MIL-C-5015 reverse bayonet 18-19 male plug e.g. Van-System CVBS 06 18-19P

Pin	Function	Description
A	TP0	Test Pulse 0 for E-Stop circuit
B	TP1	Test Pulse 1 for E-Stop and DMH circuits
C	ES0	E-Stop switch return
D	ES1	E-Stop switch return
E	TP0'	Test Pulse 0 for DMH circuit
F	DMH0	DMH switch return
G	DMH1	DMH switch return
H	24V	24V DC supply max 500mA*
I	0V	0V supply
J	LED ES	E-Stop switch LED indicator 24V DC max 75mA*

* Power outlets on emergency stop connectors are protected by a common 1A electronic circuit breaker. The total connected load of all emergency stop switching systems, indicators, beacons, and sirens must not exceed 1A.

The maximum recommended cable length using 0.5 mm2 cable is 250 m.

Shorting plugs MEN-98-2010 must be fitted to all emergency stop connections when not in use.

Always switch the Mentor off before connecting and disconnecting any equipment.

4.4.3 Ethernet & safety connections

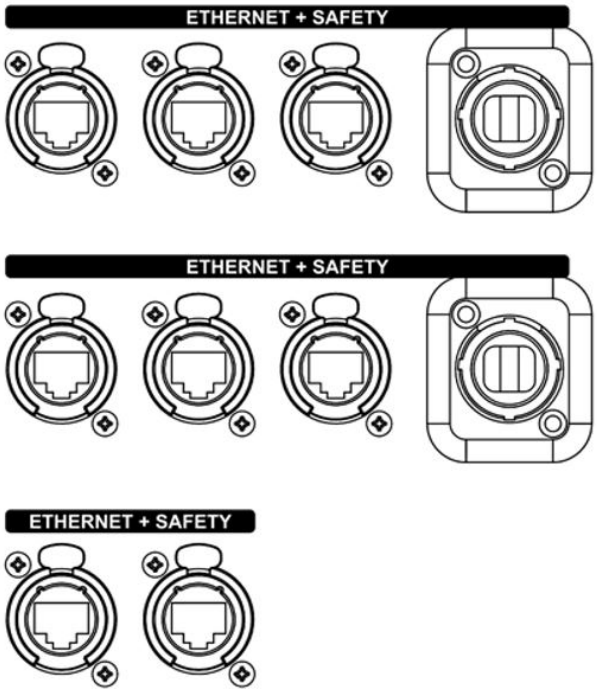


Figure 5. Ethernet & safety connections

Ten Ethernet outlets connected to the internal Ethernet switch are available on the rear panel. The two outlets furthest to the right can be optionally factory-configured for fibre optic connections where connections longer than 90m are required, for example in a front-of-house snake connection. See section 4.4.4 for details

The Ethernet outlets may be used for the connection of safety data for devices that use PROFIsafe safety signalling, such as apexDRIVE controllers.

Connector:	etherCON CAT5 e.g. Neutrik NE8FDV
Mating Connector:	etherCON CAT5 e.g. Neutrik NE8MC

Pin	Function	Description
1	ETH-TX+	Ethernet Data
2	ETH-TX-	Ethernet Data
3	ETH-RX+	Ethernet Data
4		No Connection
5		No Connection
6	ETH-RX+	Ethernet Data
7		No Connection
8		No Connection
Shell	ETH-S	Ethernet Shield

The maximum recommended cable length between devices is 90 m (subject to the cable manufacturer's recommended maximum cable length).

As this cable carries safety signals and Ethernet automation data, the use of a tactical grade cable (e.g. TMB Proplex PCCAT5EP cable with Neutrik Ethercon connectors) is highly recommended.

Shielded cables must be used for all Ethernet connections.

Note that not all flexible Ethernet cables are capable of supporting a 90m cable length while conforming to CAT5e standards – refer to the cable manufacturer for further information.

4.4.4 Ethernet & safety fibre optic connections

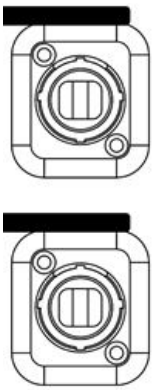


Figure 6. Ethernet & safety fibre optic connections

The two fibre optic connections are compatible with a wide range of entertainment industry Ethernet switches with fibre optic ports (e.g. the ProPlex GBS series from TMB). Fibre optic connection supports fibre lengths up to 550m.

The fibre potic Ethernet outlets may be used for the connection of safety data for devices that use PROFIsafe safety signalling such as apexDRIVE controllers.

Connector:	opticalCON QUAD Neutrik NO4DW-A
Interface specification:	1GB 1000BASE-SX 850nm multimode fibre
Cable Type:	Quad multimode fibre e.g. TMB ProPlex OM3

Pin	Function	Description
a	RECEIVE	Ethernet data receive
b	TRANSMIT	Ethernet data transmit
A		No connection
B		No connection

The maximum fibre length is 550 m.

Alternative fibre optic interface configurations are available on request e.g. single-mode fibre, opticalCON DUO, or other connectors.

4.4.5 EVO V2 Ethernet & safety connections

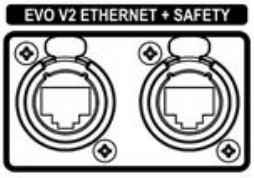


Figure 7. EVO V2 Ethernet & safety connections

Two outlets are provided for connection of EVO devices with a V2 safety interface. Additional devices may be connected using EVO DC8 V2 distribution units.

Connector:	etherCON CAT5 e.g. Neutrik NE8FDV
Interface specification:	etherCON CAT5 e.g. Neutrik NE8MC
Cable Type:	Shielded CAT5e or better

Pin	Function	Description
1	ETH-TX+	Ethernet Data
2	ETH-TX-	Ethernet Data
3	ETH-RX+	Ethernet Data
4	S-TP0	Test Pulse 0 from remote device
5	S-TP1	Test Pulse 1 from remote device
6	ETH-RX+	Ethernet Data
7	S-ES0	E-Stop circuit return to remote device
8	S-ES1	E-Stop circuit return to remove device
Shell	ETH-S	Ethernet Shield

The maximum recommended cable length between devices is 90 m (subject to the cable manufacturer's recommended maximum cable length).

As this cable carries safety signals and Ethernet automation data, the use of a tactical grade cable (e.g. TMB Proplex PCCAT5EP cable with Neutrik Ethercon connectors) is highly recommended.

Standard "office type" RJ45 patch cables are not permitted.

Note that not all flexible Ethernet cables are capable of supporting a 90m cable length while conforming to CAT5e standards – refer to the cable manufacturer for further information.

No shorting plugs are required when the EVO V2 outlets are not in use.

4.4.6 Console / pendant connection

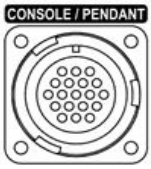


Figure 8. Console / pendant connection

The console / pendant connector allows connection of power, data and safety signals for an operator device via a single cable and connector.

Connector:	MIL-C-5015 reverse bayonet 20-A48 female receptacle e.g. Van-System CVBS 00 20-A48S
Mating Connector:	MIL-C-5015 reverse bayonet 20-A48 male plug e.g. Van-System CVBS 06 20-A48P

Pin	Function	Description
A	TP0	Test Pulse 0 for E-Stop and DMH circuits
B	TP1	Test Pulse 1 for E-Stop and DMH circuits
C	ES0	E-Stop switch return
D	ETH-S	Ethernet shield
E	ES1	E-Stop switch return
F	DMH0	DMH switch return
G	DMH1	DMH switch return
H	NC	No connection
J	NC	No connection
K	NC	No connection
L	24V	24V DC supply max 1A
M	0V	0V supply
N	ETH-TX-	Ethernet data
P	ETH-RX-	Ethernet data
R	NC	No connection
S	NC	No connection
T	NC	No connection
U	ETH-TX+	Ethernet data
V	ETH-RX+	Ethernet data

The maximum recommended cable length between devices is 90 m (subject to the cable manufacturer's recommended maximum cable length).

Shorting plugs MEN-98-2010 must be fitted to all emergency stop connections when not in use.

Always switch the Mentor off before connecting and disconnecting any equipment.

4.4.7 Beacon & siren connection

Figure 9. Beacon & Siren connection

A connector is provided for connecting beacons, status indicator lights and warning sirens, or voice annunciators.

Connector:	XLR6 female e.g. Neutrik NC6FD-LX
Mating Connector:	XLR6 male e.g. Neutrik NC6MXX

Pin	Function	Description
1	0V	0V supply / common
2	SIGOUT1	24V switched output 1 max 500mA*
3	SIGOUT2	24V switched output 2 max 500mA*
4	SIGOUT3	24V switched output 3 max 500mA*
5	SIGOUT4	24V switched output 4 max 500mA*
6	24V	24V DC supply max 500mA*

* The power outlet on the beacon / siren connector is protected by a common 1A electronic circuit breaker. The total connected load of all emergency stop switching systems, indicators, beacons, and sirens must not exceed 1A.

4.4.8 Universal device interface connection

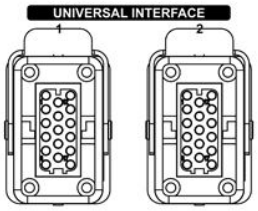


Figure 10. Universal device interface connection

Two universal device interface connectors are provided allowing the connection of legacy Kinesys equipment and third-party automation systems. Contact Kinesys for further advice on connecting other equipment such as Elevation 1+ or Digihoist systems, or third- party automation and safety systems.

Connector:	Harting DDD17F e.g. Harting 09 14 017 3101
Mating Connector:	Harting DDD17M e.g. Harting 09 14 017 3001

Pin	Function	Description
1	M-TP0	Test pulse 0 from Mentor
2	M-TP1	Test pulse 1 from Mentor
3	M-ES0	E-Stop circuit return to Mentor
4	M-ES1	E-Stop circuit return to Mentor
5	M-TP0	Test pulse 0 from Mentor
6	M-TP1	Test pulse 1 from Mentor
7	M-DMH0	DMH circuit return to Mentor
8	M-DMH1	DMH circuit return to Mentor
9	S-TP0	Test pulse 0 for E-Stop from remote device
10	S-TP1	Test pulse 1 for E-Stop from remote device
11	S-ES0	E-Stop circuit return to remove device
12	S-ES1	E-Stop circuit return to remove device
13	S-TP2	Test pulse 2 for E-Stop from remote device
14	S-TP3	Test pulse 3 for E-Stop from remote device
15	S-DMH2	DMH circuit return to remote device
16	S-DMH3	DMH circuit return to remote device
17	0V	0V reference

5. Operation

5.1 System start-up

Make all the connections to the Mentor as described in section 4. Switch the Mentor on using the power switch located on the rear panel above the mains input connector. The system will power up and after initialisation, the home screen will appear on the touchscreen display.

5.2 Touchscreen display

Only use your finger or a touchscreen stylus to operate the touchscreen. Do not use sharp objects such as pens and screwdrivers as these may cause permanent damage to the touchscreen.

5.3 Home screen

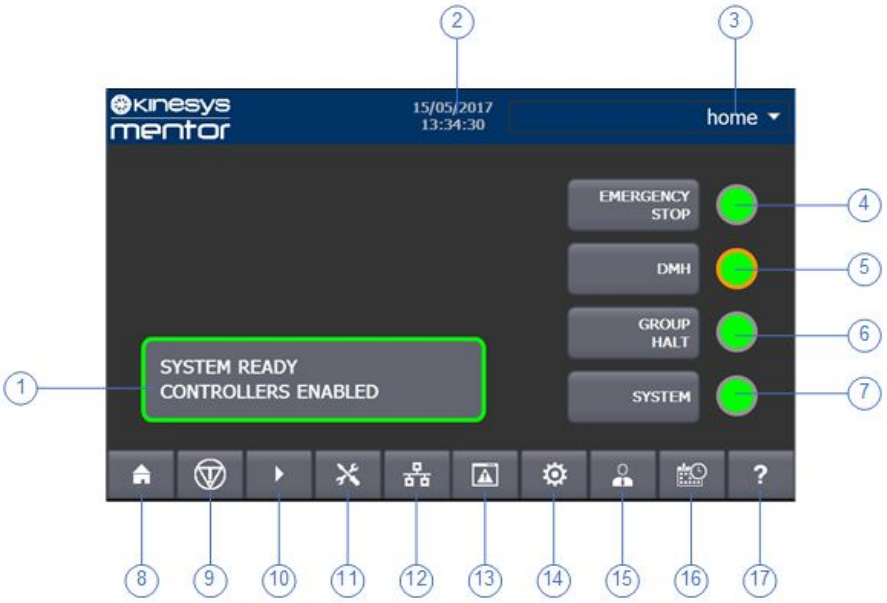


Figure 11. Home screen

Item #	Description	Notes
1	Status area	Displays the status of the Mentor outputs. The border colour shows the current system status:
		GREEN - the system is operational and one or more drives are enabled.
		YELLOW - all drives are disabled, for example because of an activated emergency stop button or released emergency switch.
		RED - there is a system fault preventing any devices from being enabled.
2	Date and time display	Shows the current date and time. Mentor can act as a time server for suitable devices, enabling log files to have a consistent time stamp across multiple devices. Touch the date and time display or the calendar menu button (16) to set the date and time.
3	Screen navigation	Shows the name of the currently displayed screen. Touch the drop-down arrow to navigate through all available

Item #	Description	Notes
		screens.
4	Emergency stop status indicator	Shows the status of all connected emergency stop switches:
		GREEN - all emergency stop switches are released and the emergency stop system is ready.
		YELLOW - all emergency stop switches are released bu the emergency stop system is awaiting a reset signal
		RED - one or more emergency stop buttons have been pressed.
5	DMH indicator	Shows the status of the Dead Man's Handle (enabling switch) system:
		GREEN - the output of the Dead Man's Handle is on and drives are enabled.
		RED - the output of the Dead Man's Handle is off.
6	Group halt status indicator	Shows the status of the group halt system:
		GREEN - all groups are OK and enabled
		YELLOW - one or more groups have a warning status, for example being close to a position / load synchronisation error.
		RED - one or more groups have a shutdown status, for example a position / load error has occurred or a device in the group has failed.
7	System status indicator	GREEN - all connected devices are communicating correctly.
		RED - one or more connected devices is offline or not communicating.
8	Home screen button	
9	Emergency stop screen button	
10	DMH (enabling switch) screen button	
11	Tools screen button	
12	Network configuration screen button	
13	Alarms screen button	
14	Settings screen button	
15	User administration screen button	
16	Calendar screen button	
17	Help screen button	

5.4 Emergency stop buttons

All emergency stop buttons must be tested following any new installation or configuration of the system, and at regular intervals thereafter.

Pressing any emergency stop button will immediately initiate an emergency stop of all connected equipment. The red LED indicator in the pressed emergency stop button will flash and a message will be shown on the display of the Mentor.

If an emergency stop button has been pressed and thereby shut down all devices, a dangerous situation may still remain. Only release the emergency stop button once the cause of the emergency stop has been assessed and resolved.

Turn the emergency stop button clockwise to release it.

The yellow ring around the emergency stop button on the Mentor front panel illuminates to indicate the status of the emergency stop system:

OFF	Safety PLC has not yet started, or system fault.
ON	Emergency stop button is ready for operation.
Flash 1 Hz	An emergency stop button has been pressed.
Flash 5 Hz	All emergency stop buttons are released and the system is waiting for a reset signal.

5.5 Security

Certain operations on the Mentor display are protected by passwords. When an attempt to access a protected area or operate a protected function is made by a user with insufficient permissions, a Login window will be displayed:

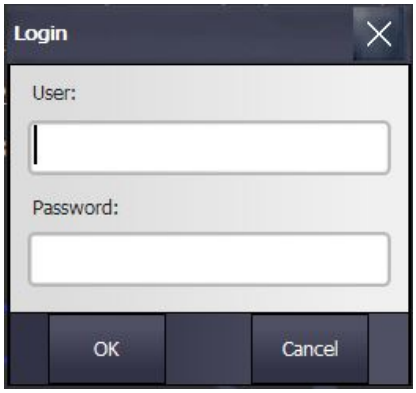


Figure 12. Login window

Touch the "User" field and a keyboard will appearon the display to allow the user name to be entered:

Figure 13. Data entry keyboard

Enter the username (not case-sensitive) and touch the Enter button to save it or press “Esc” or X to quit.

