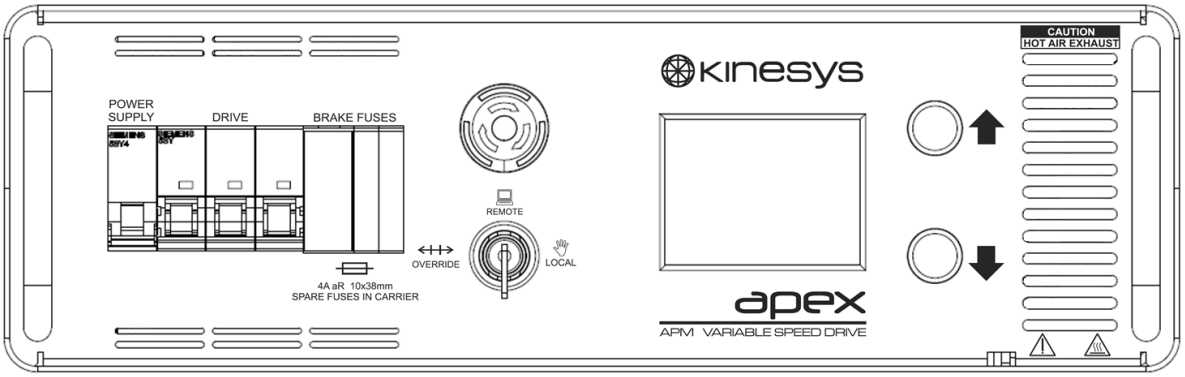
USER GUIDE

apexDRIVE

Variable Speed Chain Hoist Controller



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GLOSSARY OF TERMS USED

3 Phase	Refers to a system of power distribution of 3 electric power conductors carrying alternating current voltages that are offset by 120^{o} from each other.
CEE Form	A type of power connector which meets IEC EN 60309. Also known as “Commando” or “Pin and Sleeve”.
Encoder	A device used to measure the movement of a hoist.
E-Stop	Emergency Stop used to stop all movement in the system.
Ethernet	A family of computer networking technologies.
Group Halt	A group of hoists moving together that have been stopped.
Hard Limit	Refers to a physical limit with a connected chain hoist.
Harting	A brand name for a type of multipin connector. Also known as “Wieland”, “EPIC” or “Lectriflex” or ILME.
Hubbell	A brand name for a type of power connector (US market)
OLED	Organic Light-Emitting Diode, used for the touch screen display
LED	Light-Emitting Diode.
Limit	A set point beyond which a hoist cannot move.
Loadcell	A device used to measure weight.
Multicore	A cable consisting of multiple smaller cables.
Overload	A measurement of weight higher than that required.
Pin Out	The designated use for each of the pins in a socket or connector.
Positioning	Identifying and monitoring the current position of the chain or load.
RCD	Residual Current Device used to monitor and cut power supplies in the event of a current leakage to earth, to avoid accidental electrocution. Also referred to as “ELCB” (Earth Leakage Circuit Breaker) or “GFCI” (Ground Fault Circuit Interrupter).
Shackle	A U-shaped piece of metal secured with a clevis pin or bolt across the opening.
Soft Limit	Refers to a limit set by software.
Tare	Makes allowance for the chain, hoist or container when measuring a loads weight.
Underload	A measurement of weight lower than that required.
Vector	Kinesys Motion Control Software.
MCB	Miniature Circuit Breaker, resettable thermal overcurrent protection device

Table of Contents

Table of figures

1 Scope and Purpose

The purpose of this manual is to describe the features, functions and means of operating the Kinesys apexDRIVE chain hoist controller.

2 Introduction

The apexDRIVE is a variable speed electric chain hoist controller designed for use in the entertainment and events industry. It is designed exclusively for use with the Kinesys apexHOIST range and ancillary equipment to form a complete motion control system.

2.1 General Description & Safety Warnings

The equipment described in this manual may only be operated by personnel qualified to do so for the specific task as detailed above.
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.

The apexDRIVE is designed for indoor use only and to work in ambient temperatures between 5C and 40C. The apexDRIVE has an Ingress Protection (IP) rating of IP30.

2.1.1 Do's and Don'ts

- **Do not** start initial operations before a competent person or a trained specialist has inspected the equipment.
- **Do not** run the system without all Emergency Stop switches/buttons connected and in position.
- **Do not** use apexHOIST for moving loads other than in a vertical direction
- **Do not** connect an apexDRIVE to any lifting equipment other than apexHOIST without prior written approval by the manufacturer
- **Do not** use any hoist without having carried out the regular inspection as specified by the manufacturer
- **Do not** connect an apexDRIVE to a power source other than specified on the unit and in this manual.
- **Do not** apply power if there is risk of condensation within the apexDRIVE
- **Do not** obstruct the air intakes or exhaust ports, or operate the unit with contaminated filter media (Replace media following procedure on page 43)
- **Do not** modify an apexDRIVE in anyway unless expressly advised by the manufacturer.
- **Do not** attempt to connect more than one hoist per controller.

- **Do not** open the apexDRIVE or remove the outer casing if the system is connected to a power source even if the apexDRIVE itself is not powered on.
- **Do not** use an apexDRIVE if it is damaged or does not appear to be in perfect working order.
- **Do not** use any spare parts other than those supplied by Kinesys.
- **Do not** subject an apexDRIVE to shocks or drops.
- **Do not** install apexDRIVE on truss without using the dedicated truss mounting kit and safety bond.
- **Do not** distract the operator's attention while they are operating the system.
- **Do not** operate hoists without having a clear view of the load or reliable communication with someone who does.
- **Do** stop and investigate immediately if a hoist connected to the apexDRIVE should move in a direction opposite to that which was expected.

2.2 Transportation and storage

2.2.1 Condensation

The apexDRIVE 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 apexDRIVE to a power source immediately. Leave the apexDRIVE disconnected until the unit has reached the temperature of the location where it is to be installed.

2.2.2 Shocks

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

2.2.3 Handling

Never lift the apexDRIVE by any of its cables or connectors as this may cause damage to the unit and/or the cable.

2.2.4 Packaging

The use of a purpose made flight case (available from Kinesys as an accessory) is recommended for regular transportation such as in touring applications. Otherwise, where possible, please use the original packaging to transport the apexDRIVE.

3 Overview

3.1.1 Layout

This section describes the layout of the front panel controls and the rear panel connection option on an apexDRIVE

3.1.2 Front Panel

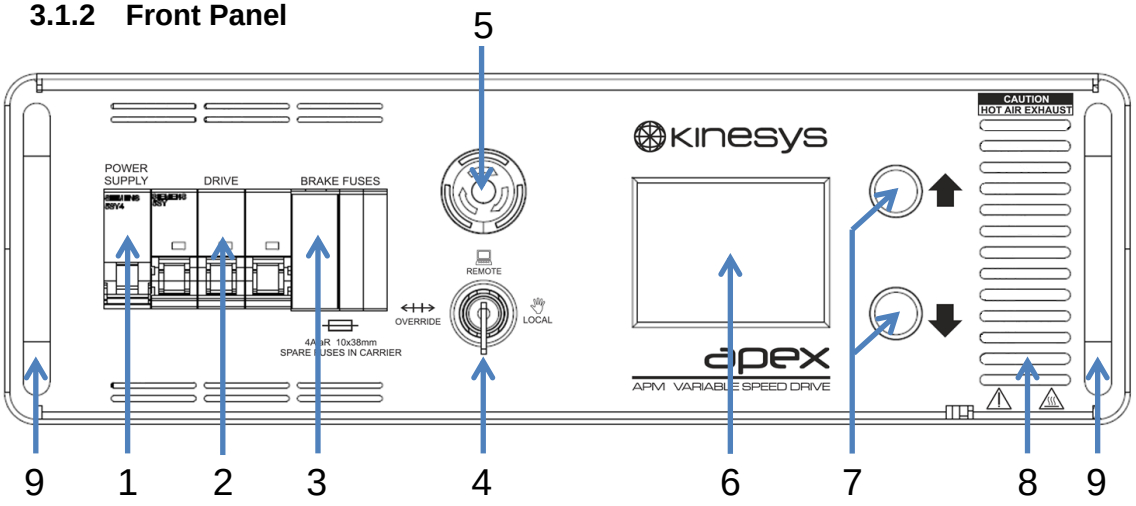


Figure 1 Front panel layout

1. **'Power Supply' MCB** – Used to isolate power to the control systems within the apexDRIVE, refer to page 22 for more details.
2. **'Drive' MCB** – Used to isolate the three phase power from the internal power electronics and the apexHOIST, refer to page 23 for more details.
3. **Brake Fuses** – replaceable fuses for the hoist brakes, refer to page 23 for more details.
4. **Mode Key Switch** – Used to select 'Override', 'Remote Control' or 'Local' operational modes, refer to page 25 for more details.
5. **Emergency Stop button** – Used to stop all movement in the system in the event of an emergency, refer to page 24 for more details.
6. **Touch Screen Display** – Used to show details of the apexHOIST position, movement, system status, faults and for navigating the system menu, refer to page 25 for more details.
7. **Manual direction controls** – Used with the touch screen to allow local control of the connected chain hoist, refer to page 32 for more details.
8. **Drive ventilation** – Hot air exhaust outlet[1] from the variable speed drive and braking resistor. DO NOT OBSTRUCT AIRFLOW.
9. **Carry handles** – To be used for carrying and handling the drive.

