



H6630EM Electro-Mechanical Controller

User Manual



Engineered Guiding Solutions

H6630EM Electro-Mechanical Controller

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Manual REVISION HISTORY

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Note: While reasonable efforts have been taken in the preparation of this manual to assure its accuracy, Fife Corporation does not assume responsibility for errors or omissions; nor is any liability assumed for damages resulting from use of this information.



WARNING!

Situations dangerous to personnel and property can arise from incorrect operation of any kind of equipment. Fife Corporation urges strict compliance with all safety standards and insurance underwriters' recommendations, plus care in operation.



WARNING!

If the system is not used according to the instructions in this manual, the protection provided by the system may be impaired.

Safety Alerts

This manual has three types of alerts:



WARNING!

Informs users that a harmful situation, such as personal injury and/or severe equipment damage, will occur if the instructions are not followed.



CAUTION

Informs users that an unexpected outcome and/or equipment damage may occur if the instructions are not followed.

Note: Helps the user to successfully complete a task.

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Section 1 – Introduction

1-1 H6630EM Product History

This product was developed originally as a solution to applications that required a unique engineered solution beginning in 2009. The early controllers were assigned part numbers in a series that began with H4506. Some controllers were hydraulic, some were electro-mechanical, and some were both. The series spans from H4506-2148 to H4506-2239. ***Refer to only the original drawings supplied with your specific systems!***

1-2 Overview

The H6630EM controller performs the entire range of guiding, control and measurement applications. The unit provides required servo motor control and performs as a self-contained unit allowing interface through a front mounted color touchscreen operator interface or through networked communications.

The controller can be used for edge guiding, center guiding and master/slave applications. It accepts inputs from all Fife Corporation detectors – edge guiding and center guiding, as well as any commercially available sensor that meets the voltage/current specifications. Position feedback is supplied through an absolute encoder located within the AC servo motor. No external transducer is required. The controller is powered by 460-380Vac, 3 phase, 48/65Hz and requires a 15 amp service. Optional 230-200Vac service is available.

The H6630EM controller has a color touchscreen operator interface (described as the HMI or Human Machine Interface). The HMI replaces traditional pushbuttons and includes screens specific for operation, maintenance, setup and diagnostics. Using the HMI, the system setup, sensor calibration, and gain settings are established.

Basic components to complete a system are as follows:

- H6630EM Controller with 7” Color Touchscreen
- Detector/Sensor (refer to “Connecting Peripheral Devices” and the applicable maintenance sheet for the device being used).
- H5535 Series AC Servo Linear Actuator Assembly with internal absolute encoder
- H5535 Series Cables

Troubleshooting is facilitated through maintenance screens that prompt the user to the potential problems. Diagnostics are provided to troubleshoot the control system. Additional diagnostics are provided to resolve issues with the entire guiding system, i.e., controller, sensor, feedback devices and strip guiding performance.

Network communications to the controller can be performed over a variety of network protocols available for the H6630EM controller. The local HMI provided communicates to the controller over Ethernet using the Modbus TCP/IP protocol. The H6630EM control panel contains an Ethernet switch to provide local and network connectivity. The local HMI provides for control locally but, also is used for system setup, maintenance related readings and configuration.

Input and Output Mapping for command and status words for using remote networking are provided by Fife Corporation.

1-3 Specifications

Power Requirements: (Based on Model) 460-380Vac or 230-200Vac ($\pm 10\%$), 3 Phase, 15 amp service, 48/65Hz

Operator Interface: Color Touchscreen, 7" wide screen, 800 x 480 pixels, High Resolution

Network Connectivity: Ethernet/IP, Modbus TCP/IP, Profinet, Profibus

Operating Temperature Range: 32-122 deg. F (0-50 deg. C)

Enclosure: NEMA 4, ANSI #61 Gray

Protection Class: NEMA 4, IP54

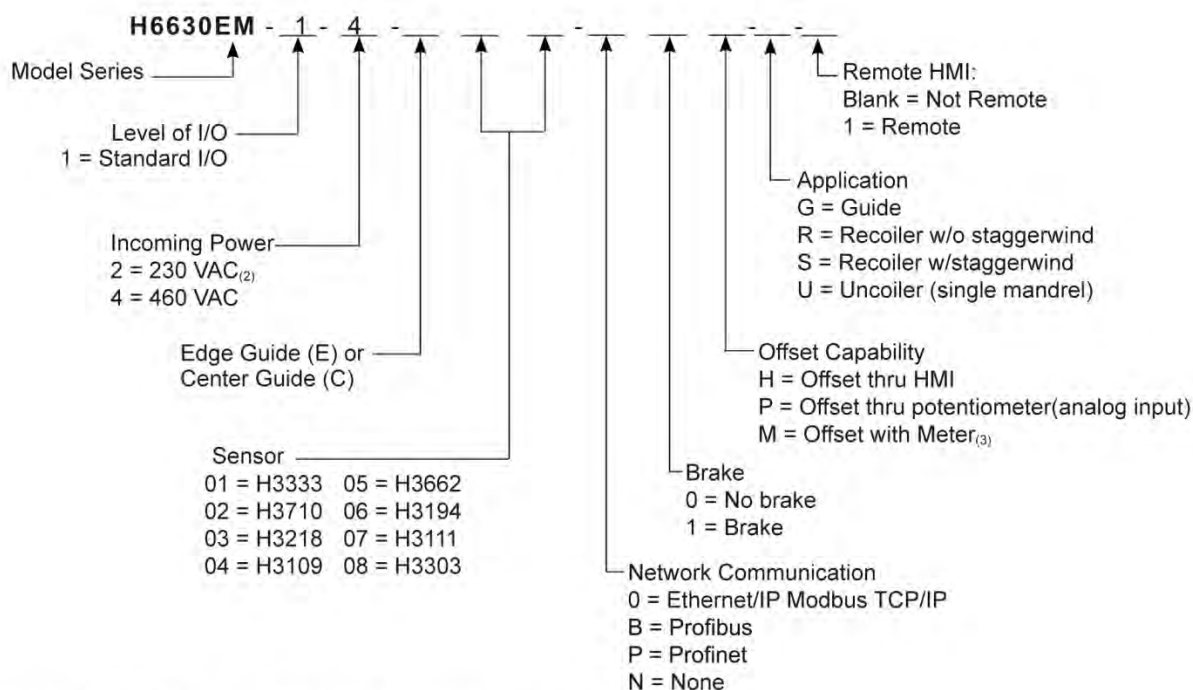
Protection Devices: Fused Disconnect, Stop, and Lock-Out Tag-Out (LOTO) switch

Dimensions: 24" wide x 30" high x 12" deep, (610 x 762 x 305 mm)

Weight: 110 lbs. (50kg)

1-4 Part Nomenclature

Part Ordering Information



For unique applications, use H6630EM-XXXX for engineered orders.

Notes:

1. Level one I/O is standard. Additional I/O are available, consult FivesNA for availability
2. 460 - 380 VAC is standard, 230 - 200 VAC is available, consult FivesNA for availability.
3. If supplying remote offset, must use H6220B-100-01. This disables the offset in the HMI.

1-5 Digital and Analog IO

3 Analog Inputs

- (1) High Resolution analog input, 16 bit + sign (± 10 Vdc)
- (2) Standard analog inputs, 10 bit + sign (configurable voltage or current)

2 Analog Outputs

- (2) ± 10 Vdc, 0-20mA, (configurable voltage or current) 10 bit

6 Digital Input/Outputs

- (3) Bi-directional Input/Outputs
- (3) Dedicated Inputs

1-6 Accessory Cables

- Absolute Encoder Cable H5535-FDBK-20M feedback cable
- Motor Cable (standard) H5535-PWR-20M power cable
- Motor Cable for motors with brakes H5535-PWRBRK-20M power cable

1-7 Accessory Actuators – H5535 Series



Section 2 – Installation

2-1 Mounting

Mount the new H6630EM control panel in a convenient location for operation of the control screen. Place the controller close enough to terminate the H5535-FDBK-20M (encoder cable) and H5535-PWR-20M (motor cable) or H5535-PWRBRK-20M (motor cable with brake) to reach the control panel. These cables route from the AC Servo Motor to terminal points in the control panel. Cables are typically 20 meters in length. Refer to the applicable H6630EM electrical drawings for termination points.

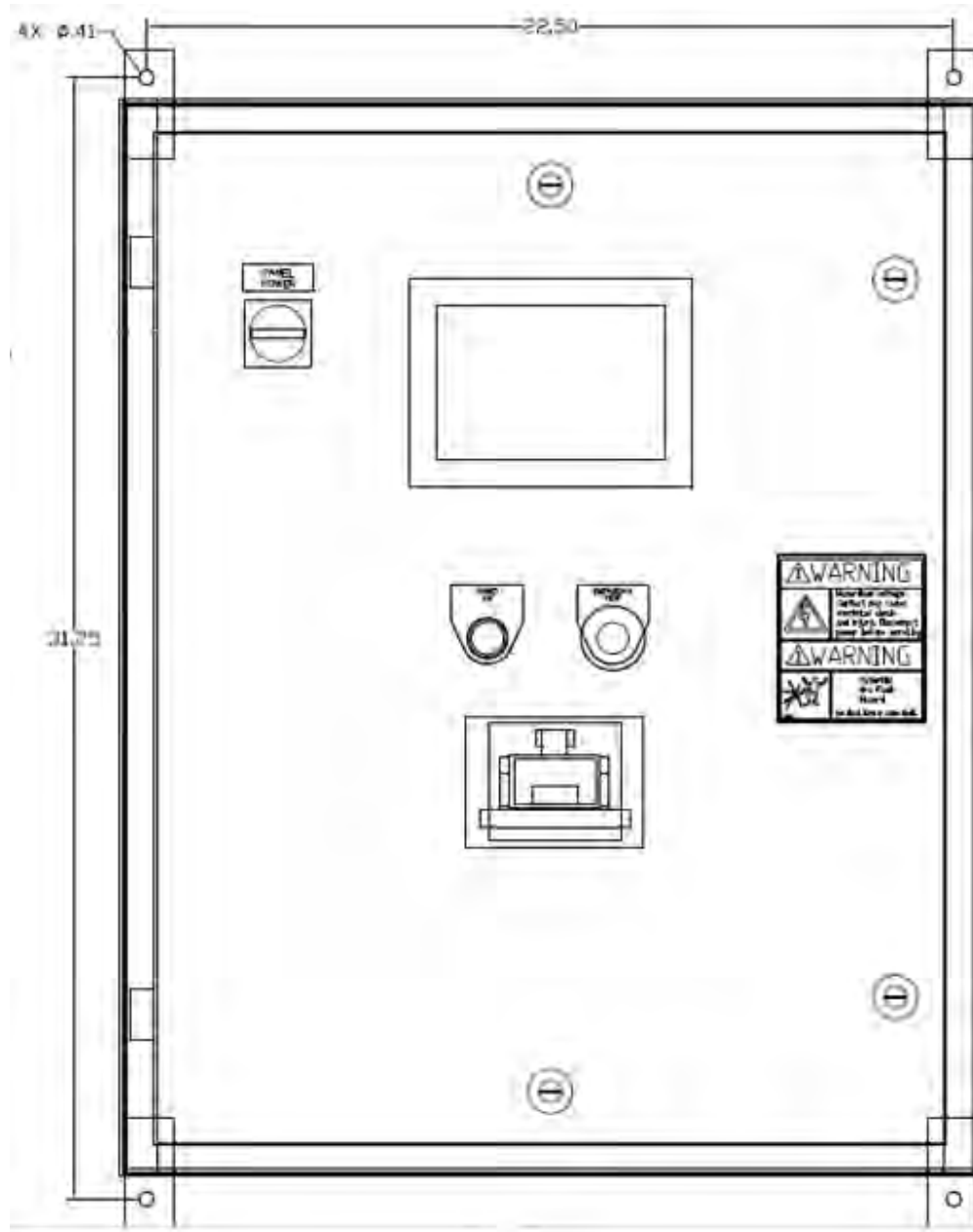


Figure 1 H6630EM Controller Mounting Dimensions

2-2 Control Wiring



Motor Cable



Encoder Cable



CAUTION

Verify proper alignment of plug when connecting to motor or encoder connection. **DO NOT FORCE**, as the pins may become damaged. Motor and Encoder cables must be run in separate conduits and be separated within the enclosure.



Route and terminate the H5535-FDBK-20M (encoder cable) and H5535-PWR-20M (motor cable) or H5535-PWRBRK-20M (motor cable with brake) to the control panel terminal points per the H4803 series drawing. Connect the cables to the encoder and motor with the screw on connectors.

Refer to the applicable H6630EM electrical drawings for termination points of all devices including the panel end of the motor and encoder cables (see Appendix A).

Terminal points are provided to wire in an external LRR (line run relay) contact which enables and disables automatic control. The LRR contact should close when the process line starts. A jumper is installed to bypass the line run relay contact and requires removal if an external contact is used. Refer to the specific H4803 series drawing supplied with the system or to the appendix in this H6630EM manual. If a customer LRR is not used, do not remove the jumper in the control panel.

The panel is equipped with a Stop button/function. If you wish to tie the controller into a global E-Stop circuit, provisions have been provided in the panel. See electrical schematics for wiring instructions.

2-3 Connecting Power Wiring



CAUTION

Power feed and motor wiring shall be separated from any control or signal cabling.



WARNING!

HIGH VOLTAGES ARE PRESENT! To avoid injury, DO NOT supply power to the panel until installation has been completed!

Install conduit and route wiring for the incoming power to the L1, L2, and L3 terminals. Ensure the system is grounded properly. All wiring must be in compliance with local and national electrical codes and standards.

2-4 Connecting Peripheral Devices

Terminal blocks are provided for all field wiring. Detectors, sensors, offset potentiometers, motor and encoder cabling and/or other external devices are shown on the applicable electrical schematic supplied with the system or refer to the appendix in the H6630EM manual. Terminate ensuring each device has good electrical and mechanical connection at the termination point.

