

Kinesys Elevation

Operating & Maintenance Manual



Variable speed chain hoist controller

Elevation 1+
Elevation v2

Kinesys Projects Limited accepts no liability for any consequences resulting from inappropriate, negligent, or incorrect use of the equipment.

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, Kinesys reserves the right to change the specification of the product or its performance, or the contents of this manual, without notice.

All rights reserved. No parts of this manual may be reproduced or transmitted in any form or by any means, electrical or mechanical including photocopying, recording or by an information storage or retrieval system, without permission in writing from Kinesys Projects Limited.

© Kinesys Projects Ltd 2023

Contact details

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

UK address

Kinesys Projects Ltd
Unit 2 Kempton Gate Business Centre
Oldfield Road
Hampton
Middlesex
TW12 2AF

US address

TAIT
401 W Lincoln Ave
Lititz
PA 17543

Contents

List of Figures	5
1. Introduction	7
1.1 Product description	7
1.2 Scope and purpose	7
1.3 Model numbers	7
1.4 Support requests	8
2. Safety information	9
2.1 Warnings	9
2.2 Operating environment	9
2.3 Handling and storage	10
3. Installation and system integration	11
3.1 Installation location	11
3.2 Compatible chain hoists and other devices	12
3.2.1 Beam trolleys	13
3.3 Compatible user interfaces	13
Array PD-ES	13
3.4 Data cable length limits	14
3.5 Power cable length limits	15
3.6 Termination plug	16
3.7 Elevation system example	17
3.8 Elevation system example with Array 485	18
3.9 Elevation system example with Mentor	19
4. Product overview	20
4.1 Front panel	20
4.2 Left side	21
4.3 Right side	22
5. Manual and remote operation	23
5.1 Manual mode operation	23
5.2 Remote mode operation (Elevation 1+ only)	24
6. Limits	25
6.1 Software limits	25

6.2 End of travel limits	25
6.3 Ultimate limits	25
7. Menu operation	26
7.1 Display overview	26
7.2 Menu operation	26
7.2.1 Navigating through sub-menus	27
7.2.2 Editing parameters	27
7.3 Fault conditions	27
7.4 Menu structure	29
7.5 Setup sub-menus (before v8)	29
7.6 Setup sub-menus (v8 and later)	33
7.7 Data sub-menus (before v8)	36
7.8 Data sub-menus (v8 and later)	36
7.9 Comms sub-menu	37
8. Editing parameters	38
8.1 Motion control parameters	38
8.1.1 Proportional gain (P1 / 600)	38
8.1.2 Integral gain (P2 / 601)	38
8.1.3 Derivative gain (P3 / 602)	39
8.1.4 Min speed output to drive (P4 / 622)	39
8.1.5 Max speed output to drive (P5 / 621)	39
8.1.6 Position error trip distance (P6 / 620)	39
8.1.7 Brake delay on start (P7 / 610)	39
8.2 Editable parameters for versions v8 and above	39
9. Unit configuration	42
9.1 Encoder scaling	42
9.2 Other parameters	43
10. Cable specifications	44
10.1 Data cable	44
10.2 Power cable	44

11. Hoist connection cable pinout	45
12. Using an Elevation with RCD	47
13. Product specifications	48
13.1 Product dimensions	49
14. Service & End of Life	49
14.1 Replacing an Elevation	49
14.2 Product disposal	50
15. Declaration of Conformity (example)	51

List of Figures

Figure 1. Attachment holes	11
Figure 2. Elevation Hoist	12
Figure 3. Kinesys converted CM Lodestar chain hoist	12
Figure 4. Litec Beam Trolley and Rotator modules	13
Figure 5. Vector Console and K2 Console	13
Figure 6. Array PD-ES front and rear panels	14
Figure 7. Array 485, LibraPRO, Array IP8	14
Figure 8. Example Elevation system - SIL2	17
Figure 9. Elevation system with Array 485	18
Figure 10. Elevation system with Mentor - SIL3	19
Figure 11. Front panel - Elevation 1+	20
Figure 12. Front panel - Elevation v2	20
Figure 13. Left side (Elevation 1+ and Elevation v2)	21
Figure 14. Right side (Elevation 1+ and Elevation v2)	22
Figure 15. Manual operation buttons	23
Figure 16. Display showing comms address	26
Figure 17. Display showing current position	26

Figure 18. Menu and Enter buttons	26
Figure 19. Extension cable male connector	45
Figure 20. Extension cable female connector	45
Figure 21. Array PD-ES adjustable RCD	47
Figure 22. Product dimensions	49
Figure 23. Attachment hole dimensions	49

1. Introduction

1.1 Product description

The Elevation is a variable speed electric chain hoist controller capable of controlling electric chain hoists whose motors meet the correct specification. Kinesys Elevation Hoists can only be operated using the Elevation chain hoist controller.

The Elevation has a robust aluminium casing with a wide range of fixing points and uses industry standard connections. Although designed to be operated principally by a console, the Elevation has full variable speed manual controls on the front of the unit.

The Elevation is equipped with custom position controller software that allows a high degree of positional and speed accuracy to be achieved. Several parameters within the software can be altered via the user interface provided by the LED display on the front of the unit. A complete list of menus and parameters is included in this manual. The majority of parameters can also be downloaded to the Elevation allowing for quick initial set-up and alteration of these settings.

The Elevation can be used in conjunction with the Kinesys Array PD-ES Power and E-Stop distribution system in order to achieve SIL 2 compliance and can be connected to a Kinesys Mentor safety controller for SIL 3 compliance.

1.2 Scope and purpose

This manual describes the key features, means of operation and maintenance operations of the Kinesys Elevation. The variants of Elevation covered in this manual are:

- Elevation 1+
- Elevation v2

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 numbers

This manual applies to the following Elevation models:

Kinesys Part Number	Elevation model
ELE-00-0010	Elevation 1+ 2.2 kW 208 V
ELE-00-0020	Elevation 1+ 2.2 kW 400 V
ELE-00-0030	Elevation 1+ 3.0 kW 208 V
ELE-00-0040	Elevation 1+ 3.0 kW 400 V
ELE-00-0050	Elevation 1+ 4.0 kW 400 V
ELE-00-2001	Elevation v2 3.0 kW 400 V

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've 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

2.1 Warnings



- Only personnel fully familiar with the operations and procedures outlined in this manual are permitted to operate the Elevation.
- Do a full risk assessment of the location where you intend to use the Elevation and its connected hoist.
- Do not use the Elevation in outdoor environments.
- Make sure you know the locations of the emergency stop buttons on all connected devices and systems.
- If you notice any unexpected or dangerous movements, use the emergency stop button/s to bring all movement to an immediate stop.
- Alternative, software independent means of stopping must be provided, including a hardware emergency stop system that is compliant with all local regulations.
- Do not use the Elevation until all emergency stop buttons are connected and functioning properly.
- Do not start movement operations until a competent and trained person has inspected the connected equipment.
- Do not use the Elevation if it does not appear to be in 100% working order.
- Do not use the Elevation without having a clear view of all the attached devices and loads. If you do not have a clear view, make sure you have reliable communication with someone who does.
- Do not dismantle or modify the Elevation unless specified to do so by Kinesys.
- Do not connect hoists to the Elevation that have not been manufactured or converted by Kinesys to meet the required specifications.

2.2 Operating environment

The Elevation 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 should not exceed 90%.

The Elevation has an Ingress Protection (IP) rating of IP40 (Protected from tools and small wires greater than 1 mm).

2.3 Handling and storage

Condensation

The Elevation 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 Elevation to a power source immediately. Leave the unit disconnected until it has reached a safe temperature.

Shocks

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

Handling

Do not lift the Elevation 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 Elevation. Alternatively, a purpose-made flight case should be used (available separately).

3. Installation and system integration

The Elevation can be used as a standalone unit to control a single chain hoist, but will more commonly be used in conjunction with other Elevation units to control a group of chain hoists. The Elevation system communicates using an RS485 network which allows communications to be linked together easily and reduces the number of cables required.

3.1 Installation location



Warning!

- The Elevation and all other connected devices may only be installed 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.
- Do a full risk assessment of the location where you intend to use the Elevation and connected devices.

The Elevation has four attachment holes on its outer casing onto which doughties, clamps, and other fixings may be attached. The attachment holes have a diameter of 12.77 mm (0.5 in) and are positioned 372 mm (15.65 in) from each other on each side of the casing. Note that unlike some other products the Elevation is not rack mountable. The exact location and securing method of the Elevation is at the discretion of the user.