Enter the password in the same way. Note that passwords are case-sensitive. When the user name and password have been entered touch the OK button to log in.

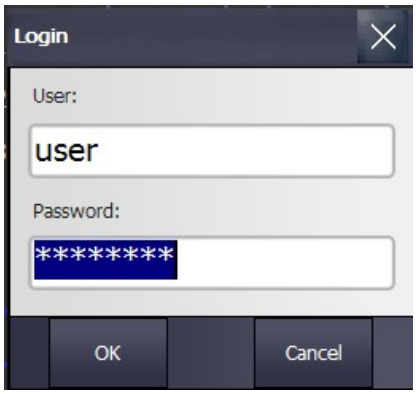


Figure 14. Login window - populated

Reselect the previously protected and, if the user has sufficient permissions, access will be granted.

Users will automatically be logged out after 5 minutes for security. The currently logged in user can be displayed by pressing the User button  .

5.6 Dead Man's Handles (enabling switches)

Up to six hard-wired Dead Man's Handles (also known as enabling switches or DMHs) may be connected to the Mentor. The use of at least one Dead Man's Handle is recommended for all applications; additional Dead Man's Handles may be also be required if the operator does not have a clear line of sight of the axis being controlled.

5.6.1 DMH status screen

Touch the DMH button  to access the DMH status screen. The Mentor has two DMH groups, at least one of which must be active to enable drives.

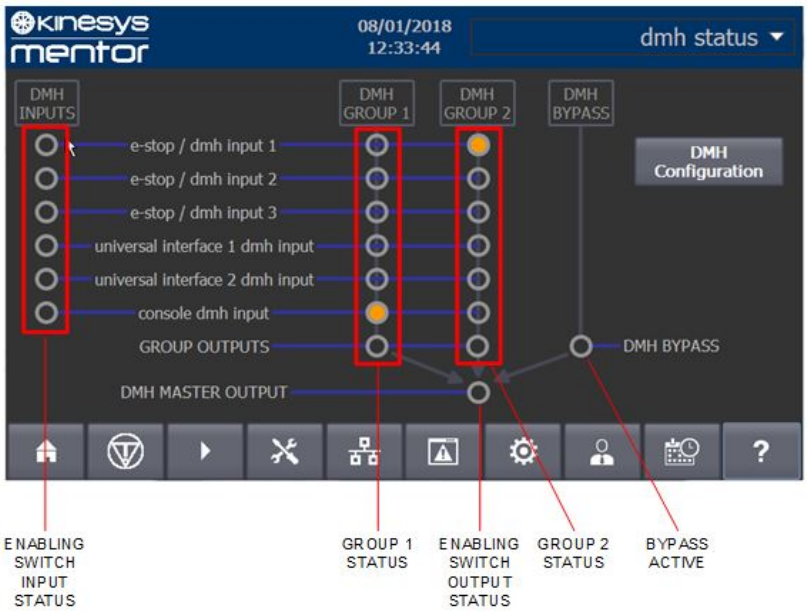


Figure 15. DMH status screen - DMH groups inactive

To enable drives, at least one of the DMH groups must be active or the DMH bypass must be selected. The status of DMHs and their group assignments is shown by the indicators on the DMH status screen.

	A DMH is assigned to that device / group and is enabled
	A DMH is assigned to that device / group and is not enabled
	A DMH is not assigned to that device / group

When all the DMH in a group are enabled, as indicated by a green indicator, the group output and DMH master output will also be active, which will be indicated by their indicators also turning green a shown for DMH Group 1 below. DMH Group 2 contains a DMH which is not enabled, as indicated by the orange indicator, and therefore Group Output 2 is not active.

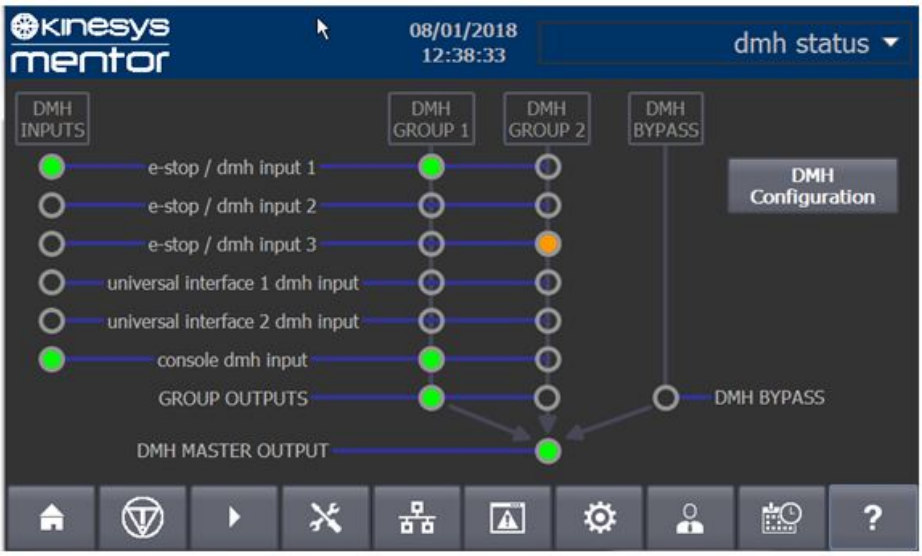


Figure 16. DMH status screen - DMH Group 1 active

5.7 Alarms screen

Touch the  button to access the Alarms screen. The initial display will show all the currently active alarms:

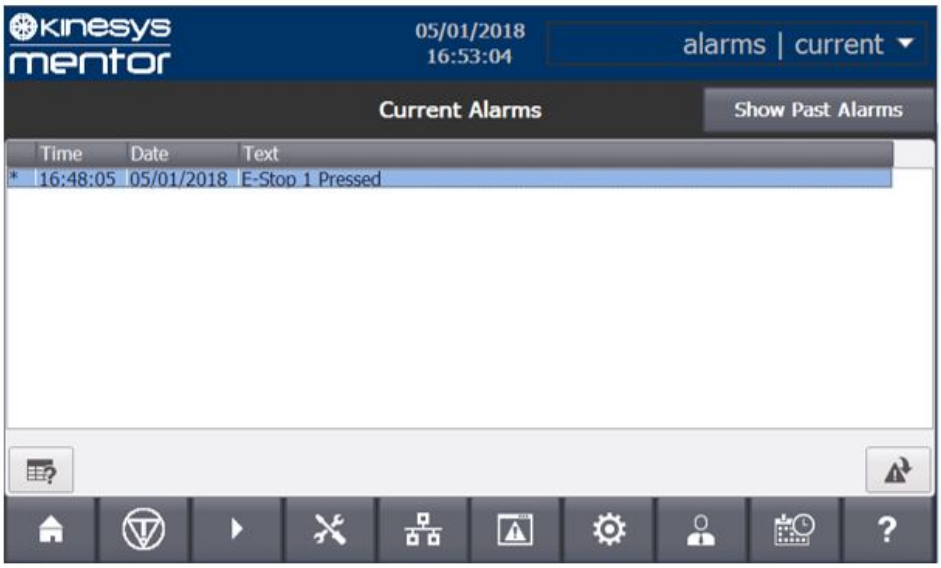


Figure 17. Alarms screen - current alarms

To view information about an alarm, touch the relevant row on the Alarms screen and then press the  button. Toclose the information window, touch the  button.

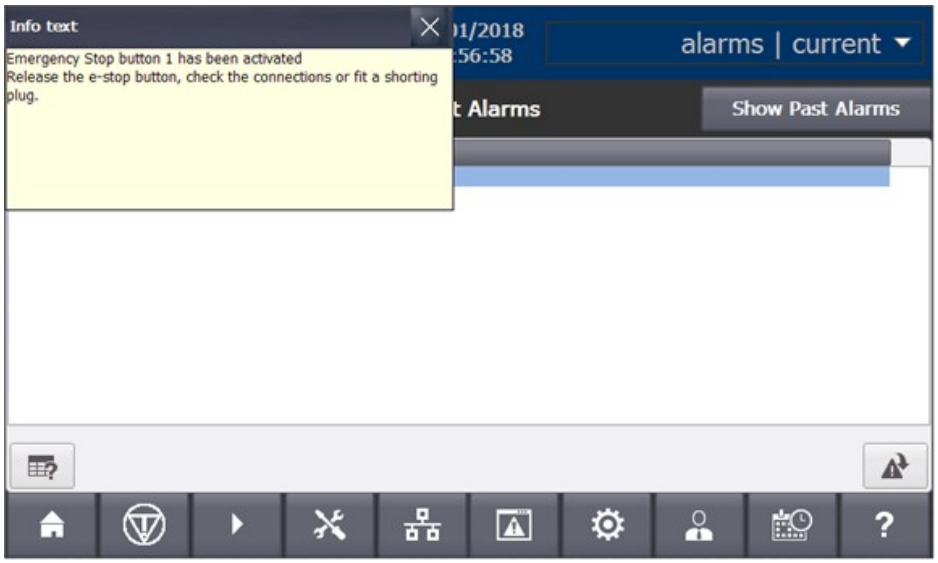


Figure 18. Alarms screen - information window

Touch the "Show Past Alarms" button to show all current and historic alarms, along with time and date stamps. An incoming alarm is shown by an "I" in the Status column and a cleared alarm is shown by "(I)O".

To revert to viewing current alarms, touch the "Show Only Current Alarms" button.

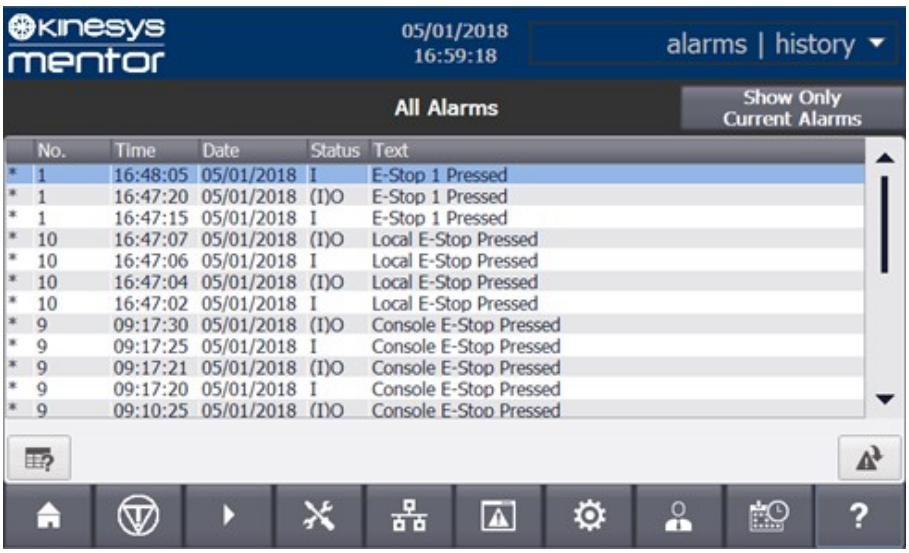


Figure 19. Alarms screen - past alarms

Note: the following button on the Alarms screen currently has no function: 

5.8 Remote display

The Mentor display may be viewed remotely on a PC using Sm@rtClient application and Mentor display IP address which can be found in the Help screen. Refer to Appendix B in section 12 for details.

6. Configuration

6.1 Configuring hard wired safety devices

The system configuration should be designed following a risk assessment of the required safety devices and implemented and modified only by authorised persons.

Document the system configuration with a layout drawing and a list of required safety devices and output devices.

Test all safety devices following each installation or system reconfiguration, and regularly following installation or reconfiguration.

Mobile devices connected using flexible cables should be tested monthly, fixed devices connected using flexible cables should be tested every three months, and fixed devices installed using fixed wiring should be tested every twelve months. Your risk assessment or local codes may dictate a different test cycle.

6.1.1 Shorting plugs

Shorting plugs MEN-98-2010 must be fitted to the Mentor wherever a hard-wired safety input device is not connected

The following connectors on the rear panel of the Mentor must have either safety devices or shorting plugs connected.

- Emergency stop 1 / DMH
- Emergency stop 2 / DMH
- Emergency stop 3 / DMH
- Emergency stop 4
- Emergency stop 5
- Emergency stop 6
- Console / pendant
- Universal device interface 1
- Universal device interface 2

Always store unused shorting plus securely to prevent misuse.

6.2 Key switches

Some operations of the Mentor are configured by the use of key-operated switches. Keys must be removed after configuration and stored in a secure location only accessible to authorised personnel.

Where the use of common key types may result in reduced security alternative key profiles may be supplied on request.

6.3 Dead Man's Handle configuration

The DMH switch inputs and processing logic are configured using the touchscreen display.

Note: DMH is an abbreviation of Dead Man's Handle (also known as enabling switch).

Touch the Settings icon and then select “DMH Configuration” to access the System Configuration menu.

Unless already logged in, the Login window will appear. Enter the user name and password to continue. Refer to section 5.5 for details on logging in.

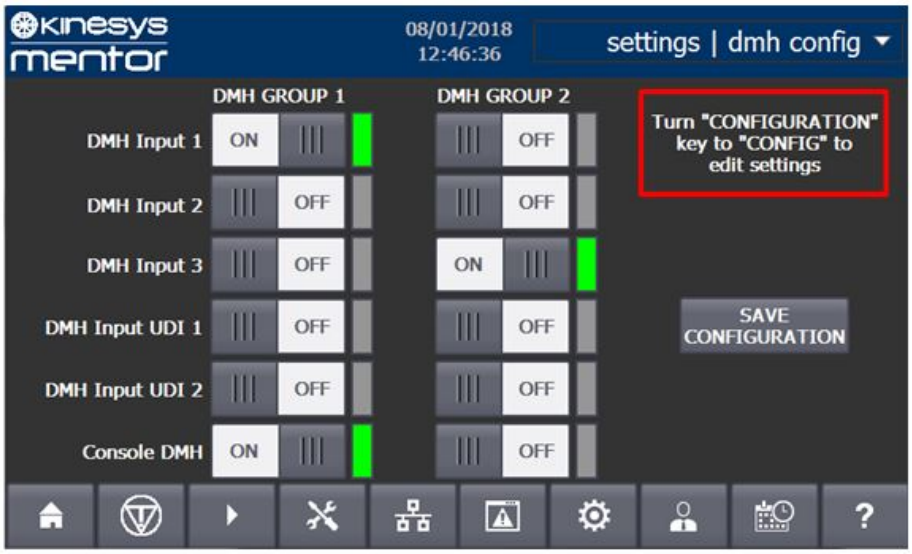


Figure 20. DMH configuration screen

The screen will prompt to turn the “CONFIGURATION” key to “CONFIG” in order to edit settings. The Configuration key can be found on the front panel of the Mentor.

Moving the Configuration key to CONFIG mode will disable all devices and stop movement.

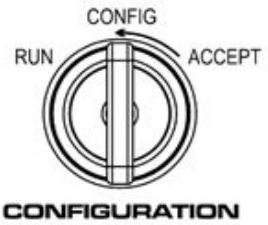


Figure 21. Configuration key

Mentor has two DMH (Dead Man's Handle) groups, at least one of which must be active to enable the connected drives. Each DMH may be selected for use in one or both DMH groups by using the switches on the configuration screen.

To activate a DMH within a group, move the switch to the right; to deactivate it, move the switch to the left. Switches may also be toggled by double-tapping. The green indicators to the right of each switch shows which devices are active in which group.

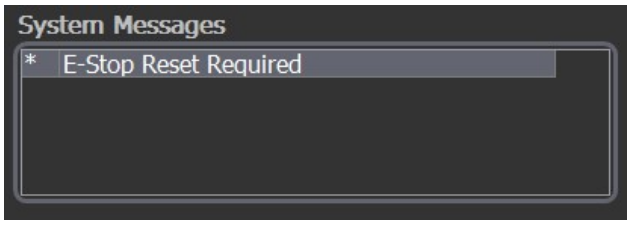
When the correct DMH group configuration has been made, turn the Configuration key to the "ACCEPT" position and then press the SAVE CONFIGURATION" button on the DMH configuration screen.