[1] Check condition periodically, refer to page 44

3.1.3 Rear Panel

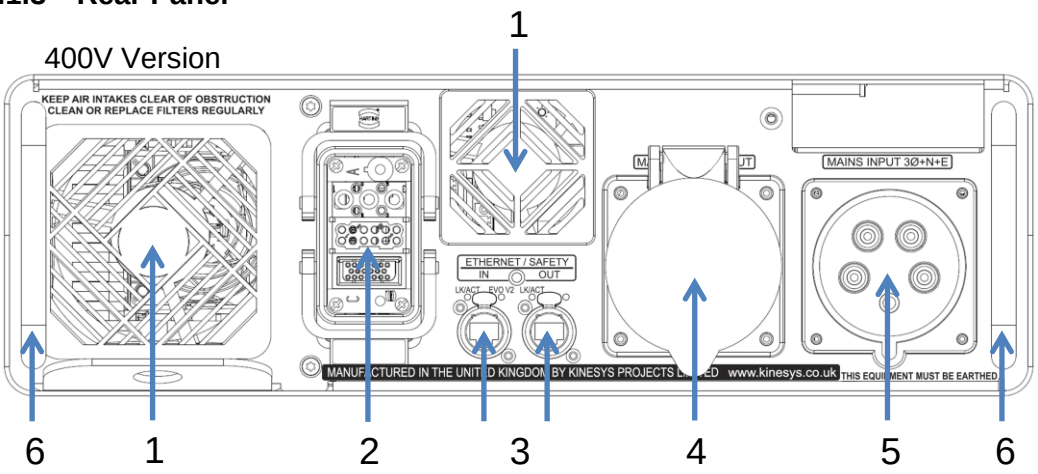


Figure 2 Rear panel layout (400V)

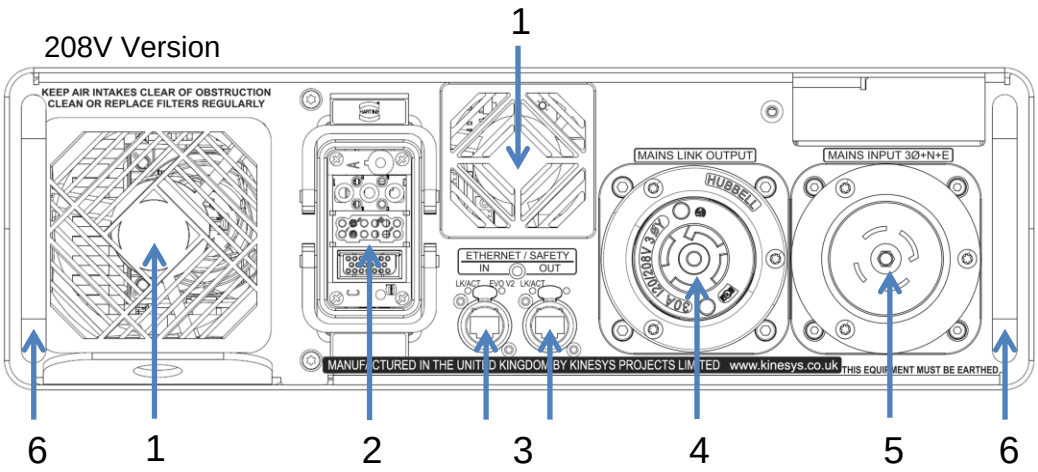


Figure 3 Rear panel layout (208V)

1. **Air Intake Filters** – Cooling air intakes for internal cooling fans. DO NOT OBSTRUCT. These feature replaceable filter media, refer to page 43 for more details.
2. **Hoist Connector** – Used to connect motor, brakes and control to apexHOIST, refer to page 21 for more details.
3. **Ethernet/ Safety Connections** – Ethernet IN and OUT connections used to link apexDRIVE units to form a networked motion control system, refer to page 18 for more details.
4. **Mains Link Output** – Used to daisy chain power to another apexDRIVE, refer to page 20 for more details.
5. **Mains Input** – Used to connect the mains power supply for the apexDRIVE, refer to page 19 for more details.
6. **Carry handles** – Used for carrying and handling the drive.

4 Installation

Although it can be used freestanding, the apexDRIVE is designed to be either truss mounted or installed in a conventional rack.

4.1 Installation precautions

When considering the location to install the apexDRIVE, make sure the device will not be exposed to extremes of heat/cold, moisture/ humidity or dust. Refer to the environmental requirements in the summary product specification on page 45.

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

Ensure there is adequate ventilation when using the apexDRIVE installed in a rack.

The apexDRIVE shall only be truss mounted using the optional Truss Mount Bracket kit (Kinesys APM-01-0010) including the supplied Safety Bond.

4.1.1 Truss Mount Bracket *(Primary Support)*

The truss mount bracket enables the apexDRIVE to be mounted on truss using (2/4) standard half couplers (not supplied). The truss mount bracket is attached to the apexDRIVE using four quarter turn DZUS fasteners.

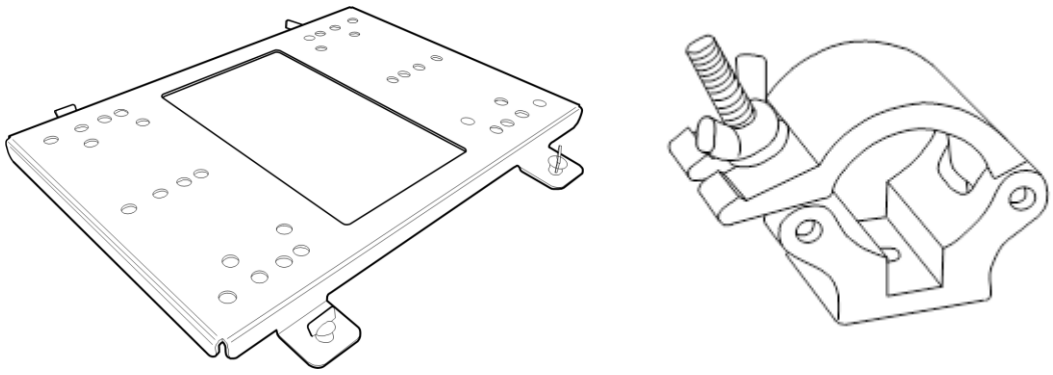


Figure 4 Truss Mount for apexDRIVE & (typical) half-coupler

4.1.1.1 Installing the Trust mount Bracket

- Bolt the half couplers to the truss mount bracket to suit the truss layout; refer to Kinesys drawing 9200166 for layout of common truss types.
- Position the truss mount bracket on top of the apexDRIVE and locate the four DZUS fasteners onto the corresponding holes in the drive.
- Turn each DZUS fastener one quarter turn clockwise until a definite “Click” is heard and felt. Verify that the bracket is secured with all four DZUS before attempting to attach to the truss.

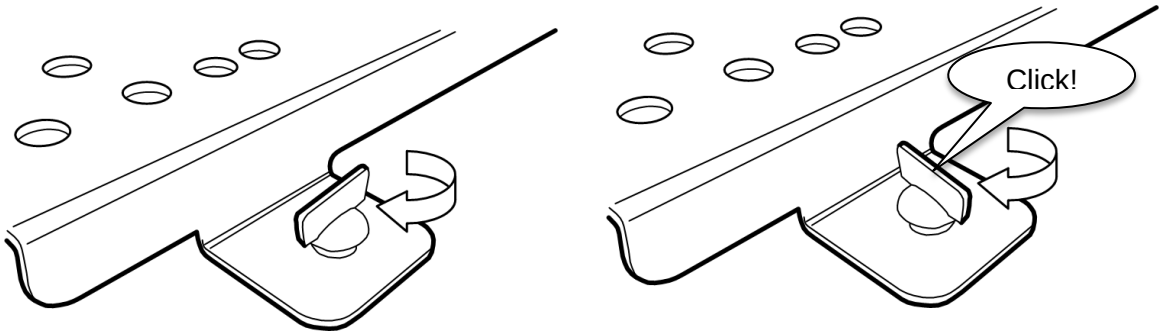


Figure 5 Locking DZUS fasteners

4.1.2 Safety Bond (Secondary support)

The truss mounting kit is supplied with a support. This shall be used to provide secondary support for the drive when truss mounted. The safety bond shall be passed around the supporting truss and clipped with the carabiner to the SAFETY BOND tab at the rear of the product.

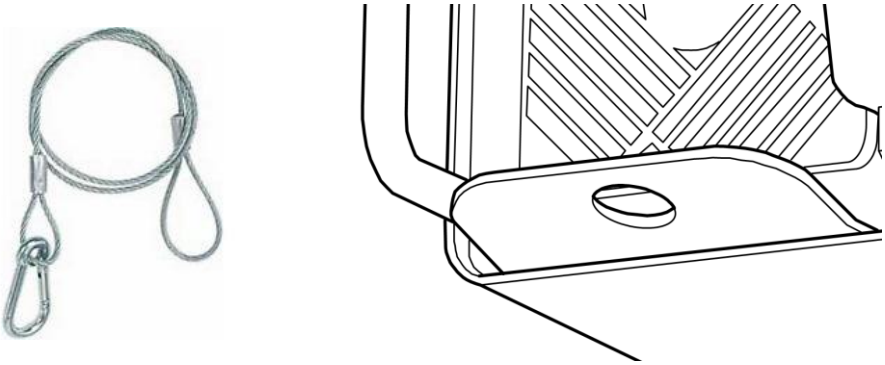


Figure 6 Safety bond

In the unlikely event of failure of the truss mounting or an operator omitting to securely fix the truss mount or half couplers the safety bond will restrain the apexDRIVE if it is dislodged.

4.1.3 Rack Mount Kit

A Rack Mount Kit is available to enable installation of the apexDRIVE in an industry standard 19” rack (3U height required). The rack mount kit includes:

- 1x pair of front ‘rack ear’ brackets
- 2x side mounted ‘rack guides’ and mounting screws
- 1x pair ‘rack slide’ brackets

1) Attach the rack guides to each side fixing on the apexDRIVE using the supplied mounting screws.

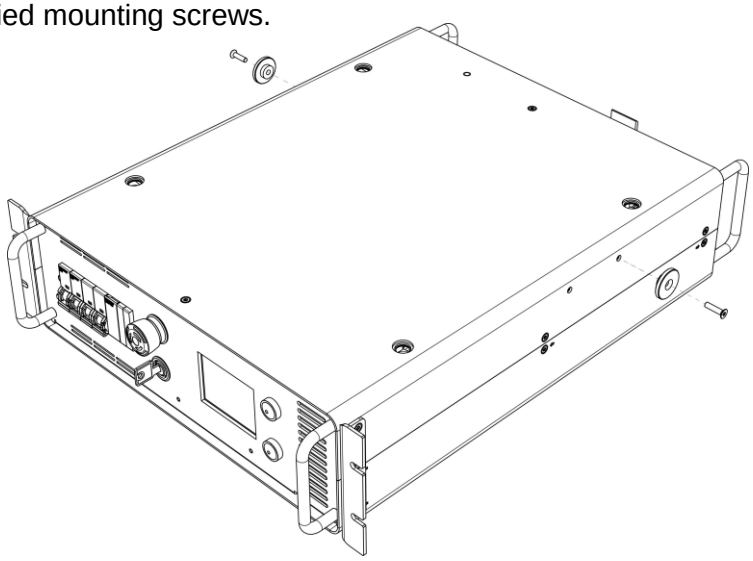


Figure 7 Rack mount - attaching rack guides

2) Secure the front mounted rack ears using the four existing (12mm Torx) fixings at the front edges of the enclosure.