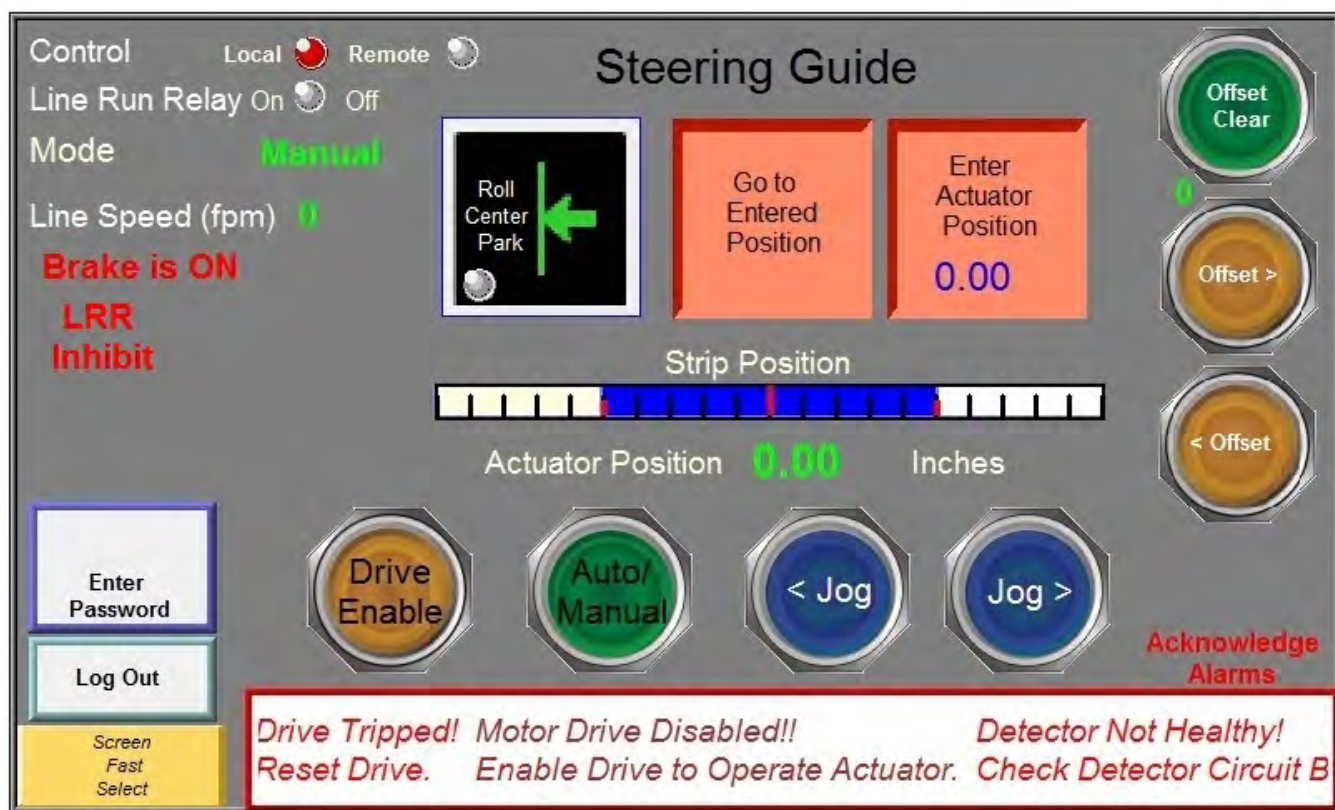
Section 3 – HMI (Human Machine Interface) Screens

Each H6630EM system is provided with a 7 inch touch screen HMI for local operation and setup. System operation is selectable with three modes of operation i.e. Auto, Manual, and Roll Center/Park modes.

The HMI allows for local operator control, selection and viewing of system status and operation, tuning, and configuration of the system.

Navigation is simplified by use of a “Screen Fast Select” button which migrates to all user screens. Simply touch the button and the button expands to show buttons for the other screens.

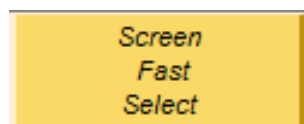
3-1 Main



The main screen allows for local operator control and viewing of the system status and alarms.

Note: Some screens are password protected and the “Screen Fast Select” menu buttons are invisible. Touch the “Enter Password” button and enter the password to make the menu buttons visible for navigation. Contact “Fife Corporation” for the user password.

Screen Fast Select -



Allows Navigation to the additional screens and back to the “Main” screen. This button appears on all screens. Note: Certain screen buttons are invisible until a security password is entered.

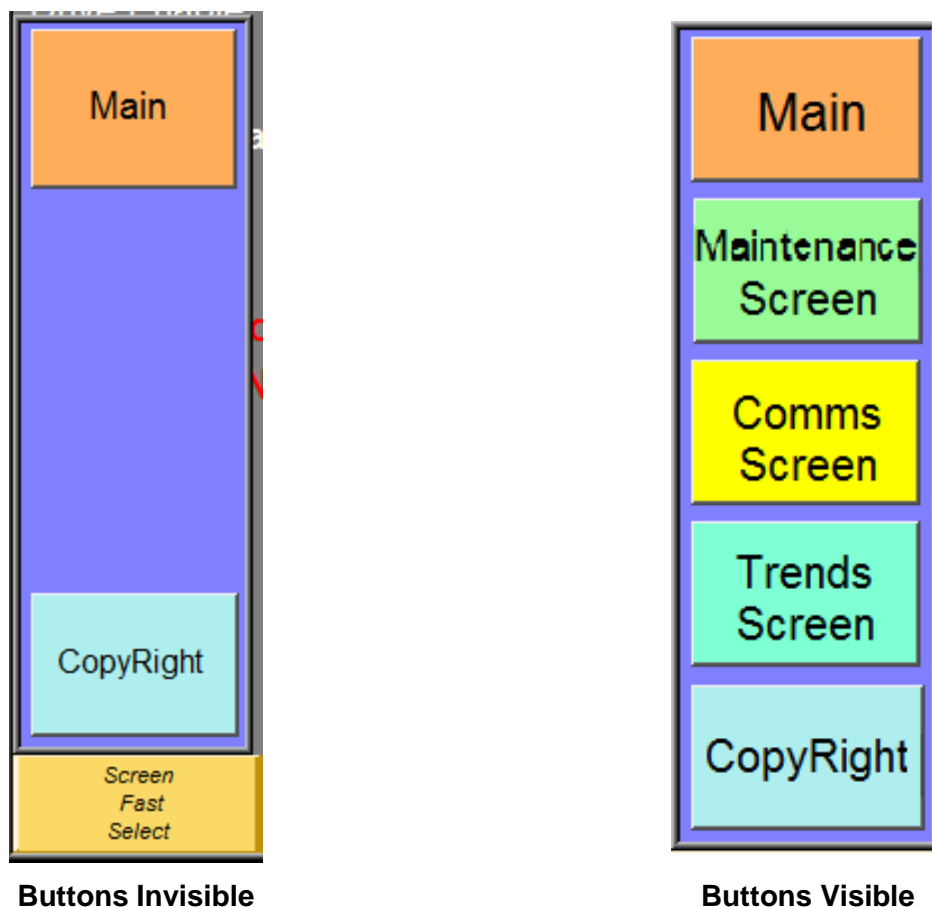
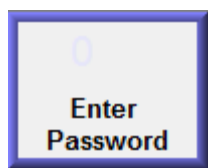


Figure 2 Screen Fast Select Button

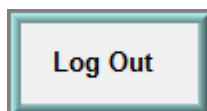
The local HMI has a maintenance screen to allow system settings and calibration to be performed. These system settings are security protected and require a password entry to perform changes. Contact Fife Corporation to obtain the password for the system.

Enter Password -



Allows the user password to be entered when required to change any of the security protected screens. Fast Select button screen buttons are invisible for the Security protected screens until the password is entered.

Log Out -



Logs the user out of the security protection. If the user does not log out within a few minutes, log out will be performed automatically by the system.

Drive Enable -



Enables or disables (toggle) drive from powering the motor. When disabled, no holding torque is applied.

Auto/Manual -



Selects Auto or Manual mode of operation (toggle). The button color changes from dark green to a light green when the mode of operation is changed.

< Jog > -



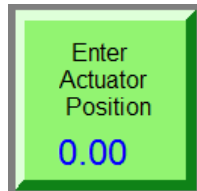
Momentary Jog in one direction. Buttons displayed for each direction of Jog.

Roll Center/Park -



The "Park" pushbutton provides a means to send the actuator to a preset position of the travel. This is usually the position that the guide is centered. This position is preset by the user by using the Park Position button described below. Speed/Motor RPM for this function may be set on the maintenance screen by using the Park RPM setting

Enter Actuator Position -



Allows entry of a predetermined position of which the operator can send the actuator using the "Go To Entered Position" button.

Go to Entered Position -



Momentary button which will send the actuator or guide to the pre-set position entered for the "Enter Actuator Position". See above.

< Offset > -



Momentary button which increments or decrements the counts of offset. See "Offset Increment" button.

Offset Clear -



Momentary button which clears any incremented offset.

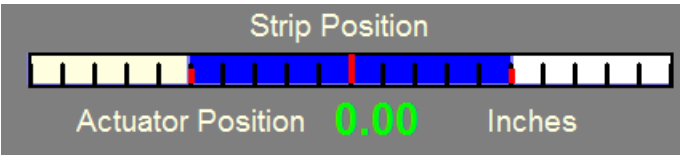
Main Screen Status

There are indicators in the upper left corner of the “Main Screen” that provide information relative to the state of the control.

Control – Local or Remote is set from the “Maintenance Screen”. Local implies that the operator controls the functions from this HMI. Remote indicates that another source controls the operation.

Line Run Relay – Displays the state of the contacts that enables and disables automatic control.

Mode – Displays the state of operation (Automatic or Manual).



The strip position bar graph is a visual indicator of approximate strip position, where blue represents the strip. Actuator position is an accurate indicator of actuator stroke at any given time.

Date	Alarm Time	Alarm Message	Acknowledged
10:53:26	11/25/14	Motor Drive Disabled!! Enable Drive to Operate Actuator.	10:53:32
10:53:25	11/25/14	Detector Not Healthy! Check Detector Circuit Board.	
10:53:25	11/25/14	Drive Tripped! Reset Drive.	

Screen
Fast
Select

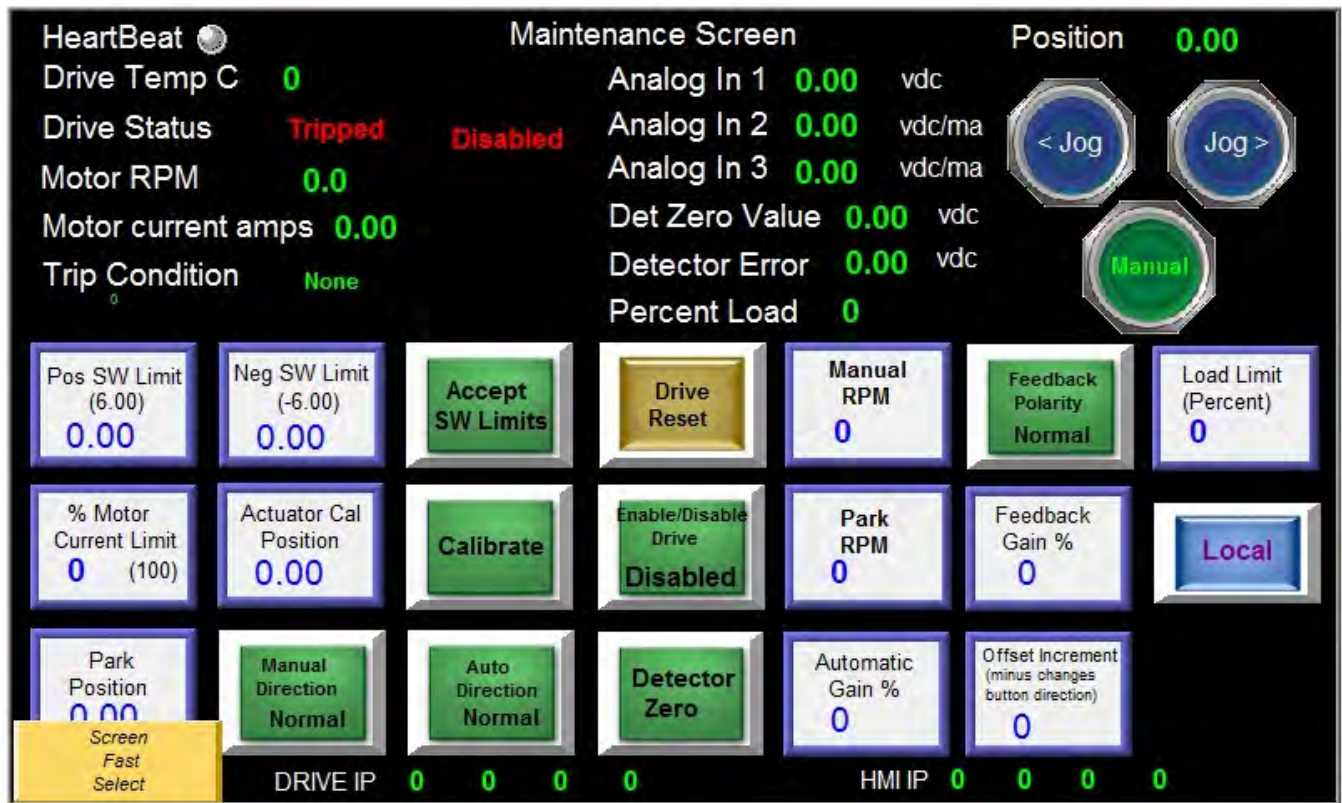
Return to Main

Clear Alarm Log

Acknowledge All

An alarm bar with red boarder displays the current alarms across the bottom of the main screen. Touching within the boarder will open a full list of past alarms in a new window (see above). If the password has been entered, all alarms can be acknowledged or cleared. Otherwise, they can only be viewed. When any alarms have occurred and have not been acknowledged, the message “Acknowledge Alarms” will flash on the main screen.

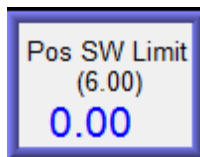
3-2 Maintenance Screen



All configuration settings are configured on the Maintenance Screen and additional status indicators are provided for commissioning and troubleshooting.

Note: The Maintenance screen is password protected and can only be accessed from the “Screen Fast Select” menu.

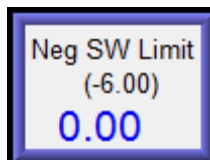
Pos SW Limit -



Upper value entry in inches which limit the movement of the actuator to prevent damage at the ends of travel or limit the amount of stroke in the positive direction.

Note: The “Accept SW Limit” button must be used to save the value.

Neg SW Limit -



Lower value entry in inches which limits the movement of the actuator to prevent damage at the ends of travel or limit the amount of stroke in the negative direction.

Note: The “Accept SW Limit” button must be used to save the value.

Accept SW Limits -



Momentary button which saves the positive and negative software limits to the controller after changes have been made.

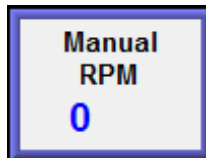
Section 3 – HMI (Human Machine Interface) Displays

Drive Reset -



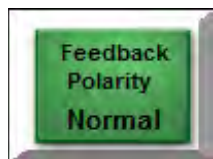
Resets the drive controller and reinitializes the system in the event that a motor drive trip occurs.

Manual RPM -



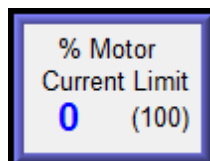
Allows setting of the motor RPM when in Manual Mode.

Feedback Polarity -



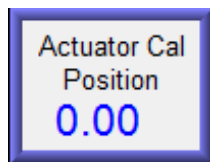
Selects "Normal" or "Reverse" polarity for the Position Feedback. If the feedback polarity is not set correctly, the guide control will be unable to be stabilized.

% Motor Current Limit -



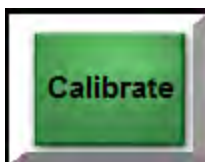
Allows entry of the % of motor rated current that the drive will be permitted to output. **Must be set to 100%.**

Actuator Cal Position -



Use this button to motor the position of the actuator stroke as measured. Readout will display the entered position after the calibrate button is depressed. See "Calibrate" button.