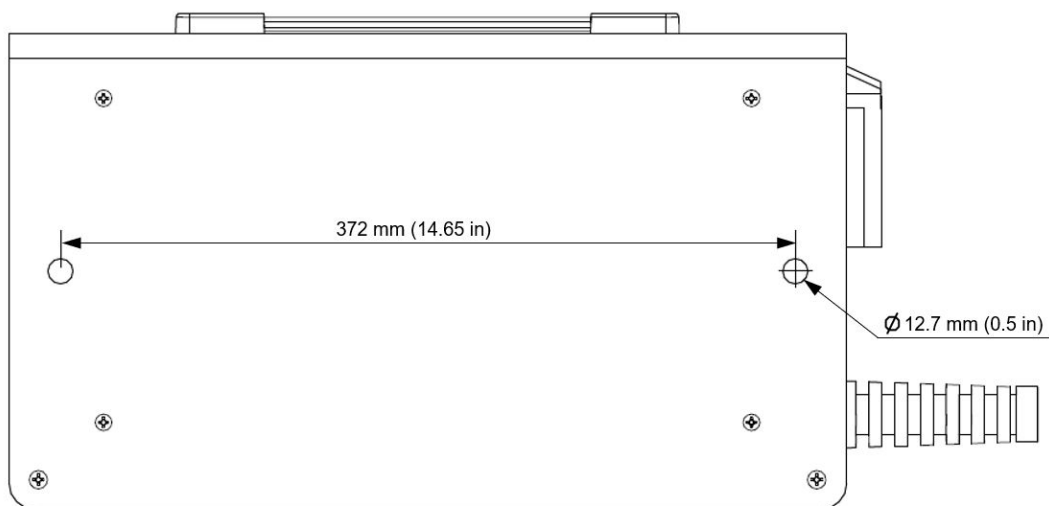


Figure 1. Attachment holes

When considering an installation location, the following conditions must be adhered to:

- The ambient temperature of the location must be between 5°C and 40°C (41°F and 104°F) and the humidity of the environment should not exceed 90%.
- The location must be indoors and not exposed to water. Outdoor use is not permitted.
- There must be adequate space at the sides of the unit to allow the connection of cables.

- There must be adequate space at the sides of the unit to allow for ventilation.
- The front panel of the unit must be easily accessible to allow for the use of the front panel controls.

3.2 Compatible chain hoists and other devices



Warning! Only connect chain hoists to the Elevation that have been converted by Kinesys to meet the correct specifications.

The Kinesys Elevation Hoist is a variable speed chain hoist designed specifically for use with the Elevation controller and is available in 208V and 400V models.



Figure 2. Elevation Hoist

Additionally, Kinesys converts a range of chain hoist models made by other manufacturers to be used in conjunction with the Elevation controller. Some of these manufacturers include CM, Liftket and GIS. If you require more advice on applicable chain hoists that can be used with Elevation, please contact the Kinesys sales team at sales@kinesys.com.



Figure 3. Kinesys converted CM Lodestar chain hoist

3.2.1 Beam trolleys

In addition to chain hoists, the Elevation controller can be used to control the motion of various trolleys including the VTE Beam Trolley and LITEC Beam Trolley. For more details on compatible beam trolleys contact the Kinesys sales team at sales@kinesys.com.

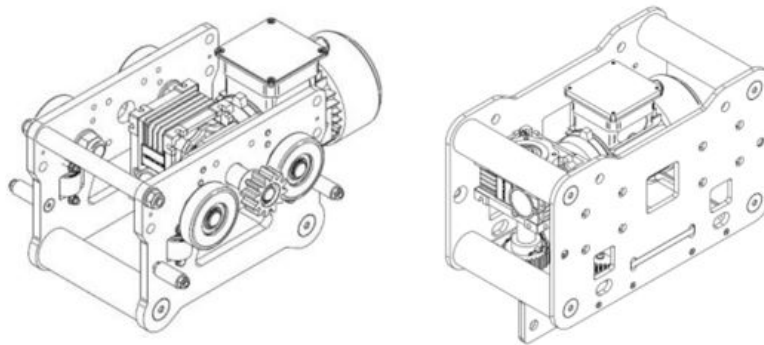


Figure 4. Litec Beam Trolley and Rotator modules

3.3 Compatible user interfaces

When in Manual mode, the Elevation can move its connected chain hoist using the buttons on the front panel. However, for programming moves and entire shows a software package such as Vector, K2 or Navigator must be used. These are available as software packages or installed supplied as part of a console (e.g. Vector Console, K2 Console).



Figure 5. Vector Console and K2 Console

Array PD-ES

The console must be connected to a Kinesys Array PD-ES Power and E-Stop distribution hub in order to properly distribute power, data communications and E-Stop signals to each Elevation unit over the RS485 network.



Figure 6. Array PD-ES front and rear panels

A maximum of 12 208V Elevation units can be connected to an Array PD-ES. This increases to 24 for 400V units.

For larger systems involving connecting more than the maximum number of Elevation units, it is recommended to use additional Array PD-ES units to distribute the power and data.

Each of the four power connections on the Array PD-ES can supply a current of 32A, meaning that a maximum of six 5A / 400V Elevation units or three 10A / 208V Elevation units can be connected to each one.

Other Kinesys devices such as the Array 485 can also be used to distribute data more effectively over long distances for a more efficient way to connect units and to enhance the E-Stop signal. For systems involving the use of LibraCELL load cells, Kinesys devices such as the LibraPRO load cell distribution hub and Array IP8 8-port Ethernet RJ45 hub may be necessary.



Figure 7. Array 485, LibraPRO, Array IP8

For more details on the operation of the Array PD-ES or any other Kinesys products, refer to the relevant operating manuals.

3.4 Data cable length limits

The following table shows the maximum allowable data cable lengths for different numbers of Elevation units per Array PD-ES, taking into account the voltage drop of the E-Stop circuit.

It is recommended to not exceed a data cable length 250 m. 250 m represents an upper extreme case and would generally not be used in practice in most cases.

Number of Elevation units connected to the Array PD-ES	Max data cable length (m)	Max data cable length (ft)
1	250	800
2	250	800
3	250	800
4	220	750
5	180	600
6	150	500
7	130	420
8	110	370
9	100	330
10	90	300
11	80	270
12	70	250

3.5 Power cable length limits

The following tables show the maximum power cable lengths permitted for 400V and 208V Elevation units, taking into account the voltage drop inside the power cables of 3.99 ohm / km.

400V:

Number of Elevation units connected to each 32A connector on the Array PD-ES	Max power cable length (m)	Max power cable length (ft)
1	250	800
2	250	800
3	190	630
4	140	470
5	110	380
6	90	310

208V:

Number of Elevation units connected to each 32A connector on the Array PD-ES	Max power cable length (m)	Max power cable length (ft)
1	150	490
2	70	240
3	50	160

3.6 Termination plug

For systems involving a chain of Elevation controllers, a termination plug is recommended to be installed in the final unit in the chain to avoid the effects of pulse signal reflections in RS485 systems. A 7-pin termination plug can be obtained by contacting Kinesys and quoting the part number ELE-98-0090.

3.7 Elevation system example

The layout below is an example of the connecting elements in an Elevation system. The hoist may not necessarily be an Elevation Hoist in your system but could be a different compatible Kinesys-converted hoist.

If you require any assistance in your specific application please contact Kinesys support or your supplier. For information on the operation of other Kinesys devices within the system such as Elevation Hoist, Array PD-ES, Vector Console, or K2 Console, refer to the relevant product operating manuals.