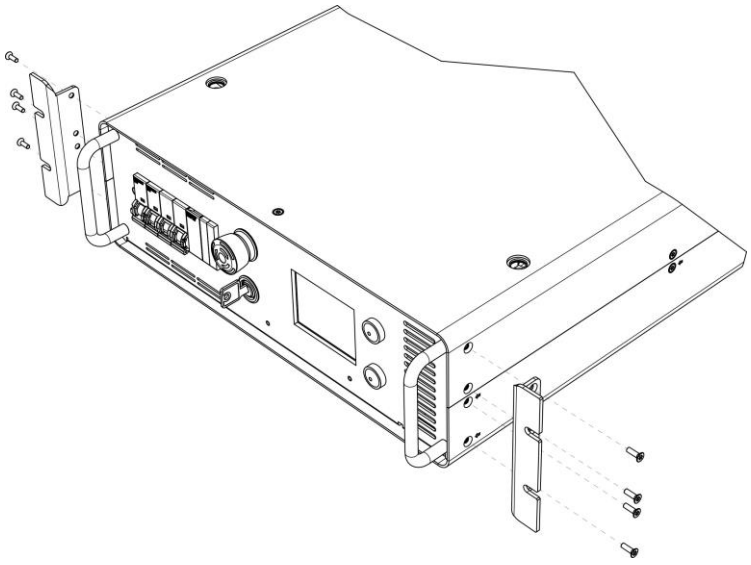


Figure 8 Rack mount – attaching rack ears

3) Checking the correct position, attach the rack slides to the rear of the rack using cage nuts and bolts.

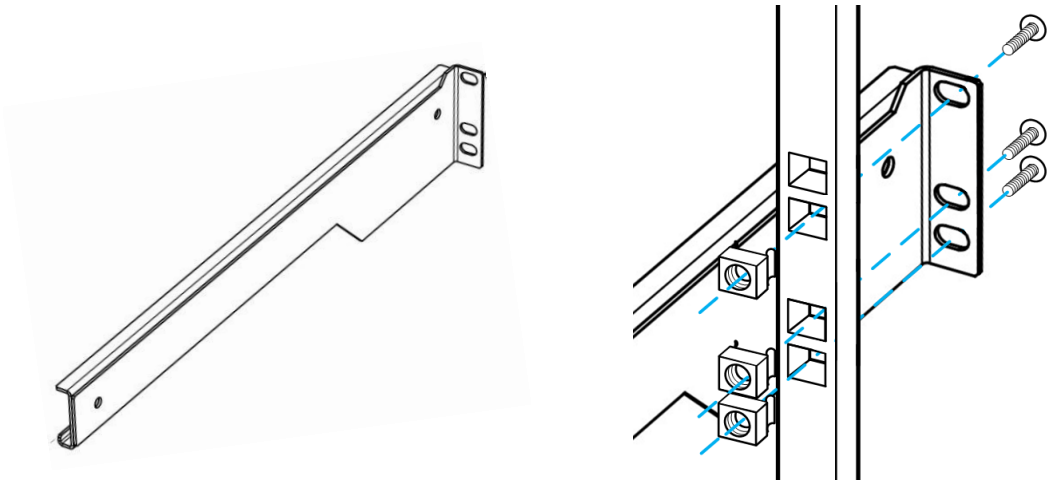


Figure 9 Rack mount - attaching rack slides to the rack frame

4) Use the rack guides on the side of apexDRIVE to slide the unit in to the fixed rack slide and line up the rack mount holes in the desired position.

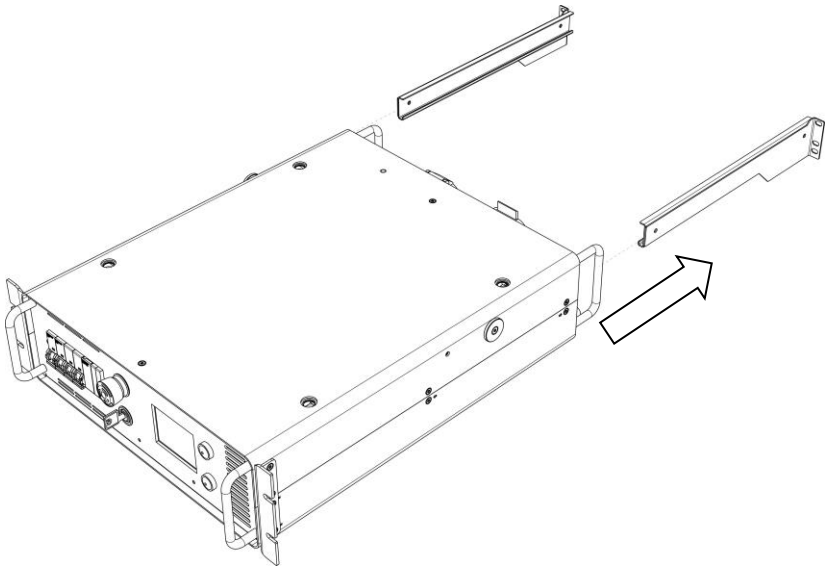


Figure 10 Rack mount – sliding the drive onto the rack guides

5) Using cage nuts and bolts, secure the apexDRIVE to the frame of the rack at the front. Verify that all fixings are secure.

5 Connections

5.1 Ethernet

The apexDRIVE IN and OUT Ethercon Ethernet connections enable networking of a number of apexDRIVE units and a Mentor safety controller. The OUT connection is used when linking more than one drive together to form a system.

Alternatively, depending on application, a DC8 v2 E-stop hub may be used. When used with an EVO v2 system the OUT connection is not used. EVO mode must be enabled using the option on the Safety Status screen, refer to page 36.

Ethernet cables must be shielded CAT5e type. Kinesys recommends the use of Neutrik Ethercon connectors with ProPlex PCCAT5EP cable.

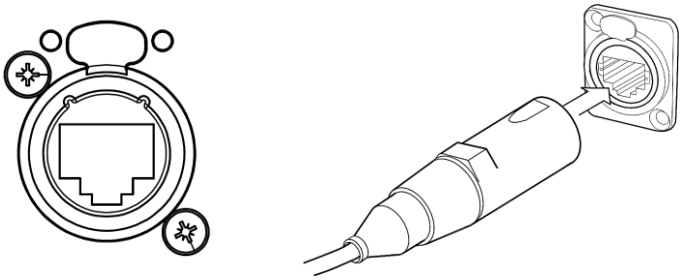


Figure 11 Ethercon connector

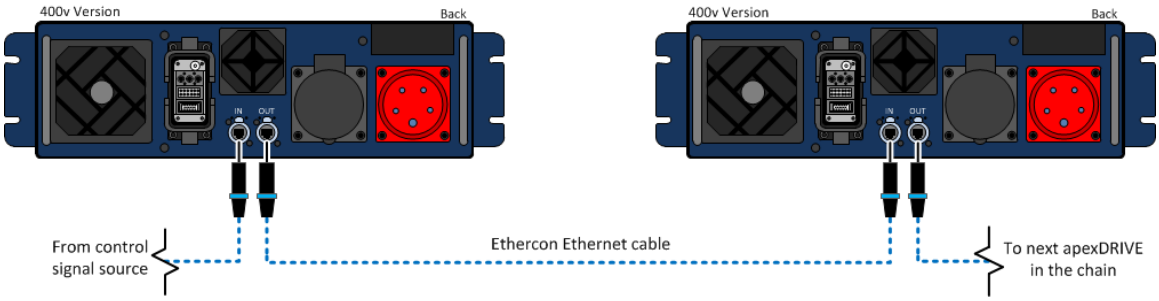


Figure 12 Network connection of multiple apexDRIVE

The maximum recommended length of an Ethernet link between units is 90m. Where possible use single cables and avoid the use of joiners or couplers. Where couplers are used reduce the maximum length of the link by 5m for each coupler inserted.

The Ethernet standard states a 100m maximum link length between devices. In order to extend further than 100m the use of a fibre connection will be required. Please consult with Kinesys for further details on using a fibre connection with an apexDRIVE.

5.2 Mains power connection

The mains power connection to the apexDRIVE should always be the last connection made.

The apexDRIVE is available configured for 400V mains supply or 208V mains supply.

5.2.1 400V apexDRIVE Power IN

The 400V apexDRIVE is fitted with a 5-pole 32A type IEC 60309 CEE power connector and requires a 3 phase mains power supply with neutral (230V Ø-N, 400V Ø-Ø, 3Ø+N+E). A earth (ground) connection is essential.

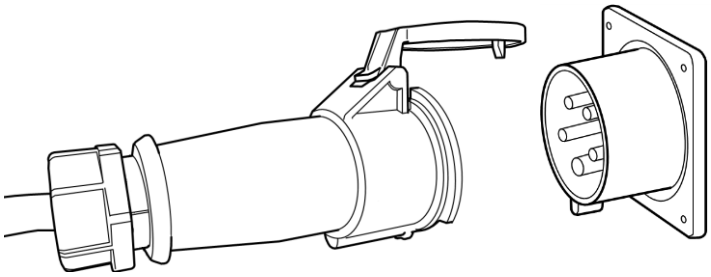


Figure 13 Mains connection on 400V apexDRIVE

5.2.2 208V apexDRIVE Power IN

The 208V apexDRIVE is fitted with a 4P+G 30A NEMA L21-30 type connector and requires a 3 phase mains power supply with neutral (120V Ø-N, 208V Ø-Ø, 3Ø+N+E). An earth (ground) connection is essential.

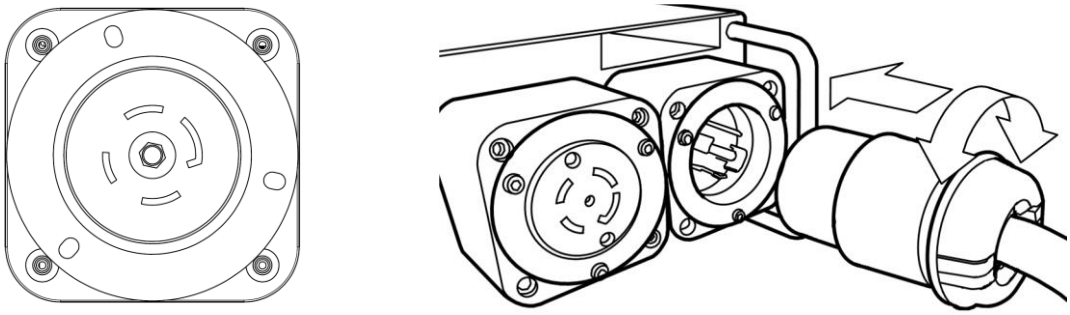


Figure 14 Mains connection on 208V apexDRIVE

5.3 Power cable pinout information

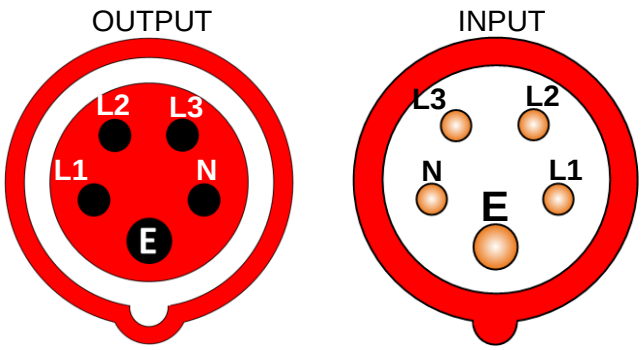
WARNING!

Serious damage may be caused by misconnection of apexDRIVE.

It is recommended that Kinesys supplied cables are used with apexDRIVE.