Calibrate -



Momentary button which saves and displays the entered position of the actuator.

Enable/Disable Drive -



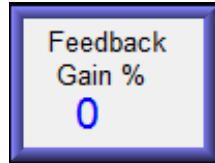
Same as "Drive Enable" on the main screen.

Park RPM -



Allows setting of the Motor RPM when the Roll Center/Park mode is used.

Feedback Gain -



The feedback gain is only used in certain applications when adjusting the Auto Gain does not stop the guide from oscillating. Always try adjusting the Auto Gain first to eliminate oscillation of the guide, but if this does not correct the oscillation then slowly increase the Feedback Gain setting until it stops the oscillation. Feedback gain limits the amount of guide correction, and is normally only needed for single roll steering guides and in systems where the detector is too far downstream.

Park Position -



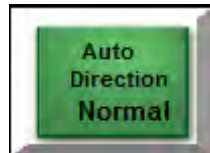
Button to enter the desired “Park” position in inches. This is the position that the actuator will travel to when the Roll Center/Park button is pressed.

Manual Direction -



Sets the direction the Jog buttons move the actuator when in manual mode.

Auto Direction -



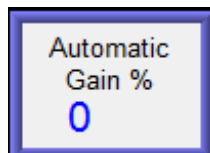
Sets the direction the automatic mode sends the actuator or motor in reference to the control point error.

Detector Zero -



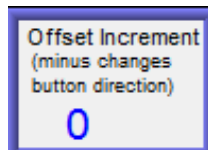
The Detector Zero button will capture the desired control point for the process. Place a sample of the process material in the detector or sensor field-of-view at the desired control point then press this button.

Automatic Gain -



Allows adjustment of the proportional gain of the primary control loop.

Offset Increment -



Adjustable value which allows offset to increment at a desired distance when using the Offset buttons. Placing a negative sign in front of the value will switch the direction the buttons increment or decrement the guide point.

Local/Remote -



Selects whether control of the drive is Locally or Remotely controlled over the network.

Maintenance Screen Status

Status indicators on the “Maintenance Screen” are useful to service personnel and not needed in a day-to-day operation.

System health is represented here by means of **heartbeat**, **drive temperature** in Celsius and **drive status** (as displayed on the “Main Screen”). When a trip occurs, a specific trip condition phrase or number may be displayed that can be looked up in the troubleshooting section.

Motor RPM and **Motor Current Amps** are instantaneous readouts for motor speed and current draw.

Analog Inputs 1-3 can vary depending on application, but generally represent the detector, feedback transducer and remote offset station inputs. All three are not always used and depend on what types of sensors are wired to the respective terminals. See the wiring diagram.

Detector Zero Value is the value captured when the “Detector Zero” button is pressed. **Detector Error** is different between current strip position and Detector Zero Value.

Percent Load is a real time display as a % of the current load on the actuator motor. Use this when setting “Load Limit”.

3-3 Communication Screen

Communications Screen

Setting IP address of the Drive in the HMI and setting at the drive

1. Set desired drive IP address with the drive's keypad, parameters 16.10 thru 16.13, (use the arrow keys to navigate to the parameter, use the M key to select, use the arrow keys to change, hit the M key), toggle parameter 16.32 to ON (will change to off), and go to any XX.00 parameter, enter "1001" and hit the RED reset button to save.
2. Enter Controller IP address here as entered above or read from drive keypad 16.10 thru 16.13

16.10	16.11	16.12	16.13
10	1	4	231

3. Cycle power to the H6630 Controller (HMI and Drive)

Setting HMI IP address

1. HMI screen lower right, touch "Left Arrow", touch "Wheel Symbol", enter password 111111.
2. Touch IP address numbers to be changed, enter new number with keypad, touch apply, then OK.
3. Cycle power to the H6630 Controller (HMI and Drive)

Addresses currently being read and communicating

Controller IP	0	0	0	0
HMI IP	0	0	0	0

Screen
Fast
Select

Change Password Screen

Alarms/Trends Screen

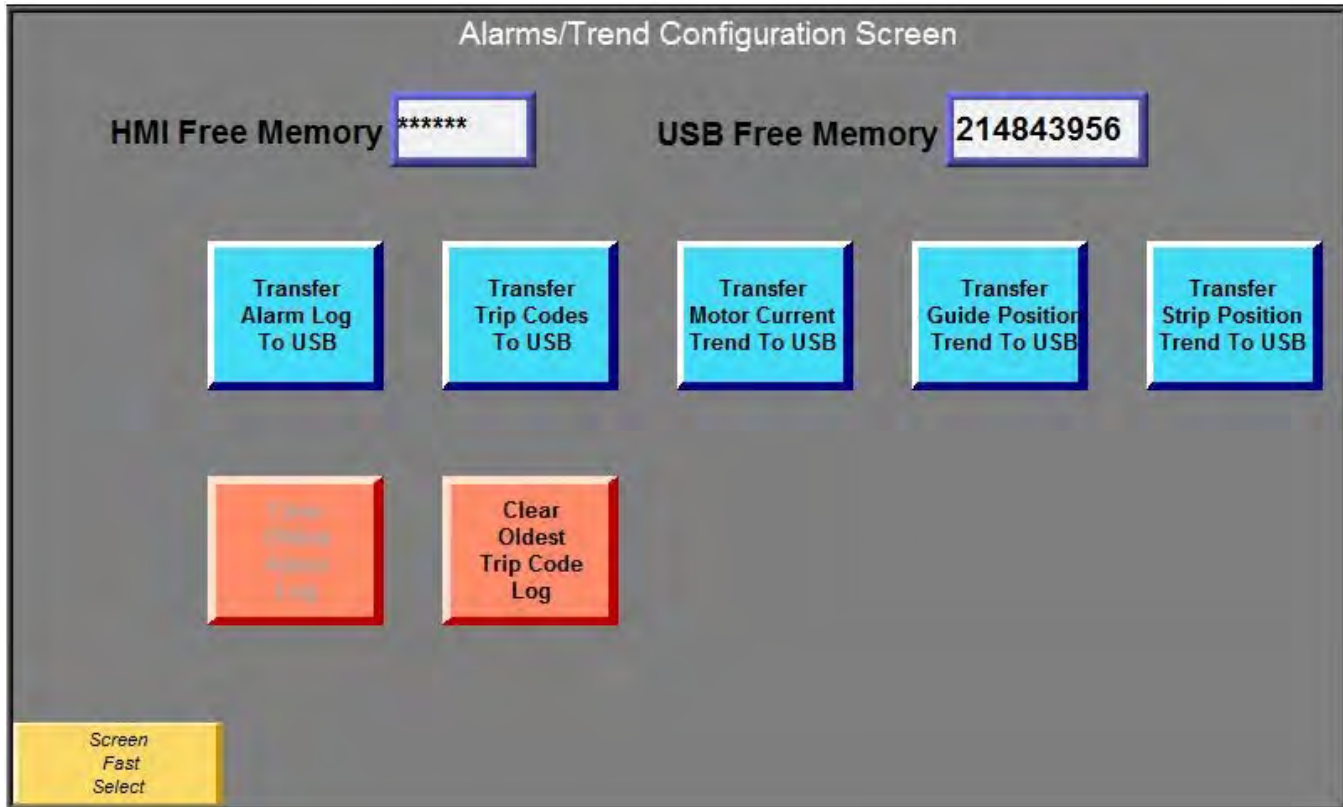
Note: This screen is password protected!

The communications screen allows you to view and configure both the HMI and drive IP addresses. The HMI and drive communicate to each other via Ethernet. Follow the instructions on this screen if you need to make changes to the system IP address.

From this screen, users are able to access the password change screen and the Alarm/Trends screen.

3-4 Alarms/Trends Configuration Screen

The Alarms/Trends section of this HMI is capable of displaying live feeds of Strip Position, Guide Position and Motor Current. Log files such as Alarms and Trends can be saved to an external device (USB, external hard drive, etc.) from this screen.



Note: This screen is password protected!

HMI Free Memory: This displays the available internal memory available in KB's.

USB Free Memory: This displays the available memory of the external device connected via the USB port of the HMI.

Transfer Alarm Log to USB: This button transfers the last 90 days of alarm log data files from the HMI memory to an external USB connected device, up to and including the last alarm log for the current day. Files are transferred in .CSV file format.

Transfer Trip Codes to USB: This button transfers all H6630 trip code trend files from the HMI memory to an external USB connected device, including the current day trend file. Files are transferred in .CSV file format.

Transfer Motor Current Trend to USB: This button transfers the previous (7) seven days of motor current trend files from the HMI memory to an external USB connected device, including the current day trend file. Files are transferred in .CSV file format.

Transfer Guide Position Trend to USB: Same as "Motor Current Trend Files" above.

Transfer Strip Position Trend to USB: This button transfers the previous (7) seven days of position trend files from the HMI memory to an external USB connected device, including the current day trend file. Files are transferred in .CSV file format.

Clear Oldest Alarm Log: This button deletes the oldest alarm log from the HMI internal memory. This button is to be used when the available HMI memory gets below 5000KB. This button must be held for 3 seconds in order to initiate a delete command.

Clear Oldest Trend File: This button deletes the oldest trend files from the HMI internal memory. This is to be used when the available HMI memory gets below 5000KB. This button must be held for 3 seconds in order to initiate the delete command.

HMI Date & Time: Shows the current date and time setting of the HMI and allows you to change them individually.

3-5 Trends Screen



By accessing the “Trends” screen from the “Screen Fast Select” menu, users are able to view real-time displays of strip position, guide position and motor current. Each window represents the last two hours of data. Touching a particular window will expand that trend to full screen.

Note: These trends are only active in automatic mode.

Section 4 – Operation/Configuration/Calibration

4-1 Power Up Checks

- Verify incoming power, all grounds, motor/encoder cables, and sensor cables have been installed or terminated properly.



WARNING

The following steps include energizing power. Ensure proper safety procedures are followed and panel doors are closed securely. Only authorized and trained personnel should perform these steps. Lethal voltages are present!

- Verify incoming power, energize disconnect, and verify the HMI powers up.
- Verify the Stop switch on the panel is in the released position, otherwise twist to release.
- Initiate the Power ON button on the front panel to turn ON the 3 phase power to the drive.
- Verify the HMI displays the main screen. Note any alarm or status conditions.

Note: See “**Changing, Verifying, or Setting up an H6630 Controller IP Address**” in the troubleshooting section, if the HMI indicates “PLC No Response”.



CAUTION

Prior to commanding any motion to the system, and in order to prevent actuator damage, the motor load limit should be set down to 30%. This will limit the motor output in the event any hard stops or binding is encountered. Navigate to the HMI maintenance screen and set the “Load Limit” to 30% for initial set up.

4-2 Mode Selection and Set Up

Manual Mode

Manual mode provides the ability to perform the normal Jog In/Out of the actuator, along with the ability to Jog In/Out over the Network connection. The local HMI has Jog In/Out pushbuttons. The jog function will be used to calibrate the position and the “Software Limits” which prevent the actuator from hitting the end of travel stops during normal manual and automatic operation.

Jog the actuator to the center of travel position. Enter “0.00” inches in the “Actuator Cal Position” numeric input. Press the “Calibrate” button. The “Position” display should now read 0.00”. In the event that the actuator stops prior to reaching the center of travel position, the Software Limit Setting may be adjusted to an expanded range temporarily per the next section to allow the unit to reach the center position.

Actuator Software Limit Setting (range of travel)

Software limits are set on the maintenance screen and limit the movement of the actuator to prevent damage at the ends of travel. Care must be taken to not run the actuator into the ends of travel. The positive and negative software limits must be set to eliminate this. After logging in with the password, verify the positive software limit and the negative software limit are set to the amount of actuator travel. If not, enter the correct values and press accept SW limit button. The range may be set less as desired by the customer or dictated by the actual amount of stroke or limitation of the guide. **It is recommended to set the limits less than the actuator stroke to ensure the ends of stroke are not hit.** Also ranges may be offset as needed for the specific installation. Example: for a 12" stroke actuator, positive limit could be set to 4.00" and negative limit set -5.50".

At this time, the jog functions can be retested and software limits verified. Jog pushbuttons are located on the Control screen and Maintenance screen of the local HMI. Utilize the jog pushbuttons to slowly reach the end position and verify the actuator stops at the limit prior to reaching the end of travel.

The "Manual Direction" pushbutton on the maintenance screen will allow selection of the direction the Jog pushbuttons move the actuator when pressed.



CAUTION

Repeated driving into the stops may cause actuator damage and/or controller trip on overcurrent. Utilize the jog functions to test that the unit is stopping due to the SW limits, otherwise re-perform this section. Ensure the Accept software limits pushbutton is depressed after making any changes to the SW limits. The SW limit may be reduced as needed to ensure the end of stroke is not reached. If the controller trips during set up due to overcurrent etc., depress the reset button on the maintenance screen to clear the trip.

Note: Motor Manual RPM can also be reduced from the maintenance screen to provide slower movement if needed.

Roll Center or Park Position

The "Park" pushbutton provides a means to send the actuator to a preset position of the travel. This is usually the position that the guide is centered. On the maintenance screen, enter the desired "Park" position in inches. Jog the guide off center and test by using the "Park" pushbutton on the Main screen. Speed for this function may be set on the maintenance screen by using the Park RPM setting.

Detector Zero

By placing a sample of the process material in the detector, or with the line threaded through the detector, the voltage output of the sensor can be read on the maintenance screen. If using a flag or sample, ensure the material is grounded as required for capacitance style detectors. Once the strip is placed at the desired position to be guided to, the "Detector Zero" button can be pressed to capture the desired control point.

Post Calibration Steps

Verify the load limit setting is returned to 100%. Verify the Manual and Park RPM are set to the desired RPM or speed, as desired, on the maintenance screen. Verify the software limits are set correctly.

Automatic Operation

Once the unit is set up and calibrated, verify the automatic Gain is set to 50%; the unit can be placed into auto from the HMI main screen. While providing some error of the strip as compared to the zeroed control point, verify the actuator moves the guide in the direction to correct the error. If not, change the “Auto Direction” on the maintenance screen.

Note: It will be necessary to have the guide system, process and guide, in a “closed loop” and moving with strip tension to verify the guide brings the process to the control point.

While in “closed loop” operation, i.e., line in operation, adjust the “Auto Gain” to provide proper control.



CAUTION

If the Gain is set too high, the system will be unstable and oscillate. If it is set too low, the response will be sluggish for most applications.

Section 5 – Troubleshooting

5-1 Visual Fault Indications

Use the following to determine the characteristics of any fault conditions:

- Controller Keypad
- Maintenance Screens
- Alarm Log

Any controller fault indications will appear on the keypad as they are triggered. Also individual parameters can be accessed and values noted to assist in troubleshooting.

A list of the most common indications will be listed throughout this procedure.

Controller Keypad

The keypad is used to access the controller parameters which have been configured to control the drive through the internal program and can be used to display values of the parameters. Parameter ranges are from 0 to 22 (example 22.xx) where the xx is a series of parameters, which varies in length depending on the range selected.