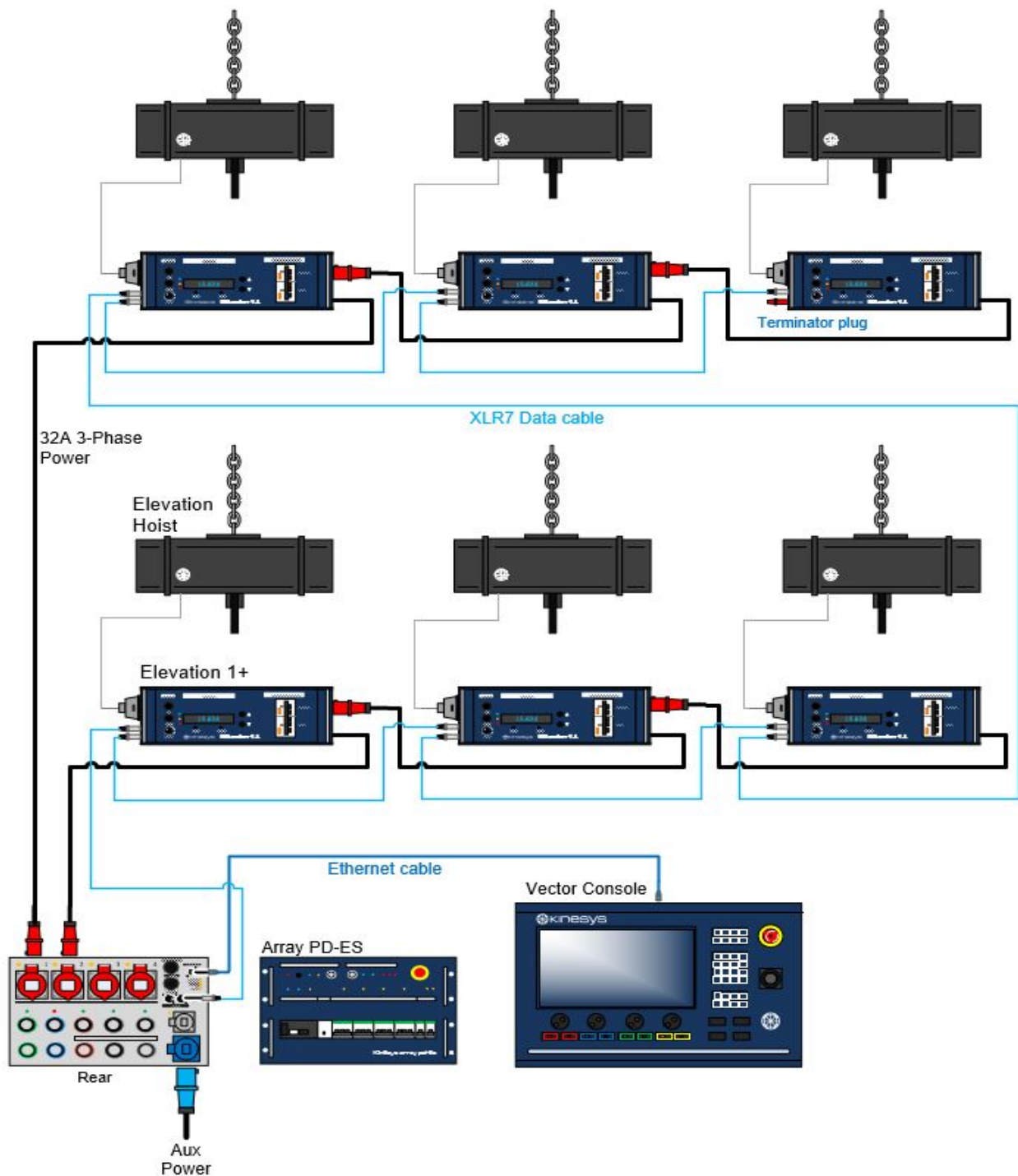


Figure 8. Example Elevation system - SIL2

3.8 Elevation system example with Array 485

Using the Array 485 as a data hub allows chains of Elevation units to be grouped together using separate XLR7 data cables. It may be beneficial to use this system for better cable logistics and fault finding.

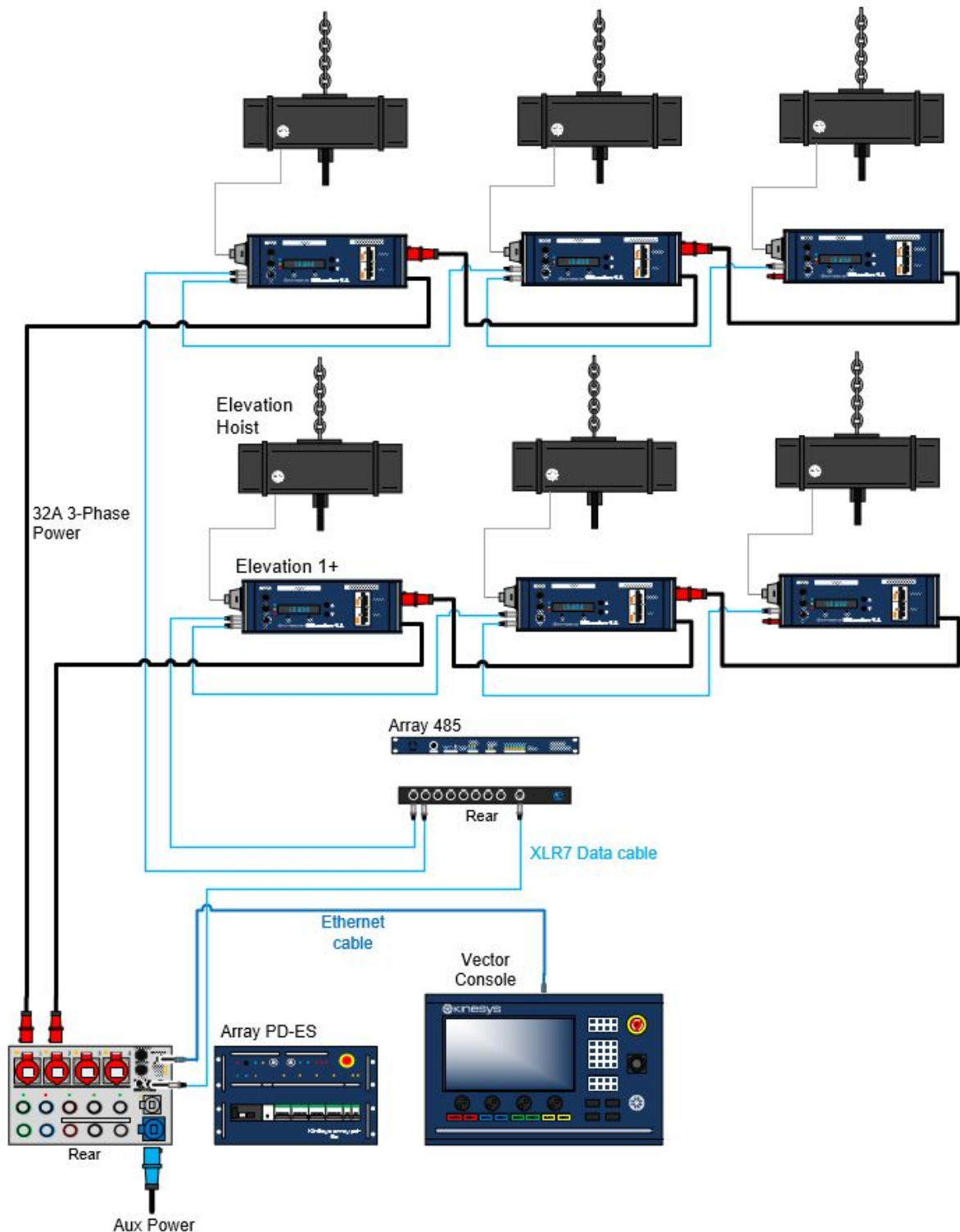


Figure 9. Elevation system with Array 485

3.9 Elevation system example with Mentor

A Kinesys Mentor safety controller allows the Elevation system to achieve SIL 3 compliance. The Mentor comes in a range of models; for more information contact Kinesys or your supplier.