Turn the Configuration key ro "RUN" once the configuration is complete.

6.4 Emergency stop reset configuration

The Mentor can be configured to automatically reset the emergency stop outputs when all emergency stop buttons have been released, or to require a reset command from the RESET key on the front panel.

When auto reset mode is off, and the emergency stop buttons require resetting following release, the yellow ring around the emergency stop button on the Mentor will flash rapidly and the following message will be displayed in the System Message Centre:



Turn the Reset key clockwise to reset the emergency stop system.

Figure 22. Reset key

To configure the emergency stop reset mode, touch the Settings icon  and then select “System Configuration” to access the E-Stop configuration screen.

Unless already logged in, the Login window will appear. Enter the user name and password to continue. Refer to section 5.5 for details on logging in.

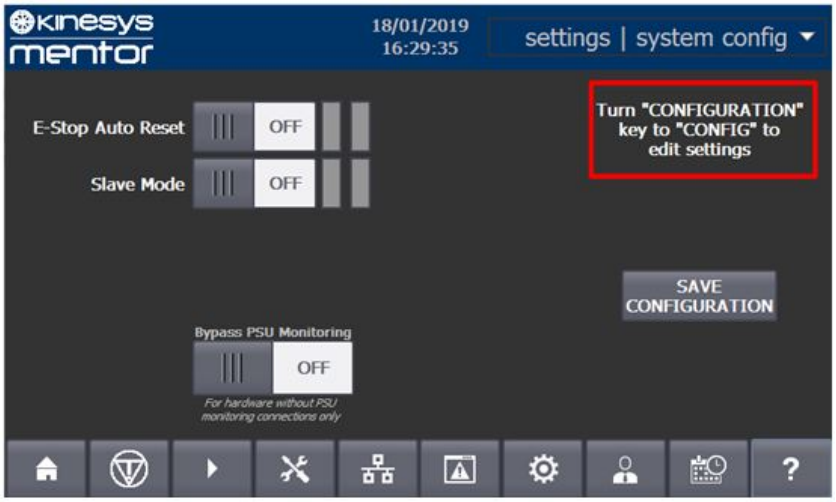


Figure 23. E-Stop configuration screen

The screen will prompt to turn the “CONFIGURATION” key to “CONFIG” in order to edit settings. The Configuration key can be found on the front panel of the Mentor.

Moving the Configuration key to CONFIG mode will disable all devices and stop movement.

Turn the Configuration key to "CONFIG". To enable automatic reset mode, slide the “E-Stop Auto Reset” switch to the right. To disable automatic reset mode, slide the switch to the left. The first indicator to the right of the switch will turn green to confirm the setting has been saved.

When the configuration has been made, turn the Configuration key to “ACCEPT” and touch the “SAVE CONFIGURATION” button. The second indicator to the right of the switch will turn green to show the final configuration.

Turn the Configuration key back to "RUN" once the configuration is complete.

For details on the "Slave Mode" switch, refer to section 7.1.2.

6.5 Configuring network safety devices

The Mentor can be used to integrate devices using PROFIsafe over PROFINET safety signalling. PROFIsafe uses coded data transmission which requires a matching "PROFINET device name" and "F-device address" for each connected device. Device names and addresses must be unique within the network.

The Mentor is factory configured for a range of device names and F-device addresses. The range can only be re-configured by Kinesys. The available range of devices can be seen on the Help screen.

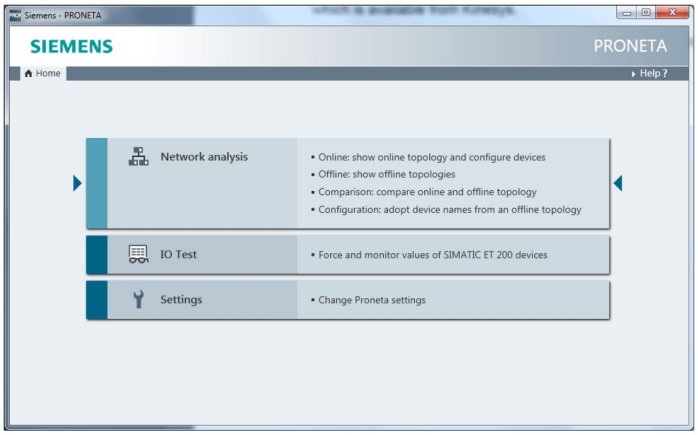
Each device controlled by the Mentor must be assigned a unique PROFINET device name and matching F-device address from the available address range. The following sections describe how to check and change these details. The only device currently able to support PROFIsafe is the apexDRIVE.

6.5.1 Checking the PROFINET device name

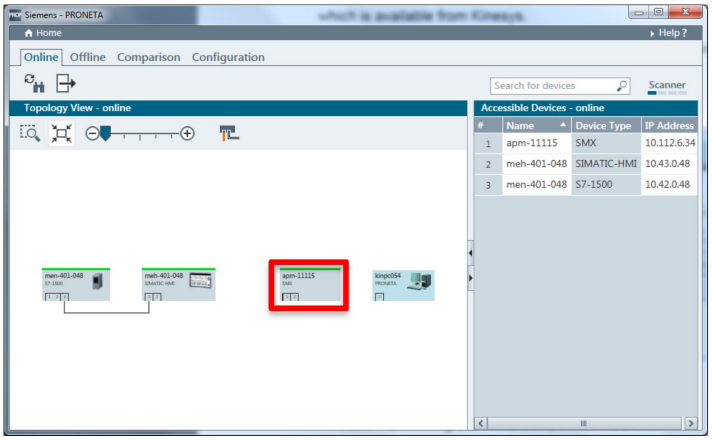
This must be done using the PRONETA software which is available from Kinesys. Contact Kinesys support for more details.

Note: it is easier to check the device name when only one device is connected to the Mentor.

1. Run PRONETA and select "Network Analysis".

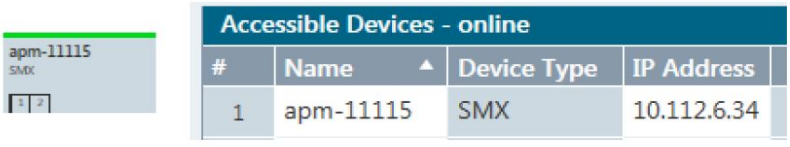


2. The connected devices are shown in graphical and tabular format.



3. The devices visible in the main window should be the following:

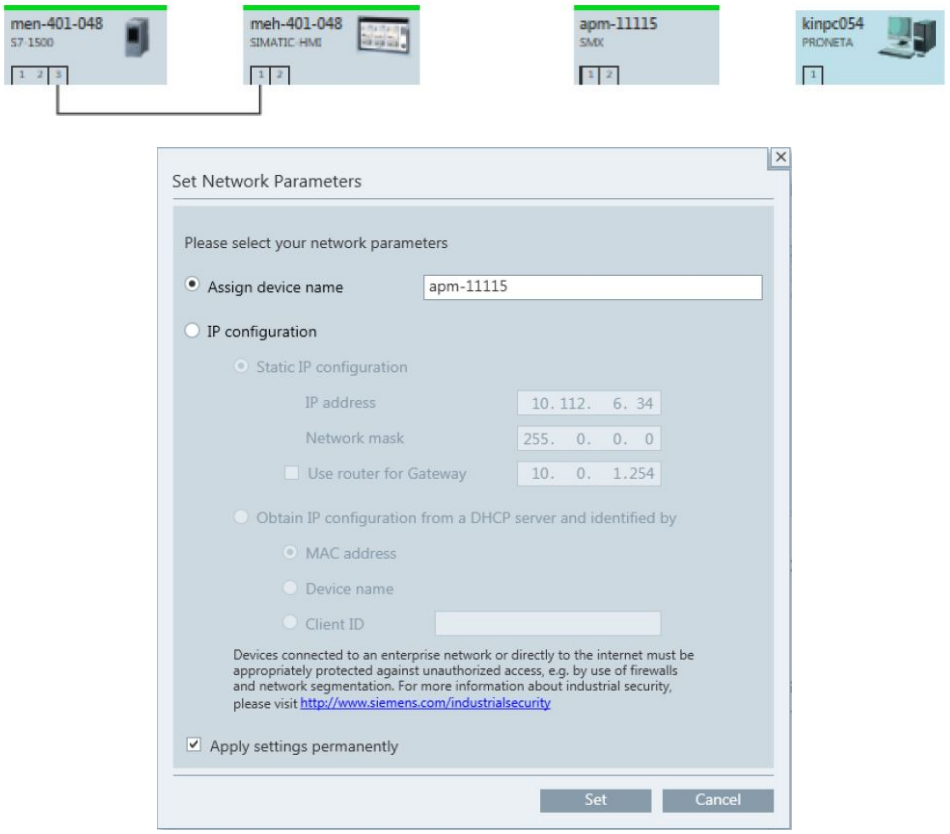
- any configuration PC with the PROFINET device driver
- the Mentor SPLC (name **men-401-xxx** where xxx is the last three digits of the serial number)
- the Mentor display (name **meh-401-xxx** where xxx is the last three digits of the serial number)
- a PROFINET device e.g. device type "SMX" which is used in the apexDRIVE. The device name can be read from the PRONETA display.



Note that all devices are assigned a unique IP address in the 10.0.0.0 / 24 subnet at manufacture. This must not be changed.

6.5.2 Changing the PROFINET device name

1. Open PRONETA and run the Network Analysis as described in the previous section.
2. In the graphical area of the main window, double-click on the icon for the required device to bring up the "Set Network Parameters" dialog.



3. Make sure the "Assign device name" radio button is checked and enter the required device name in the text field. apexDRIVE controllers all have a device name in the format **apm-abcde** where abcde is a numeric sequence.

   The IP address fields must not be changed.

   The F-device address must match the five numeric digits in the PROFINET device name otherwise communications will not be enabled. Refer to section 6.5.4 for details on changing the F-device address.

   Click "Set" to save the changes.

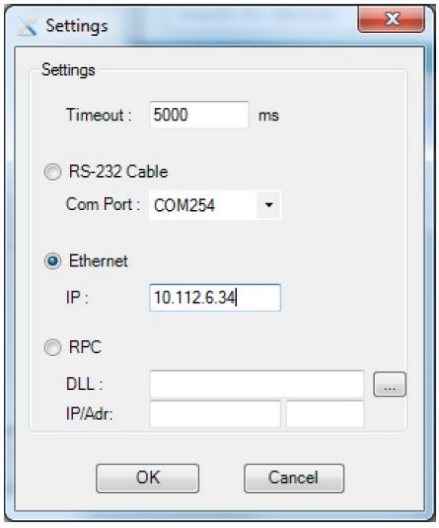
6.5.3 Checking the F-device address

The F-device address is written into the memory of the SPLC safety processors independently of the PROFINET device name. The F-device address can only be verified by producing a safety system report using the SafePMT software available from Kinesys.

1. Run the SafePMT software and click the Settings icon from the toolbar or select "Connections" and then "Settings".

2. In the Settings dialog, check the "Ethernet" radio button and then tenter the IP address in the "IP" field.

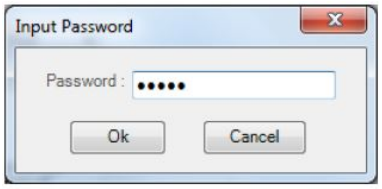
The IP address can be seen in the PRONETA display (refer to the section 6.5.1). For apexDRIVE controllers the IP address is in the format **10.112.xx.yy**, where xxyy is the last four digits of the device serial number. For example is the serial number is 12027-0634, the IP address is 10.112.6.34.



Click "OK" to save the changes.

3. Click the Connect icon on the toolbar or select "Connections" and then "Connect".

4. Enter the device password in the “Input Password” dialog as confirmation that connection has been made to the correct device. The password is the same as the device serial number and can be read from the apexDRIVE SPLC status screen.

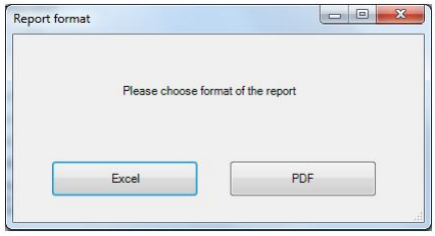


Passwords must be entered as a five-digit number. If the serial number has fewer than five digits, add "0"s to the beginning of the serial number to create a five-digit password. For example if the serial number was **123**, the password woudl be **00123**.

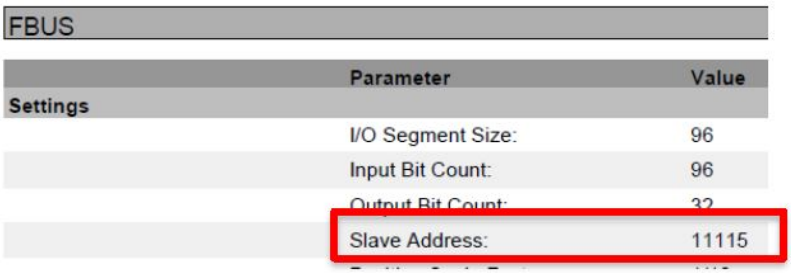
5. If no configuration file is open in SafePMT, a warning dialog will appear. Click "OK" to dismiss the warning.
6. When connected, the word "Connected" will appear in the status bar at the bottom of the screen.
7. Select "Validation" and then "Generate Report" from the menu. Click "Yes" to confirm the change in device state.

Caution! This action will stop the connected SPLC, which will stop motion of the connected drive and, if the drive is enabled in Mentor, all other devices connected to the Mentor.

8. On the next dialog select the "PDF" report format. Then enter a file name and select a location to save the report.



9. On the report, scroll down to the "FBUS" section. The F-device address is shown in the report as the "Slave Address".



FBUS

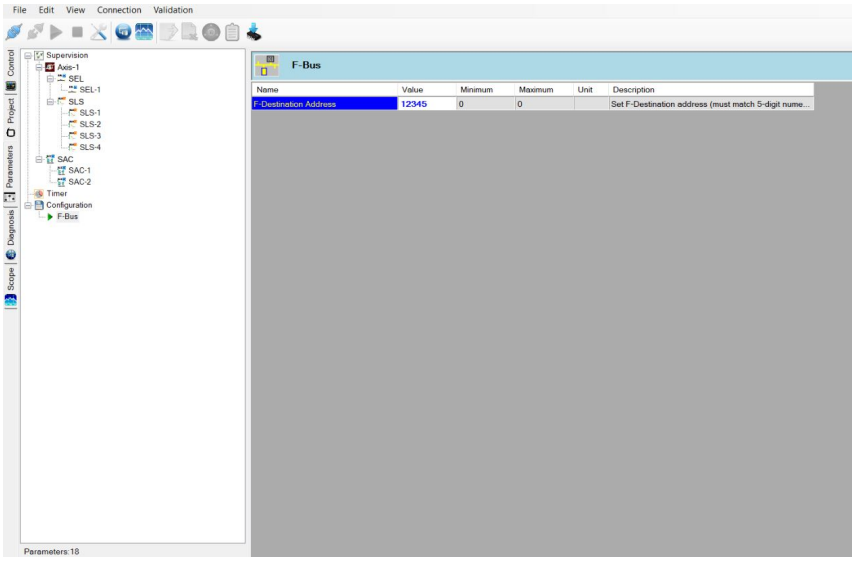
	Parameter	Value
Settings		
	I/O Segment Size:	96
	Input Bit Count:	96
	Output Bit Count:	32
	Slave Address:	11115

For correct operation the Slave Address number (F-device address) should match the five-digit number in the PROFINET device name (refer to section 6.5.1).

6.5.4 Changing the F-device address

The F-device address must be set to match the five-digit number in the PROFINET device name. For example, if the device name is apm-11115 then the F-device address must be 11115. If these numbers do not match then communications will not be enabled. For details on how to check the device name, refer to section 6.5.1.

1. Run the SafePMT software. Open the correct parameter (.PMT) file for the hoist and drive including any user configured settings that may be required.
2. Click the "Parameters" tab on the left side of the window. Then select "F-Bus" at the bottom of the parameter browser.
3. In the "value" field next to "F-Desintation Address" enter the correct F-device address and press Enter. Make sure when you press Enter that the text highlights blue - this shows that the change has saved.