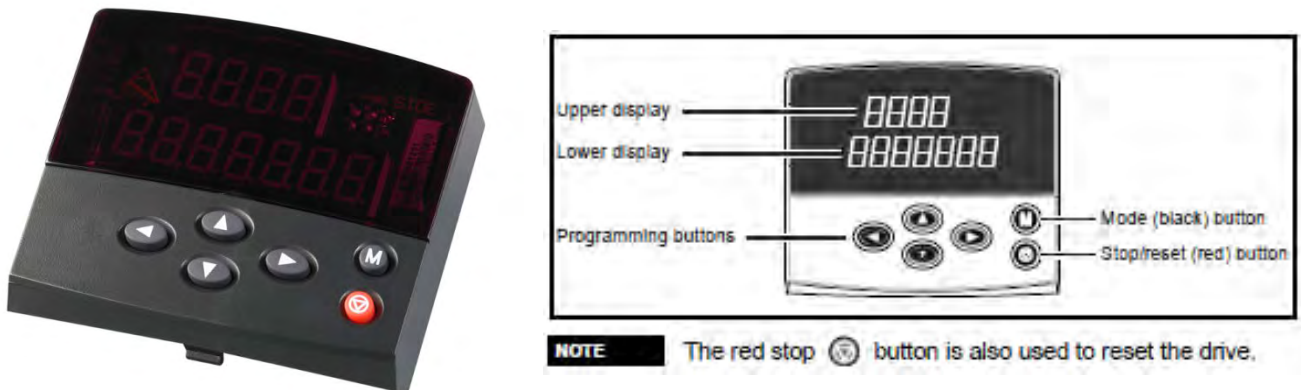


Figure 6 H6630 Keypad

Keypads can be hot swapped from one drive to another and can be used for system diagnostic information. Simply grab the keypad and pull to remove. Plug into the next controller as needed

Upper display – indicates the trip condition/mode or selected parameter number.

Lower display – indicates the value of the selected parameter.

Programming buttons – allows scroll up/down or selecting specified digit of a value.

Mode Button – once depressed allows changing of a value at the lower display, press again to exit.

Reset (red button) – performs a drive reset and cycles the program.

Keypad Navigation example:

Press the left/right or up/down arrow keys to scroll through the units parameters. The left/right keys scroll through the 00 to 22 levels while the up/down scroll through the individual parameters of the chosen level.

Press the left arrow key until the upper display reads 0.xx. Press the up arrow key until the upper display reads 0.49. Press the “M” mode button once to allow changing of the setting in the lower display. Use the up/down keys to select “L2”. Press the “M” key again to exit.

Note: Parameter 0.49 must be set to L2 to allow access of all parameters; otherwise the parameters available are limited.

1001 Non-Volatile Save

The keypad can be used to perform a non-volatile save of any changed parameters by performing the following: Press the left arrow key a couple times to display any level parameter with an “xx00”. Press the ‘M’ key and change the lower level display to read “1001” by using the left/right and up/down arrow keys. Now depress the “red” reset button.

Parameters used for Indication and Setting

00.49	Set to L2 to allow access of all parameters
03.25	Encoder Phase Angle
03.36	Encoder Supply Voltage
04.20	Percentage Load (Motor current % of Rated)
05.07	Motor Rated Current
07.10	Analog Input 1 reading
07.14	Analog Input 2 reading
07.18	Analog Input 3 reading
10.01	Drive OK
10.20-29	Last 10 Drive Trips
16.10-13	Drive IP Address
16.14-17	Drive Subnet Mask
16.32	Reinitializes Ethernet communications
16.37	Turns on Ethernet communications.

Maintenance Screens

The HMI has individual maintenance screens which provide additional or alternate indications of device output readings or component status.

5-2 Electrical Checks

Power Supplies

One of the first steps in troubleshooting any problem in which a device does not function entirely, is to confirm that the power supplies are functioning properly. This section covers in more detail the system power supplies.

The following two supplies are contained in the system:

1. 460Vac main supply (supplied by customer to each control panel).
2. 24Vdc supply (internal 480Vac to 24Vdc power supply, one located in each panel).



WARNING

Only authorized and trained personnel should perform these steps. Lethal voltages are present!

230/460Vac 3 Phase: Check incoming voltage to the control panel disconnect, and the branch circuits. Refer to the wiring diagrams supplied with the system. Readings should be taken across L1 – L2, L2 – L3, and L3 – L1. The voltage reading should be within $\pm 10\%$ of the rated volts and should be balanced within $\pm 1\%$.

24Vdc: Check power supply load side terminals 0Vdc to +24Vdc. Normally the voltage reading is within ± 2 volts. Voltage on 24Vdc power supplies should not drop below 20Vdc. If the voltage reading is lower, this is indicative of excessive load on the circuit. Each supplied device can be disconnected one at a time to determine the source of the loading condition.

5-3 Motor Visual Trip Indications

Under-Voltage Trip – UV

If the controller keypad indicates “UV” (under voltage trip), the DC bus on the drive has reached an under-voltage level. This should not occur unless the 230/460vac power to the controller is low or de-energized. Ensure that the power button on the face of the panel has been depressed and the contactors are pulled in. Refer to the applicable H4506 or H4803 electrical drawing.

Overcurrent Trip – IT.Ac

Overcurrent or output current overload is usually caused a jammed or sticking actuator or excessive load on the motor. These conditions may occur if an object or obstruction is blocking the normal path of travel. Verify these conditions are addressed. The trip can be reset with the red key on the keypad. If the condition reappears during operation intermittently, loading of the actuator or motor should be verified. If loading or sticking appears to not be an issue, the rated speed parameter or controller proportional gain setting parameter may be adjusted as follows:

1. Record the value of parameter #3.10.
2. Reduce the value by 25%. Operate and see if the tripping is eliminated. If not, try reducing by another 25%.
3. Perform a “1001” save to retain the value.

If the condition is still reoccurring, a motor auto tune may need to be performed (See “Motor Auto Tune”).

Over Speed Trip – O.SPd

Over speed trips occur when the motor exceeds the speed threshold. The threshold is preset in the drive program. If this trip occurs due to the motor speed being near the preset threshold, perform the same steps as used for an overcurrent trip.

5-4 Motor Maintenance

The motor and actuators require minimal amount of maintenance. Components should be kept reasonably clean and care taken when disconnecting motor and encoder cables as to not allow debris to enter into the connections.



CAUTION

When reconnecting the motor or encoder cables, ensure the connectors are aligned properly. Connectors should push ON and rotate without a lot of force.

Motor/Actuator Damage

Refer to the system diagram or order for the top level component number, replace with the available spares or contact Fife Corporation for further assistance and a replacement.

Motor Auto Tune

There are auto tuning tests available through the controller in the event that a new motor appears to be noisy, has a jerky motion, or fails to move due to an encoder fault, consult Appendix B for trip codes. The auto tune test will measure the stator resistance, inductance of the motor, and adjust the phase angle setting. These values will be retained in the controller after performing a “1001” save.

If a new motor is installed and appears to be noisy (high frequency) or has a jerky motion, first try adjusting parameter #03.10.

1. Record the value of parameter #03.10.
2. Reduce the value by 25%. Operate and see if the problem is eliminated. If not, try reducing by another 25%.
3. Perform a “1001” save to retain the value.

If the adjustment of parameter #03.10 did not cure the problem, perform a motor auto tune per the following:

- a. Decouple the motor or actuator from the driven device.
- b. Set parameter #17.13, set to “OFF” and do a “1001” save.
- c. Set parameter #00.40 to 2 (this selects a low speed test which rotates the motor two rotations).
- d. Pull the connector with terminal points 21 through 31 from the front of the drive.

- e. Set parameter #08.23 to 0.00 then perform a 1001 save (see “1001 Non-Volatile Save” on page 30). Turn OFF power and restart.
- f. Set parameter #06.30 and #06.15 to “ON”.
- g. Set parameter #00.40 to 2, verify 3 phase contactor is pulled in (power button). While reading parameter #00.40, plug the connector back ON. The readout will flash “Auto Tune”.

Note: An acceptable tune test will set parameter #00.40 to zero, wait for the test to complete. If a fault code is presented on the keypad, see encoder faults below or Appendix B trip code list.

- h. Upon completion, set parameter #06.30 and #06.15 to “OFF”.
- i. Set parameter #17.13 to “ON”.
- j. Perform a “1001” save.
- k. Power down the controller and reboot.

If tune fails, read code and consult the trip code list and perform the listed actions. If the failure is corrected, you can tune again by pulling connector, setting parameter #6.15 and 6.30 to “ON” then #00.40 to 2 then plug in connector.

5-5 Encoder Visual Trip Indications

EnC7 Trip Code

Perform the following in order until the drive trip is cleared:

1. Reset the drive.
2. Check encoder wiring.
3. Perform motor tune procedure.
4. Replace feedback device.

EnC10 Trip Code

1. Check encoder wiring.
2. Perform motor tune procedure.

5-6 Absolute Encoder Maintenance

The actuator motors and positioner motors all have absolute encoders. All programs are set up with the necessary encoder configuration parameters which perform an auto configuration upon power up. If encoder issues are apparent, check encoder cabling and terminations. Power down the unit and re-energize to reset.

5-7 Communications Module

The Ethernet module resides in the top slot of the controller. The module is simply an interface, with the parameters that control the module residing in the controller. Unlike the keypad, the module is not hot swappable. Power must be removed from the drive prior to insertion or removal. Squeeze the outer tabs and pull to remove.

Changing, Verifying, or Setting up an H6630 Controller IP Address

The top slot modules are controlled by the 16.xx range of parameters. The IP address is contained in the 16.10 through 16.13 parameters while the subnet mask is in the 16.14 through 16.17 parameters.

Using the keypad, scroll through the menu 16 parameters and verify the drivers IP address is set correct.

The following structure shows an example of the controller IP address 192.168.1.69.

Parameter	Description	
16.10	IP address W	192
16.11	IP address X	168
16.12	IP address Y	1
16.13	IP address Z	69
16.14	Subnet mask W	255
16.15	Subnet mask X	255
16.16	Subnet mask Y	255
16.17	Subnet mask Z	0

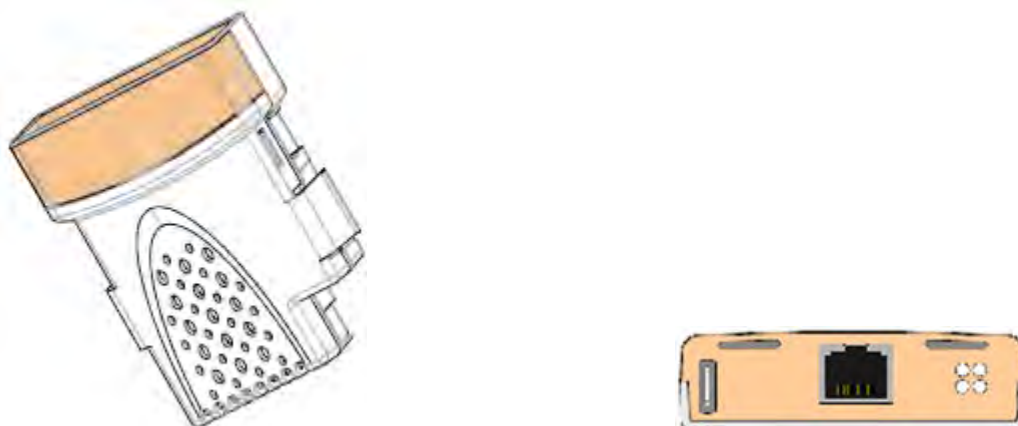






Figure 7 Controller Ethernet Module

Ethernet Module LED Indicators

Line / Activity   Module Status
 Speed (ON = 100Mbps)   Flash Across

LED Name	LED State	Description
Link / Activity	OFF	Ethernet connection not detected
	Steady green	Ethernet connection detected
	Flashing green	Ethernet communication detected
Speed	OFF	10Mb/s data rate
	ON	100Mb/s data rate
Module Status	Flashing green (slow)	Running RAM boot loader image
	Flashing green (fast)	Initializing main image
	Steady green	Running
	Flashing green and red	Warning (slot or configuration error)
	Steady red	Major fault
Flash Access	Steady green	Reading from flash memory
	Steady red	Writing to flash memory

If changing any of the IP address parameters, change parameter 16.32 to a 1 to reinitialize the module. Once set to a 1, the readout will then automatically change back to a zero after initialization has taken place.

Note: Remember to do a “1001” save, if changing the Ethernet address of the controller. Refer to the “Keypad Navigation” example to do a “1001” save.

Refer to Section 3-3 for an example of the “Communications” screen.

Troubleshooting the Ethernet Module

1. Verify Ethernet cable connections are made and are not damaged.
2. Verify the IP address is set correctly for the specific controller (parameter #16.10 through #16.17).
3. Verify parameter #16.37 is “ON” or a “1”, which turns on the Ethernet communications.
4. Use the controller Ethernet module LED indicators to assist in diagnostics.
5. Use the LED indicators on the Ethernet switch in the panel and verify the switch is powered. Check communication activity by the flashing LED’s.
6. Parameter #16.10 will indicate the number of Ethernet packets which are being transferred. A positive number is good while a negative number is indicative of a malfunction.
7. If the keypad shows “SL2Er”, this indicates the module has produced an error. Parameter 16.50 will show the specific error code. Try the “Red” reset button on the keypad to clear the fault. Listed below are the most common codes for the installed system.

16.50 number	Error Description
61	Invalid configuration parameters
70	No valid menu data available for the module from the drive
74	The Solutions Module has overheated
75	The drive is not responding

8. If the keypad indicates “SL2.HF”, this indicates the module has a hardware fault. This could be a bad connection or the module is not seated correctly. Power OFF the drive and remove the module. Visually inspect the connection to the controller, clean if required, and reseal.
9. If the fault reappears, try a replacement module.

Section 6 – Repair/Replacement

6-1 Controller Drive Unit

In the event that the H6630 drive must be replaced due to failure, refer to Installation Instructions (IS-1293), this describes how to use the Winflash software in a PC to download the program file to the H6630 controller using Ethernet. The program files will be supplied by Fife Corporation on a USB flash drive, along with the Winflash software and files.

IS-1293 “Instructions for using H6630 Download Tool to download program files to the H6630EM controller using Ethernet”; can be found in Appendix A of this manual.