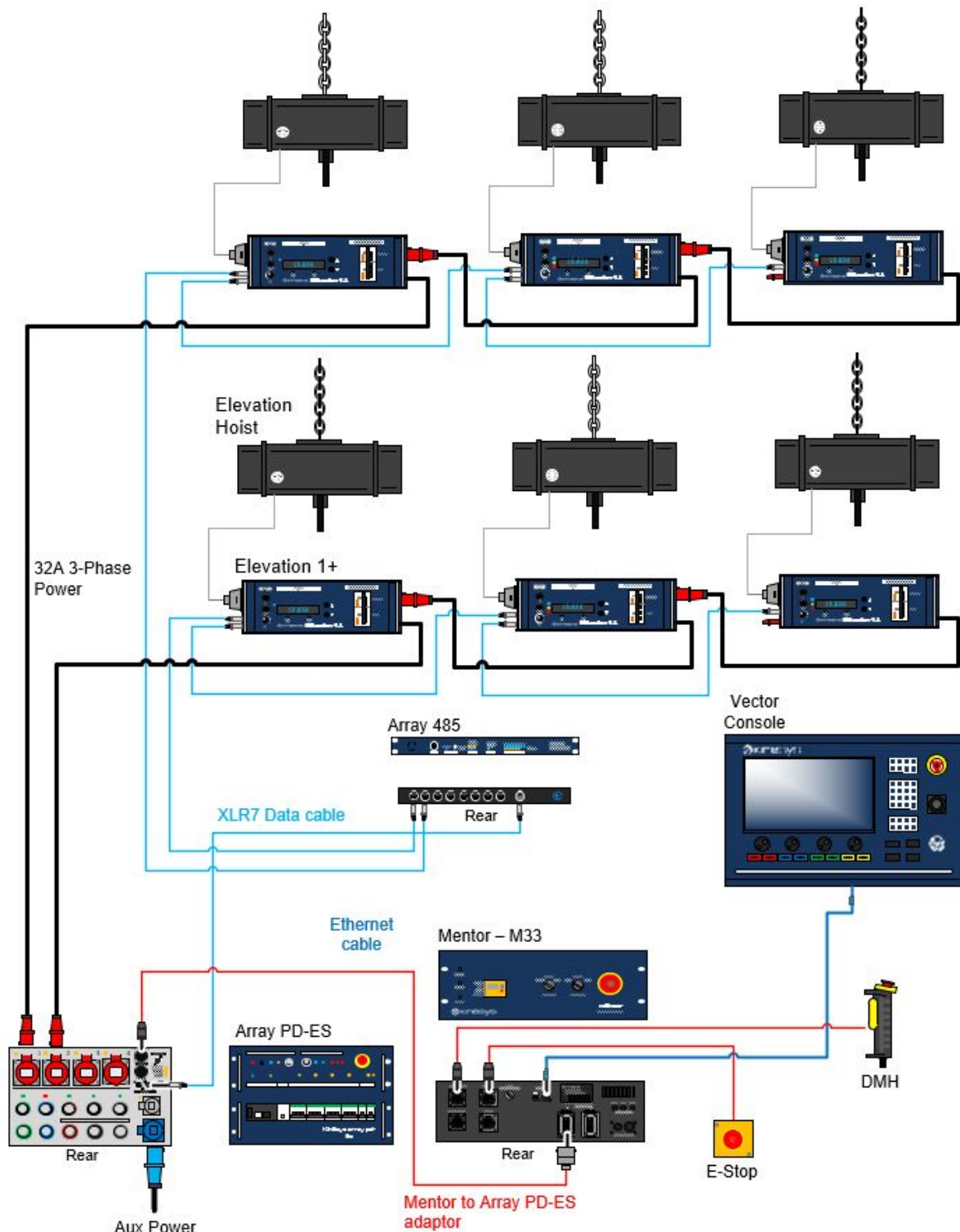


Figure 10. Elevation system with Mentor - SIL3

4. Product overview

4.1 Front panel

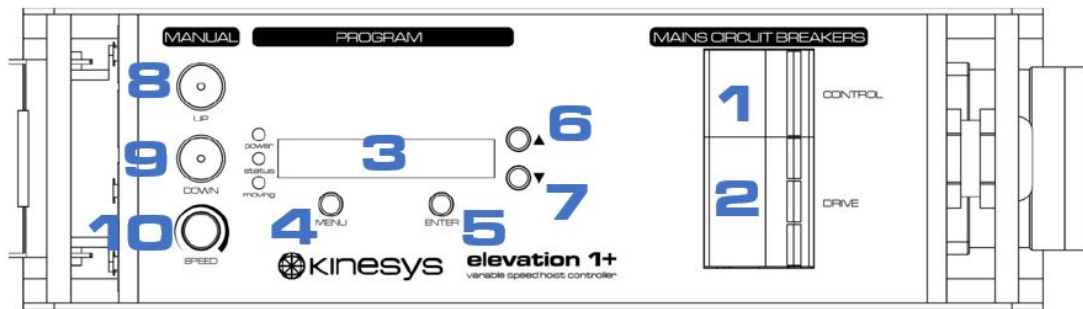


Figure 11. Front panel - Elevation 1+

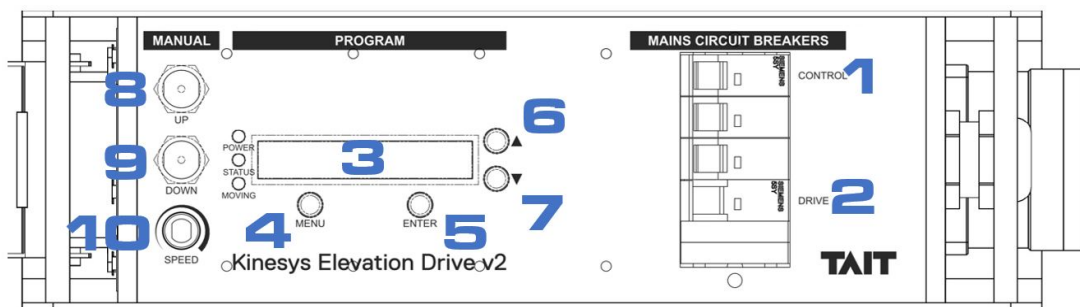


Figure 12. Front panel - Elevation v2

Item #	Description	Notes
1	Control MCB	Switches off the control transformer and electronics. Note that If the unit is linked to other Elevation units, then operating the Control MCB may not turn off the electronics in cases where they are phantom powered. In this situation, disconnect the Data/Control In and Thru connectors as well to ensure that the unit turns off.
2	Drive MCB	Switches power to the drive and brake supply voltage to the hoist. The hoist is safe and cannot be moved if this MCB is off.
3	Menu display	Displays information relating to the unit's status and position as well as allowing the ability to view and alter certain device parameters.
4	Menu button	Accesses the menu system and navigates backwards through the menu tree once in the menu system. When pressed in conjunction with the Enter it button, it toggles the unit in and out of manual mode.
5	Enter button	Confirms selections within the menu system. When pressed in conjunction with menu, it toggles the unit in and out of manual mode.
6	Menu Up button	Moves up the current menu items, increases the currently displayed parameter value, or when used in conjunction with the down button, allows the ultimate limit to be bypassed.

Item #	Description	Notes
7	Menu Down button	Moves down the current menu items, decreases the currently displayed parameter value, or when used in conjunction with the up button, allows the ultimate limit to be bypassed.
8	Manual Up button	Allows the hoist to be run upwards locally without the use of an external controller.
9	Manual Down button	Allows the hoist to be run downwards locally without the use of an external controller.
10	Manual speed controller	Sets the speed of all local manual moves from the Manual Up and Manual Down buttons.

4.2 Left side

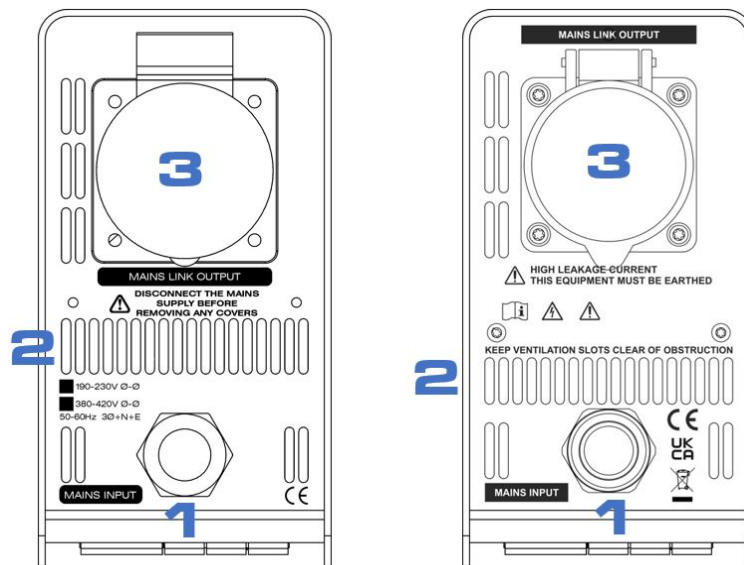


Figure 13. Left side (Elevation 1+ and Elevation v2)

Item #	Description	Notes
1	Mains inlet gland	Supplied with cable to a 32A 3PN+E plug. This must connect to a Kinesys Array PD-ES to guarantee SIL2 compliance
2	Air intake grilles	These must not be obstructed.
3	Mains outlet connector	Unprotected pass-through.

4.3 Right side

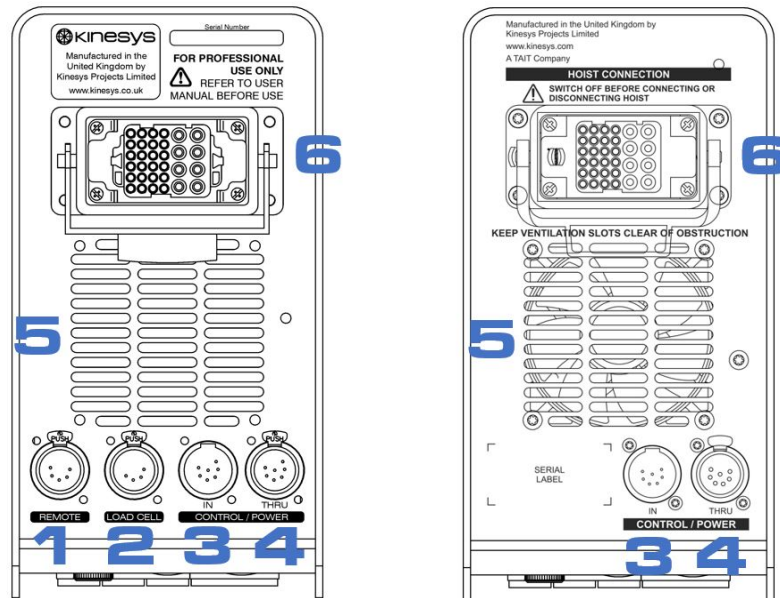


Figure 14. Right side (Elevation 1+ and Elevation v2)

Item #	Description	Notes
1	Remote controller connection (Elevation 1+ only)	Allows the connection of a fixed or variable speed up/down pendant or remote handset.
2	Load cell connection (Elevation 1+ only)	Allows the connection of an external load cell for monitoring the load applied to the motor.
3	Data/Control In connection	Data, supply voltage, emergency stop and remote enable connections are provided through this connector.
4	Data/Control Thru connection	Direct pass-through connection for Data/Control In connections.
5	Fan outlet	This must be kept clear at all times to allow the free flow of air to the unit.
6	Hoist connection	Motor, brake and control voltage connections to the hoist, as well as limit and encoder feedback from the hoist are all provided through this connector. For pinout diagrams see section "Hoist connection cable pinout " on page 45

5. Manual and remote operation

The Elevation has three possible operating modes:

- AUTO - this is the default mode and is used when the Elevation is connected to a console.
- MANUAL - this mode allows the connected hoist to be controlled locally using the directional buttons on the front panel.
- REMOTE (Elevation 1+ only) - this modes allows the use of a remote handset or pendant controller.