The following sections detail the pinout of the power connections for the apexDRIVE[2]. Wiring standards vary and there is always the possibility that pinouts on cables may not be compatible. If in doubt always check cables before use.

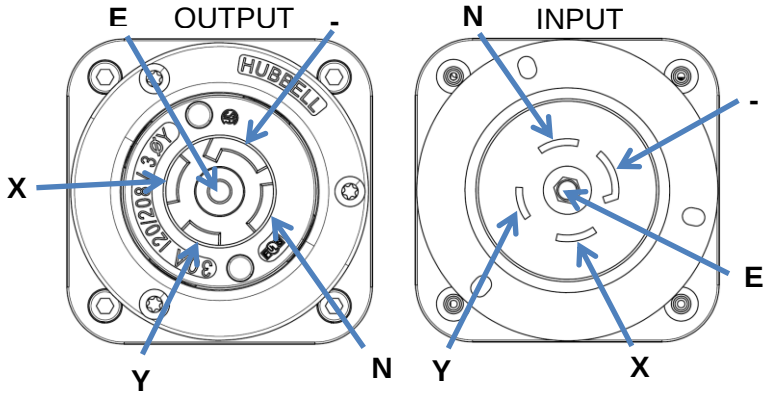
5.3.1 400V mains input & output



L1	Phase 1
L2	Phase 2
L3	Phase 3
N	Neutral
E	Earth (Ground)

Figure 15 Mains connection pinout on 400V apexDRIVE

5.3.2 208V mains input & output



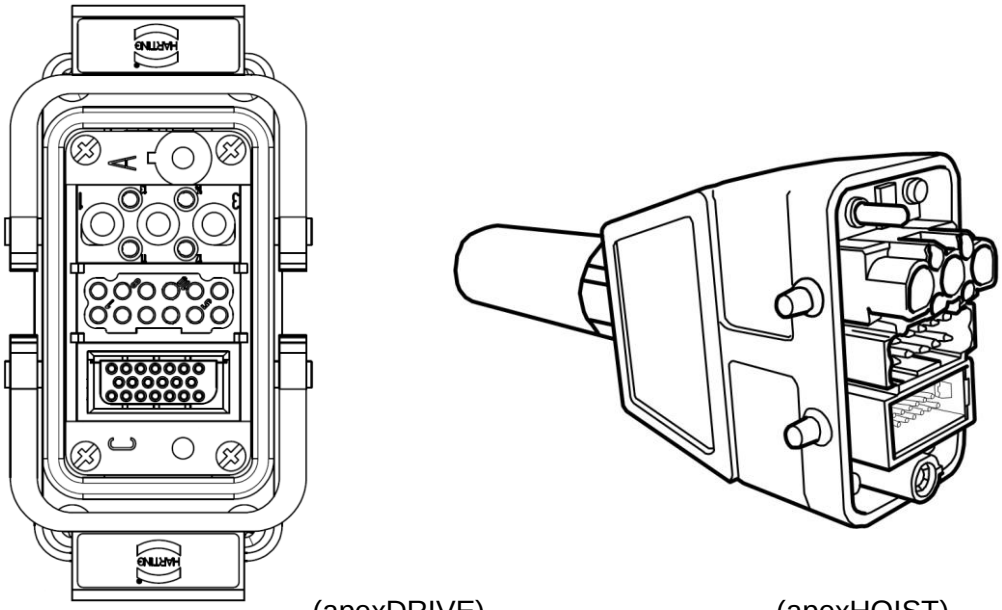
X	Phase 1
Y	Phase 2
Z	Phase 3
W	Neutral
E	Ground (Earth)

Figure 16 Mains connection pinout on 208V apexDRIVE

[2] Connectors as seen from the rear of the apexDRIVE

5.4 Hoist connection

The hoist connection is made using a Harting modular connector with two locking levers. The apexHOIST has a captive tail cable assembly with a mating connector. See Figure 17



(apexDRIVE) (apexHOIST)

Figure 17 apexDRIVE and apexHOIST Harting connectors

Check the orientation of the connector and socket, the connector can only be inserted one way round. To prevent accidental disconnection make sure both locking levers are secured after making connection as shown in Figure 18.

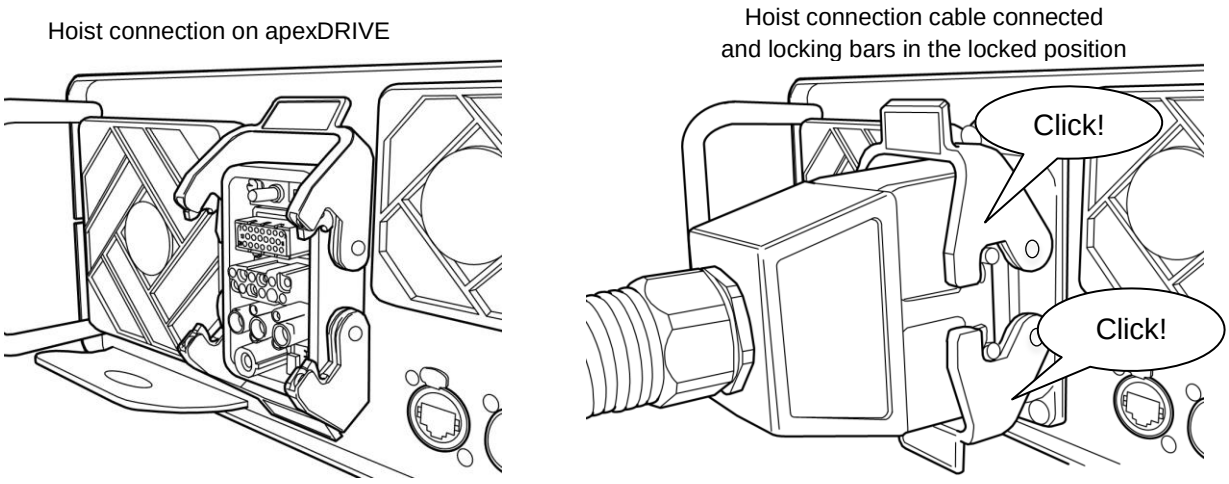


Figure 18 apexHOIST (Harting) connection on apexDRIVE

6 Circuit protection

Each apexDRIVE uses Miniature Circuit Breakers (MCB) to protect the power supply to the apexDRIVE control and the connected apexHOIST.

Additionally fuses are provided to protect the electromagnetic brakes in the apexHOIST.

WARNING!

DO NOT ATTEMPT TO KEEP AN MCB POWERED ON BY HOLDING THE LEVER IN THE ON POSITION

WARNING!

ALWAYS REPLACE FUSES WITH SAME TYPE AND RATING. SPARE FUSES ARE SUPPLIED IN THE 'BRAKE' FUSE CARRIER

6.1 Control 'POWER SUPPLY' MCB

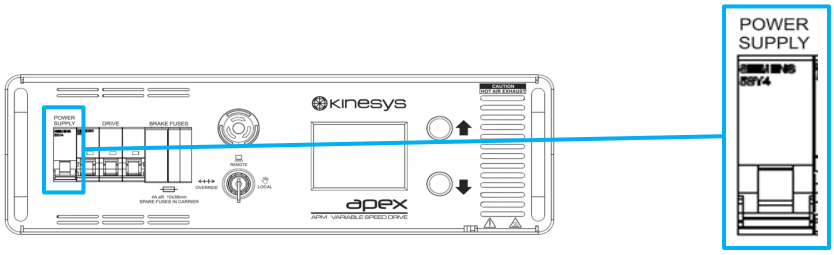


Figure 19 Power MCB

The *POWER SUPPLY* MCB is used to turn the apexDRIVE on and off. With the MCB lever up the apexDRIVE is on, moving the MCB lever down will turn the apexDRIVE off.

If the power MCB should trip in to the down position try to move the lever up to restore power. If the MCB immediately trips again this indicates a fault. Switch over to an alternative apexDRIVE and contact your supplier or Kinesys for support.

WARNING!

DO NOT ATTEMPT TO KEEP AN MCB POWERED ON BY HOLDING THE LEVER IN THE ON POSITION

6.2 'Drive' MCB

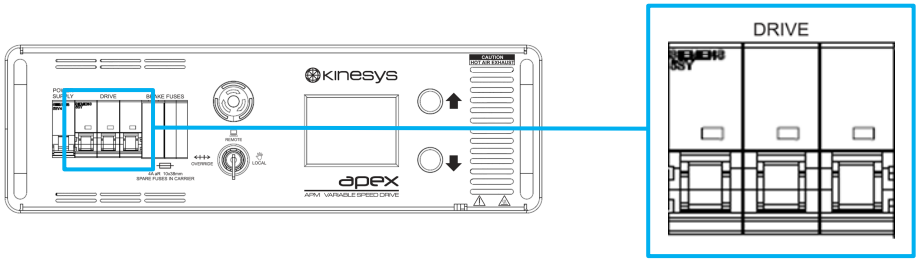


Figure 20 Drive MCB

The Drive MCB is used to protect three phase power to the internal power electronics. This MCB does not affect the apexDRIVE control electronics.

If the Drive MCB should trip in to the down position, try to move the lever back up to restore power. If the MCB immediately trips again this indicates a fault. Switch over to an alternative apexDRIVE and contact your supplier or Kinesys for support.

WARNING!

DO NOT ATTEMPT TO KEEP AN MCB POWERED ON BY HOLDING THE LEVER IN THE ON POSITION

6.3 Brake Fuses

Each apexDRIVE is fitted with a 4A aR 10x38mm Fuse (two fuses on 208V variants) to provide protection for the electromagnetic brakes on the apexHOIST.

Spare fuses are provided in the front mounted fuse holder. The fuse change process is detailed on page 42.

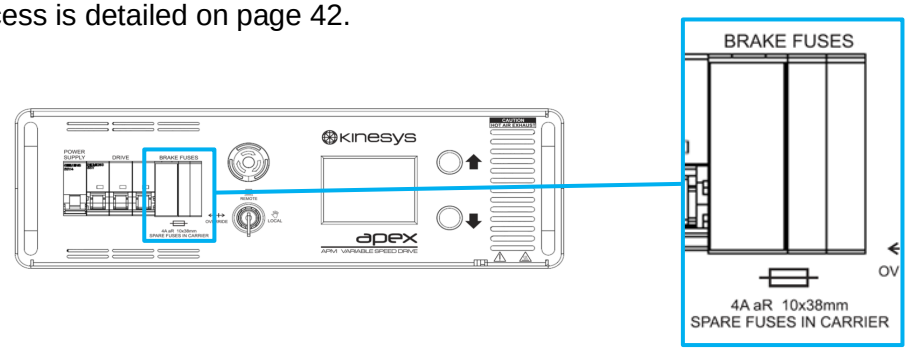


Figure 21 Brake fuses

WARNING!

ALWAYS REPLACE FUSES WITH SAME TYPE AND RATING.