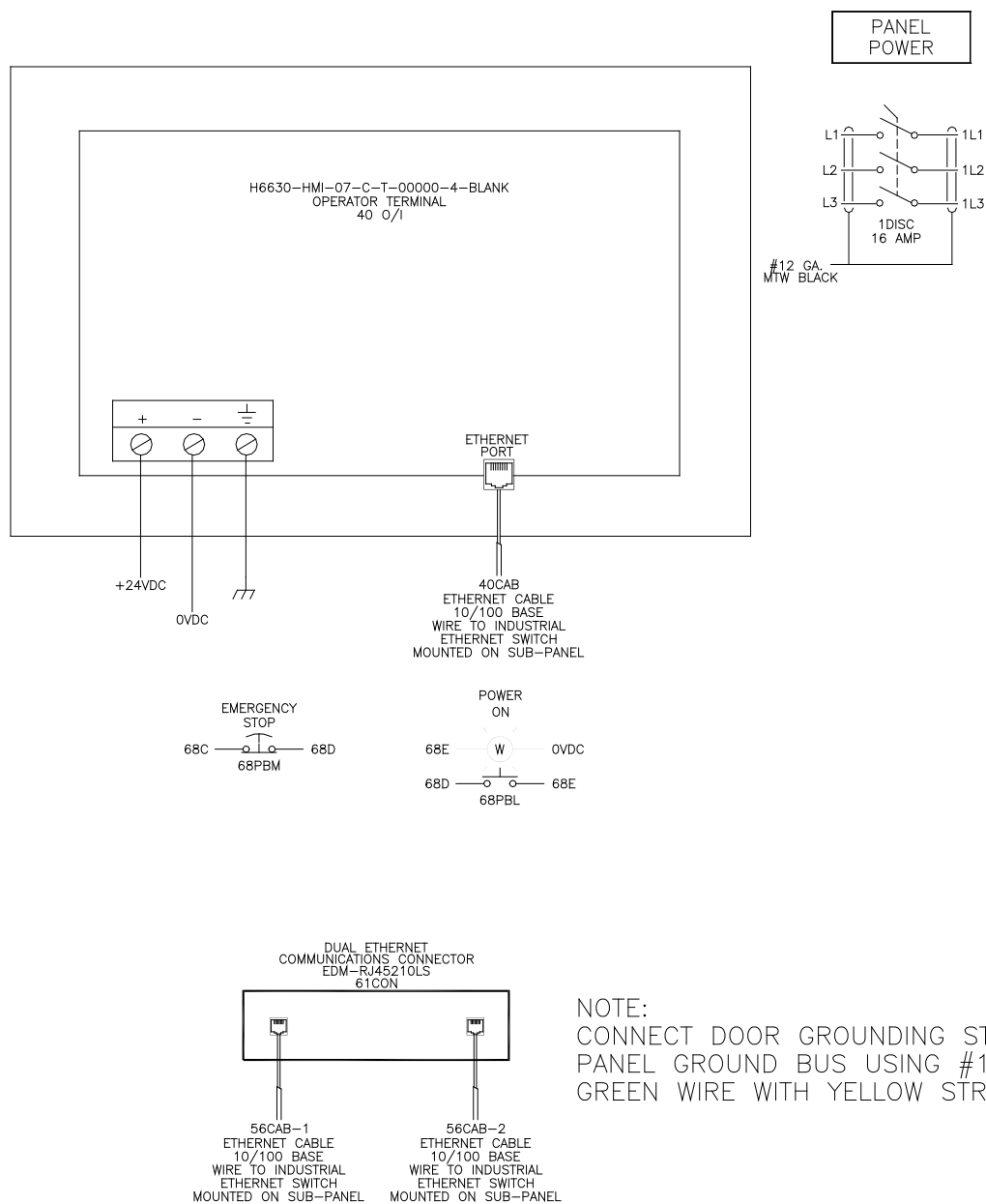
6-2 Operator Interface – HMI

In the event that the HMI must be replaced due to failure, refer to Installation Instructions (IS-1287). This will describe how to download the HMI program file to the H6630-HMI operator interface.

IS-1287 “Instructions for downloading programs to the H6630-HMI-07” can be found in Appendix A of this manual.

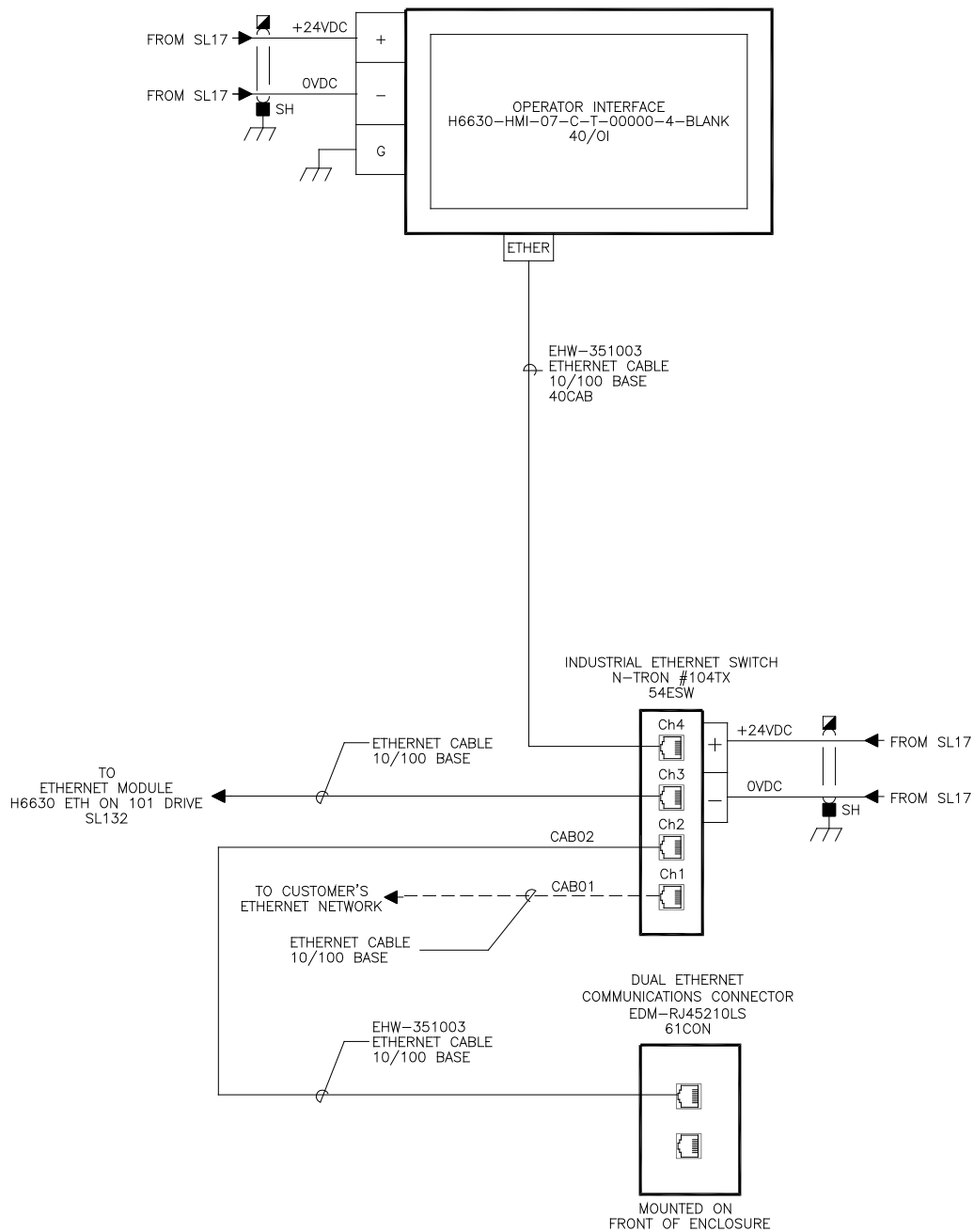
Appendix A

Typical Connections for Incoming power



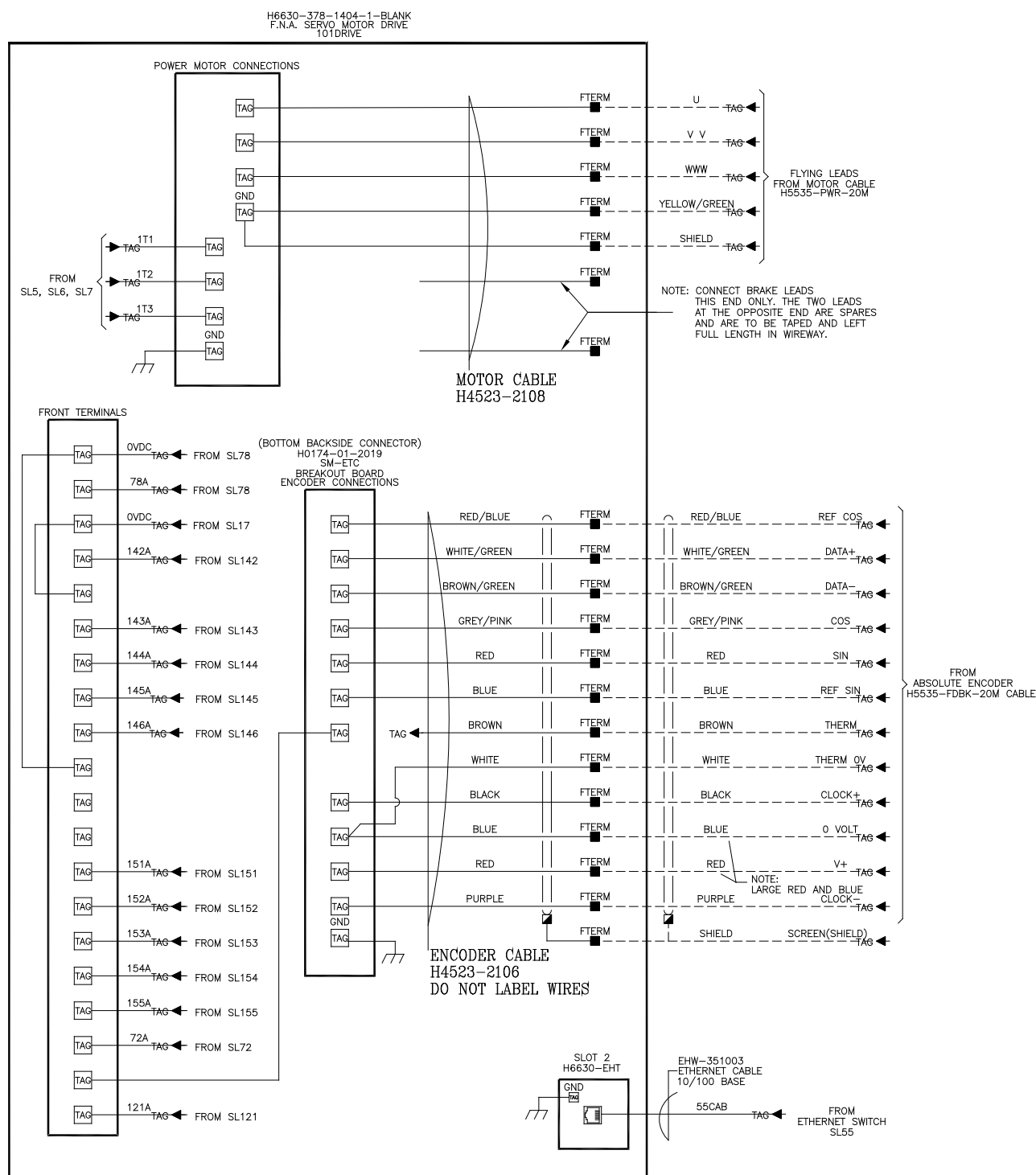
See specific wiring schematic for application, supplied with equipment when received.

Typical Connections for Network Communications



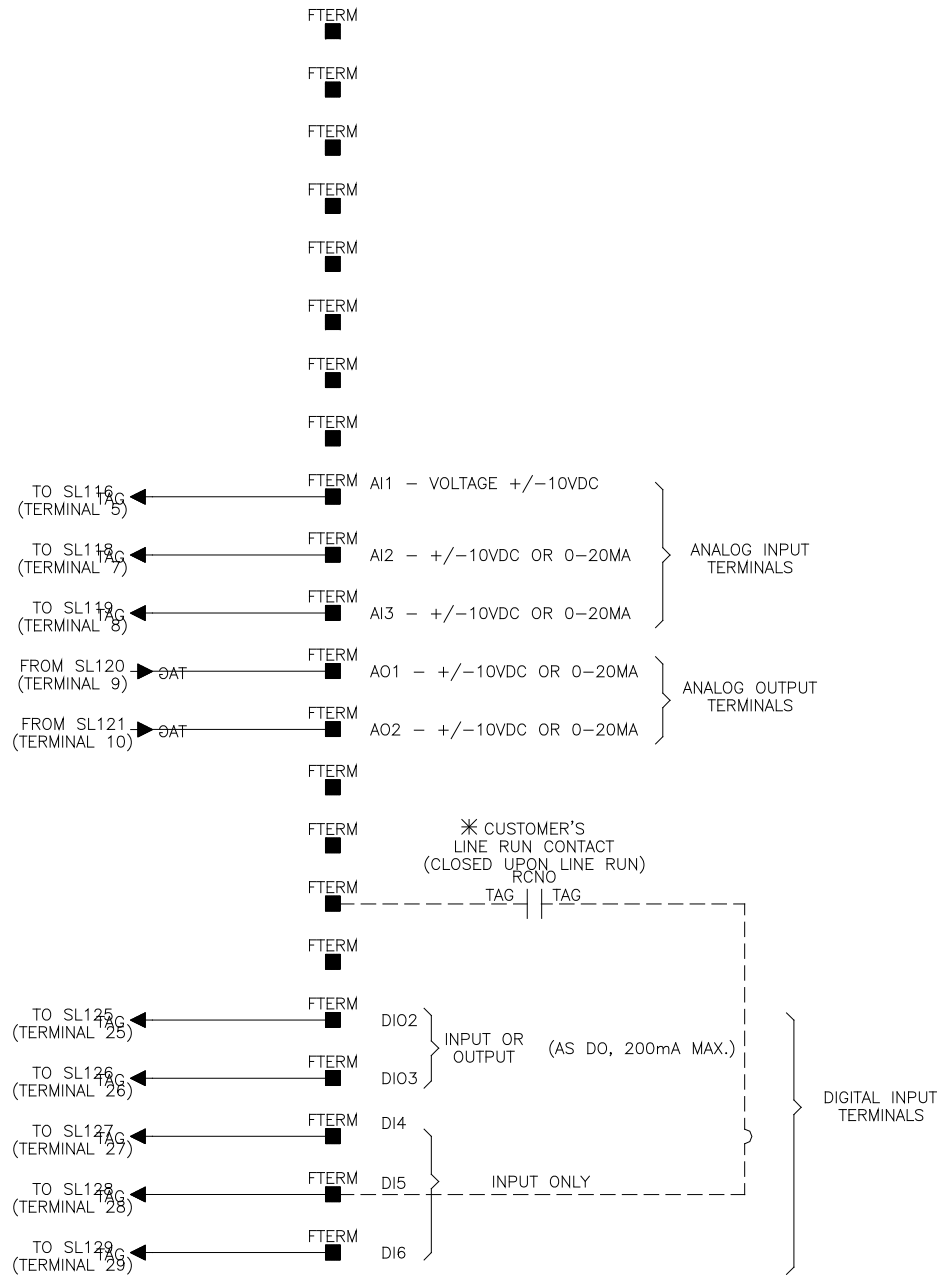
See specific wiring schematic for application, supplied with equipment when received.

Typical Motor Connections (power and feedback cables)



See specific wiring schematic for application, supplied with equipment when received.

Typical Analog and Digital Inputs/Outputs



See specific wiring schematic for application, supplied with equipment when received.