5.1 Manual mode operation

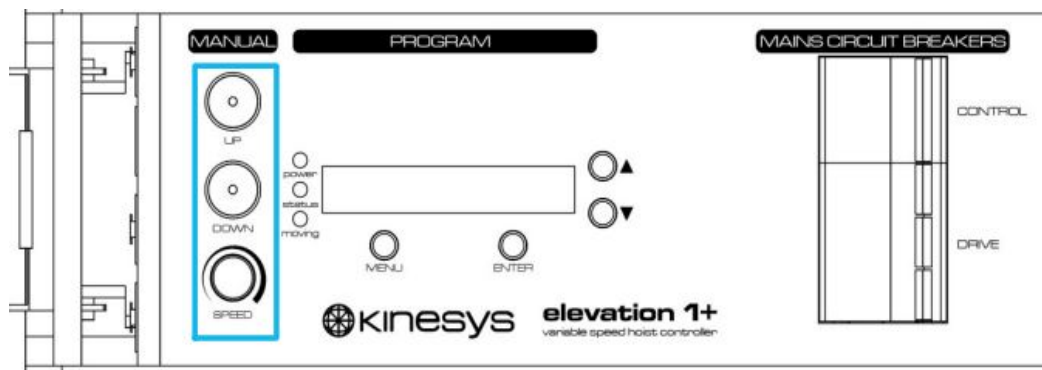


Figure 15. Manual operation buttons

To the left of the menu display there are two buttons and a rotary speed control. These controls allow the hoist to be moved at a variable speed directly from the unit. When the unit is running in Manual mode, any commands from the connected console are bypassed.

Before entering Manual mode, note the following conditions:

- Make sure an emergency stop button has not been pressed. If the unit is in an emergency stop state then manual mode will not work.
- If the Elevation is operating as a single unit (e.g. a workshop environment), rather than as part of a chain, a cheater plug must be installed to the connector where a data/E-Stop cable would normally be installed. This makes the system operate as if an E-Stop system is connected, allowing Manual mode to be used. To obtain the correct cheater plug, contact Kinesys and quote the part number ELE-98-0100.



Warning! Once in Manual mode, the front panel controls will take precedence and the controls of the connected console will become disabled.

To enter Manual mode press and hold the Menu and Enter buttons together. The display will change to the word 'Manual' and the indicators in the Up and Down manual buttons will illuminate. To move the connected hoist make sure the speed control is set to its slowest speed by turning the dial fully anti-clockwise and then press and hold either the Up or Down button depending on the desired direction of travel. Slowly turn the dial clockwise until the desired speed is reached.

To stop movement either release the Up or Down button, which will stop the hoist in a quick ramp, or return the speed dial to zero and then release the button, which will stop the device more gradually.

Once Manual operation is complete, return the unit to Auto mode by pressing and holding the Menu and Enter buttons together. The word 'Auto' will be displayed and operation of the unit will revert to the console.

Note that the unit will time out of Manual mode and return to Auto mode after two minutes of inactivity.

5.2 Remote mode operation (Elevation 1+ only)

Remote operation is a feature that allows the Elevation to be operated by a remote handset or pendant controller. To enter remote mode, connect the handset or pendant to the 'Remote' connection on the right side of the unit. Unlike manual mode, a message is not shown on the display to indicate this mode is active. Once connected, the hoist can be run up and down between its limits at a speed determined by the default speed setting within the unit.

The hoist is ramped up and down when the run button on the handset or pendant is pressed. The button must be held during the entire movement of the hoist. Movement is stopped whenever the button is released.

6. Limits

The Elevation has the capability of monitoring and reacting to three different types of limit: software limits, end of travel limits and ultimate limits.

6.1 Software limits

Software or soft limits are positions stored inside the Elevation beyond which the hoist will not run. There is an upper and lower soft limit and these can be set to any value from -65000 to 65000 mm. Settings may be changed on the front panel display or on the console. If target positions greater than the soft limits are requested then the Elevation will clamp the target to the limit.

If operating from a Vector Console, the only way to travel past the soft limits is to reset the limits to allow a greater range of travel. If running locally in Manual mode then 'limit bypass' can be selected within the menu system which allows the unit to run beyond its soft limits. Always make sure that this setting is reset to Off afterwards, otherwise the original soft limits will have no effect on future moves. Refer to section "Menu operation" on the next page for details on how to change the upper and lower software limits.

6.2 End of travel limits

These limits are physical limits located within the hoist and are monitored by the internal electronics. Reaching an end of travel limit will stop the movement of the hoist immediately and from then on only movement in the opposition direction is allowed until the limit has cleared. If a limit is reached, the unit will display the name and report it back to console. End of travel limits cannot be overridden. These limits are generally set to protect the physical device by preventing the hook of the hoist running into the body or the chain running through the hoist. Adjustment of these limits can only be done by disassembly of the hoist, which is not recommended.

6.3 Ultimate limits

Ultimate limits are the last line of defence and are only reached if both software and end of travel limits have not been set correctly or have failed. The ultimate limits, if fitted, are located within the hoist and are monitored by both software and hardware. If an ultimate limit is reached then a safety chain of relays will be broken, which will engage the brake immediately and disable the internal drive electronics. Movement will be prevented in either direction. Ultimate limits cannot be overridden within the console or the front panel controls and a special sequence must be followed in order to allow movement again. The fault condition 'Limit' will be shown on the display and the issue will also be reported back to the console.

Due to the severity of reaching an ultimate limit both a software and hardware bypass is necessary to allow movement of the hoist again. Within the menu system the parameter 'Ult By' must be selected and set to On. Once this has been done, both the menu up and menu down buttons must be pressed and held together. This allows a ultimate bypass relay to be operated which will in turn allow movement. The device should be moved, either manually or from the console, at a slow speed away from the limit. Once the limit is cleared, the ultimate bypass parameter in the menu will automatically clear itself and normal operation can be resumed.

7. Menu operation

7.1 Display overview

Four buttons are available to operate the menu system: Menu, Enter, Menu Up and Menu Down. The Menu Up and Menu Down buttons are those with the up and down arrows to the right of the display and are not to be confused with the Manual Up and Down buttons to the left of the display.

On power up - the display briefly shows the firmware revision number.

During normal stationary operation - the display alternates between showing the comms address and position in mm. Position is shown as a right justified number and the address has a right justified number but with an 'A' in the left most character. The two displays alternate every two seconds.



Figure 16. Display showing comms address



Figure 17. Display showing current position

During normal moving operation - the display will show the position only.

7.2 Menu operation

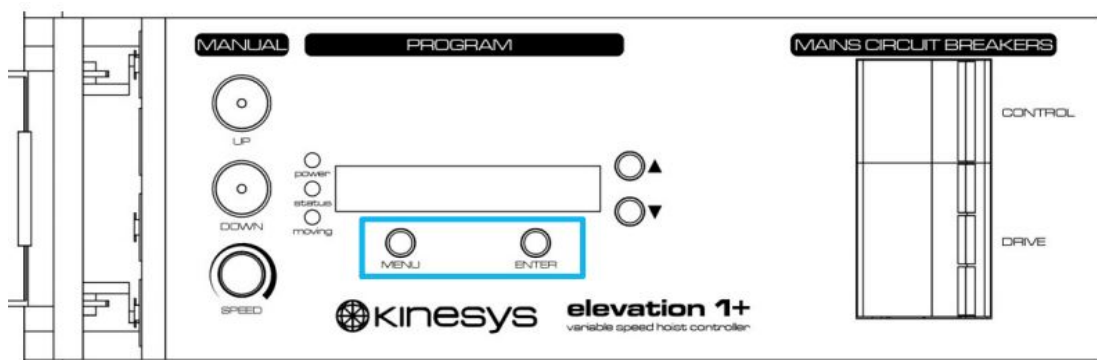


Figure 18. Menu and Enter buttons

To access the menu structure, pressing and hold the Menu button for two seconds while the unit is not moving. Once in the menu structure, a period of inactivity of two minutes will revert to the default display.

7.2.1 Navigating through sub-menus

Pressing and holding Menu from the start display enters the first menu level. Pressing the Menu Up and Menu Down buttons will cycle through menus in this first level (Limits, Comms and Data). Press Enter to go into the sub-menus and press Menu to return to previous sub-menus. Use the Menu Up and Menu Down buttons again to cycle through different options within each sub-menu.

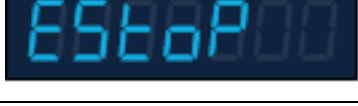
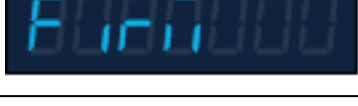
7.2.2 Editing parameters

When an editable parameter is displayed, pressing the Menu Up and Menu Down buttons will scroll through the allowable range of values for that parameter. Pressing Menu will return to the previous sub-menu and the value will remain unchanged. Pressing Enter will save the new value and return to the previous sub-menu. The longer the Menu Up or Menu Down button is held, the faster the display will cycle through the value range. Note that some parameters have a binary setting of either On or Off rather than a range of values.

7.3 Fault conditions

If the unit detects a fault condition, an error code will flash on the display. If the error is not rectified the, error code will be shown on the default display in addition to the comms address and position. If more than one error is present, the most recently detected error will be the one displayed. The following error codes are possible:

Fault display	Description
	Drvcan - shown when the drive is powered down. The fault indicates a CAN Bus communications failure between the drive and control card.
	Drv - shown when the drive is tripped. The letters drv are followed by the fault code read from the drive e.g. drv012 = earth fault. If the display shows the letters drv without a fault code, then it means the unit has been switched to Analog mode. This mode needs to be turned off in the setup menu.
	Limit - an ultimate limit has been reached.
	Upper - an upper overall travel limit has been reached.
	Lower - a lower overall travel limit has been reached.
	U soft - an upper software limit has been reached.