SPARE FUSES ARE SUPPLIED IN THE 'BRAKE' FUSE CARRIER

7 Front panel controls

7.1 Emergency Stop

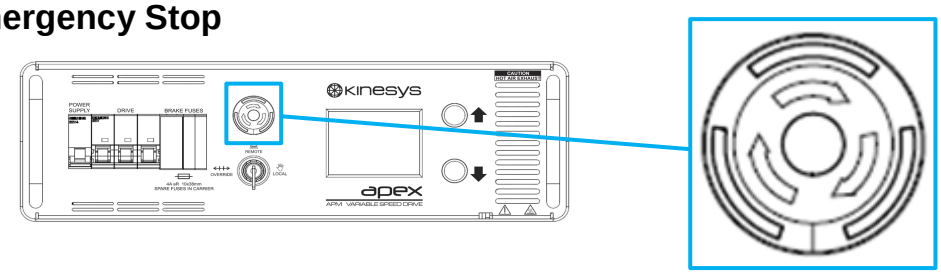


Figure 22 Emergency Stop button

Each apexDRIVE is fitted with an Emergency Stop button. Pressing the Emergency Stop button at any time will stop all movement of the locally connected hoist as well as any apexDRIVE units connected to the same system. The Emergency Stop button will flash if it has been triggered and a fault condition will be displayed on the display.

Warning! When connecting multiple apexDRIVE units with EVO V2 e-stop distribution the local emergency stop switch will only stop the locally connected hoist. Your system risk assessment shall consider this. If there is any possibility of confusion then suitable warning notices shall be displayed and additional operator training shall be conducted.

The Emergency Stop system must be tested to ensure it is fully operational before commencing any operations.

Once an Emergency Stop button has been pressed, twist the Emergency Stop button Clockwise to release it.

7.2 Mode Key switch

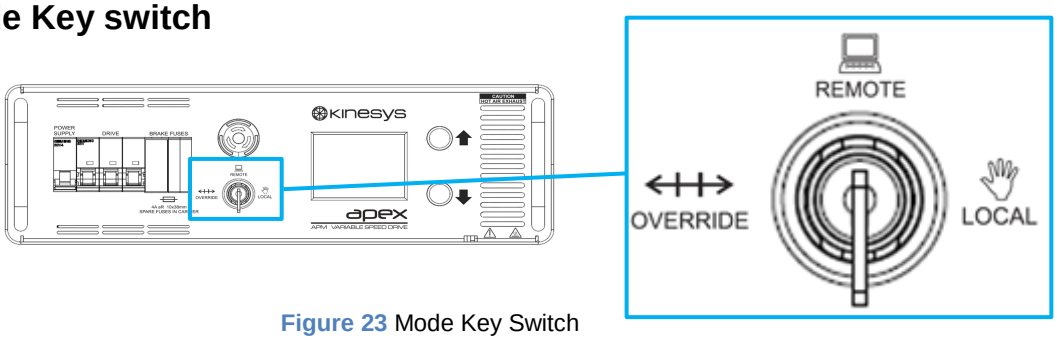


Figure 23 Mode Key Switch

The Mode Key Switch is used to define the preferred mode the drive will operate in.

- **Override** is used to set the apexDRIVE to be controlled manually from the front panel controls. In this mode certain limits may be overridden. Speed is deliberately limited in this mode. Refer to page 33 for more details.
- **Remote** is used to set the apexDRIVE to be controlled remotely from motion control software running on a PC or from a connected remote handset. Refer to page 34 for more details.
- **Local** is used to set the apexDRIVE to be controlled manually from the front panel controls. Refer to page 32 for more details.

7.3 Touch screen display and menu system

The apexDRIVE's touch screen display is used to show the status of the apexDRIVE and the connected apexHOIST. Alarm and status indicators are displayed as well as providing access to the on board settings screens.

Note! If the apexDRIVE is inverted then the display will automatically rotate for ease of use.

7.3.1 Menu system overview

Pressing the Home icon at any time will return the touch screen display to the home screen.

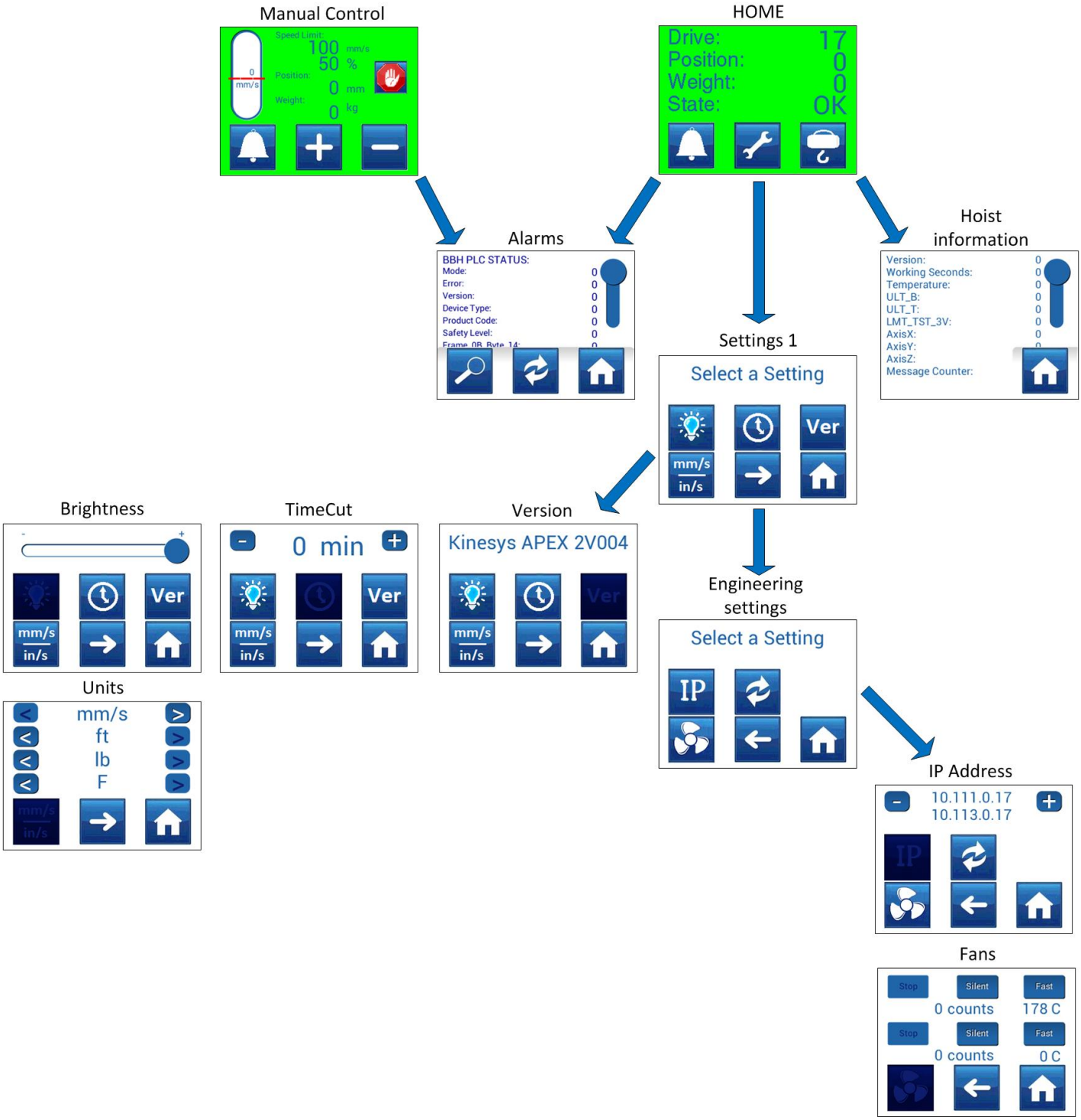


Figure 24 ApexDRIVE menu system overview

7.3.2 Home screen

Figure 25 Home screen

The Home screen is the default menu screen. The background colour indicates the current status of the drive, RED for an alarm or fault, YELLOW for warnings, GREEN for OK. The Home screen also displays the following information:

- **Drive Number** indicates the specific number associated with the drive. This relates to the pre- assigned IP address
- **Position** indicates the position (in mm) of the load; this value may be affected by any adjustments to the position where the apexDRIVE is controlled remotely by motion control software.
- **Weight** is the load on the chain (in kg) as measured by the integral Loadcell on the apexHOIST.
- **State** indicates the current status of the apexDRIVE and connected apexHOIST. A full list of status conditions can be found on page 38.

The Home screen also features 3 icons for displaying other screens:

Alarms Press this icon to display the Alarms screen. Refer to pages 37 and 38 for details.

Settings Press this icon access the settings screens. Refer to page 29 for details.

Hoist Information Press this icon to display information about the connected apexHOIST. Refer to page 31 for details.

7.3.3 Alarms screen

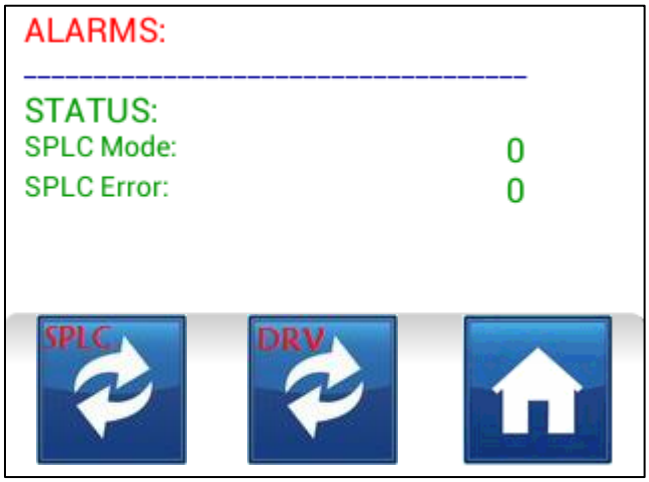


Figure 26 Alarm screen

Press the Alarms icon from the Home screen or Manual control screen to display the Alarms screen which lists any current alarm conditions and status messages. A full list of alarm and status conditions can be found on page 37 to 38.

Details Pressing any of the listed alarms followed by the Details icon will show more information on the current alarm, the status of the apexDRIVE or the connected apexHOIST. Use the slider on the right of the touch screen to scroll down to view information lower down the screen.

Home Pressing the Home icon will return the display to the Home screen.

Note! The following *Reset* icons are inactive in Remote mode, refer to page 34.

Safety System Reset Pressing the reset icon initiates a reset of the apexDRIVE safety system. Once the fault condition has been cleared the fault list will clear. Refer to page 35 for detailed information on safety system alarms and faults.

Drive Reset Pressing the reset icon initiates a reset of the apexDRIVE motor drive system. Once the fault condition has been cleared the fault list will clear. Refer to page 37 for detailed information on drive system alarms and faults.