Downloading Programs

Drive Program (IS1293)

Instructions

Title:	Instructions for using Winflash software to download program files to the H6630 controller using ethernet		
Document:	IS1293	Rev.	2.0
Date:	11/17/2014	By:	RPM
		Approval:	JVB

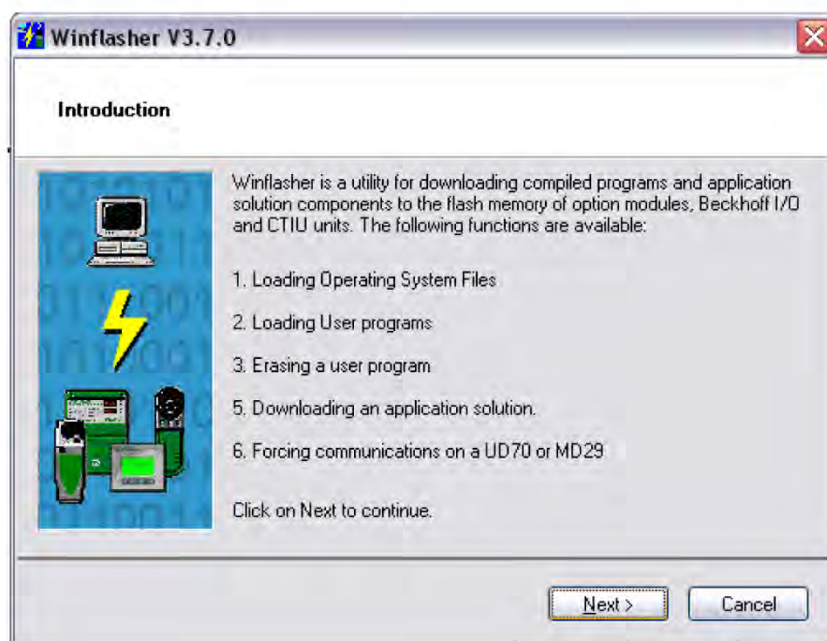


Overview

To begin you will need to have the Winflash program installed on your laptop computer. If you do not have the program installed you can get it from Fives North American via email. Once you have installed the Winflash program, start it by double clicking on the Winflash.exe file or icon (see below).



Once the Winflash program opens and starts running you will see the following window:



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Instructions

Title:	Instructions for using Winflasher software to download program files to the H6630 controller using ethernet		
Document:	IS1293	Rev. 2.0	
Date:	11/17/2014	By: RPM	Approval: JVB

Click the **Next** button to continue to the next screen seen below.



To download a new program file to the H6630 controller, you will want to select “Download a compiled program”, as shown above. To erase the program in the H6630 you will want to select “Erase the program in the target”. Once you have selected the function you want to perform, click on the **Next** button to proceed.

Note: You should only erase the program if directed to do so by Fife Corporation.

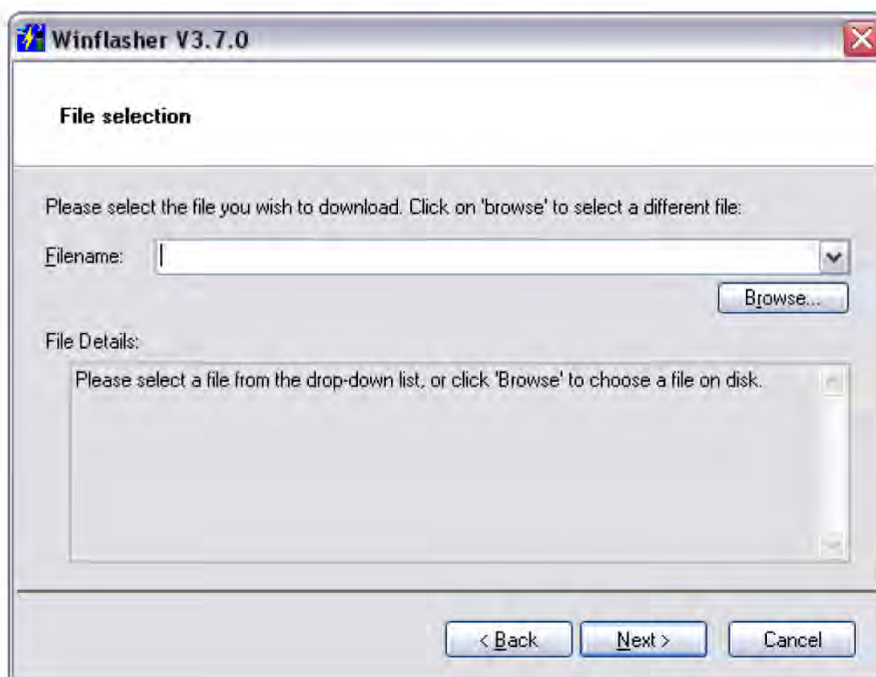
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Instructions

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Document:	IS1293	Rev.	2.0
Date:	11/17/2014	By:	RPM
		Approval:	JVB



Downloading a new program to the H6630 controller



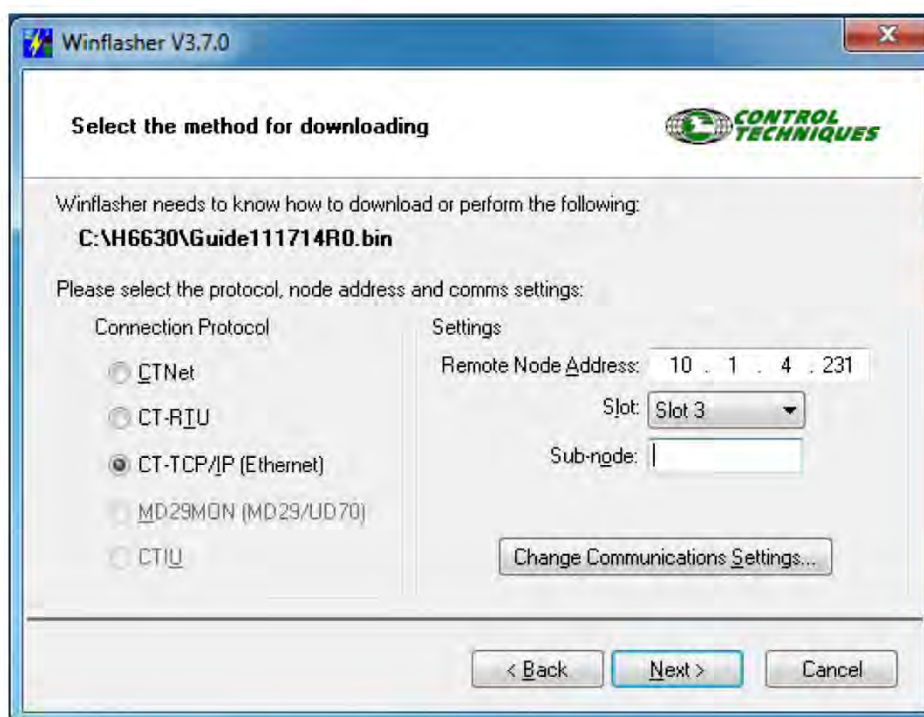
On this screen you will need to search for and select the program file that you wish to download to the H6630 controller. Click on the **Browse** button to open up the pop-up window from which the program to be downloaded can be selected. Once you have selected the program file to download, click on the **Next** button to proceed. Program files will end in .bin, and are specific for every application.

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On this screen you need to select the method of communication with the drive and select the correct “Slot”. Under **Connection Protocol** select CT-TCP/IP (Ethernet). Under **Settings** you first need to enter the IP address of the H6630 controller. This can be found by looking at registers 15.10 thru 15.13 on the keypad (if the SM-Ethernet module is in slot1, the “lower” slot in the side of the controller). This can be found by looking at registers 16.10 thru 16.13 on the keypad (if the SM-Ethernet module is in slot2, the “upper” slot in the side of the controller).

Next, click on the arrow to the right of “Slot:” (as shown above) and in the drop down menu select Slot 3.

Once you have finished configuring this screen, click on the **Next** button to proceed.

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		Approval:	JVB



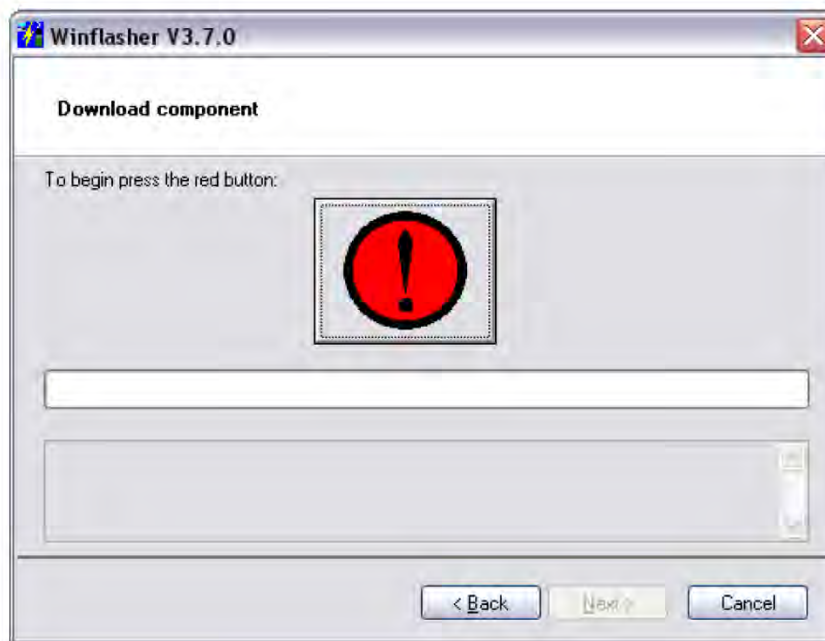
The Warning screen appears next, as seen above. This screen serves to warn you that the operation of the system will stop while the download is in progress. Due to this it is strongly recommended that the system be placed in manual, and the download be done when the process is stopped. Click on the Next button to proceed.

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Document:	IS1293	Rev. 2.0	
Date:	11/17/2014	By: RPM	Approval: JVB

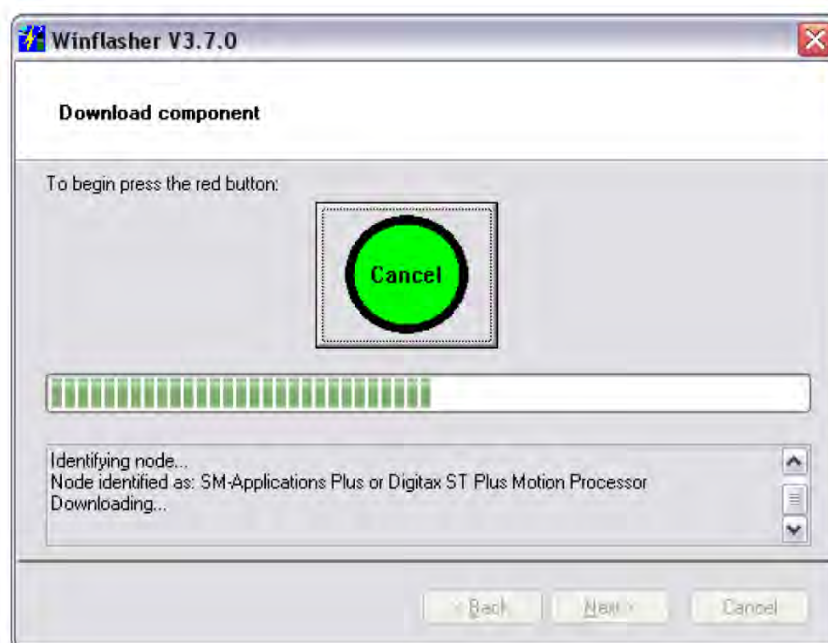


This screen is the final warning before proceeding with the download to the H6630 controller. If you are certain that everything is correct, then click on the red circle with the exclamation point in it to start the download progress. Once you do this the following screen will appear:

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This screen is an indication that everything is correct and you can see the progress of the download to the controller. The screen will indicate when the download is complete and the **Next** button will become available for you to click. Click on it and the **Complete** screen will appear (see next).

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Once this screen appears the download has finished successfully. Click on **Finish** to close the program.

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Instructions

Title:	Instructions for downloading programs to the H6630-HMI-07		
Document:	IS1287	Rev. 1.0	
Date:	5/15/2012	By: JVB	Approval: MHC



Overview

This document describes how to download program files to the H6630-HMI-07 operator interface.

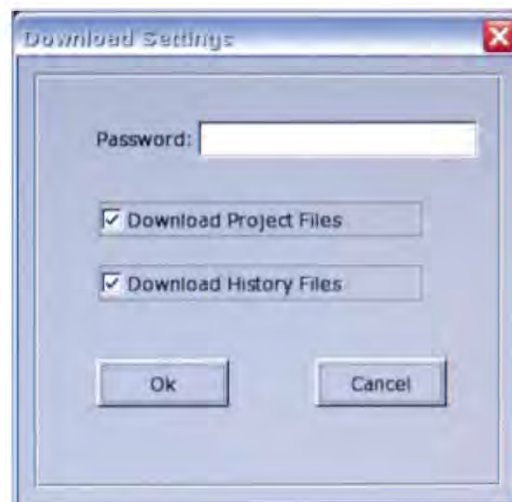
Downloading program files from a USB Flash Drive

To download a program to an H6630-HMI-07 using a USB flash drive, simply plug the flash drive with the HMI program file into the USB port on the bottom of the HMI and follow the screen prompts. The first window that appears is the Download/Upload (See below).



Select **Download Project** to proceed.

Next the "Download Settings" window appears, along with a keyboard for entering the Password. The default password for the H6630-HMI-07 is 111111.



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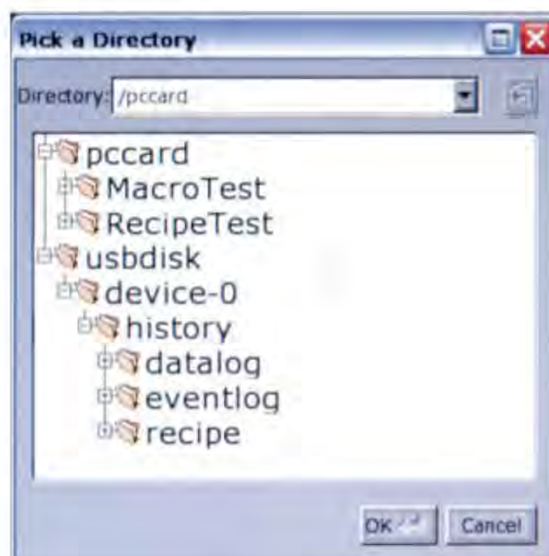


Instructions

Title:	Instructions for downloading programs to the H6630-HMI-07		
Document:	IS1287	Rev. 1.0	
Date:	5/15/2012	By: JVB	Approval: MHC

Enter the password and select **Ok** to proceed.

Once the correct password is entered, the **Pick a Directory** window will appear. In this window you will see a list of all of the folders on the USB flash drive. Click on the + next to **usbdisk** to expand the directory, and select the correct folder that contains the program that you wish to download to the H6630-HMI-07, then select **OK**.



It will take a few seconds for the program file to download, during which time you will see the screen change to the default main screen. Once the file download is complete, the H6630-HMI-07 will begin to operate with the new program file installed.