Fault display	Description
	L soft - a lower software limit has been reached.
	OLoad - an overload has been detected.
	ULoad - an underload has been detected.
	Ospeed - overspeed detected. The motor is travelling faster than expected.
	USpeed - underspeed detected. The motor is travelling slower than expected.
	Udog - comms watchdog trip. A status stationary message was received while a move was in progress.
	Comms - communications timeout if no communications received in 2 seconds. Shown on the display for 15 seconds after timeout occurs, even if comms returns - clears after 15 seconds.
	Enc 1 - no encoder count detected.
	Enc 2 - encoder reversed.
	EStop - emergency stop trip.
	Reset - the unit is resetting.
	Firm - a firmware update is required.
	Code - licence code is missing.
	NoPosn - invalid stored position, manual referencing required.

Fault display	Description
	OHeat - overheat switch activated.
	Dis - enable input is not present (overwritten by E-Stop).

7.4 Menu structure

The menu structure is divided into three main sections: Setup, Comms, and Data. For details on how to use the buttons to navigate the menu structure, refer to "Menu operation" on page 26.

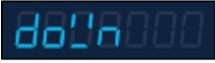
The types and order of sub-menus is different depending on the version number of the unit's firmware. This section describes the menu and sub-menu structure in both pre and post v8 versions.

7.5 Setup sub-menus (before v8)



1st level	2nd level	3rd level	4th level
 Limits	 Upper Max upper travel	 Edit value	
	 Ultimate Bypass	 On Selectable when ultimate limit reached	
		 Off Default setting	
	 Bypass	 On	
		 Off	

1st level	2nd level	3rd level	4th level
		Off	
		Default setting	
		 	
	Lower Max lower travel	Edit value	
 Default		 	
	Speed mm/s	Edit value	
		 	
	Acceleration mm/s/s	Edit value	
		 	
	Deceleration mm/s/s	Edit value	
 Fast		 	This is the value used for E-Stop deceleration.
	Deceleration mm/s/s	Edit value	
 Clamps	 Max	 Speed mm/s	  Edit value
		 Acceleration mm/s/s	  Edit value
			 

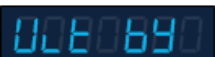
1st level	2nd level	3rd level	4th level
		Deceleration mm/s/s	Edit value
		 Speed mm/s	  Edit value
		 Acceleration mm/s/s	  Edit value
		 Deceleration mm/s/s	  Edit value
 Offset	 Up mm	  Edit value	
	 Down mm	  Edit value	
 Encoder Encoder pulses per mm	  Edit value		
 Profile No function			
 PARAM	 P	 	Refer to "Editing parameters" on page 38 for details

1st level	2nd level	3rd level	4th level
Paremeters	1 Proportional gain P0000002	Edit value 	on each parameter.
	2 Integral gain P0000003	Edit value 	
	3 Derivative gain P0000004	Edit value 	
	4 Min drive speed P0000005	Edit value 	
	5 Max drive speed P0000006	Edit value 	
	6 Pos. trip distance P0000007	Edit value Default value 300	
	7 Brake delay P0000000	Edit value Deaful value 0	
	Analog AnALo90	Off Default setting oFF00000	On = Lenze 8200 mode, Off = Analogue output mode.
oN000000			

1st level	2nd level	3rd level	4th level
	On		
 Display flip	 Off Default setting	When selected to On, flips the display 180 degrees.	
	 On		

7.6 Setup sub-menus (v8 and later)



1st level	2nd level	3rd level	4th level
 Limits	 Upper Max upper travel	 Edit value	
	 Ultimate Bypass	 On Selectable when ultimate limit reached	
		 Off Default setting	
	 Bypass	 On	
		 Off	

1st level	2nd level	3rd level	4th level
		Default setting	
	 Lower Max lower travel	  Edit value	
 Invert	 Off Default setting	When selected to On, inverts all positional parameters including upper and lower limits.	
	 On		
 Display flip	 Off Default setting	When selected to On, flips the display 180 degrees.	
	 On		
 Analogue	 Off Default setting	On = Lenze 8200 mode, Off = Analogue output mode.	
	 On		
 Drive Parameter	  Edit value 1 - 1050	These are used to change the drive parameters. Warning! Do not alter these settings unless instructed to do so by Kinesys.	
 Parameters	  Edit value	Refer to "Editing parameters" on page 38 for details on each parameter.	

1st level	2nd level	3rd level	4th level
	100 - 626		
 Encoder Encoder pulses per mm	 Edit value		
 Clamps	 Max	 Speed mm/s	 Edit value
		 Acceleration mm/s/s	 Edit value
		 Deceleration mm/s/s	 Edit value
	 Min	 Speed mm/s	 Edit value
		 Acceleration mm/s/s	 Edit value
		 Deceleration mm/s/s	 Edit value
 Fast	 Deceleration	 Edit value	This is the value used for E-Stop deceleration.

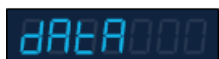
1st level	2nd level	3rd level	4th level
	mm/s/s		
 Default	 Speed mm/s	 Edit value	
	 Acceleration mm/s/s	 Edit value	

7.7 Data sub-menus (before v8)



1st level	2nd level	3rd level	4th level
 Position mm	Data		
 Version	Data		
 Product ID	Data		
 License	Data		

7.8 Data sub-menus (v8 and later)



1st level	2nd level	3rd level	4th level
 Position	Data		

1st level	2nd level	3rd level	4th level
mm			
 License	Data		
 Product ID	Data		
 Version	Data		
 Loadcell	Data		

7.9 Comms sub-menu



Comms only has one sub-menu, which is used for changing the comms address of the unit:

1st level	2nd level	3rd level	4th level
 Address	  Edit value		

8. Editing parameters

Editing parameters is possible by navigating to the Setup menu and then the Parameters sub-menu. For details how to access and navigate the menu structure, refer to "Menu operation" on page 26.

Firmware versions lower than v8 have seven editable parameters ranging from P1 to P7. These are all motion control parameters.

Firmware versions v8 and higher have a wider range of editable parameters from 100 to 626. These contain the original seven motion control parameters as well as additional parameters which are explained in more detail in section "Editable parameters for versions v8 and above" on the facing page.

8.1 Motion control parameters

The advanced position controller inside the Elevationr takes the move profile sent by the user and translates the signal into movement commands for the internal drive electronics. The control software uses a closed loop 'PID' system to regulate the speed and position of the hoist at any given moment. The Proportional, Integral and Derivative (PID) sections of the control loop each have a unique effect on the accuracy and smoothness of the final motion and consequently the tuning of these parameters can be important to the correct functioning of the unit.



Warning! Only adjust these parameters if you are confident of your abilities to tune the system. The Elevation is supplied with a default set of parameters which are designed to work in the vast majority of situations and environments. When tuning the drive make sure that the device and load are safe to move and that there is enough room to allow for unexpected movement and behaviour.

8.1.1 Proportional gain (P1 / 600)

The proportional gain in the system creates an output that is proportional to the position following an error (the difference between its current location and expected location). This gain is not affected by speed or ramps and provides the majority of the feedback required to keep the system working correctly.

Default value = 25000

8.1.2 Integral gain (P2 / 601)

The integral gain creates an output that is proportional to the sum of errors that have occurred during the system operation. Its purpose is to reduce small steady-state position errors. Integral gain ensures that the desired speed is as accurate as possible and applies most during the cruise phase of a move profile.

Default value = 1500

8.1.3 Derivative gain (P3 / 602)

The derivative gain is a function of the measured velocity and improves the high frequency closed loop response. Derivative gain is the most volatile of the three settings. Its effect is most pronounced during the acceleration and deceleration phases of a move profile. An incorrect value for this setting can lead to instability during movement and potentially erratic behaviour.

Default value = 00250

8.1.4 Min speed output to drive (P4 / 622)

This value is used to set the minimum drive speed required to obtain movement. It is used in conjunction with the Max speed output to limit the range of the PID loop.

Default value = 50 = 1 Hz

8.1.5 Max speed output to drive (P5 / 621)

This value is used to set the maximum drive speed that may be permitted. It is used in conjunction with the Main speed output to limit the range of the PID loop.

Default value = 5000 = 100 Hz

8.1.6 Position error trip distance (P6 / 620)

The PID servo control generates the correct move profile in software which the PID loop attempts to follow as closely as possible. If the expected position following an error exceed this setting, an overspeed or underspeed error will be generated and the move will be stopped.

Default value = 300 mm

8.1.7 Brake delay on start (P7 / 610)

This is the amount of time that the brake is delayed on start. This gives the drive time to build up current to hold the load. This value needs to be set to a value other than 0 only for very fast acting brakes.

Default value = 0 (ms x 10)

8.2 Editable parameters for versions v8 and above

Firmware versions v8 and above have a wider range of editable parameters ranging from 100 to 626.