7. Linking Mentors

It may be necessary to link multiple Mentor systems to connect large numbers of apexDRIVEs, or to use apexDRIVEs from different address ranges without re-addressing the devices.

7.1 Linking using the Universal Device Interface connection

Up to two Mentor units operating in Slave mode may connected to a single Mentor acting as the master using the two Universal Device Interface connectors on the rear panel.

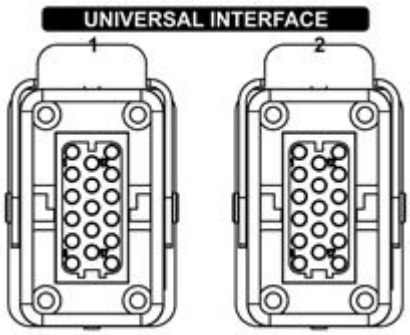


Figure 24. Universal Device Interface connections

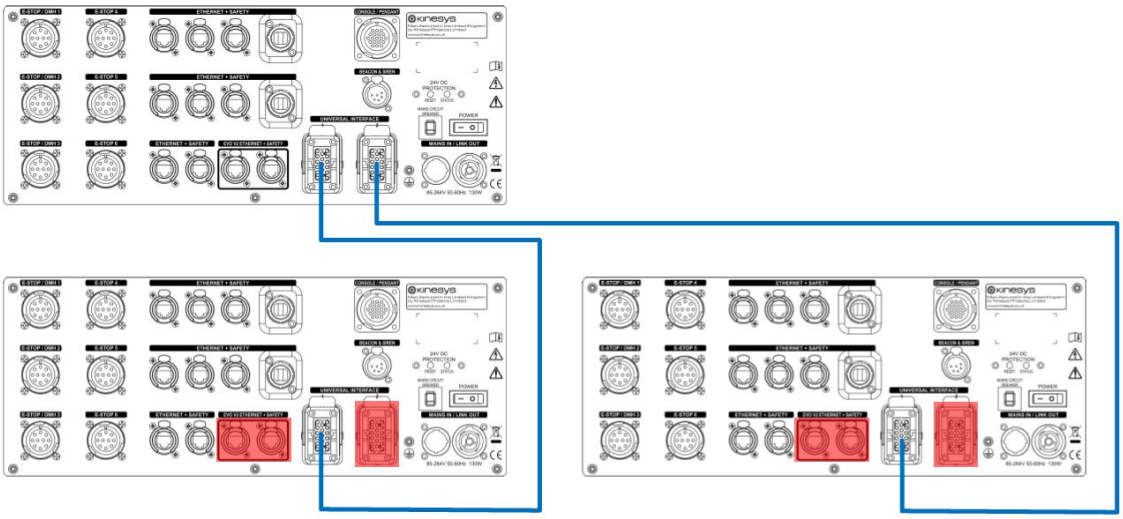


Figure 25. Linking Mentor units

Notes:

- A male- male UDI link cable (Kinesys part number 9280201) is required for each slave Mentor connection.
- The second UDI connection and the two EVO V2 connections of the slave Mentor must not be used. However, the unused UDI connection and EVO V2 connections of the master Mentor can be used for connecting other devices.
- All connected devices must have unique PROFINET device names and F- device addresses. Any duplicate names or addresses will cause conflicts. For more details, refer to section 6.5.
- Ethernet control data may be linked from a common computer or pendant, or may be left separated if two independent control systems are required.

Slave mode configuration is currently only available as a factory set option (version 21 onwards). Mentor systems with software version 16 and higher can act as a master when the Dead Man's Handle system is configured as detailed in the following sections.

7.1.1 Configuring the master Mentor

The Mentor used as the master must have the DMH inputs for the relevant UDI connector(s) enabled on the DMH Configuration screen. Refer to section 6.3 for details on configuring Dead Man's Handles (DMHs).

A different configuration may be entered for DMH Group 2 but the UDI DMH inputs connected to slave Mentors must be switched ON in both groups.

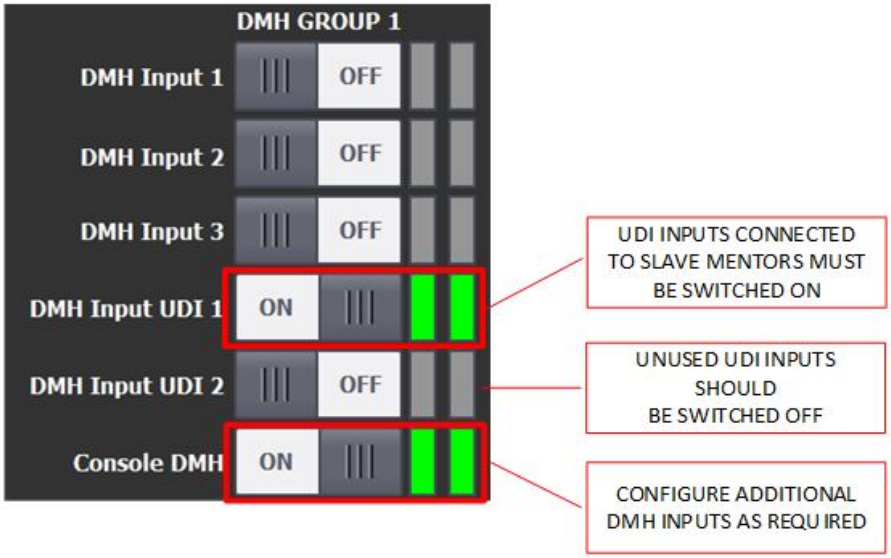


Figure 26. Master Mentor DMH Configuration screen

7.1.2 Configuring the slave Mentor

Touch the Settings icon  and then select “DMH Configuration” to access the System Configuration menu.

Unless already logged in, the Login window will appear. Enter the user name and password to continue. Refer to section 5.5 for details on logging in.

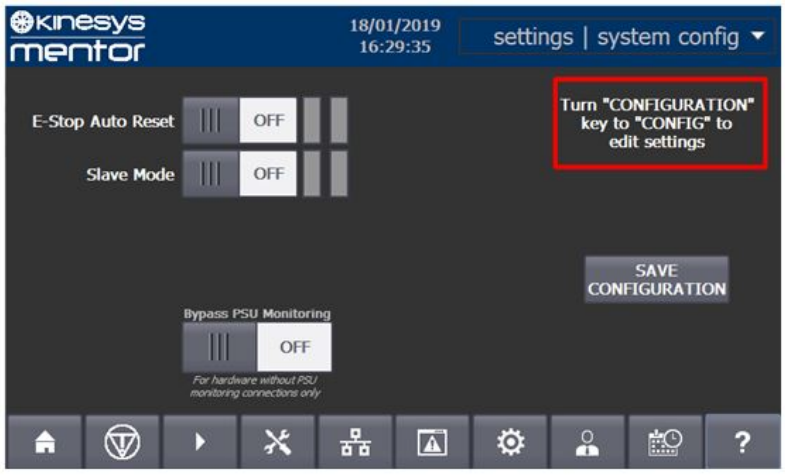


Figure 27. Slave Mentor System Configuration screen

The screen will prompt to turn the “CONFIGURATION” key to “CONFIG” in order to edit settings. The Configuration key can be found on the front panel of the Mentor.

Caution! Moving the Configuration key to CONFIG mode will disable all devices and stop movement.

Turn the Configuration key to "CONFIG". To enable slave mode, slide the “Slave Mode” switch to the right. To disable slave mode, slide the switch to the left. The first indicator to the right of the switch will turn green to confirm the setting has been saved.

When the configuration has been made, turn the Configuration key to “ACCEPT” and touch the “SAVE CONFIGURATION” button. The second indicator to the right of the switch will turn green to show the final configuration.

Turn the Configuration key back to "RUN" once the configuration is complete.

A Mentor that has been configured to slave mode will show a "Slave Mode" banner on the main screen:

In a similar manner to setting up the master Mentor, the slave Mentor(s) must have the DMH inputs for the relevant UDI connector(s) enabled on the DMH Configuration screen. Refer to section 6.3 for details on configuring Dead Man's Handles (DMHs).

A different configuration may be entered for DMH Group 2 but the UDI DMH inputs must be switched ON in both groups.

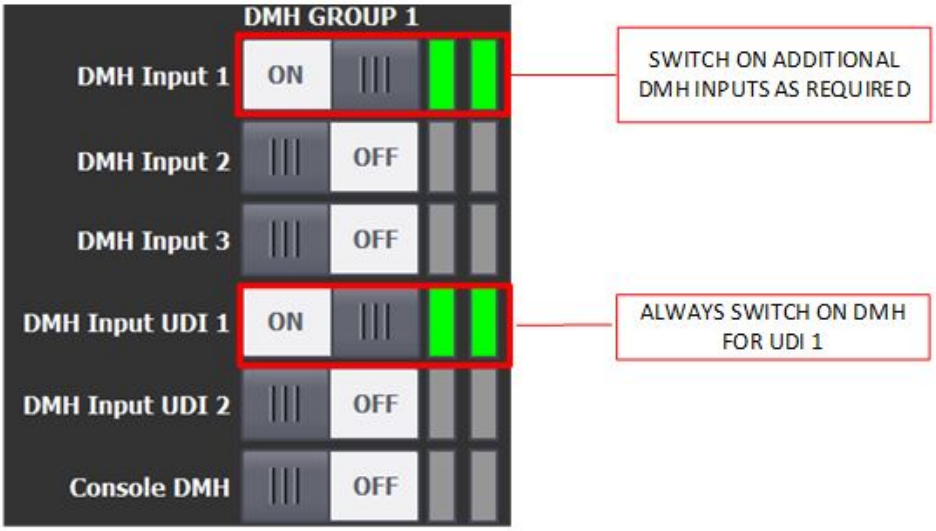


Figure 28. Slave Mentor DMH Configuration screen

7.2 Testing the master-slave configuration

Always test all connected emergency stop devices and Dead Man's Handles after connection and configuration to ensure that all of the drives connected to the master and slave Mentors operate correctly and receive emergency stop and DMH commands as required. Retest the entire system following any change in configuration.

8. Fault finding & maintenance

8.1 Diagnostics

The PLC diagnostics screen provides information on the Mentor hardware and software which may be helpful for Kinesys engineers when diagnosing a problem.

To view the PLC diagnostics, touch the button to bring up the Tools screen. Then select "plc diagnostics" from the drop-down menu.

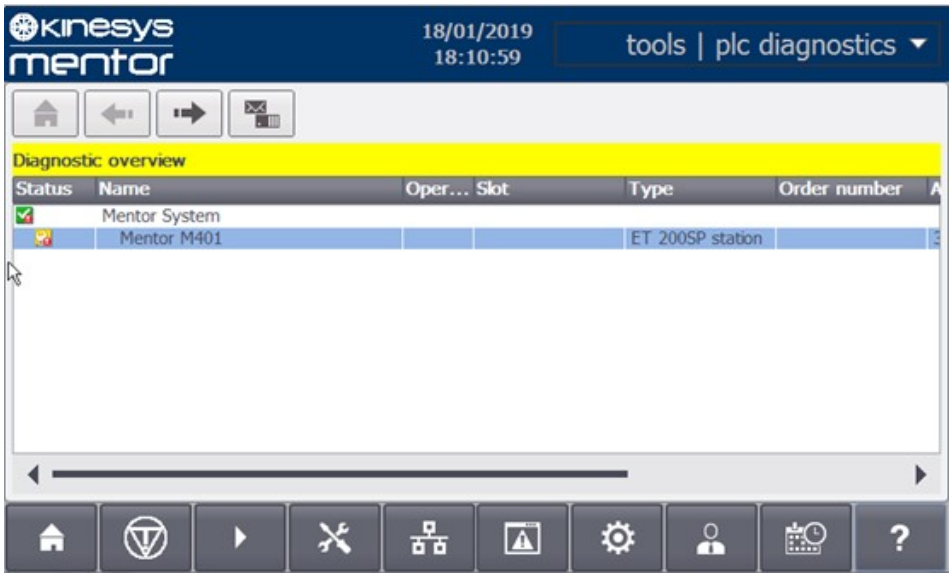


Figure 29. PLC diagnostics screen

Select the "Mentor 401" entry on the main screen and touch the button to drill down into the system.

To see the status of connected devices, select the "PROFINET IO_System" line and touch the button.

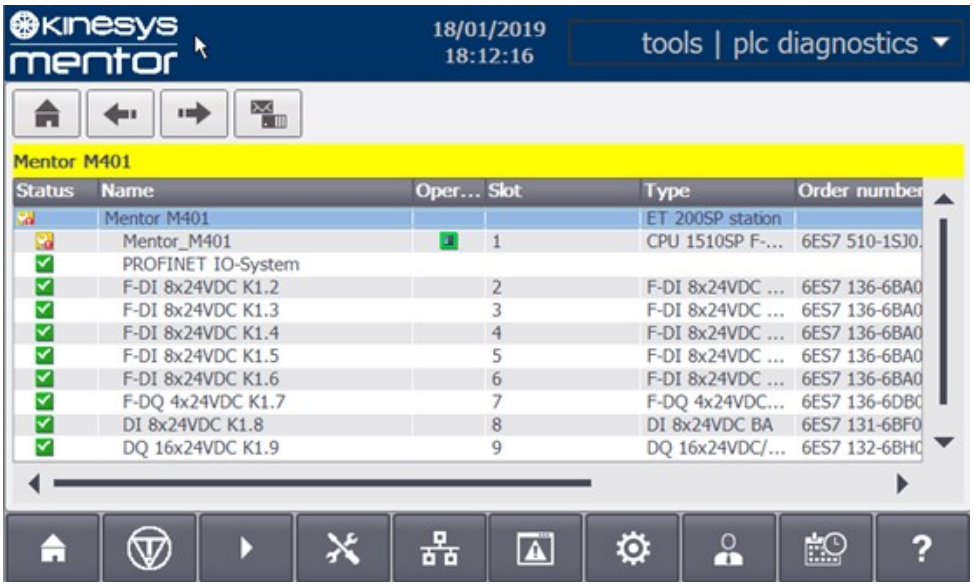


Figure 30. PLC diagnostics screen - 2nd level

On the next screen, each device is represented by a box.

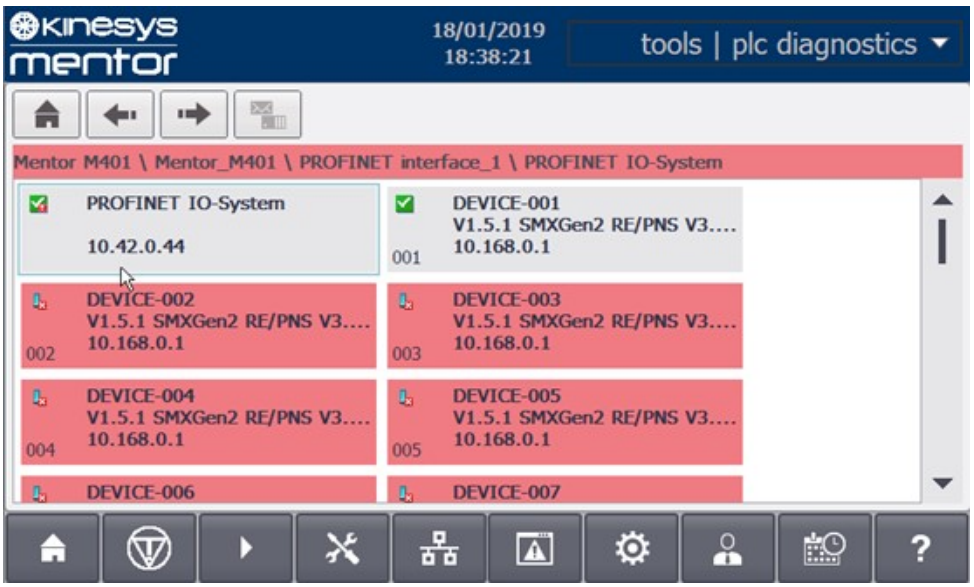
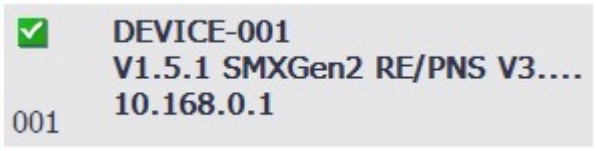
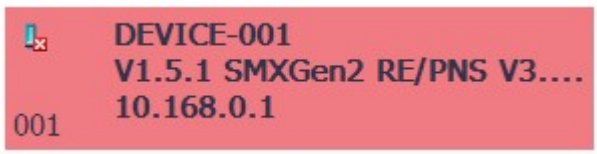


Figure 31. PLC diagnostics screen - 3rd level

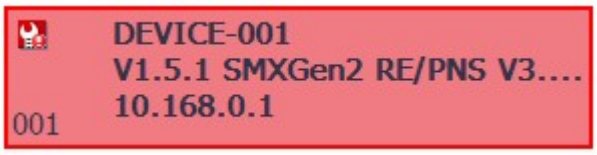
A grey box with the "device OK" icon indicates a device that has connected successfully, including the safety communications.