7.3.4  Settings screen

Press the Settings icon to access the main settings screen from the Home screen.

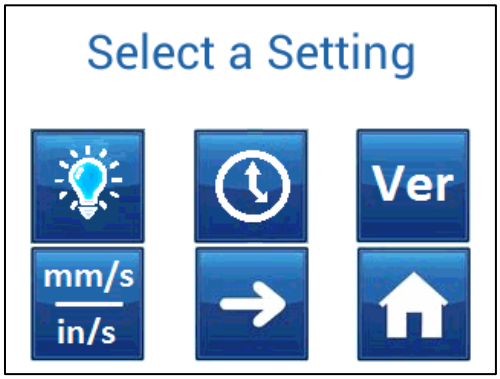


Figure 27 Settings screen

7.3.4.1  Brightness

Press this icon to adjust the brightness of the touch screen display. Use the slider bar to set the desired brightness of the display.

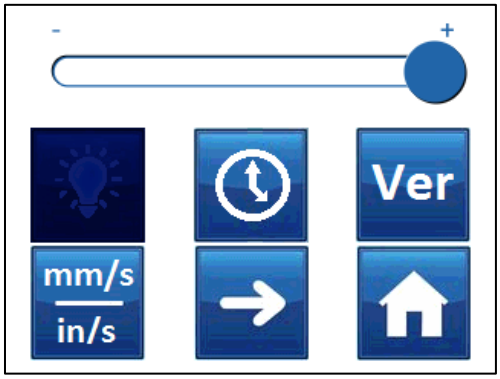


Figure 28 Brightness screen

7.3.4.2  Display time out

Press this icon to set the time in minutes until the display will turn itself off when not being used. Use the + / - buttons to set the time in minutes.

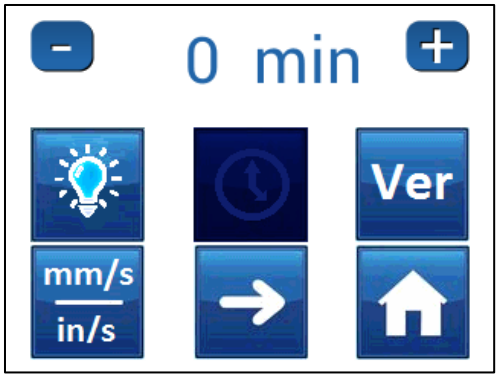


Figure 29 Display timeout screen

7.3.4.3 Ver Version

Press this icon to display the apexDRIVE current software version.

Figure 30 Version screen

7.3.4.4 mm/s in/s Units

Press this icon to configure the preferred measurement units for the apexDRIVE display. Select Imperial or Metric units using the arrows on either side of the screen.

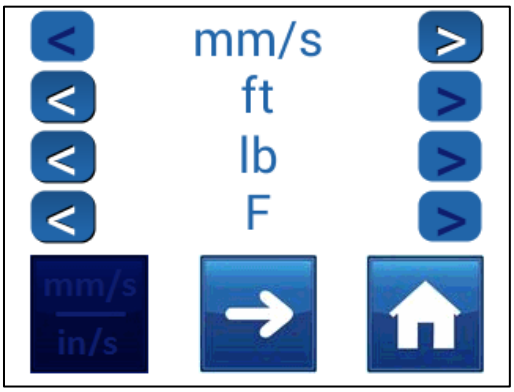


Figure 31 Units screen

Next press this icon to access the engineering / support section of the menu. Refer to page 40 for more details.

Home press this icon to confirm any changes and return to the Home screen.

7.3.5 Hoist information

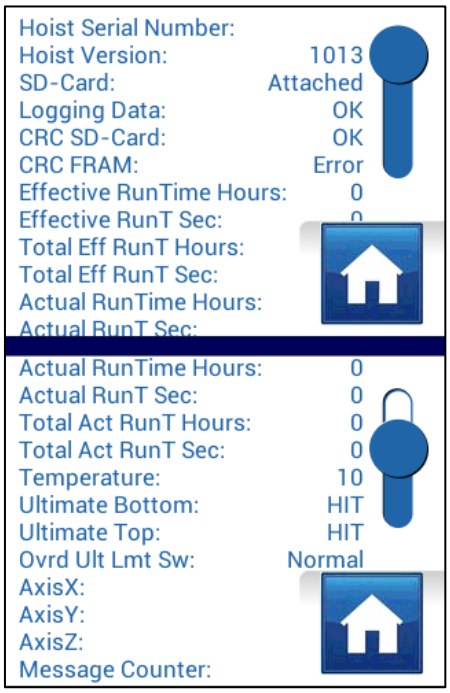


Figure 32 Hoist Information screen

Press the Hoist Information icon from the Home screen to display information[3] about the connected apexHOIST:

- **Hoist Version** displays the current hoist firmware revision
- **Effective RunTime Hours** hoist accumulated running time in hours based on current running conditions. This time in hours determines when the hoist requires servicing. This value is reset by Kinesys during servicing.
- **Total Eff RunT Hours** hoist usage time overall. This value cannot be cleared.
- **Actual RunTime Hours** hoist actual usage time during current service cycle i.e. active hours regardless of running conditions (speed, load etc.). This value is reset during servicing.
- **Total Act RunT Hours** total actual usage time overall. This value cannot be cleared.
- **Temperature** displays the current temperature within hoist electronics.
- **Ultimate Bottom** displays status of *ultimate bottom limit* switch within the hoist (status is reported as either Normal or HIT when activated)
- **Ultimate Top** displays status of *ultimate top limit* switch within the hoist (status is reported as either Normal or HIT when activated)
- **Ovrd Ult Lmt Sw** displays status of the *ultimate limit override* switch within the hoist (status is reported as either Normal or ON when activated)

[3] *The following Kinesys diagnostics may also be displayed:*
Effective RunT Sec | Total Eff RunT Sec | Actual RunT Sec | Total Act RunT Sec
SD-Card/ Logging Data/ CRC CD-Card/CRC FRAM | LMT_TST_3V | AxisX / Y / Z | Message Counter

7.4 Operation

7.4.1 Manual [LOCAL] operation

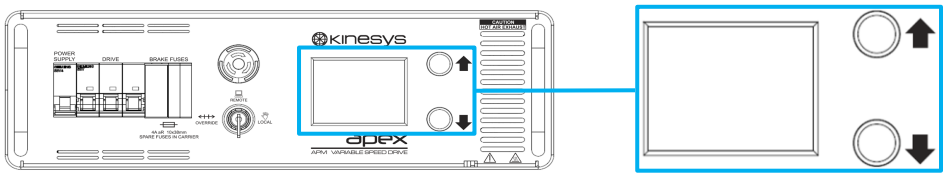


Figure 33 Display screen

Each apexDRIVE has the facility to control the apexHOIST directly from the front panel controls. To access manual controls turn the Mode Key Switch to the **LOCAL** position. The following screen will be displayed on the touch screen display.

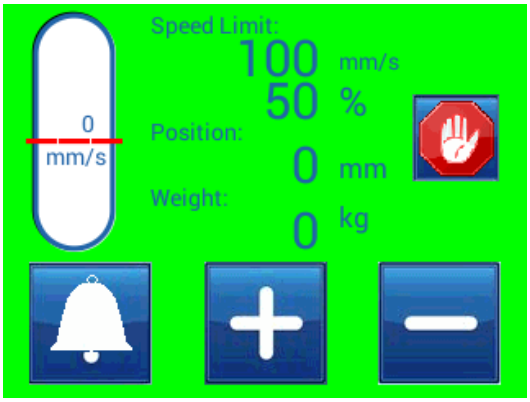


Figure 34 Manual control screen

Set the speed of the hoist movement using the + or - icons. The speed will change, displayed both in mm/s and as a % value. The apexDRIVE will obtain parameters directly from the connected apexHOIST to determine the maximum speed available.

Once the desired speed of movement is set, press and hold the Up or Down manual direction buttons[4] to the side of the screen (see Figure 33) to start moving the hoist. The buttons will illuminate (green) to indicate that movement is possible in that direction. The bar in the left of the display will move in the same direction as the movement of the hoist.

Release the Up or Down manual direction button to stop movement. If a limit is reached then movement will stop, the illumination of the button will be turned off and a limits warning will be displayed.

[4] Note! If the apexDRIVE is inverted then the display will automatically rotate and the UP DOWN buttons also switch functions to maintain ease of use.

While moving a connected apexHOIST using manual controls, the ramp up and down speed is fixed and determined by the speed of movement. This is adjustable when controlling hoists remotely using Vector or K2 motion control software.

Alarms Pressing this icon will display the Alarm screen. See page 28 for details.

7.4.1 Manual [OVERRIDE] operation

When the Mode Key Switch is set to Override the hoist may be driven manually (exactly as described in local mode) but with speed limited to 20% of maximum. In this mode certain limits may be temporarily overridden to resolve technical issues that may occur with the system.

7.4.2 Remote [REMOTE] operation

When the Mode Key Switch is set to REMOTE it enables control of the apexDRIVE from a laptop or PC running either Vector or K2 motion control software. A Mentor 401 is used as part of an Apex System as the main safety controller for the Emergency Stop system. The PC or laptop running K2 or Vector needs to be connected to one of the Ethernet ports on the Mentor 401. Figure 35 shows an example of how this would be connected.