Parameter	Description	Notes
Addressing		
100	Address	Target address from 1 - 65535
System		
210	Display state	0 = Normal

Parameter	Description	Notes
		1 = Auto blank 2 = Flipped 3 = Flipped, auto blank
211	Analogue	0 = Lenze 8200 mode 1 = Analogue output mode
Positioning		
300	Upper soft limit	
301	Lower soft limit	
302	Limit bypass	1 = Bypass soft limits
310	Underload and overload bypass	1 = Bypass underload and overload inputs
Encoder		
400	Encoder scaling	
Generic motion		
500	Max speed	
501	Default speed	
502	Min speed	
510	Max acceleration	
511	Default acceleration	Used for jog acceleration / deceleration
512	Min acceleration	
520	Max deceleration	
521	Default deceleration	
522	Min deceleration	
523	Fast deceleration	Used for E-Stop deceleration
Device specific motion		
600	Proportional gain	Pre v8 equivalent = P1
601	Integral gain	Pre v8 equivalent = P2
602	Derivative gain	Pre v8 equivalent = P3
610	Brake delay on start	Pre v8 equivalent = P7
620	Position error trip distance	Pre v8 equivalent = P6
621	Max speed output to drive	Pre v8 equivalent = P5
622	Min speed output to drive	Pre v8 equivalent = P4
625	Max wrong direction movement before ENC2 error	(Valid range 0 – 250). The number of mm an axis is allowed to move in the wrong direction before an ENC2 error is declared and movement is halted. The default value is 0mm.

Parameter	Description	Notes
626	No movement trip time x 10 ms	(Valid range 1 – 250) If no positional change is detected for value x 10 ms, an ENC1 fault is declared. The default value is 160 (1.6 seconds). Lowering this value will clamp the PID runaway faster in the event of an encoder failure.

9. Unit configuration

Several of the parameters that have to be set up within the Elevation are dependent on the type of motor in use. Motion control parameters are covered in more detail in section "Motion control parameters" on page 38.

9.1 Encoder scaling

Encoder scaling converts the number of encoder pulses derived from the hoist to physical distance travelled in millimetres. The encoder scaling is defined as the distance travelled per encoder pulse edge. This distance is measured in mm x 100,000. The number of encoder pulse edges per encoder revolution is 4 x the number of encoder pulses per revolution (A 100 pulse encoder will produce 400 encoder pulse edges per revolution).

As an example, an encoder scaling of 55060 means the encoder produces a pulse edge every 0.5506 mm. If the encoder scaling value is incorrect, the result may either be no movement from the hoist or it may overshoot or fail to reach its target position as well as running at incorrect speeds.

An example encoder calculation is shown below for a winch with a 1024 pulse encoder connected directly to a drum of 788 mm circumference:

Distance traveled per encoder edge (mm) = Drum Circ / (Encoder Pulses x 4).

Distance traveled per pulse = 788/(1024x4) = 0.19238 mm.

This would equate to an encoder scale of 19238.

When determining the encoder scaling of a particular hoist, if the Elevation shows a position change smaller than the actual position travelled then the encoder scaling needs to be increased.

To change the encoder scaling, navigate to the Encoder sub-menu in the Setup menu. For more details, refer to section "Menu operation" on page 26.

The list below shows the required value for different hoists. Software versions v4.xx and earlier use a less accurate encoder scaling. If the unit has a software version of v4.xx or earlier then encoder scaling must be divided by 10.

Hoist Model	UK Speed	US Speed	Enc Scale < = v4.xx	Enc Scale > v5.00
Lodestar LL	8 m/min	32 ft/min	759	7590
Lodestar JJ	16 m/min	64 ft/min	759	7590
Liftket (most models)	20 m/min	80 ft/min	5506	55060

9.2 Other parameters

Two other parameters that can effect the operation of the hoist are the boost setting and the switching frequency of the inverter. These are factory set to a value of 45000 for the boost and 20000 for the switching frequency. These values only need to be modified if instructed to by Kinesys. They can be set by accessing drive parameters 16 (boost) and 18 (switching frequency) in Vector or K2.

10. Cable specifications

10.1 Data cable

Male connector: XLR7M e.g. Neutrik NC7MX or NC7MX-B

Female connector: Neutrik e.g. Neutrik NC7FX or NC7FX-B

Note: alternative manufacturer's connectors may have different pin configurations - check compatibility with Neutrik parts before use.

Cable: 3-pair 22AWG with overall shield 100/120 ohm nominal impedance e.g. TMB "ProPlex" PC226T (for portable / touring use) Alpha 6213C (for installation use).

Cable colour code:

Pin	Function	Colour (PC226T)	Colour (6213C)	Pair
1	Data ground	shield	shield	shield
2	Data -	black	black (red)	pair 1A
3	Data +	white	red	pair 1B
4	24V DC	red	black (white)	pair 2A
5	0V	green	white	pair 2B
6	E-Stop (12V)	blue	black (green)	pair 3A
7	Enable (24V)	orange	green	pair 3B

10.2 Power cable

Male connector: 32A 5-pin plug "Ceeform" type Red 6h earth position .g. Walther 230

Female connector: 32A 5-pin coupler "Ceeform" type Red 6h earth position e.g. Walther 330

Cable: 5-core 6mm² 400V/700V rated (H07) e.g. Lapp Cable 1600 1313 (H07RN-F) for portable use

Cable colour code:

Pin	Function	Colour
E	Earth	green/yellow
L1/R	Live 1	brown
L2/S	Live 2	black
L3/T	Live 3	grey
N	Neutral	blue

11. Hoist connection cable pinout

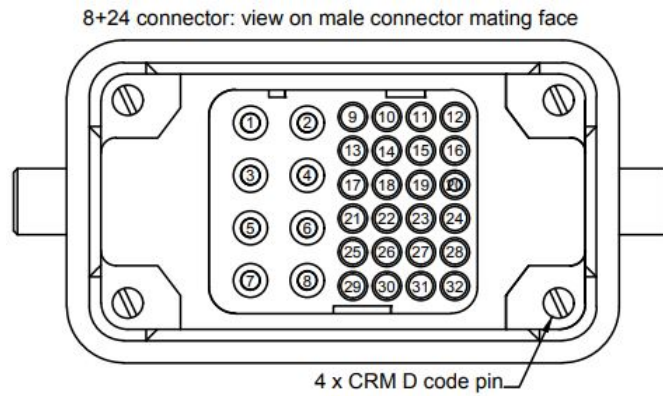


Figure 19. Extension cable male connector

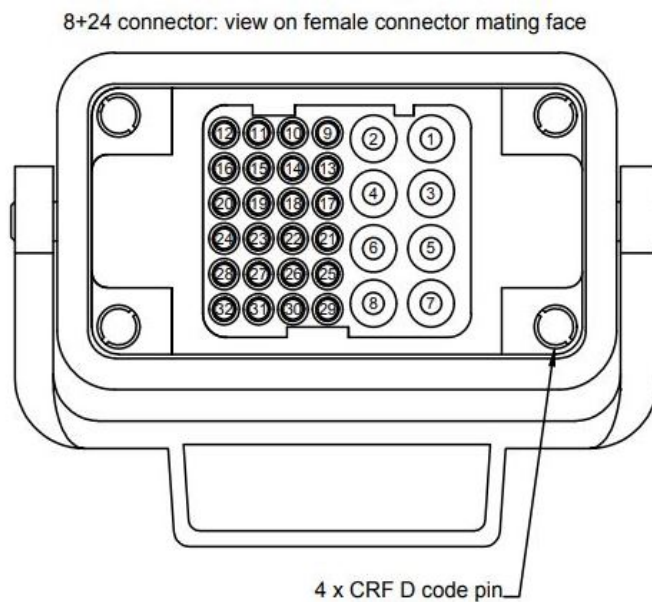


Figure 20. Extension cable female connector

Pin	Function	Colour
1	Earth	green/yellow
2	Motor L1	brown
3	Motor L2	black
4	Motor L3	grey
5	Aux L1	black
6	Aux L2	black
7	Aux N	black
8	Reserved	brown/red
9	AC Power	black
10	Ultimates Common	violet
11	Ultimates Out	grey/pink

Pin	Function	Colour
12	Top / Overload Common	red/blue
13	Top Limit Out	white/green
14	Overload Out	brown/green
15	Bottom / Underload Common	white/yellow
16	Bottom Limit Out	yellow/brown
17	Underload Out	white/grey
18	Reserved	grey/brown
19	Brake 1	white/pink
20	Load Cell	yellow
21	Brake 2	pink/brown
22	Up Contactor	white/blue
23	Down Contactor	brown/blue
24	Fixed Speed Select	white/red
25	Encoder Screen	drain
26	Encoder 0V	white
27	Encoder 5V	green
28	Encoder 24V	brown
29	Encoder A	grey
30	Encoder /A	pink
31	Encoder B	blue
32	Encoder /B	red

12. Using an Elevation with RCD

The Kinesys Elevation is designed to comply with European legislation for variable speed drives, which require that an RFI (Radio Frequency Interference) filter is included to prevent the noise generated by the drive from interfering with nearby computer systems and radio equipment. The inverter drive within the Elevation 1+ is an independently manufactured product widely available within Europe and the US which incorporates the filtering required to comply with the European EMC (ElectroMagnetic Compatibility) directive 89/336/EEC. One of the consequences of including such a filter is a small current leakage to ground within each Elevation 1+.