This completes these instructions.

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Page 2 of 2

Battery Life/Replacement

Controller

The H6630EM controller does not have any internal battery to replace, none is required.

HMI (Human Machine Interface)

While there is a battery within the HMI, its only function is to power the internal clock. The program does not require a battery backup. If left in an unpowered state, the battery life is many years. The replacement battery is a common battery same as used in watches and calculators. If replacement is deemed necessary, it is commercially available and the part number CR2032 can be obtained from most consumer retail stores.


Appendix B

Error Codes / Trip Codes


To access error codes, the controller keypad must be installed into the drive. Refer to Section 5 “Controller Keypad” for more information. The following drawing lists the error codes and diagnosis of most occurrences:

H25-4674 – H6630 Advanced Parameters Trip Indications

NO.		REVISIONS		DRAWING NO.		REV.	
0		Initial Release		HA25-4674		A	
1		ECR#82796		DR. MHC		09/30/2014	
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				REFERENCE			

			
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Trip	Diagnosis
Br.th	Braking resistor thermistor temperature monitoring fail
10	If no brake resistor is installed, set Pr 0.51 (or Pr 10.37) to 8 to disable this trip. If a brake resistor is installed: Ensure that the braking resistor thermistor is connected correctly Ensure that the fan in the drive is working correctly Replace the braking resistor
cL2	Analog input 2 current loss (current mode)
28	Check analog input 2 (terminal 7) current signal is present (4-20mA, 20-4mA)
cL3	Analog input 3 current loss (current mode)
29	Check analog input 3 (terminal 8) current signal is present (4-20mA, 20-4mA)
dES	Two or more parameters are writing to the same destination parameter
199	Set Pr xx.00 = 12001 check all visible parameters in the menus for duplication
EnC1	Drive encoder trip: Encoder power supply overload
189	Check encoder power supply wiring and encoder current requirement Maximum current = 200mA @ 15V, or 300mA @ 8V and 5V
EnC2	Drive encoder trip: Wire break (Drive encoder terminals 1 & 2, 3 & 4, 5 & 6)
190	Check cable continuity Check wiring of feedback signals is correct Check encoder power is set correctly Check that the encoder cable is connected to the right encoder port on the drive (not to the buffered encoder output port)
EnC3	Drive encoder trip: Phase offset incorrect while running
191	Check the encoder signal for noise Check encoder shielding Check the integrity of the encoder mechanical mounting Repeat the offset measurement test
EnC4	Drive encoder trip: Feedback device comms failure
192	Ensure encoder power supply is correct Ensure baud rate is correct Check encoder wiring Replace feedback device
EnC5	Drive encoder trip: Checksum or CRC error
193	Check the encoder signal for noise Check the encoder cable shielding With EnDat encoders, check the comms resolution and/or carry out the auto-configuration Pr 3.41
EnC6	Drive encoder trip: Encoder has indicated an error
194	Replace feedback device With SSI encoders, check the wiring and encoder supply setting
EnC7	Drive encoder trip: Initialization Failed
195	Reset the drive Check the correct encoder type is entered into Pr 3.38 Check encoder wiring Check encoder power supply is set correctly Carry out the auto-configuration Pr 3.41 Replace feedback device
EnC8	Drive Encoder trip: Auto configuration on power up has been requested and failed
196	Change the setting of Pr 3.41 to 0 and manually enter the drive encoder turns (Pr 3.33) and the equivalent number of lines per revolution (Pr 3.34) Check the comms resolution
EnC9	Drive encoder trip: Position feedback selected is selected from a Solutions Module slot which does not have a speed/position feedback Solutions Module installed
197	Check the setting of Pr 3.26 (or Pr 21.21 if the second motor parameters have been enabled)
Trip	Diagnosis

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EnC10	Drive encoder trip: Phasing failure because encoder phase angle (Pr 3.25 or Pr 21.20) is incorrect
198	<p>Check the encoder wiring. Perform an auto-tune to measure the encoder phase angle or manually enter the correct phase angle into Pr 3.25 (or Pr 21.20). Spurious EnC10 trips can be seen in very dynamic applications. This trip can be disabled by setting the overspeed threshold in Pr 3.08 to a value greater than zero. Caution should be used in setting the over speed threshold level as a value which is too large may mean that an encoder fault will not be detected.</p>
Enc11	Drive encoder trip: A failure has occurred during the alignment of the analog signals of a SINCOS encoder with the digital count derived from the sine and cosine waveforms and the comms position (if applicable). This fault is usually due to noise on the sine and cosine signals.
161	<p>Check encoder cable shield. Examine sine and cosine signals for noise.</p>
Enc12	Drive encoder trip: Hiperface encoder – The encoder type could not be identified during auto-configuration
162	<p>Check encoder type can be auto-configured. Check encoder wiring. Enter parameters manually.</p>
Enc13	Drive encoder trip: EnDat encoder – The number of encoder turns read from the encoder during auto-configuration is not a power of 2
163	Select a different type of encoder.
Enc14	Drive encoder trip: EnDat encoder – The number of comms bits defining the encoder position within a turn read from the encoder during auto-configuration is too large.
164	<p>Select a different type encoder. Faulty encoder.</p>
Enc15	Drive encoder trip: The number of periods per revolution calculated from encoder data during auto-configuration is either less than 2 or greater than 50,000.
165	<p>Linear motor pole pitch / encoder ppr set up is incorrect or out of parameter range i.e. Pr 5.36 = 0 or Pr 21.31 = 0 Faulty encoder.</p>
Enc16	Drive encoder trip: EnDat encoder – The number of comms bits per period for a linear encoder exceeds 255.
166	<p>Select a different type of encoder. Faulty encoder.</p>
Enc17	Drive encoder trip: The periods per revolution obtained during auto-configuration for a rotart SINCOS encoder is not a power of two.
167	<p>Select a different type of encoder. Faulty encoder.</p>
EnP.Er	Data error from electronic nameplate stored in selected position feedback device.
176	Replace feedback device.
Et	External trip from input on terminal 31.
6	<p>Check terminal 31 signal. Check value of Pr 10.32 Enter 12001 in Pr xx.00 and check for parameter controlling Pr 10.32 Ensure Pr 10.32 or Pr 10.38 (=6) are not being controlled by serial comms</p>
HF02	Data processing error: DMAC address error
	Hardware fault – return drive to supplier
HF03	Data processing error: illegal instruction
	Hardware fault – return drive to supplier
HF04	Data processing error: Illegal slot instruction
	Hardware fault – return drive to supplier

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Appendix B

NO.		REVISIONS	H6630 ADVANCED PARAMETERS TRIP INDICATIONS		DRAWING NO.		REV.
0		Initial Release			HA25-4674		A
1		ECR#82796					
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					REFERENCE		

Trip	Diagnosis
HF05	Data processing error: Undefined exception
	Hardware fault – return drive to supplier
HF06	Data processing error: Reserved exception
	Hardware fault – return drive to supplier
HF07	Data processing error: Watchdog failure
	Hardware fault – return drive to supplier
HF08	Data processing error: level 4 crash
	Hardware fault – return drive to supplier
HF09	Data processing error: Heap overflow
	Hardware fault – return drive to supplier
HF10	Data processing error: Router error
	Hardware fault – return drive to supplier
HF11	Data processing error: Access to EEPROM failed
	Hardware fault – return drive to supplier
HF12	Data processing error: Main program stack overflow
	Hardware fault – return drive to supplier
HF13	Data processing error: Software incomplete with hardware
	Hardware or software fault – return drive to supplier
HF17	Multi-module system thermistor short circuit or open circuit
217	Hardware fault – return drive to supplier
HF18	Multi-module system interconnect cable error
218	Hardware fault – return drive to supplier
HF19	Temperature feedback multiplexing failure
219	Hardware fault – return drive to supplier
HF20	Power stage recognition: serial code error
220	Hardware fault – return drive to supplier
HF21	Power stage recognition: unrecognized frame size
221	Hardware fault – return drive to supplier
HF22	Power stage recognition: multi-module frame size mismatch
222	Hardware fault – return drive to supplier
HF23	Power stage recognition: multi-module voltage rating mismatch
223	Hardware fault – return drive to supplier
HF24	Power stage recognition: unrecognized drive size
224	Hardware fault – return drive to supplier
HF25	Current feedback offset error
225	Hardware fault – return drive to supplier
HF26	Soft start relay failed to close, soft start monitor failed or braking IGBT short circuit at power up
226	Hardware fault – return drive to supplier
HF27	Power stage thermistor 1 fault
227	Hardware fault – return drive to supplier
HF29	Control board thermistor fault
229	Hardware fault – return drive to supplier
HF30	DCCT wire break trip from power module
230	Hardware fault – return drive to supplier


Trip	Diagnosis
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NO.	REVISIONS	H6630 ADVANCED PARAMETERS TRIP INDICATIONS	DRAWING NO. HA25-4674	REV. A
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lt.AC	Output current overload timed out (I²t) – accumulator value can be seen in Pr 4.19
20	<p>Ensure the load is not jammed / sticking</p> <p>Ensure that the motor rated current is not set to zero</p> <p>Check the load on the motor has not changed if seen during an auto tune, ensure that the motor rated current Pr 0.46 (Pr 5.07) or Pr 21.07 is current rating of the drive</p> <p>Tune the related speed parameter</p> <p>Check feedback device signal for noise</p> <p>Check the feedback device mechanical coupling</p>
lt.br	Braking resistor overload timed out (i²t) – accumulator value can be seen in Pr 10.39
19	<p>Ensure the values entered in Pr 10.30 and Pr 10.31 are correct</p> <p>Increase the power rating of the braking resistor and change Pr 10.30 and Pr 10.31</p> <p>If an external thermal protection device is being used and the braking resistor software overload is not required, set Pr 10.30 or Pr 10.31 to 0 to disable the trip</p>
O.CtL	Drive control board over temperature
23	<p>Check enclosure / drive fans are still functioning correctly</p> <p>Check enclosure ventilation paths</p> <p>Check enclosure door filters</p> <p>Check ambient temperature</p> <p>Reduce drive switching frequency</p>
O.ht1	Power device over temperature based on thermal model
21	<p>Reduce drive switching frequency</p> <p>Reduce duty cycle</p> <p>Decrease acceleration / deceleration rates</p> <p>Reduce motor load</p>
O.ht2	Heatsink over-temperature
22	<p>Check enclosure / drive fans are still functioning correctly</p> <p>Check enclosure ventilation paths</p> <p>Check enclosure door filters</p> <p>Increase ventilation</p> <p>Decrease acceleration / deceleration rates</p> <p>Reduce drive switching frequency</p> <p>Reduce duty cycle</p> <p>Reduce motor load</p>
O.ht3	Drive over-temperature based on thermal model
27	<p>The drive will attempt to stop the motor before tripping. If the motor does not stop in 10s the drive trips immediately</p> <p>Check DC bus ripple</p> <p>Decrease acceleration / deceleration rates</p> <p>Reduce duty cycle</p> <p>Reduce motor load</p>
Ol. AC	Instantaneous output over current detected
3	<p>Over current threshold is Kc/0.45 (see Table "Maximum motor rated current" for Kc values)</p> <p>Acceleration / deceleration rate is too short</p> <p>If seen during auto tune, reduce voltage boost Pr 5.15</p> <p>Check for short circuit on output cabling</p> <p>Check integrity of motor insulation</p> <p>Check feedback device wiring</p> <p>Check feedback device mechanical coupling</p> <p>Check feedback signals are free from noise</p> <p>Is motor cable length within limits</p> <p>Reduce the values in speed loop gain parameters – Pr 3.10, Pr 3.11 and Pr 3.12</p> <p>Has offset measurement test been completed?</p> <p>Reduce the values in current loop gain parameters – Pr 4.13 and Pr 4.14</p>

200V			400V		
Size	Current scaling (Kc) A	Max current rating A	Size	Current scaling (Kc) A	Max current rating A
DST1201x	2.92	1.70	DST1401x	2.56	1.50
DST1202x	6.52	3.80	DST1402x	4.63	2.70
DST1203x	9.26	5.40	DST1403x	6.86	4.00
DST1204x	13.03	7.60	DST1404x	10.12	5.90
			DST1405x	13.72	8.00

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0	Initial Release			
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Trip	Diagnosis									
Ol.br	Braking transistor over-current detected: short circuit protection for the braking transistor activated									
4	Check braking resistor wiring Check braking resistor value is greater than or equal to the minimum resistance value Check braking resistor insulation									
O.Ld1	Digital output overload: total current drawn from 24V supply and digital outputs exceeds 200mA									
26	Check total load on digital outputs (terminals 24, 25, 26) and +24V rail (terminal 22)									
O.SPd	Motor speed has exceeded the over speed threshold									
7	Increase the over speed trip threshold in Pr 3.08 Reduce the speed loop P gain (Pr 3.10) to reduce the speed overshoot									
OV	DC bus voltage has exceeded the peak level or the maximum continuous level for 15 seconds									
	Increase deceleration ramp (Pr 0.04) Decrease braking resistor value (staying above the minimum value) Check nominal AC supply level Check for supply disturbances which could cause the DC bus to rise – voltage overshoot after supply recovery from a notch induced by DC drives Check motor insulation <table> <tr> <td>Drive voltage rating</td><td>Peak voltage</td><td>Maximum continuous voltage level (15s)</td></tr> <tr> <td>200</td><td>415</td><td>400</td></tr> <tr> <td>400</td><td>830</td><td>800</td></tr> </table> If the drive is operating in low voltage DC mode the over voltage trip level is 1.45 x Pr 6.46.	Drive voltage rating	Peak voltage	Maximum continuous voltage level (15s)	200	415	400	400	830	800
Drive voltage rating	Peak voltage	Maximum continuous voltage level (15s)								
200	415	400								
400	830	800								
PAd	Keypad has been removed when the drive is receiving the speed reference from the keypad									
34	Install keypad and reset Change speed reference selector to select speed reference from another source									
PH	AC voltage input phase loss or large supply imbalance detected									
32	Ensure all three phases are present and balanced Check input voltage levels are correct (at full load) NOTE: LOAD LEVEL MUST BE BETWEEN 50 AND 100% FOR THE DRIVE TO TRIP UNDER PHASE LOSS CONDITIONS. THE DRIVE WILL ATTEMPT TO STOP THE MOTOR BEFORE THIS TRIP IS INITIATED									
PS	Internal power supply fault									
5	Remove any Solutions Modules and reset Hardware fault – return drive to supplier									
PS.10V	10V user power supply current greater than 10mA									
8	Check wiring to terminal 4 Reduce load on terminal 4									
PS.24V	24V internal power supply overload									
9	The total user load of the drive and Solutions Modules has exceeded the internal 24V power supply limit. The user load consists of the drive's digital outputs, the SM-I/O Plus digital outputs, the drive's main encoder supply and the SM-Universal Encoder Plus encoder supply. <ul style="list-style-type: none"> Reduce load and reset Provide an external 24V >50W power supply Remove and Solutions Modules and reset 									
PSAVE.Er	Power down save parameters in the EEPROM are corrupt									
37	Indicates that the power was removed when power down save parameters were being saved. The drive will revert back to the power down parameter set that was last saved successfully. Perform a user save (Pr xx.00 to 1000 or 1001 and reset the drive) to ensure this trip does not occur the next time the drive is powered up.									
SAVE.Er	User save parameters in the EEPROM are corrupt									
36	Indicates that the power was removed when user parameters were being saved. The drive will revert back to the user parameter set that was last saved successfully. Perform a user save (Pr xx.00 to 1000 or 1001 and reset the drive) to ensure this trip does not occur the next time the drive is powered up.									