A red box with the "device disconnected" icon indicates that the device is not connected (no Ethernet connection or incorrect PROFInet address).



A red box with a red border and the "maintenance" icon indicates that the device is connected but there is a fault with the safety communications - usually an incorrect F-device address.



To view further information about the device, touch the button:

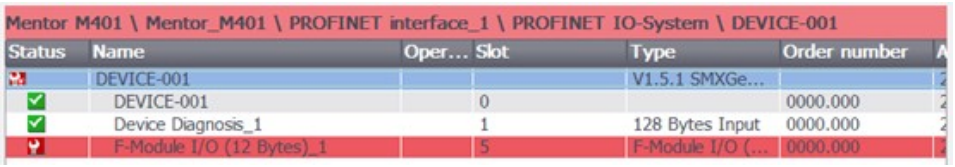


Figure 32. Diagnostics screen - 4th level

The example in Figure 32 shows that the safety inputs and outputs of the device are not working - select the line highlighted in red and touch the button for further information.

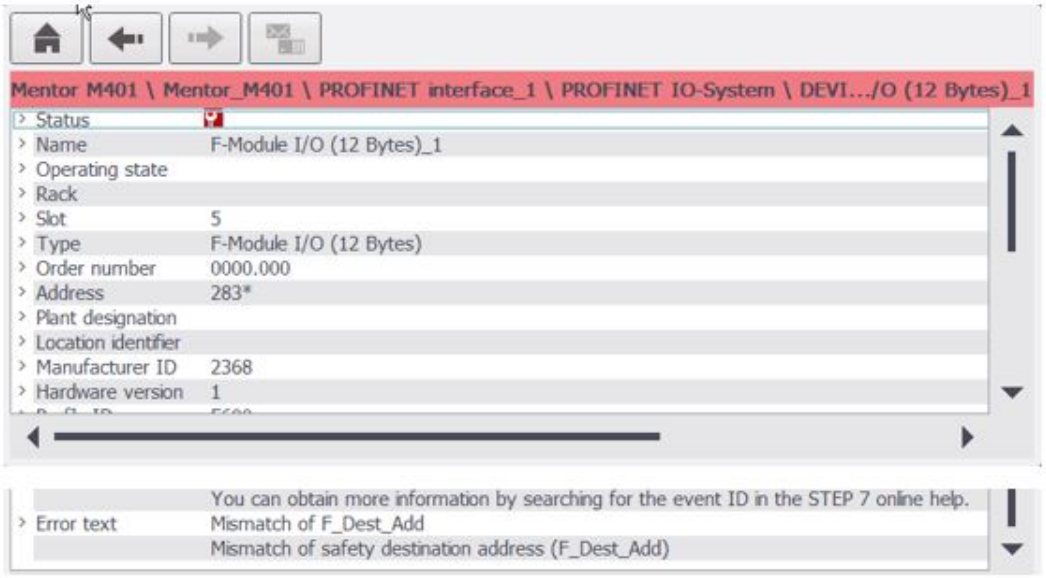


Figure 33. Diagnostics screen - 5th level

Scroll down on this screen to see further information. The example in Figure 33 shows a mismatch of F-device address (or "F_Dest_Add").

Touch the button to move back up through the levels or touch the button to return to the top level of the Diagnostics screen.

Note: the following button on the Diagnostics screen currently has no function:

8.2 Power supply protection

8.2.1 Mains input (AC supply)

The mains input to the Mentor is protected by a 2A thermal magnetic circuit breaker mounted on the rear panel above the mains inlet.

When tripped, the circuit breaker will pop out and reveal a white indicator. Press the actuator to reset the circuit breaker; it may be necessary to wait for up to 3 minutes to allow the circuit breaker to cool before resetting is permitted.

If the circuit breaker trips repeatedly, contact Kinesys or your local distributor for support.

8.2.2 DC circuit protection

The Mentorincorporates an electronic protection system for the 24V DC control circuits. The protection is split into four circuit groups:

1. Programmable Logic Controller, Ethernet switch (internal)
2. Touchscreen display, fans (internal)

3. Emergency stop switch power supplies and indicators, beacons and siren outputs - **1A total load maximum**
4. Console / pendant output - **2A maximum**

An overloaded circuit will trip while leaving other circuits operational.

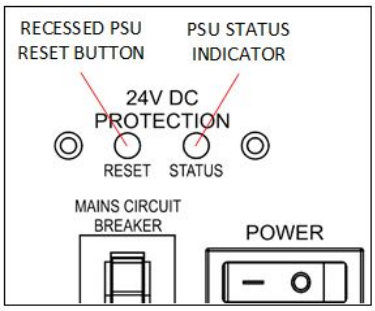


Figure 34. Reset button and Status indicator

The status of the protection system is shown by the STATUS indicator on the rear panel. The indicator can be in one of three states:

Green	Supply OK
Yellow flash	Warning - one or more outputs operating at > 80% capacity
Off	Alarm - one or more outputs tripped

To reset the power supply following a trip, gently press the recessed RESET button with a pen or small screwdriver.

If the power supply trips repeatedly, disconnect all external devices (pendant or console, emergency stop switches). If the power supply trips with no external devices connected, contact Kinesys or your local distributor for support. If the power supply does not trip then reconnect the external devices and cables one at a time to identify the device or cable with a fault.

8.3 Maintenance and repair

The Mentor is designed for long service in a demanding, professional environment. In normal use, no user maintenance should be required beyond periodic functional and safety testing, and basic cleaning.

The Mentor contains no user-serviceable parts. In the event of damage or premature failure please contact Kinesys or your local distributor to arrange service or repair.

8.3.1 Cleaning the enclosure

Turn off the power to the Mentor before cleaning.

The enclosure should be kept clean and dust free by periodically wiping down with a soft cloth. A clean, dry brush or vacuum cleaner brush attachment may be used to remove dirt from cooling grilles and around controls.

Light dirt or finger marks may be removed using a slightly dampened cloth if necessary. To avoid damaging the surface finishes of the Mentor do not use harsh chemicals or abrasive materials when cleaning.

8.3.2 Cleaning the touchscreen

Switch off the power to the touchscreen when cleaning it. If the power is left on this may cause inadvertent operator inputs.

Go to the Tools screen by touching the tools button and then the "Clean Touchscreen" button. Once the clean screen mode is activated, touchscreen operation is locked for 30 seconds. The time remaining for the lockout is indicated by a progress bar.

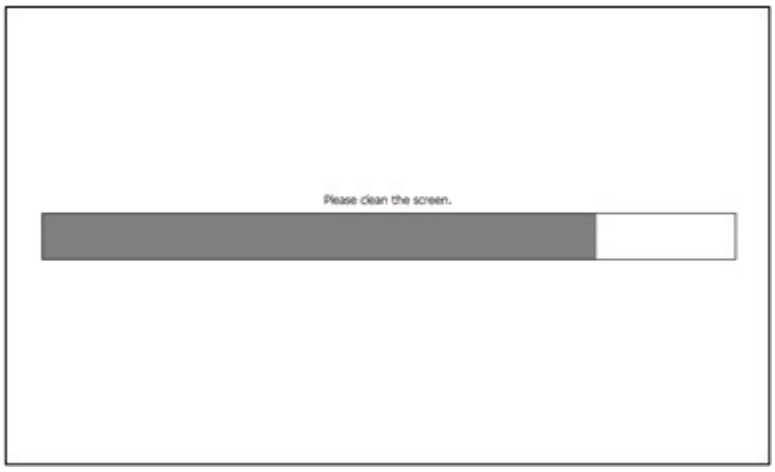


Figure 35. Clean screen mode

Clean the touchscreen with a cleaning cloth dampened with a cleaning agent. Only use water with a little liquid detergent or a screen cleaning foam. Do not use solvents or abrasive cleaners. Do not spray cleaning agent directly onto the screen. When cleaning the display, wipe inwards from the edge of the screen.

8.3.3 Periodic inspection

Visually inspect all connectors and controls. If damage is noted then contact Kinesys or your local distributor to arrange repair.

8.3.4 Electrical testing

The Mentor is safety tested during manufacture:

- Earth Bond 25A
- 500V DC Insulation Resistence

Periodic safety testing should be carried out in accordance with local electrical equipment safety regulations.

To avoid damage to internal electronics, do not flash test (Hipot test) the Mentor

8.3.5 Safety system testing

The Mentor tests all safety inputs during operation by using pulsed signals to determine the presence of short-circuits between safety signals, or to power supply rails. Additionally, two-circuit safety devices such as emergency stop switches and enabling switches are tested to ensure that both circuits make and break simultaneously when operated. No additional tests need to be performed on the safety system other than the complete, documented functional tests performed following each installation or reconfiguration of the system and regularly thereafter.

8.3.6 Calibrating the touchscreen

The touchscreen is factory calibrated and shot not normally require calibration.

If calibration is required, enter the touchscreen calibration screen by touching the tools button  and then the "Calibrate Touchscreen" button. The following dialog is displayed:

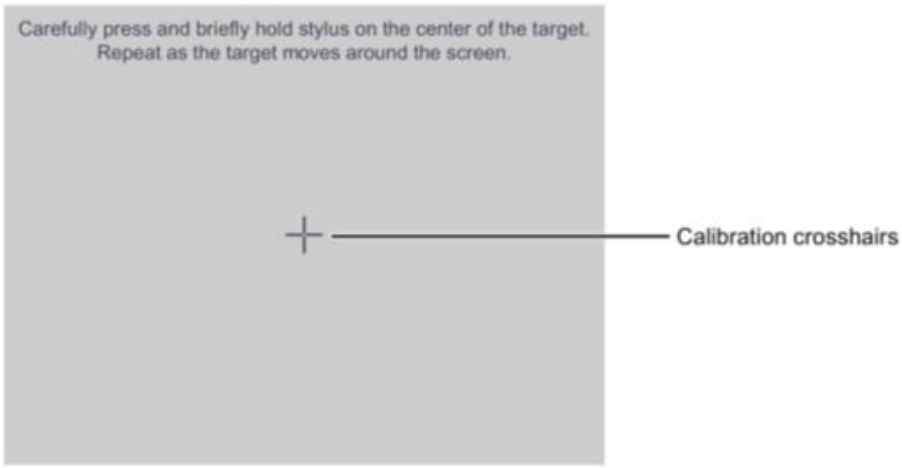


Figure 36. Calibration screen

Touch the centre of the calibration crosshairs until it is shown at the next position. The calibration cross appears at four other positions.

Only use a touchscreen stylus to calibrate the touchscreen. Do not use pens, screwdrivers or other sharp objects as these may cause permanent damage to the touchscreen.

Once the calibration crosshairs have been touched at all five positions, the following dialog appears:

Figure 37. Calibration screen

8.3.7 Spare parts

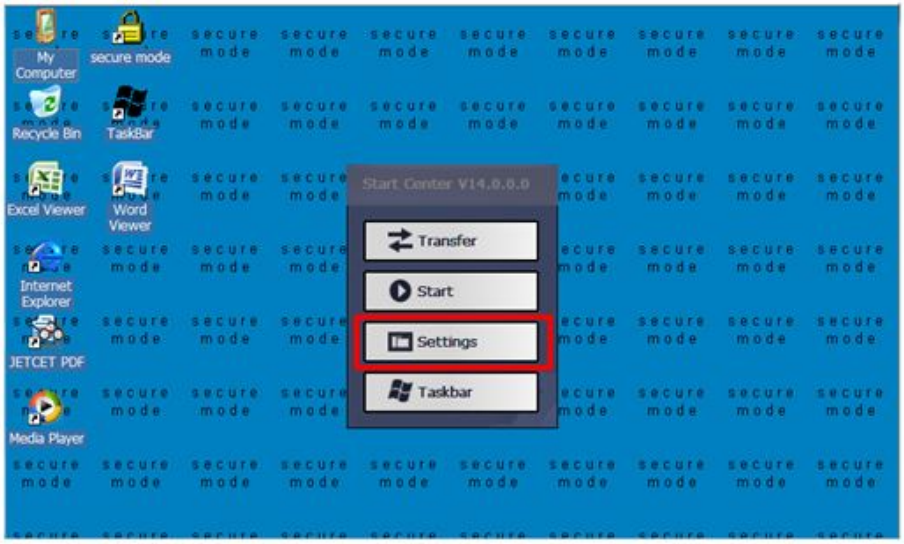
For continued service and a long working life it is recommended to contact Kinesys or your local distributor to obtain original spare parts. Refer to section 9.3 for a full spare parts list.

8.3.8 Accessing the Windows CE control panel

On occasions it may be necessary to access the Windows CE control panel to perform various maintenance or diagnostic functions.

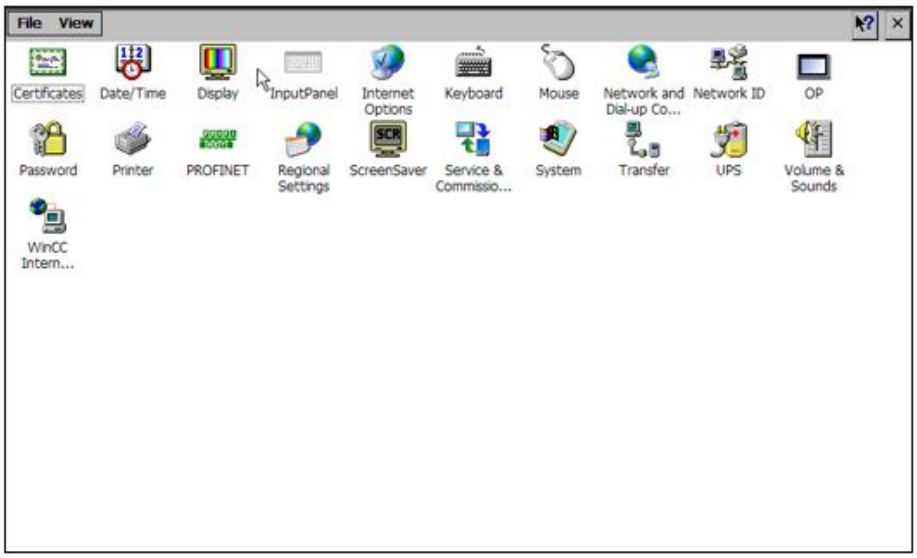
Changing the settings in the Windows CE control panel may render the Mentor display inoperable. Only access the Windows CE control panel if instructed to do so by Kinesys support personnel.

1. Access the Tools screen by touching the tools button .
2. Touch "Exit Program". If not already logged in, a user login with basic configuration rights will be required.
3. Wait for the Runtime operating system to close.
4. Touch the "Settings" button on the Start Center window.