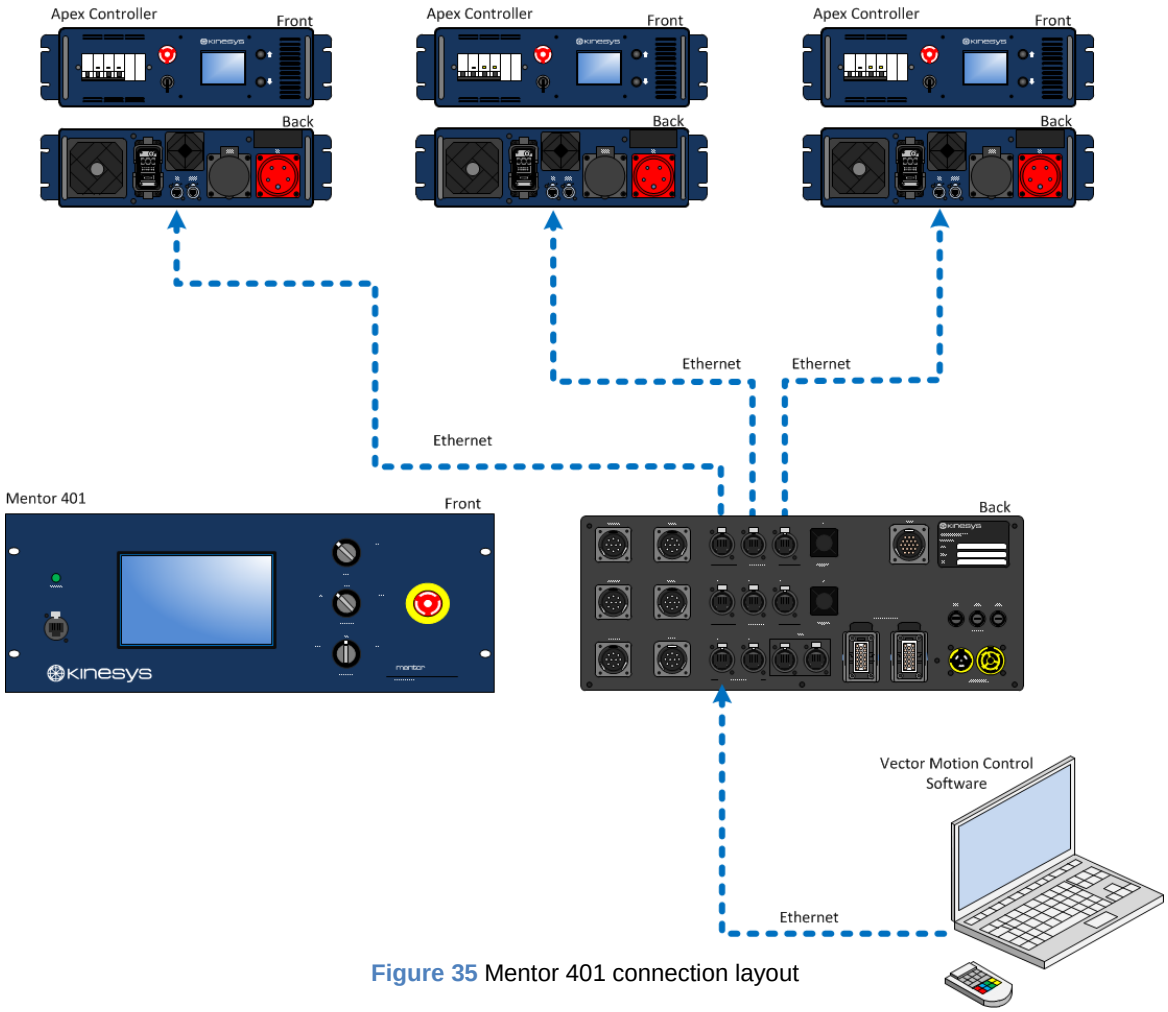


Figure 35 Mentor 401 connection layout

For more details on controlling an Apex system from either Vector or K2 motion control software please refer to the operating manual for the software.

For more details on the Mentor 401 and its connections please refer to the operating manual for the Mentor 401. Contact either your local Kinesys distributor or Kinesys directly.

8 Troubleshooting guide

8.1 Safety system status

The Apex safety system has a user accessible status menu accessed from the Settings screen

Figure 36 Accessing safety controller status screen

Touch the SPLC icon to access the status screen:

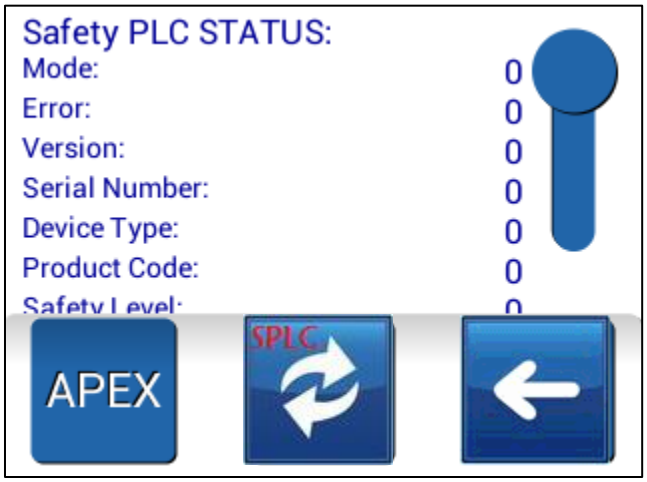


Figure 37 Safety controller status screen

This screen lists current status of the apexDRIVE safety PLC and, if required, allows a manual reset command to be issued by the operator. Refer to pages 36.

This screen also allows configuration of the e-stop system to allow compatibility with Kinesys ‘EVO v2’ based e-stop controllers, refer to section 8.1.1 on page 36.

8.1.1 E-stop configuration

By default the Apex system is configured for use with a Mentor safety master and the 'APEX' icon will be shown on this screen:

Touching this icon enables 'EVO V2' e-stop compatibility mode. The APEX icon will change to EVO:

Additionally the Alarms screen will show *'EVO v2 e-stop ENABLED'* under Status and the 'EVO' LED above the Ethernet IN connection will be illuminated.

Note! If EVO mode is set, the setting is persistent and must be reset using this screen.

Warning! In 'EVO' mode the e-stop button is a **LOCAL** function and will **not** affect other apexDRIVE units on the same network. In 'Apex' mode e-stop is managed by the Mentor safety master and e-stop may be configured to be global or grouped as required.

8.1.2 Safety system status

8.1.2.1 Mode

Current safety controller operating mode

Reported mode	Action required
Startup	Normal during system startup, no action required
Initialization	
Bus startup	
Run	NORMAL STATE
Stop	Refer to Kinesys
Fatal error	Refer to Kinesys
Alarm	Identify source of alarm (see 8.1.3), clear fault, attempt reset to restore operation

8.1.3 Safety system reset

Reset Pressing the reset icon initiates a reset of the apexDRIVE safety system. If the fault condition has been cleared the error code will clear. Refer to the following sections on diagnosing safety system alarms and faults.

8.1.4 Resolving safety system faults

Refer to the fault code tables in this chapter. Check the reported fault code against the relevant list and follow the suggested course of action.

If a fault is not listed (or states 'Refer to Kinesys') contact either your reseller or Kinesys directly for further technical support.

8.2 Alarm conditions

Alarm	Description	Action
Brake Fuse Fault	There is a fault with the brake fuse.	Replace the fuse if possible or contact Kinesys Support.
DMH	A Dead Man's Handle is not active in the system	The switch on a dead man's handle connected to the system is not being pressed to release movement.
Brake Sense Fault	There is a fault with the brake sensor.	Contact Kinesys support.
Overload Limit	The loadcell on the connect apexHOIST is registering a higher load than has been set in the Overload Limits settings.	Check the load to make sure it is loaded as expected. Re-set the Overload settings if required.
Slack Limit	The apexDRIVE has detected the chain on the connected apexHOIST has become slack	Check the load to make sure it is loaded as expected. Adjust movement of other hoists to remove any slack in the chain.
Hard Up Limit	The hoist has reach the physical limit of its upwards movement	The apexHOIST will not move past this point. Reverse direction to clear this fault condition
Hard Dn Limit	The hoist has reach the physical limit of its downwards movement	The apexHOIST will not move past this point. Reverse direction to clear this fault condition
Ultimate Up Limit	The hoist has reach the limit of its upwards movement as determined by a position set in the control software being used	The apexHOIST will not move past this point. Reverse direction to clear this fault condition
Ultimate Dn Limit	The hoist has reach the limit of its downwards movement as determined by a position set in the control software being used	The apexHOIST will not move past this point. Reverse direction to clear this fault condition
Estop Active	An Emergency Stop has been activated in the system	Locate the source of the Emergency stop being pressed. Once the reason for the stop has been resolved, release the E-Stop button to resume operations.
Local Control Mode	The apexDRIVE is set to be controlled from the front panel local controls.	This is determined by the position of the Mode Key switch. See page 32 for more details.
Remote Control Mode	The apexDRIVE is set to be controlled from motion control software on a connect computer.	This is determined by the position of the Mode Key switch. See page 34 for more details.
Comms Fault	There is a fault with communications to or from the apexDRIVE	Check the hoist and Ethernet connections and swap the apexDRIVE for another one to determine the nature of the fault. Alternatively contact Kinesys Support.

Table 1 Apex Alarm Conditions

8.3 Alarm Conditions continued

Alarm	Description	Action
Comms Fault	There is a fault with communications to or from the apexDRIVE	Check the hoist and Ethernet connections and swap the apexDRIVE for another one to determine the nature of the fault. Alternatively contact Kinesys Support.
Drive Fault	There is a fault with the apexDRIVE	Contact Kinesys support.
PowerOff	The apexDRIVE is being powered down	This message is displayed as the power to the apexDRIVE is turned off.
Encoder Fault	The apexDRIVE has detected a fault with the encoder fitted to the connected apexHOIST	Contact Kinesys support.

Table 2 Apex Alarm Conditions continued

8.4 Status conditions

Status	Description	Action
EVO V2 ON	Legacy e-stop mode selected	No action required if using Kinesys DC8 e-stop hub. If using Mentor 40x then use the icon on Safety Status screen to select APEX.
Apex Mentor safety	Mentor 40x series controlled safety system selected	No action required if using Kinesys Mentor 40x series safety master. If using DC8 v2 then use the icon on Safety Status screen to select EVO.
Soft Up Limit	The hoist has reach the limit of its upward movement as determined by a position set in the control software being used	The apexHOIST will not move past this point. Reverse direction to clear this status condition
Soft Dn Limit	The hoist has reach the limit of its downward movement as determined by a position set in the control software being used	The apexHOIST will not move past this point. Reverse direction to clear this status condition
Limits Bypassed	Limits that have been set are being bypassed	Turn keyswitch to Remote or Local mode once the limits bypass operation is complete
Moving Up	The connected apexHOIST is moving its load up	
Moving Down	The connected apexHOIST is moving its load down	
Accelerating	The connected apexHOIST is accelerating from a stopped position to its set speed	
Cruising	The connected apexHOIST is currently moving at its set speed	

Table 3 Apex Status Conditions

8.5 Status Conditions continued

Status	Description	Action
Decelerating	The connected apexHOIST is decelerating from its set speed to a stopped position	
Stationary	The connected apexHOIST is currently stationary	
Safe Up Limit	The hoist has reached the limit of its upward movement as determined by a position set in the control software being used	The apexHOIST will not move past this point. Reverse direction to clear this status condition
Safe Down Limit	The hoist has reached the limit of its downward movement as determined by a position set in the control software being used	The apexHOIST will not move past this point. Reverse direction to clear this status condition
Temperature Warning	The apexDRIVE has detected a high temperature within the connected apexHOIST	Stop all operation of the connected apexHOIST until it has reached a safe temperature.

Table 4 Apex Status Conditions Continued

8.6 System menu

Each apexDRIVE has an Engineering / Support sub menu which is password protected. This menu is only used for technical support and repair. Access to this menu is not required for normal operation of the apexDRIVE. Please contact Kinesys for more details.