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NO.		REVISIONS		H6630 ADVANCED PARAMETERS		DRAWING NO.		REV.	
0		Initial Release		TRIP INDICATIONS		HA25-4674		A	
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						CK. JS			
						REFERENCE			

Trip	Diagnosis		
SCL	Drive RS485 serial comms loss to remote keypad		
30	Re-install the cable between the drive and keypad Check cable for damage Replace cable Replace keypad		
SLX.dF	Solutions Module slot X trip: Solutions Module type installed in slot X changed		
204.209	Save parameters and reset		
SLX.Er	Solutions Module slot X trip: Solutions Module in slot X has detected a fault		
202.207.212	Feedback module category Check value in Pr 15/16.50. The following table lists the possible error codes for the SM-Universal Encoder Plus, SM-Encoder Plus and SM-Resolver. See the <i>Diagnostics</i> section in the relevant Solutions Module User Guide for more information.		
	Error code	Module	Diagnostic
	0	All	No trip
	1	SM-Universal Encoder Plus	Encoder power supply overload
		SM-Resolver	Excitation output short circuit
	2	SM-Universal Encoder Plus & SM-Resolver	Wire break
	3	SM-Universal Encoder Plus	Phase offset incorrect while running
	4	SM-Universal Encoder Plus	Feedback device communications failure
	5	SM-Universal Encoder Plus	Checksum or CRC error
	6	SM-Universal Encoder Plus	Encoder has indicated an error
	7	SM-Universal Encoder Plus	Initialization failed
	8	SM-Universal Encoder Plus	Auto configuration on power up has been requested and failed
	9	SM-Universal Encoder Plus	Motor thermistor trip
	10	SM-Universal Encoder Plus	Motor thermistor short circuit
	11	SM-Universal Encoder Plus	Failure of the sin/cos analog position alignment during encoder initialization
		SM-Resolver	Poles not compatible with motor
	12	SM-Universal Encoder Plus	Encoder type could not be identified during auto-configuration
13	SM-Universal Encoder Plus	Number of encoder turns read from the encoder during auto-configuration is not a power of 2	
14	SM-Universal Encoder Plus	Number of comms bits defining the encoder position within a turn read from the encoder during auto-configuration is too large.	

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NO.	REVISIONS	H6630 ADVANCED PARAMETERS TRIP INDICATIONS	DRAWING NO. HA25-4674	REV. A
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	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Error code</th> <th style="width: 15%;">Module</th> <th style="width: 30%;">Trip Description</th> <th style="width: 40%;">Diagnostic</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">15</td> <td>SM-Universal Encoder Plus</td> <td>The number of periods per revolution calculated from encoder data during auto-configuration is either <2 or >60,000.</td> <td>Linear motor pole pitch / encoder ppr set up is incorrect or out of parameter range i.e. Pr5.36 = 0 or Pr21.31 = 0. Faulty encoder</td> </tr> <tr> <td style="text-align: center;">16</td> <td>SM-Universal Encoder Plus</td> <td>The number of comms bits per period for a linear encoder exceeds 255.</td> <td>Select a different type of encoder. Faulty encoder</td> </tr> <tr> <td style="text-align: center;">74</td> <td>SM-Universal Encoder Plus & SM-Resolver</td> <td>Solutions Module has overheated.</td> <td>Check ambient temperature. Check enclosure ventilation</td> </tr> </tbody> </table>	Error code	Module	Trip Description	Diagnostic	15	SM-Universal Encoder Plus	The number of periods per revolution calculated from encoder data during auto-configuration is either <2 or >60,000.	Linear motor pole pitch / encoder ppr set up is incorrect or out of parameter range i.e. Pr 5.36 = 0 or Pr 21.31 = 0. Faulty encoder	16	SM-Universal Encoder Plus	The number of comms bits per period for a linear encoder exceeds 255.	Select a different type of encoder. Faulty encoder	74	SM-Universal Encoder Plus & SM-Resolver	Solutions Module has overheated.	Check ambient temperature. Check enclosure ventilation																																							
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202,207,212	Automation (Applications) Module category Check value in Pr 17.50 . The following table lists the possible error codes for the Digitax ST Plus and Digitax ST indexer.																																																							
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0		Initial Release		TRIP INDICATIONS		HA25-4674		A	
1		ECR#82796				DR. MHC		09/30/2014	
		CR. JS							
		REFERENCE							

Trip		Diagnosis	
SLX.Er		Solutions Module slot X trip: Solutions Module in slot X or Digutax ST Plus/Indexer has detected a Fault	
202,207,212		Automation (Applications) Module category	
		Check value in Pr 17.50. The following table lists the possible error codes for the Digitax ST Plus and Digitax ST indexer.	
		Error Code	Trip Description
		66	User heap too large
		67	RAM file does not exist or a non-RAM file id has been specified
		68	The RAM file specified is not associated to an array
		69	Failed to update drive parameter database cache in Flash memory
		70	User program downloaded while drive enabled
		71	Failed to change drive mode
		72	Invalid CTNet buffer operation
		73	Fast parameter initialization failure
		74	Over-temperature
		75	Hardware unavailable
		76	Module type cannot be resolved. Module is not recognized
		77	Inter-Solutions Module comms error with module in slot 1
		78	Inter-Solutions Module comms error with module in slot 2
		79	Inter-Solutions Module comms error with module in slot 3
		80	Inter-Solutions Module comms error with module unknown slot
		81	APC internal error
		82	Communication to drive faulty

SLX.Er		Solutions Module slot X trip: Solutions Module in slot X has detected a fault		
202,207,212		Automation (I/O Expansion) module category		
		Check value in Pr 15/16.50. The following table lists the possible error codes for the SM-I/O Plus, SM-I/O Lite, SM-I/O Timer, SM-I/O PELV, SM-I/O 120V and SM-I/O 24V Protected. See the <i>Diagnostics</i> section in the relevant Solutions Module User Guide for more information.		
		Error Code	Module	Trip Description
		0	All	No errors
		1	All	Digital output overload
		2	SM-I/O Lite, SM-I/O Timer	Analog input 1 current input too high (>22mA) or too low (<3mA)
			SM-I/O PELV, SM-I/O 24V Protected	Digital input overload
		3	SM-I/O PELV, SM-I/O 24V Protected	Analog input 1 current input too low (<3mA)
			SM-I/O 24V Protected	Communications error
		4	SM-I/O PELV	User power supply absent
		5	SM-I/O Timer	Real time clock communication error
		74	All	Module over temperature

SLX.Er		Solutions Module slot X trip: Solutions Module in slot X has detected a fault		
202,207,212		Fieldbus module category		
		Check value in Pr 15/16.50. The following table lists the possible error codes for the Fieldbus modules. See the <i>Diagnostics</i> section in the relevant Solutions Module User Guide for more information.		
		Error Code	Module	Trip Description
		0	All	No trip
		52	SM-PROFIBUS-DP, SM-Interbus, SM-DeviceNet, SM-CANOpen	User control word trip
61	SM-PROFIBUS-DP, SM-Interbus, SM-DeviceNet, SM-CANOpen, SM-SERCOS	Configuration error		


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NO.		REVISIONS		H6630 ADVANCED PARAMETERS		DRAWING NO.		REV.	
0		Initial Release		TRIP INDICATIONS		HA25-4674		A	
1		ECR#82796				DR. MHC		09/30/2014	
						CK. JS			
						REFERENCE			

Trip		Diagnosis			
SLX.Er		Solutions Module slot X trip: Solutions Module in slot X has detected a fault			
202,207,212		Fieldbus module category			
		Check value in Pr 15/16.50. The following table lists the possible error codes for the Fieldbus modules. See the <i>Diagnostics</i> section in the relevant Solutions Module User Guide for more information.			
		Error Code	Module	Trip Description	
		64	SM-DeviceNet	Expected packet rate timeout	
		65	SM-PROFIBUS-DP, SM-Interbus, SM-DeviceNet, SM-CANOpen, SM-SERCOS	Network loss	
		66	SM-PROFIBUS-DP	Critical link failure	
			SM-CAN, SM-DeviceNet, SM-CANOpen	Bus off error	
		69	SM-CAN	No acknowledgement	
		70	All (except SM-Ethernet)	Flash transfer error	
			SM-Ethernet	No valid menu data available for the module from the drive	
		74	All	Solutions module over temperature	
		75	SM-Ethernet	The drive is not responding	
		76	SM-Ethernet	The Modbus connection has timed out	
		80	All (except SM-SERCOS)	Inter-option communications error	
		81	All (except SM-SERCOS)	Communications error slot 1	
		82	All (except SM-SERCOS)	Communications error slot 2	
		83	All (except SM-SERCOS)	Communications error slot 3	
		84	SM-Ethernet	Memory allocation error	
		85	SM-Ethernet	File system error	
		86	SM-Ethernet	Configuration file error	
87	SM-Ethernet	Language file error			
98	All	Internal watchdog error			
99	All	Internal software error			

SLX.Er		Solutions Module slot X trip: Solutions Module in slot X has detected a fault			
202,207,212		SLM module category			
		Check value in Pr 15/16.50. The following table lists the possible error codes for the SM-SLM. See the <i>Diagnostics</i> section in the SM-SLM User Guide for more information.			
		Error Code	Trip Description		
		0	No fault detected		
		1	Power supply overloaded		
		2	SLM version too low		
		3	DriveLink error		
		4	Incorrect switching frequency selected		
		5	Feedback source selection incorrect		
		6	Encoder error		
		7	Motor object number of instances error		
		8	Motor object list version error		
		9	Performance object number of instances error		
		10	Parameter channel error		
		11	Drive operating mode incompatible		
		12	Error writing to the SLM EEPROM		
		13	Motor object type incorrect		
		14	Digitax ST object error		
		15	Encoder object CRC error		
		16	Motor object CRC error		
17	Performance object CRC error				
18	Digitax ST object CRC error				
19	Sequencer timeout				
74	Solutions module over temperature				

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			REFERENCE	

Trip	Diagnosis
SLX.HF	Solutions Module slot X trip: Solutions Module X hardware fault
200,205,210	Ensure Solutions Module is installed correctly. Return Solutions Module to supplier.
SLX.nF	Solutions Module slot X trip: Solutions Module has been removed
203,208,213	Ensure Solutions Module is installed correctly. Re-install Solutions Module. Save parameters and reset drive.
SL.rtd	Solutions Module trip: Drive mode has changed and Solutions Module parameter routing is now incorrect
215	Press reset. If the trip persists, contact the supplier of the drive.
SLX.tO	Solutions Module slot X trip: Solutions Module watchdog timeout
201,206,211	Press reset. If the trip persists, contact the supplier of the drive
t038	User trip defined in 2nd processor Solutions Module code
38	SM-Applications program must be interrogated to find the cause of this trip.
t040 to t089	User trip defined in 2nd processor Solutions Module code
40 to 89	SM-Applications program must be interrogated to find the cause of this trip.
t099	User trip defined in 2nd processor Solutions Module code
99	SM-Applications program must be interrogated to find the cause of this trip.
t101	User trip defined in 2nd processor Solutions Module code
101	SM-Applications program must be interrogated to find the cause of this trip.
t112 to t160	User trip defined in 2nd processor Solutions Module code
112 to 160	SM-Applications program must be interrogated to find the cause of this trip.
t168 to t171	User trip defined in 2nd processor Solutions Module code
168 to 171	SM-Applications program must be interrogated to find the cause of this trip
t216	User trip defined in 2nd processor Solutions Module code
216	SM-Applications program must be interrogated to find the cause of this
th	Motor thermistor trip
24	Check motor temperature Check thermistor continuity Set Pr 7.15 = VOLT and reset the drive to disable this function
thS	Motor thermistor short circuit
25	Check motor thermistor wiring Replace motor / motor thermistor Set Pr 7.15 = VOLT and reset the drive to disable this function
tunE*	Autotune stopped before completion
18	The drive has tripped out during the autotune The red stop key has been pressed during the autotune The SAFE TORQUE OFF signal (terminal 31) was active during the autotune procedure
tunE1*	The position feedback did not change or required speed could not be reached during the inertia test (see Pr 5.12)
11	Ensure the motor is free to turn i.e. brake was released. Check feedback device wiring is correct. Check feedback parameters are set correctly. Check encoder coupling to motor
tunE2*	Position feedback direction incorrect or motor could not be stopped during the inertia test (see Pr 5.12)
12	Check motor cable wiring is correct. Check feedback device wiring is correct.
tunE3*	Drive encoder commutation signals connected incorrectly or measured inertia out of range (see Pr 5.12)
13	Check motor cable wiring is correct. Check feedback device U,V and W commutation signal wiring is correct
Trip	Diagnosis

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NO.	REVISIONS	H6630 ADVANCED PARAMETERS TRIP INDICATIONS	DRAWING NO.	REV.
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			DR. MHC	09/30/2014
			CK. JS	
			REFERENCE	

tunE4*	Drive encoder U commutation signal fail during an autotune		
14	Check feedback device U phase commutation wires continuity Replace encoder.		
tunE5*	Drive encoder V commutation signal fail during an autotune		
15	Check feedback device V phase commutation wires continuity Replace encoder.		
tunE6*	Drive encoder W commutation signal fail during an autotune		
16	Check feedback device W phase commutation wires continuity Replace encoder.		
tunE7*	Motor number of poles set incorrectly		
17	Check lines per revolution for feedback device Check the number of poles in Pr 5.11 is set correctly		
UP ACC	Onboard PLC program: cannot access Onboard PLC program file on drive		
98	Disable drive – write access is not allowed when the drive is enabled. Another source is already accessing onboard PLC program – retry once other action is complete		
UP div0	Onboard PLC program attempted divide by zero		
90	Check program		
UP OFL	Onboard PLC program variables and function block calls using more than the allowed RAM space (stack overflow)		
95	Check program		
UP ovr	Onboard PLC program attempted out of range parameter write		
94	Check program		
UP Par	Onboard PLC program attempted access to a non-existent parameter		
91	Check program		
UP ro	Onboard PLC program attempted write to a read-only parameter		
92	Check program		
UP So	Onboard PLC program attempted read of a write-only parameter		
93	Check program		
UP udF	Onboard PLC program un-defined trip		
97	Check program		
UP uSEr	Onboard PLC program requested a trip		
96	Check program		
UV	DC bus under voltage threshold reached		
1	Check AC supply voltage level		
	Drive voltage rating (Vac)	Under voltage threshold (Vdc)	UV reset voltage (Vdc)
	200	175	215
	400	330	425

* If a tunE through tunE7 trip occurs, then after the drive is reset the drive cannot be made to run unless it is disabled via the SAFE TORQUE OFF input (terminal 31), drive enable parameter (Pr 6.15) or the control word (Pr 6.42 and Pr 6.43).

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