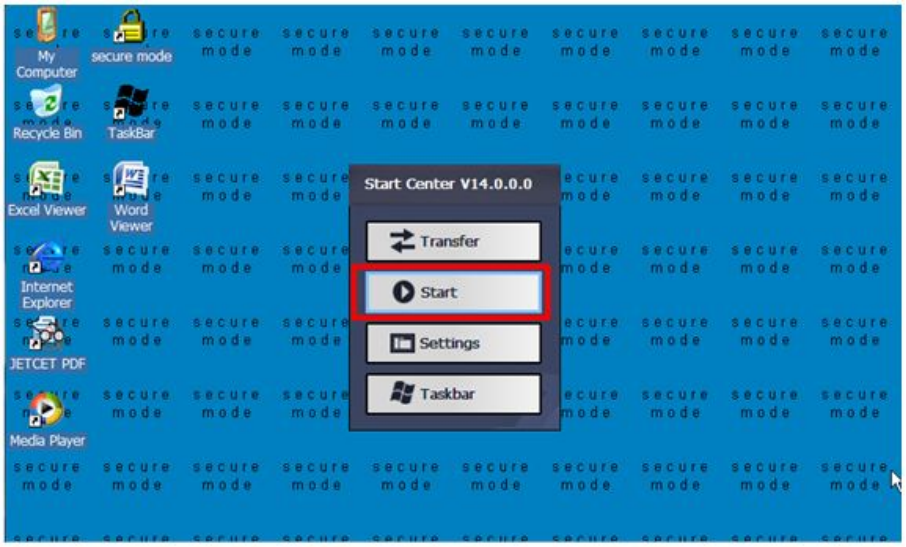


5. Enter the Windows Secure Mode password as advised by Kinesys.

6. The control panel is displayed. Make the necessary changes using the tools as directed by Kinesys support personnel. Do not make any changes other than those instructed as this may render the Mentor display inoperable.



7. Once finished with the configuration tools, close the control panel by touching the 'x' button.
8. Touch the "Start" button on the Start Center to return to the Mentor display screens.



9. Service & End of Life

9.1 Service life

The Mentor safety system is designed based on a service life (“proof test interval” according to EN 62061; “mission time” according to EN 13849-1) of 20 years from the date of manufacture. After this time the safety related parts of the control system must be replaced.

The Mentor manufacturing date is shown on the serial number label on the rear panel above the mains input connector. The Mentor must be taken out of service and the safety related elements of the control system replaced no later than 20 years after the date of manufacture.

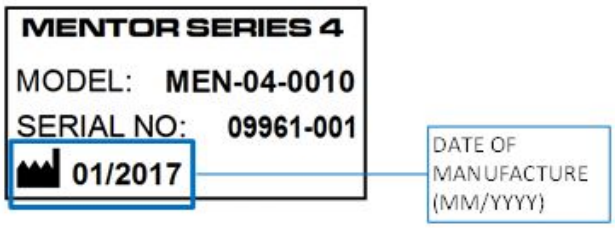


Figure 38. Date of Manufacture

9.2 End of life

In the event of a product being considered beyond economic repair it should be disposed of with care and in line with local legislation on disposal of Waste Electrical and Electronic Equipment (WEEE).

In Europe WEEE shall be disposed of in accordance with European Union Directive 2012/19/EU.

In most regions of the world, similar legislation exists to ensure that WEEE is handled separately to maximise reuse of materials and avoidance of landfill.

9.3 Spare parts

The following table shows common spare parts and accessories for the Mentor Series 4. This is not an exhaustive list. Please contact Kinesys, or your local distributor, for any component that is not listed.

Item	Kinesys part number
Reset key, yellow, OMR 73033	5303099
Configuration key, black, OMR 73034	5303098
Maintenance key, blue, OMR 73038	5303096
Slide rail kit, Accuride 3307 20"	-
Power cable, PowerCON TRUE1 - bare ends, 2m	-
E-Stop input shorting plug	MEN-98-2010

Item	Kinesys part number
Console input shorting plug	MEN-98-2020
Universal Device Interface shorting plug	MEN-98-2040

10. Product specifications

10.1 Specifications

Feature	Specification
Environmental	
Operating temperature range	5°C to 40°C (41°F to 104°F)
Storage and transportation range	-25°C to 55°C (-13°F to 131°F)
Operating humidity	<50% at maximum 40°C
Maximum altitude	1000m
Location	**For indoor use only**
Ingress Protection (IP) rating	IP30 - protected from tools and small wires greater than 2.5 mm (not protected from water).
Other	
Mains power supply	• 85-264V, 50-60 Hz, 130W • Protected by 2A thermal magnetic circuit breaker.
Enclosure	• Steel enclosure, zinc plated finish • Steel front panel, blue stove enamel finish
Cooling	• Forced air cooled (2 x internal DC fan) • Air intakes on left side of enclosure • Air exhausts on right side of enclosure
Rack mounting	Suitable for 19" rack mount, 4U x 500mm (19.6") deep (excluding handles and connectors)
Maximum safety level	• SIL3 (according to EN 62061) • PLe (according to EN 13849-1)
Dimensions (W x H x D)	423 mm x 177 mm x 504 mm (excluding handles, connectors, cabling, mounting hardware)
Weight	20 kg (44 lbs)

10.2 Product dimensions

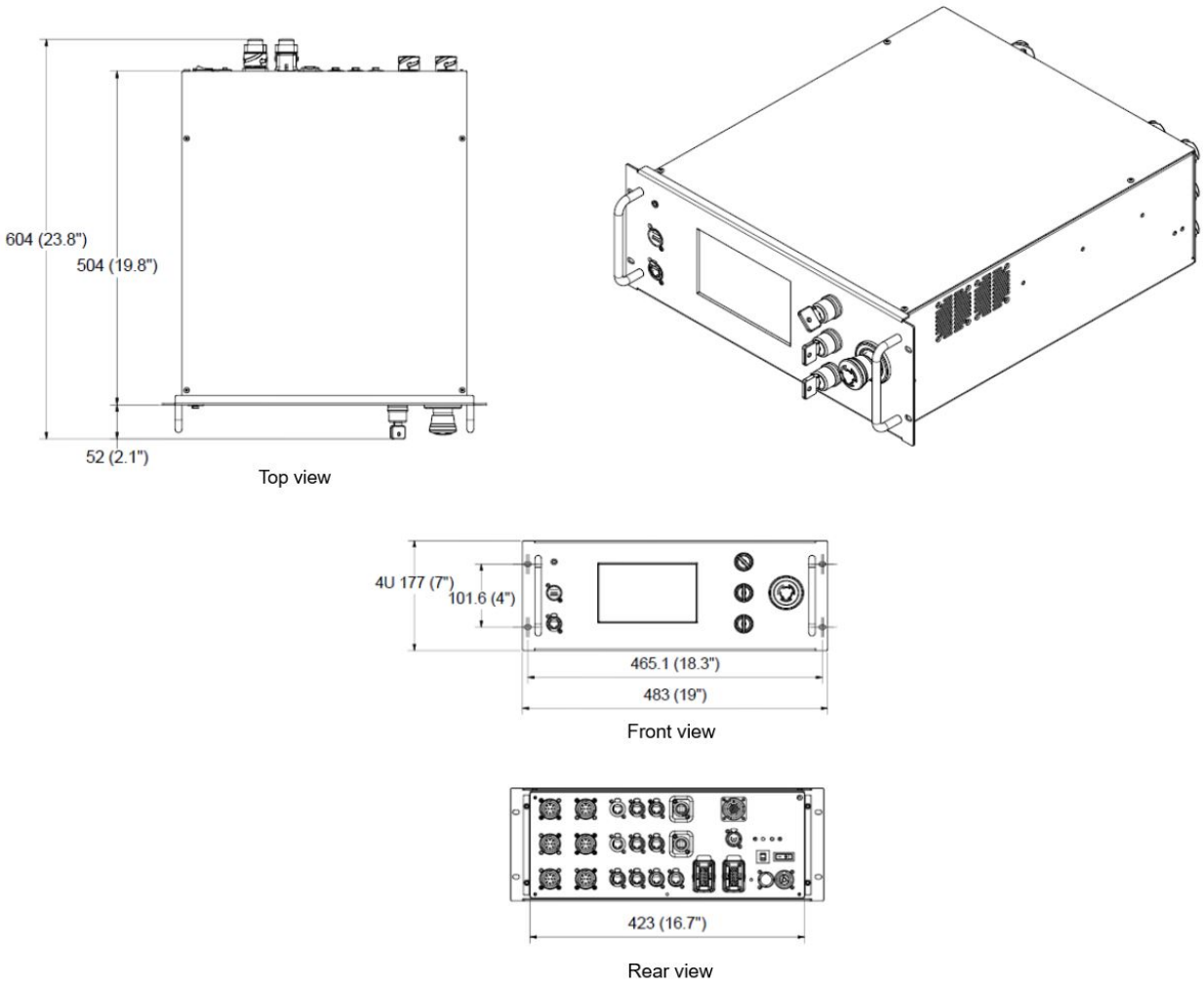


Figure 39. Product dimensions

11. Declaration of Conformity

ORIGINAL

EC Declaration of Conformity

Manufacturer:	Kinesys Projects Limited
of the address:	Unit 2 Kempton Gate, Oldfield Road, Hampton, Middlesex, TW12 2AF, UK
in accordance with the following EC directives:	**Low Voltage Directive 2014/35/EU** **EMC Directive 2014/30/EU**
declares that the products:	**Kinesys Mentor M401 and Kinesys Mentor M402**
with part numbers:	**MEN-04-0010; MEN-04-0020**

are in conformity with the applicable requirements of the following harmonised standards:

EN 60204-1:2006	**Safety of machinery – Electrical equipment of machines – Part 1: General requirements**
EN 62061:2005	**Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems** Emergency stop circuit complies to SIL2.
EN 61000-6-1:2007	**Electromagnetic compatibility (EMC). Generic standards. Immunity for residential, commercial and light-industrial environments.**
EN 61000-6-3:2007	**Electromagnetic compatibility (EMC). Generic standards. Immunity for residential, commercial and light-industrial environments.**

The manufacturer hereby declares that the products named above have been designed to comply with the relevant sections of the above referenced standards. The units comply with all applicable essential requirements of the directives.

In the EU the party authorised to compile the technical file is:
TAIT Netherlands B.V.
Weesperplein 4a, 1018 XA Amsterdam, The Netherlands
In the UK the party authorised to compile the technical file is:
Kinesys Projects Ltd.
Unit 2 Kempton Gate, Oldfield Road, Hampton,
Middlesex, TW12 2AF, UK

Equipment referred to in this Declaration of Conformity was first manufactured in 2017.

D Weatherhead
Managing Director
Hampton, November 2024

The attention of the specifier, purchaser, installer, or user is drawn to special measures and limitations to use which must be observed when these products are taken into service to maintain compliance with the above directives. Details of these special measures and limitations to use are available on request and are also contained in the product manuals.

Kinesys Projects Ltd.
TAIT Technologies UK Ltd.
Unit 5 Langthwaite Road, Langthwaite Grange Ind Estate, South Kirkby, Pontefract, West Yorkshire, UK, WF9 3AP

Registered in England and Wales No. 02962782 +44 2082 086000 taittowers.com

Appendix A: Connection to Array PD-ES

Test all emergency stop buttons after each installation of a touring system, and regularly for fixed installations.

The number of emergency stop switches and their location, and any additional safety requirements, must be determined following a risk assessment.

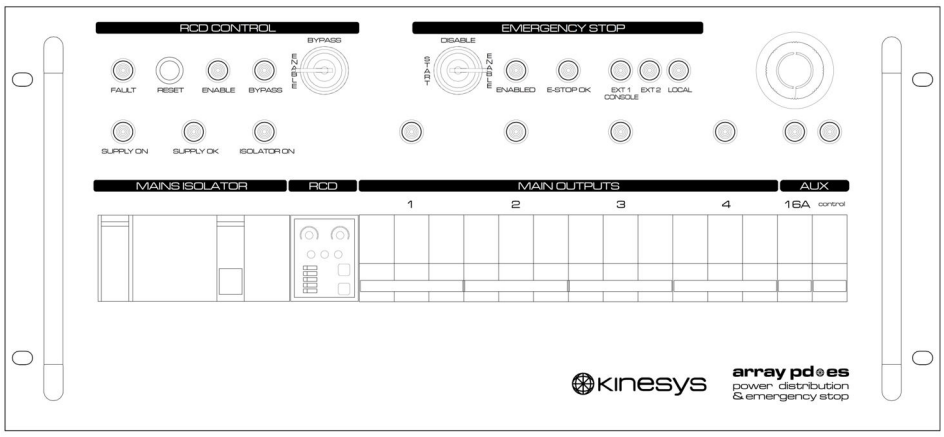


Figure 40. Array PD-ES

The safety connections of Elevation 1+ systems using an Array PD-ES distribution unit can be connected to the Universal Device Interface connections on the Mentor using the Kinesys cable assembly MEN-98-2130. When motion data uses the same network as the Mentor, an additional Ethernet connection must be made between one of the Ethernet sockets on the Mentor and the Array PD-ES.

The Array PD-ES contains a safety relay and mains line contactor(s) which control the power output to Elevation 1+ controllers, providing a Category 0 stop according to EN 60204-1:2006 – “a stopping by immediate removal of power to the machine actuators”. In addition, the line contactor and the drive enable signal in the Elevation 1+ controller are switched off via control lines in the Elevation data cable.

The line contactors in the Array PD-ES are monitored to prevent restarting of the system in the event of a fault; the control lines to the Elevation 1+ controller are not monitored, and a fault in these control circuits may lead to a loss of the safety function within the Elevation 1+ controller. To provide an increased level of safety dual line contactors are fitted to some Array PD-ES units.

All Array PD-ES units manufactured after 2014 are fitted with dual mains contactors; units manufactured prior to this date may have been modified by Kinesys as required. Units conforming to the new standard (dual contactors) are identified by the following:

- A label on the front panel stating "EN 13849 CAT4 DUAL LINE CONTACTORS”
- A label on the rear panel stating "EN 13849 CAT4 DUAL LINE CONTACTORS”

The following table describes the emergency stop safety performance that can be achieved with the Array PD-ES.

System	SIL (EN 62061)	PL (EN 13849)
Array PD-ES - single contactor - all operation modes	SIL 1	PLc
Array PD-ES - dual contactor - with up to two external emergency stop buttons and front panel emergency stop button	SIL 2	PLd
Array PD-ES - dual contactor - with one external emergency stop button and the front emergency stop button covered*	SIL 3	PLe
Array PD-ES - dual contactor - linked systems	SIL 1	PLc
Array PD-ES - dual contactor - with Mentor master controller*	SIL 3	PLe

* For SIL 3 operation, the emergency stop button on the front of the Array PD-ES must be covered to prevent operation. Where a single external emergency stop button is connected, this must be located next to the system operator. Where multiple emergency stop buttons are connected, they must be connected to the inputs of the Mentor. An additional emergency stop button may be connected to the Mentornext to the Array PD-ES if required by risk assessment.

Note that the statement above only applies to the full size Array PD-ES, with a Powerlock or Camlok mains input, and not the Array PD-ES Mini.

12. Appendix B: Viewing the Mentor remotely

The Sm@rtClient application allows the Mentor display to be viewed and operated on a desktop PC connected to the automation network.

12.1 Setting the PC IP address

The PC must have an IP address in the 10.0.0.0 / 8 subnet to connect to the Mentor. An IP address structured as follows will not clash with any Kinesys equipment:

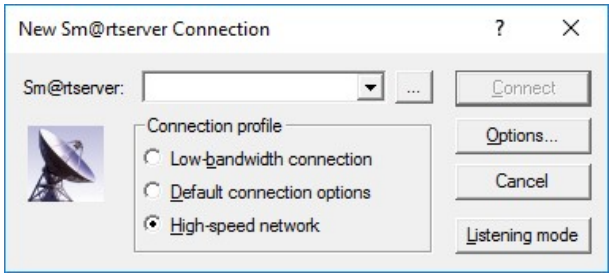
- IP address = **10.x.0.y** (where x = 5-10 and y = 1-253)
- Subnet Mask = **255.0.0.0**

12.2 Installing Sm@rtClient

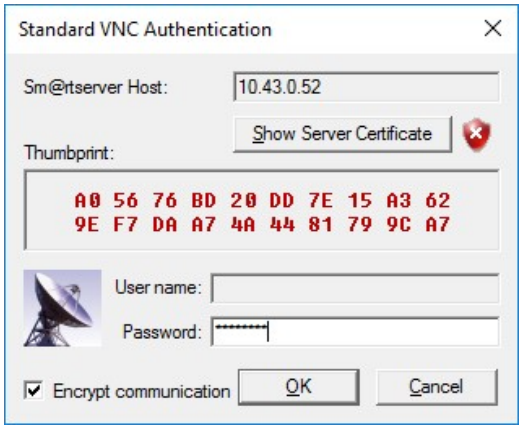
1. Download the Sm@rtClient application from the link supplied by Kinesys.
2. Copy the Sm@rtClient application to a convenient folder on the PC hard disk, for example C:\Program Files (x86)\Kinesys. Create a shortcut to the program in the start menu or on the task bar if required.