The total ground leakage for a typical Elevation system may be in the region of 60-300 mA, which could trip the 30 mA RCD (Residual Current Device) fitted to many house rigging supplies within Europe. A single Elevation controller may also trip a sensitive RCD on power-up due to the charging of the internal capacitors - this is a common situation when using any variable speed drive. As most moving lights and video screen power supplies will also have an inherent earth leakage due to internal RFI filters, tripping may increase when other equipment is turned on.

RCDs are set at a default level of 30 mA as this has been found to be the point at which an RCD will trip before a current high enough to cause physiological damage will flow through the human body in the event of accidental contact - refer to IEC publication 479 "Effects of currents passing through the human body" for further information. Where a system has an inherent leakage, some protection may still be provided by setting the RCD at a level approximately 30 mA higher than the system's base leakage current - this will overcome the problem of nuisance tripping but still provide a degree of personal protection.

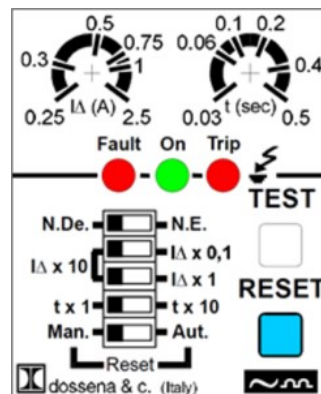


Figure 21. Array PD-ES adjustable RCD

Kinesys have addressed this issue by providing an adjustable RCD within the Array PD-ES power distribution system. The adjustable RCD should be set to a point approximately 30 mA higher than the point at which a full system trips on power up - 100 mA would be a recommended starting point. The time delay should always be set to a minimum (30 ms). Refer to the Array PD-ES operating manual for details on how to adjust the RCD.

In any large power distribution system, the ideal situation is for each service to be protected by its own RCD, set to provide the required level of protection. An overall RCD on the generator or incoming supply should be set to a current value higher than any of the downstream devices, and should also incorporate a time delay. With this system, a fault on a final circuit such as a hoist controller or video screen will still result in disconnection of the final supply but will not cause disruption to other devices.

13. Product specifications

Feature	Specification	Notes
Supply voltage	208V or 400V, 3-phase, neutral and earth.	
Supply current	5A for 400V, 10A for 208V	
Communications network	RS485 specification	
Control signals	0 - 24V DC	
Emergency stop system	Single wire 12V system - Category 2 rated	
SIL safety rating	• SIL 2 achievable when used with Array PD-ES • SIL 3 achievable when used with Mentor	
Operating temperature range	-10° C to 55° C	
Ingress Protection (IP) rating	IP40	Protected from tools and small wires greater than 1 mm
Product dimensions	424 mm x 241 mm x 126 mm	Excluding fixing hardware, handle and cable glands
Weight	9.5 kg (20.9 lbs)	Excluding fixing hardware

13.1 Product dimensions

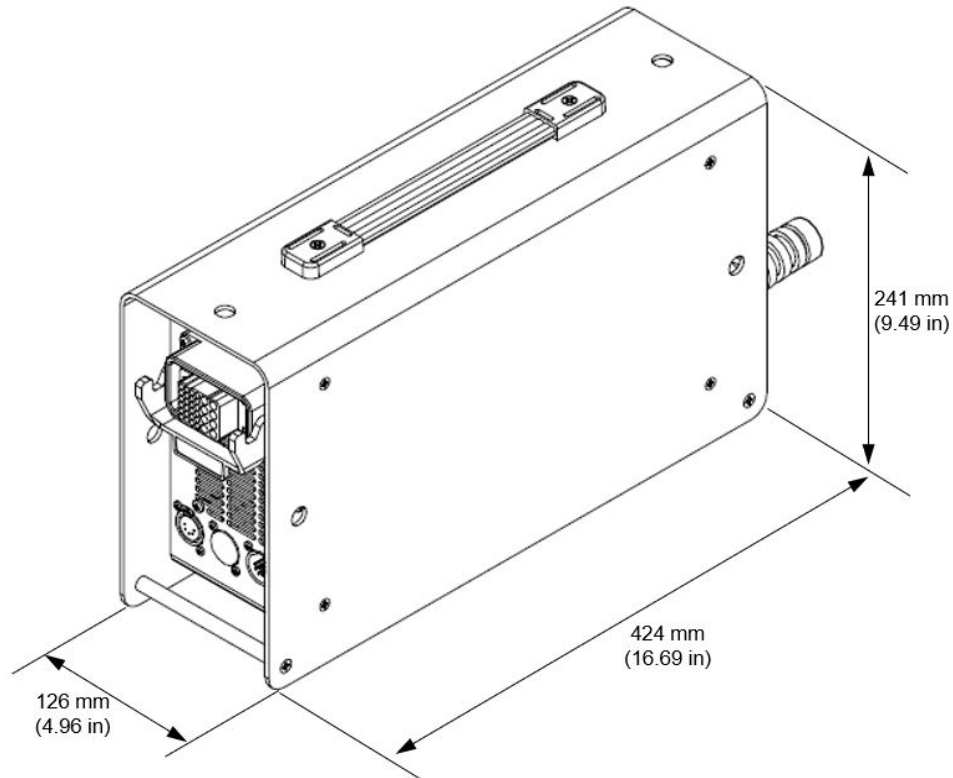


Figure 22. Product dimensions

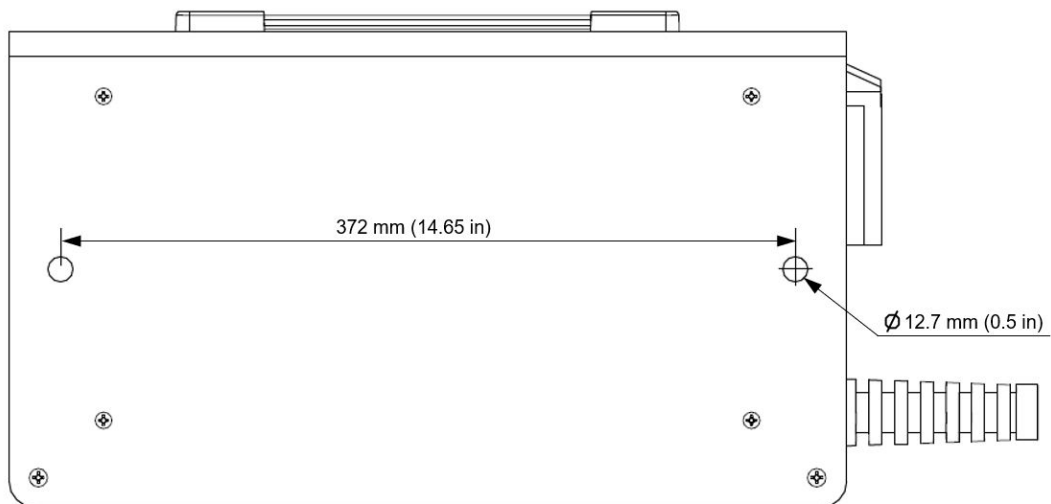


Figure 23. Attachment hole dimensions

14. Service & End of Life

14.1 Replacing an Elevation

In the unlikely event that an Elevation is not working correctly and needs to be replaced with a new one, the following settings must be copied from the original unit and entered into the new unit:

- Setup → Limits → Upper / Lower
- Comms → Address
- Data → Position

For more information on how to access these settings in the menu structure refer to "Menu operation" on page 26.

It is recommended to note down these settings for all Elevation units in the Elevation system in order to be prepared if one needs to be replaced.

The one parameter that you will not be able to record in preparation is the current position. This should be entered into the replacement Elevation if the hoist being controlled is at a known position or its position can be estimated from the position of other hoists in the system.

14.2 Product disposal

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.

15. Declaration of Conformity (example)



ORIGINAL

EC Declaration of Conformity

manufacturer: **Kinesys Projects Limited**
 address: **Unit 2 Kempton Gate, Oldfield Road, Hampton,
 Middlesex. TW12 2AF**

in accordance with the following EC directives:
Low Voltage Directive 2014/35/EU
EMC Directive 2014/30/EU

declares that the products:
 description: **Elevation 1+ Variable Speed Hoist Controller**
 models: **2,2 kW 208 V ELE-00-0010**
2,2 kW 400 V ELE-00-0020
3,0 kW 208 V ELE-00-0030
3,0 kW 400 V ELE-00-0040

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

EN 60204-1 Safety of machinery - Electrical equipment of machines -- Part 1: General requirements
EN 61000-6-2 Electromagnetic compatibility (EMC). Generic standards. Immunity for industrial environments
EN 61000-6-4 Electromagnetic compatibility (EMC). Generic standards. Emission standard for 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.

The party authorised to compile the technical file is:
TAIT Netherlands B.V.
Stadsplateau 7, 3521 AZ, Utrecht, The Netherlands

Equipment referred to in this Declaration of Conformity was first manufactured in 2003

A M Cave
Technical Director
 Hampton, 31 October 2022

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.



+44 (0)20 8481 9850



kinesys.co.uk



info@kinesys.co.uk

Kinesys, Unit 2 Kempton Gate, Oldfield Road,
 Hampton, Middlesex, TW12 2AF, UK

Kinesys Projects Ltd, Registered in England & Wales No. 04620583 Registered Office as above VAT Number GB 805 2763 38