Next from Settings screen,

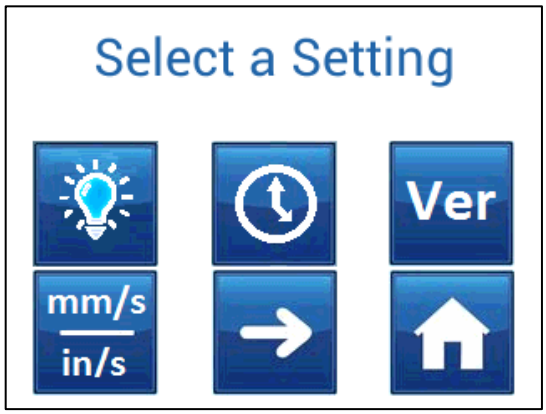


Figure 38 Main settings screen

Press the Next icon to access the system settings screen.

Figure 39 System menu

The icons for protected menus are darker in colour while locked.

To access the IP SETTING and FAN CONTROL menus touch the padlock icon.

Enter the password when the numeric keypad appears:

Figure 40 Numeric keypad for password entry

Note! For safety reasons password access is strictly limited to Kinesys and other trained personnel. Refer to service manual or training documentation for use of protected menu functions.

Pressing the Back button at any stage returns to Settings screen.

9 Maintenance & Repair

Your apexDRIVE 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, basic cleaning and filter replacement.

In the event of damage or premature failure please contact Kinesys, or your local distributor to arrange service support or repair.

9.1 Cleaning & Inspection

Warning! Turn off power to the apexDRIVE before cleaning and inspection.

The enclosure should be kept clean and dust free by periodically wiping down with a dry lint free cloth. A small clean, dry paintbrush may be used to remove dirt from 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 apexDRIVE do NOT use harsh chemicals or abrasive materials when cleaning.

Filters shall be cleaned in accordance with the procedure on page 43.

Check the integrity of all connectors and controls. If damage is noted then contact Kinesys, or your local distributor to arrange repair.

9.2 Checking & replacing brake fuses

The brake fuses are simple to change using the spare fuses supplied in the fuse carrier(s)

1. Turn off power to apexDRIVE
2. Open fuse carrier
3. Remove fuse
4. Use fuse checker or continuity function of a multimeter to confirm fuse has failed.
5. Use fuse checker or continuity function of a multimeter to confirm SPARE fuse is serviceable before use.
6. Check fuse rating is correct (4A aR 10x38mm)
7. Insert serviceable fuse in fuse carrier
8. Restore power and confirm fuse fault has cleared

Note! *It is recommended to replace the spare fuse after use so that a spare is always available.*

9.3 Checking and replacing air intake filters

In normal use the air intake filters for the internal fans can become contaminated with dust leading to impaired cooling of the apexDRIVE.

It is recommended to check the condition of filters regularly.

Depending on the nature of the contamination it may be possible to clean the filter media. Alternatively, packs of spare filter media can be supplied by Kinesys to allow replacement when needed.

1. Turn off power to apexDRIVE
2. Unclip cover from each filter housing in turn
3. Remove the filter media (external metal mesh and internal woven particulate filter)
4. Clean filters (light contamination with dry dust may be knocked out or blown through with an airline); if filter remains dirty it should be replaced.
5. Replace filters as required
6. Insert woven filter first, then the outer metal mesh. Clip the plastic cover back on to retain the filter.
7. Check exhaust ports on the front of the apexDRIVE are clean and unobstructed.

Warning! To avoid contamination of the internal electronics with dust/dirt do NOT operate apexDRIVE without filter media correctly installed.

9.4 Periodic testing

The apexDRIVE is safety tested during manufacture:

Earth Bond 25A

500V DC Insulation Resistance

Periodic safety testing should be carried out. Contact Kinesys for more details.

Warning! To avoid damage to the internal electronics, do NOT flash (Hi-Pot) test apexDRIVE or apexHOIST.

9.5 Spare parts

For continued service and long working life it is recommended to contact Kinesys, or your local distributor to obtain original spare parts for your apexDRIVE. See spare parts list on page 49.

10 Recalibration of Touchscreen

The display touchscreen is calibrated during manufacture and, usually, should not require recalibration.

However if the screen is replaced or it is found that, in use, icons do not respond centrally to touch, then recalibration should be carried out.

IMPORTANT! Before starting please confirm that the apexDRIVE is level and positioned with the front panel text readable left to right as shown in Figure 41:

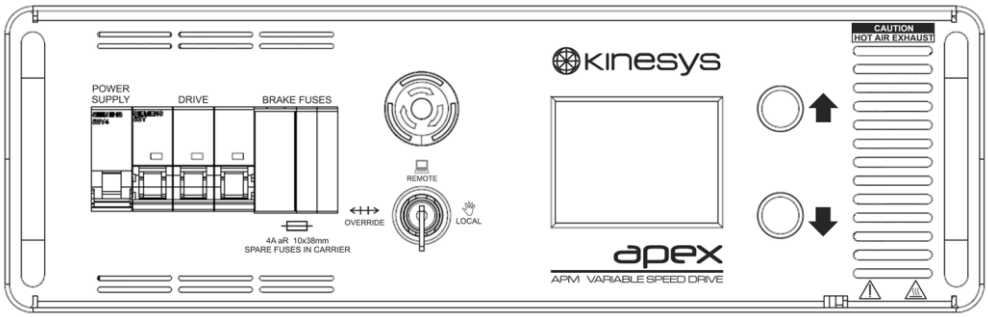


Figure 41 Correct orientation of apexDRIVE for screen calibration

1. Confirm key switch is in REMOTE position
2. Check e-stop is ON (button depressed)
3. Press UP and DOWN buttons together, button LEDs will light, hold down for next step
4. Turn the key switch to LOCAL position, the display will now show the calibration Screen (Figure 42):

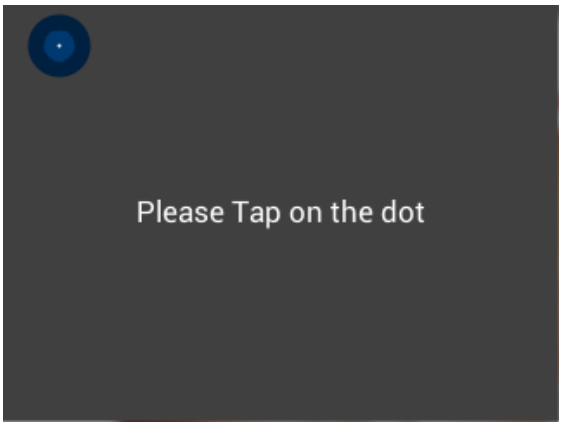


Figure 42 Touchscreen calibration screen

5. Follow the calibration sequence; touching the screen where the three targets indicate; try to be as accurate as possible to ensure good calibration.

6. **IMPORTANT!** Turn the key switch back to REMOTE to store settings and return to the normal operational screens.

11 Product specification

Feature	Specification
Environmental	*Operating Temperature Range* - 5C to 40C *Storage & Transportation Temperature Range* - -25C to + 55C *Humidity* - RH <50% at maximum 40C *Altitude* - 1000m **For indoor use only!**
Mains power supply	400V version - 3Ø+N+E 47-63Hz, 9A / Ø maximum - 200-260V Ø-N, 350-450V Ø-Ø
	208V version - 3Ø+N+E 47-63Hz, 15A / Ø maximum - 105-150V Ø-N, 180-260V Ø-Ø
Mains power feedthrough[5]	400V version - 32A maximum <u>including</u> apexDRIVE load 200V version - 30A maximum <u>including</u> apexDRIVE load
Circuit protection	400V version - Control – 4A MCB Type C 6kA - Motor – 13A MCB Type C 6kA - Brakes – 4A aR 10x38mm ‘CC’ fuse (x1)
	208V version - Control – 4A MCB Type C 6kA - Motor – 20A MCB Type C 6kA

[5] For ‘daisy chain’ connection of mains power supply to additional apexDRIVE units

	- Brakes – 4A gR 10x38mm ‘CC’ fuse (x2)
ApexHOIST interface	Multi-function Harting connector
Kinesys apexHOIST compatibility Do **NOT** connect other hoist types	Motor 208V / 400V Nominal 3kW (4hp) maximum Brakes 205V DC
Front panel controls	Resistive touch screen TFT Emergency stop button 3 position key switch OVERRIDE, REMOTE and LOCAL UP and DOWN direction buttons
Front panel indicators	3.5” (90mm) colour TFT display Illuminated UP and DOWN buttons, green LED Illuminated e-stop button, red LED
Rear panel indicators	Ethernet IN Link/Activity, green/amber LED Ethernet OUT Link/Activity green/amber LED EVO V2 compatibility mode enabled, amber LED
Connections	Mains Input & Output Hoist interface Ethernet IN and OUT
Enclosure	Aluminium enclosure, black powder coat finish Carry handles front & rear Ingress Protection IP30
Cooling	Force air cooled (2x internal DC fan) Temperature controlled Fan air intakes at rear of enclosure Air exhausts to front of enclosure User serviceable filters on rear of unit Automatic over temperature cut out on drive brake resistor

Dimensions	423mm x 132mm x 520mm (excluding handles, connectors, cabling and mounting hardware) *Refer to Kinesys drawings:* 9200174 (400V) or 9200175 (208V)
Rack mount	3U 19” rack mount
Truss mount	Optional truss mounting kit APM-01-0010 including safety bond *Refer to Kinesys drawings:* 9200174 (400V) or 9200175 (208V) & 9200166.
Kinesys safety system compatibility	Mentor 40x series DC8 v2 e-stop distribution (EVO v2 compatible interface)

12 Declaration of Conformity

An individual Declaration of Conformity shall be provided with each apexDRIVE:

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: **ApexDRIVE Variable Speed Hoist Controller**
model: **APM-23-0010**
APM-43-0010

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 62061	**Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems** The following safety functions may be used in applications up to SIL3 (in conjunction with ApexHOIST and Mentor M4xx Safety Controller): SS1; STO; SBC; SLP; SLS, SLM
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.

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

A M Cave

Technical Director

Hampton, 17 May 2017

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. 04820583 **Registered Office** as above **VAT Number** GB 805 2763 38

13 Packaging

The apexDRIVE comes supplied in a cardboard carton 740mm x 528mm x 325mm.

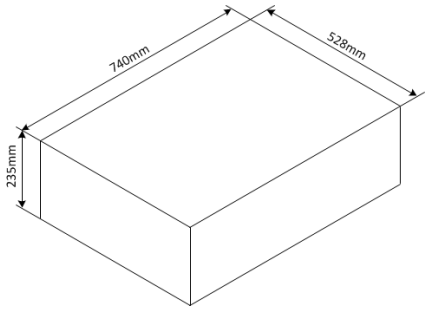


Figure 43 Packaged Dimensions

14 Service & 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.

15 Spare parts

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

Item	**KINESYS Part number**
Replacement filter for drive fan	7920011
Replacement filter for electronics fan	7020009
Truss mount kit	APM-98-0010
Rack mount kit	APM-98-0020
Brake fuse 4A aR	5040057
Replacement safety bond wire for Truss Mount Bracket	7694515

Table 5 apexDRIVE spare parts

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