12.3 Connecting to Mentor

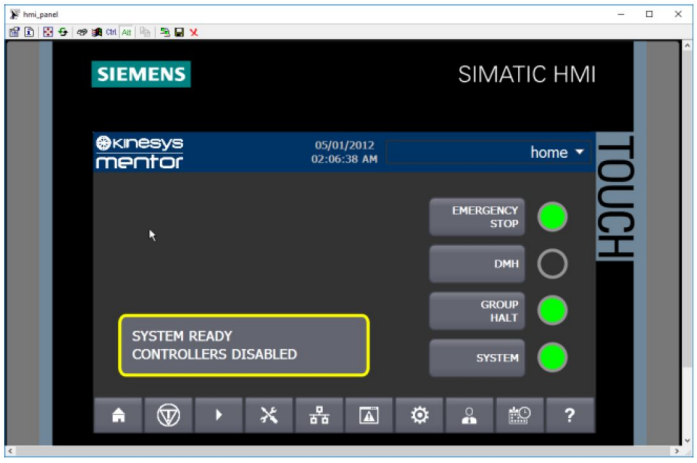
1. Run the Sm@rtClient program. The "New Sm@rtClient Connection" window will open.



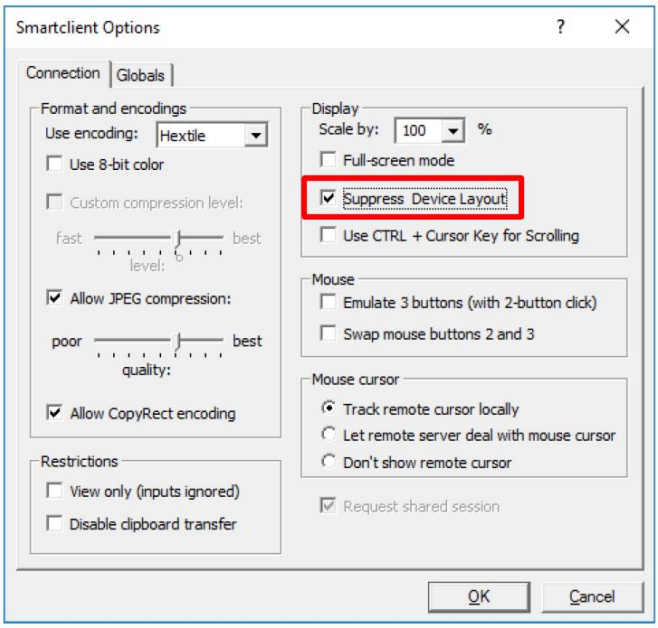
2. In the field next to "Sm@rtserver:" type the IP address of the Mentor display. This is in the format **10.43.XX.YY** where XX and YY are the last digits of the Mentor display serial number. For example, a Mentor with serial number 09961-1234 will have an IP address of 10.43.12.34.
3. Press the "Connect" button to connect to the Mentor display.
4. Enter the password in the Authentication window. Leave the User name area blank. note that passwords are case sensitive.



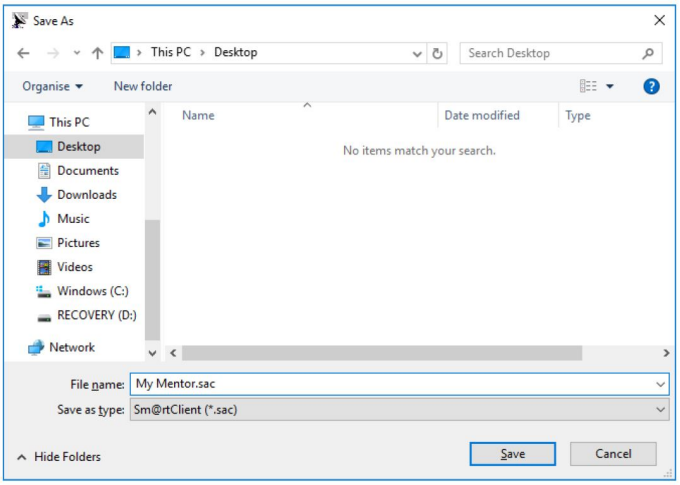
5. Click the "OK" to log in. The Mentor display screen will now appear on the connected PC and the mouse can now be used to navigate the buttons.



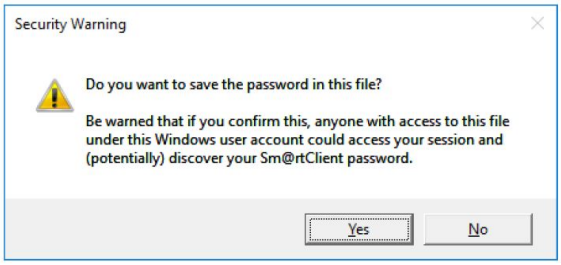
6. To reduce the size of the Mentor window on screen, click the Connection icon on the task bar to open the Options dialog. Then check the "Suppress Device Layout" check box.



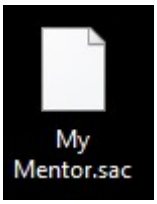
7. To save the connection as a shortcut, click the Save icon on the task bar. The Save As window will appear and allow you to save the connection in the form of a .sac file.



8. A Security Warning dialog may appear asking if you want to save the connection password. Observe the security warning and click "Yes".



9. The Sm@rtClient session may now be opened from the saved location or, if saved to the desktop, by clicking on the shortcut icon.



13. Appendix C: Updating firmware

The Mentor firmware can be updated using the SIMATIC Automation Tool (version 3.1.0.0 or later), available from Kinesys support.

Operations using the SIMATIC Automation Tool will put the Mentor PLC into STOP mode and will put all connected devices into an emergency stop / disabled state. Do not use the SIMATIC Automation Tool until all connected devices are disconnected and in a disabled state.

Interrupted file operations may leave the Mentor in an unusable state. Make sure that the Mentor is connected to a secure power supply before commencing any update or restore operations.

13.1 Installing the SIMATIC Automation Tool

System requirements:

- Windows 10 Home or Pro, version 1607 or later
- 1.4 GB of free space on drive C:\ for system files
- Ethernet adapter for connection to the Mentor with an IP address in the 10.5.0.x range with a subnet mask of 255.0.0.0.
- An account with Administrator privileges.

Save all work and close all applications before installing the SIMATIC Automation Tool.

Click on the “Start.exe” file in the tool folder to start the installation. Accept the default settings throughout the installation wizard. You may be prompted to restart your computer before and after installation.

Note: Only one version of the SIMATIC Automation Tool can be installed on the PC. The software setup may guide you on removing old versions of the tool from the PC if installed.

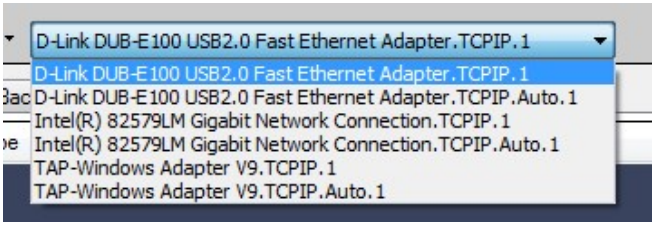
13.2 Starting the SIMATIC Automation Tool

Use one of the following methods to open the tool:

- Double click the tool icon on the desktop
- Click the Start button and navigate to the "Siemens Automation" folder, followed by the "SIMATIC Automation Tool" folder, and then double click on the tool icon in the folder.

13.3 Selecting a network interface

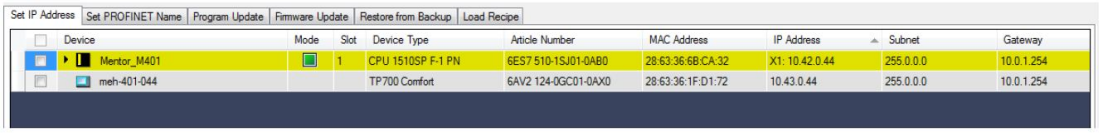
Before operations can start, select the network interface to which the Mentor is connected from the drop-down list in the toolbar. Always select the device name without "Auto". Note that the network interface will need a unique IP address in the 10.0.0.0 / 8 subnet.



13.4 Scanning the network

To scan the network, select Operations > Scan Network > Scan Entire Network from the menu. Alternatively, click the Scan button and select "Scan Entire Network" from the drop-down menu.

After the network scan is complete, at least two devices should be reported in the device table.



13.5 Backing up the Mentor data

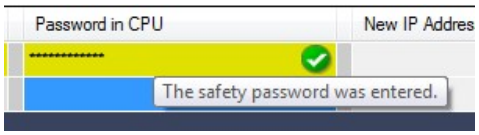
Backing up the Mentor configuration allows it to be restored should the software fail for any reason.

Two backups must be taken: one for the Mentor PLC and one for the Mentor display.

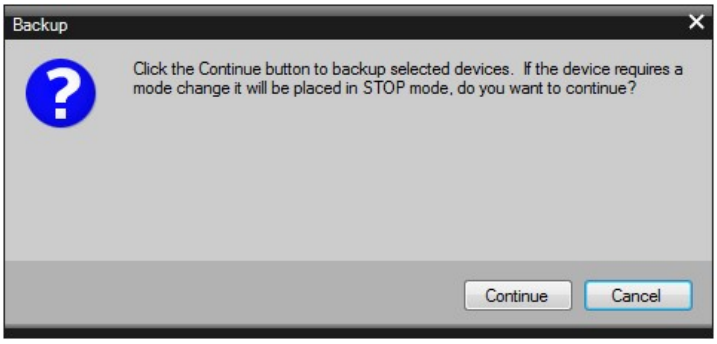
To create the backups, continue as follows:

1. Select the check box next to the Mentor PLC.

2. Enter the PLC password in the "Password in CPU" field and press Enter. A valid password will be indicated by a green tick icon.



3. Select Operations > Backup/Restore > Backup Device to File from the menu or click the Backup button on the toolbar and then select "Backup Device to File" from the drop-down menu.
4. Click "Continue" on the Backup dialog. The Mentor PLC will be stopped and all connected devices will be placed into an emergency stop / disabled state. The PLC contents will be backed up to the local hard drive.

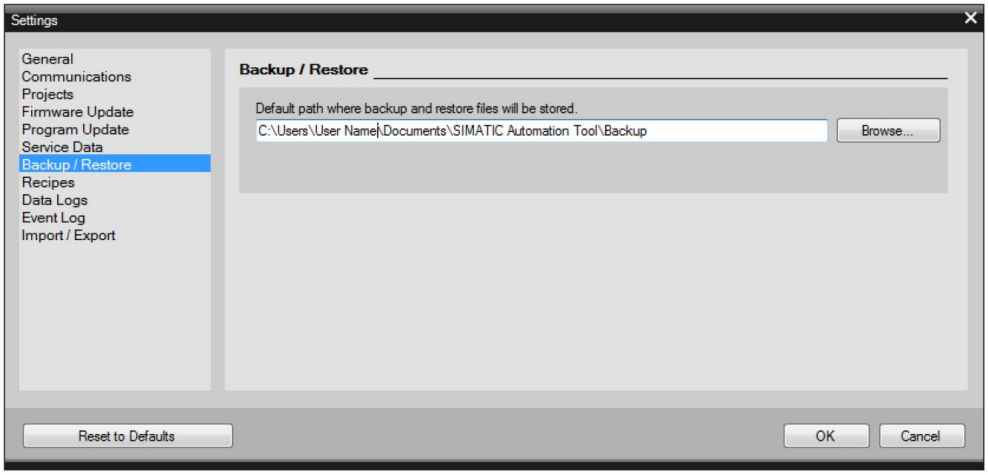


5. Once finished, the Event Log at the bottom of the screen will indicate a successful backup.

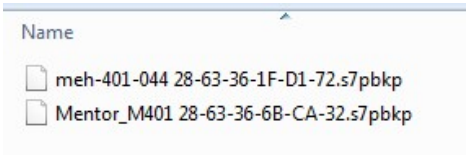
6. The PLC will remain in the stopped state when the backup is complete. To restart the PLC, click the Run button on the toolbar and then click "Continue" or select Tools > Start PLC from the menu.
7. De-select the Mentor PLC and select the Mentor display checkbox.

8. Repeat steps 2 thru 5 for the Mentor display.

Backups are stored in the Backup and Restore folde (normally C:\Users\ {UserName}\Documents\SIMATIC Automation Tool\Backup). The location of the Backup and Restore folder can be checked by selecting Options > Settings and then “Backup / Restore” from the menu tree.



The backup files can be identified by the device name and MAC address.

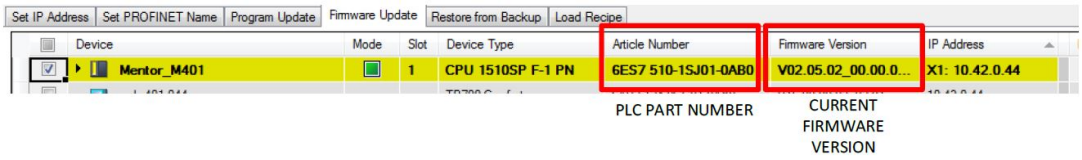


13.6 Updating the Mentor PLC Firmware

New program features may require a PLC firmware update to function correctly. The minimum firmware version required will be advised when the PLC program update is made available. If necessary, request a firmware update file from Kinesys and follow the steps below to update the PLC firmware.

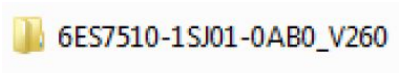
13.6.1 Checking the current firmware

Scan the network as described previously in this appendix. Selec the Mentor PLC and click the "Firmware Update" tab. The current firmware version and PLC part number are displayed as shown.



13.6.2 Installing the new firmware file

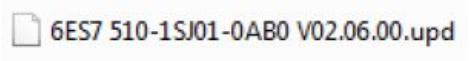
The firmware is supplied by Kinesys in a ZIP archive containing a single top level folder.



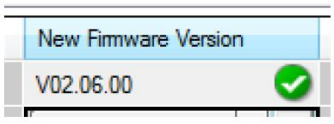
The folder name is in the form **{PLC PART NUMBER}_{VERSION}**.

1. Extract the contents of the ZIP folder to the computer's hard drive.
2. In the SIMATIC Automation Tool, click the "..." icon in the "New Firmware Version" column.

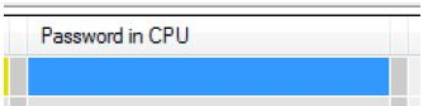
3. Navigate to the folder where the extracted firmware files are located and open the "6ES7510..." top level folder followed by the "FWUPDATE.S7S" folder.
4. Check that the file ending in ".upd" matches the PLC part number and is the correct firmware version; select the file and click "Open".



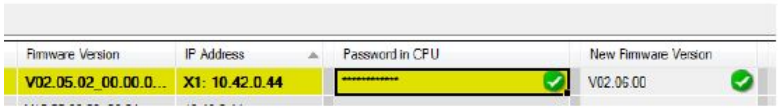
5. The firmware file is verified and loaded into the SIMATIC Automation Tool.



6. Enter the PLC password in the "Password in CPU" field and press Enter. A valid password will be indicated by a green tick icon.

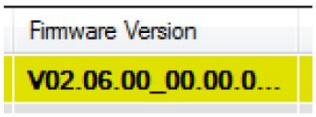


7. Once all the information has been entered, select Operations > Update > Firmware Update from the menu to start the operation. Alternatively, click the toolbar button and select "Firmware Update" from the drop-down menu.



8. Click "Continue". The Mentor PLC will be stopped and any connected devices will be placed into an emergency stop / disabled state.
9. The firmware update will take several minutes. When the update is complete, the Event Log at the bottom of the screen will indicate a successful operation.

10. The device table will be updated showing the new firmware version.



11. The PLC will remain in the Stop state after the firmware update is complete. To restart the PLC, click the Run button on the toolbar and then click "Continue" or select Tools > Start PLC from the menu.

13.7 Updating the Mentor PLC program

The Mentor PLC program update is supplied by Kinesys in a ZIP archive named similar to the following:

```
M401_PLC-rel018_ser044_11101-11160.zip
```

In the above example:

- M401_PLC = Mentor 401 PLC program
- rel018 = release version number
- ser044 = Mentor serial number
- 11101-11160 = device address range

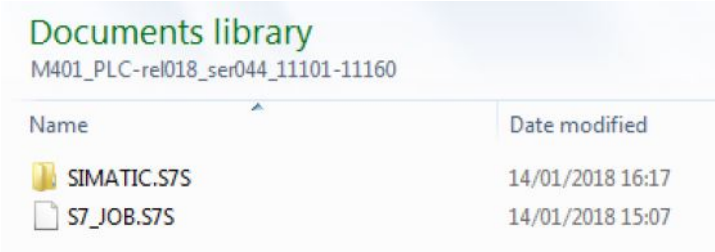
Check the serial number in the received update file matches the serial number of the Mentor to be upgraded. Using an upgrade file with the wrong serial number will render the Mentor inoperable.

Back up the existing Mentor configuration as described in section 13.5 before updating the program.

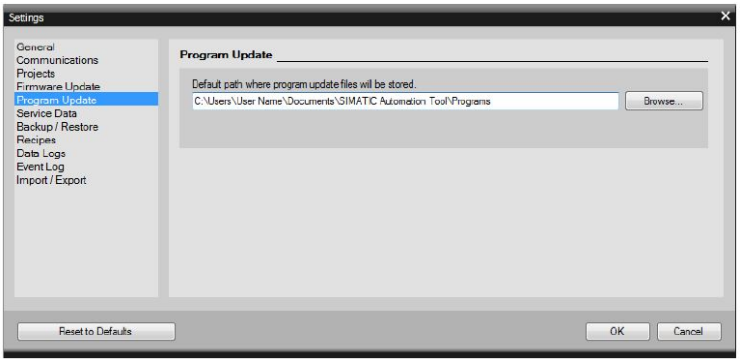
13.7.1 Making the update accessible

Use the following steps to make the update accessible to the SIMATIC Automation Tool:

1. Extract the ZIP archive to a folder of the same name. This will result in a master update folder containing a SIMATIC.S7S folder and a S7_JOB.S7S file. Do not edit or rename any of the files.



2. Copy the resulting folder, together with its contents, to the SIMATIC Automation Tool Program Update folder, normally located at C:\Users\{UserName}\Documents\SIMATIC Automation Tool\Programs. The location of the Program Update folder can be changed by selecting Options > Settings and then "Program Update" on the menu tree.

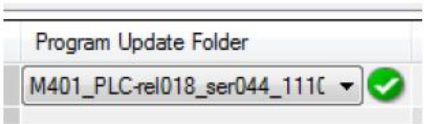


Once the program update has been transferred to the SIMATIC Automation Tool folder, use the following steps to update the program in the PLC:

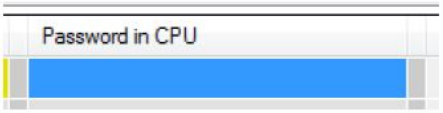
1. Click the "Program Update" tab.

2. Select the check box next to the Mentor PLC.

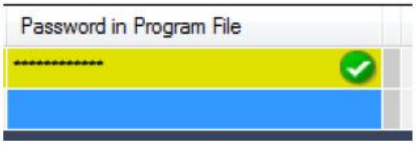
3. Use the "Program Update Folder" column drop-down list to select a folder name. The drop-down list shows the folders that were created in the program update path. You can also use the browse button and navigate to the folder where the program is stored.



4. Enter the PLC password in the "Password in CPU" field and press Enter. A valid password will be indicated by a green tick icon.

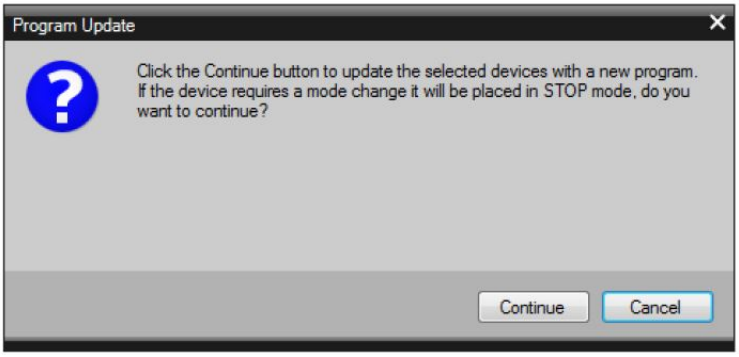


5. Enter the program password in the "Password in Program File" column and press Enter (this may be the same as the PLC password but must still be entered). A valid password will be indicated by a green tick icon.

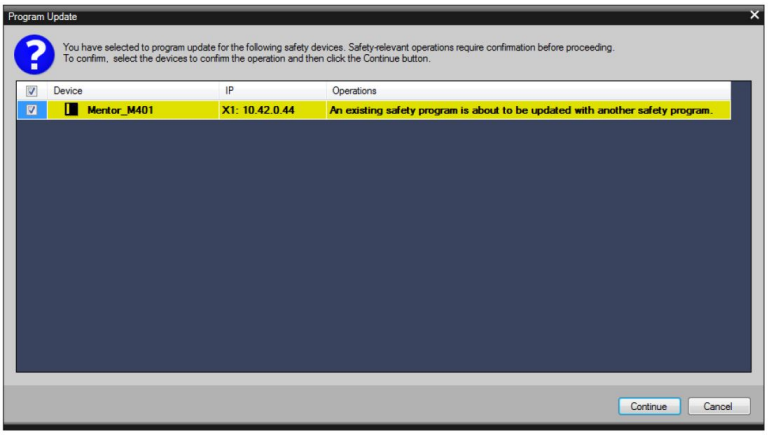


6. Once the information has been entered, select Operations > Update > Program Update from the menu to start the operation. Alternatively, select the toolbar button and select "Program Update" from the drop-down menu.

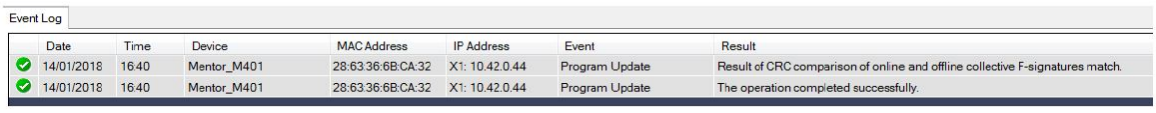
7. Click "Continue" on the Program Update dialog. The Mentor PLC will be stopped and all connected devices will be placed into an emergency stop / disabled state.



8. An additional confirmation dialog is presented to confirm an update of the safety system. Confirm that the correct Mentor device is shown, select the device and click “Continue”.



9. The PLC program will update. When the update is complete, the Event Log at the bottom of the screen will indicate a successful operation.



10. The PLC will remain in the Stop state after the firmware update is complete. To restart the PLC, click the Run button on the toolbar and then click "Continue" or select Tools > Start PLC from the menu.

11. Verify the program version and safety program on the Help menu of the Mentor display.

13.8 Updating the Mentor display program

The Mentor HMI (display) program update is supplied by Kinesys in a ZIP archive named similar to the following:

```
M401_HMI-rel018_ser044.zip
```

In the above example:

- M401_HMI = Mentor 401 HMI program
- rel018 = release version number
- ser044 = Mentor serial number

Check the serial number in the received update file matches the serial number of the Mentor to be upgraded. Using an upgrade file with the wrong serial number will render the Mentor inoperable.

13.8.1 Making the update accessible

Use the following steps to make the update accessible to the SIMATIC Automation Tool:

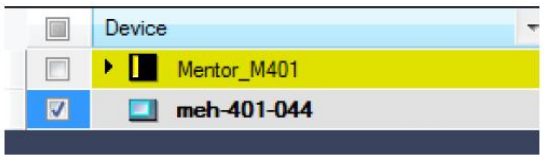
1. Extract the ZIP archive to a folder of the same name. This will result in a master update folder containing a SIMATIC.HMI folder. Do not edit or rename any of the files.

2. Copy the resulting folder, together with its contents, to the SIMATIC Automation Tool Program Update folder, normally located at C:\Users\{UserName}\Documents\SIMATIC Automation Tool\Programs. The location of the Program Update folder can be changed by selecting Options > Settings and then "Program Update" on the menu tree.

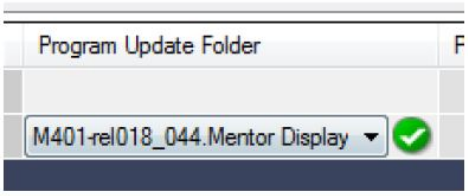
Once the program update has been transferred to the SIMATIC Automation Tool folder, use the following steps to update the program in the HMI:

1. Click the "Program Update" tab.

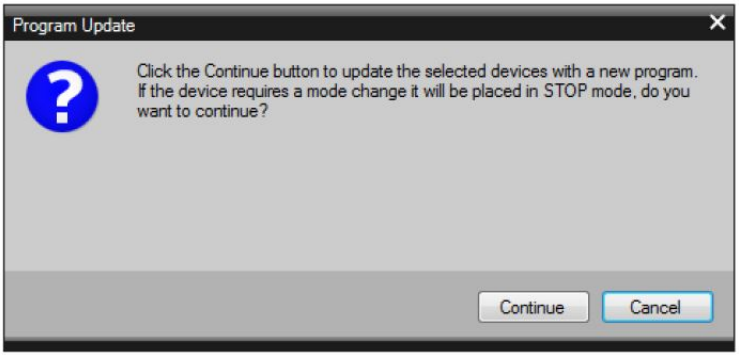
2. Select the check box next to the Mentor display.



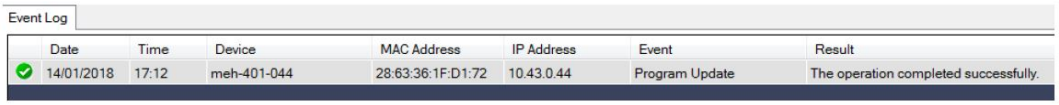
3. Use the "Program Update Folder" column drop-down list to select a folder name. The drop-down list shows the folders that were created in the program update path. You can also use the browse button and navigate to the folder where the program is stored.



4. Select Operations > Update > Program Update from the menu to start the operation. Alternatively, select the toolbar button and select "Program Update" from the drop-down menu.
5. Click "Continue" on the Program Update dialog. The Mentor PLC will be stopped and all connected devices will be placed into an emergency stop / disabled state.



6. The display exits to Windows and the operating system and program are updated. This process may take several minutes.
7. When the update is complete, the Event Log at the bottom of the screen will indicate a successful operation.



8. Check the display program version on the Help menu of the Mentor display.

14. Appendix D: Obtaining diagnostic data

The PLC log data may be downloaded to assist with diagnosing and resolve system faults. Log files are downloaded using the SIMATIC Automation Tool. For more information on installing the SIMATIC Automation Tool refer to section 13.

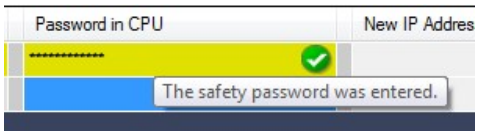
14.1 Displaying the diagnostic log

1. Select the Mentor PLC.

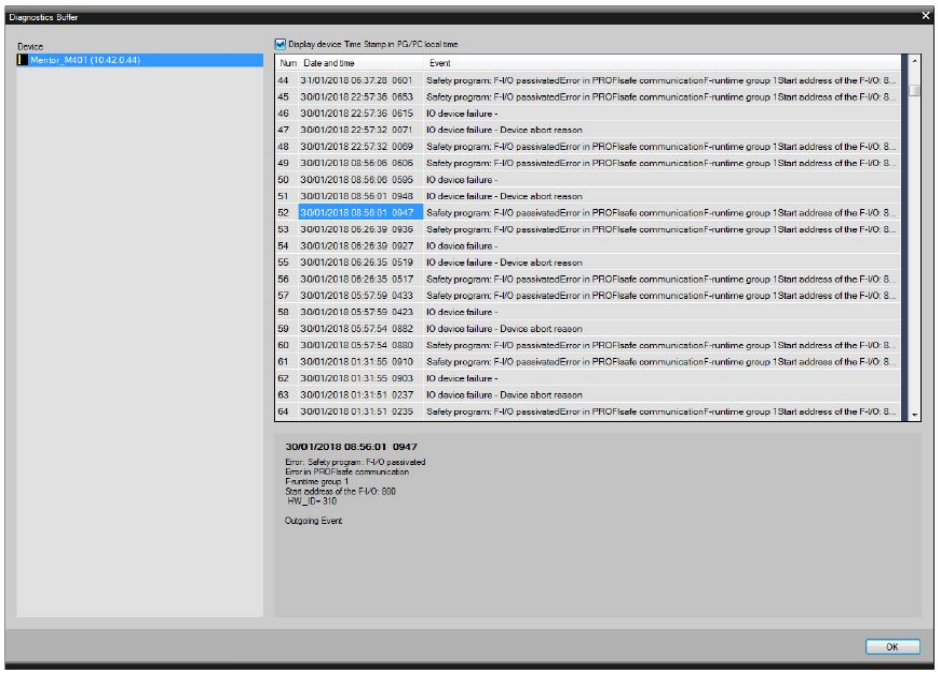
If the PLC is password protected this will be displayed as "S7-1500".

If there are multiple Mentor systems in the network verify the device's IP address.

2. Enter the PLC password in the "Password in CPU" field and press Enter. A valid password will be indicated by a green tick icon.

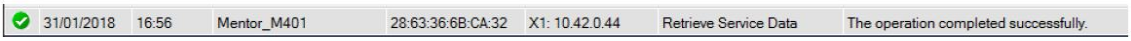


3. To view the diagnostics log, select Operations > Diagnostics > Show CPU Diagnostics from the menu. Alternatively, click the information button  and select "Show CPU Diagnostics" from the drop-down menu.
4. The diagnostic log window opens.

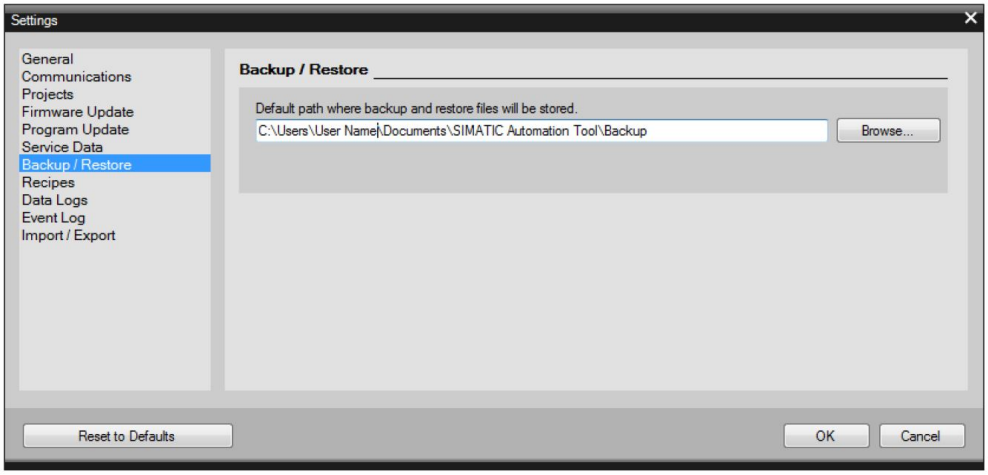


14.2 Uploading service data for analysis

1. Upload the log files by selecting Operations > Diagnostics > Retrieve Service Data from the menu. Alternatively, click the information button  and select "Retrieve Service Data" from the drop-down menu.
2. The log file is uploaded to the PC. When finished, a line will appear in the event log window at the bottom of the screen.



3. The uploaded log data will be stored in the Service Data folder, usually located at C:\Users\{username}\Documents\SIMATIC Automation Tool\Service Data. The location of the Backup and Restore folder can be checked by selecting Options > Settings and then “Backup / Restore” from the menu tree.



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