KNIGHT
GLOBAL

E-Tractor
Operation, Installation, and Maintenance Manual

THIS MANUAL CONTAINS IMPORTANT INFORMATION REGARDING INSTALLATION, SAFETY, MAINTENANCE, AND OPERATION OF KNIGHT GLOBAL E-TRACTOR AND SHOULD BE AVAILABLE TO ALL PERSONNEL RESPONSIBLE FOR USING THE E-TRACTOR.

Rev: 010-202102

Warranty

Knight warrants that its products and parts shall meet all applicable specifications, performance requirements, and be free from defects in material and workmanship for one year, (Servo Systems for two years), from the date of invoice, unless otherwise noted. One exclusion would include any purchased components not manufactured by Knight and their specific individual warranties. Paint defects, scratches and marring from shipping are also excluded.

This warranty shall not cover failure or defective operation caused by inadequate training provided by customer regarding the operation and / or maintenance of the tool, misuse, negligence, misadjustment, or alteration not approved by Knight. Knight's obligation is limited to the replacement or repair of Knight's products at a location designated by Knight. Buyer is responsible for all associated internal removal and reinstallation costs as well as freight charges to and from Knight Global. Knight's maximum liability shall not in any case exceed the contract price for the products claimed to be defective.

On a design & build job, the customer is the owner of the equipment once they authorize shipment. The equipment cannot be returned for reimbursement or credit.

Knight warranties servo hoists, servo balancers, and servo tractors to be free from defects in material or workmanship for a period of two years or 6000 hours use from date of shipment.

Knight distributors/agents are not authorized to circumvent any of the terms and conditions of this warranty unless approved in writing by Knight Management. Statements made by Knight distributors/agents do not constitute warranties.

Unauthorized changes to any of Knight's products voids our performance warranty and any potential liabilities. If changes are necessary, please contact Knight for authorization to continue.

Disclaimers: OTHER THAN AS SET FORTH HEREIN, NO OTHER EXPRESS WARRANTIES, AND NO IMPLIED WARRANTIES, ORAL AND WRITTEN, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE MADE BY KNIGHT WITH RESPECT TO ITS PRODUCTS AND ALL SUCH WARRANTIES ARE HEREBY SPECIFICALLY DISCLAIMED. KNIGHT SHALL NOT BE LIABLE UNDER ANY CIRCUMSTANCES FOR ANY INCIDENTAL, SPECIAL AND/OR CONSEQUENTIAL DAMAGES WHATSOEVER, WHETHER OR NOT FORESEEABLE, INCLUDING BUT NOT LIMITED TO DAMAGES FOR LOST PROFITS AND ALL SUCH INCIDENTAL, SPECIAL AND / OR CONSEQUENTIAL DAMAGES ARE HEREBY ALSO SPECIFICALLY DISCLAIMED.

A. VISIBLE LOSS OR DAMAGE
If any of the goods called for on the bill of lading or express receipt are damaged, or the quantity is short, do not accept them until the freight or express agent makes an appropriate notation on your freight bill or express receipt.

B. CONCEALED LOSS OR DAMAGE
When a shipment has been delivered to you in an apparent good condition, but upon opening the crate or container, loss or damage has taken place while in transit, notify the transportation company immediately.

C. DAMAGE CLAIMS
You must file claims for damage with the carrier. It is the responsibility of the transportation company to reimburse you for repair or replacement or goods damaged in shipment. Claims for loss or damage in shipment must not be deducted from the Knight Global invoice, nor should payment of Knight Global invoice be withheld awaiting adjustment of such claims as the carrier guarantees safe delivery. Products damaged in shipment must be returned to us for repair, services will be charged to your account and these charges will form the basis for claim against the carrier.

Every effort has been made to provide complete and accurate product information in this manual. However, due to product improvements and changes, discrepancies and omissions may be present. It is the responsibility of the end user to exercise common sense and judgment when performing the tasks described in this manual. If any procedure seems inaccurate, incomplete or unsafe please put the equipment in a safe condition and contact Knight Global service department for assistance.

Safety

This manual provides important information for all personnel involved in the installation, operation and maintenance of the Knight Global E-Tractor. Even if you feel that you are familiar with this or similar equipment, you should read and understand this manual before performing any of the tasks.

Knight Global recognizes that most companies have a safety program in place at their facility. The Safety Section, Notes, Cautions and Warnings in this manual are intended to supplement and not supersede any existing plant or company safety guidelines or regulations.

Knight Global cannot be aware of or provide for all the procedures by which the E-Tractor operations or repairs may be conducted and the hazards which may result from each method. If operation or maintenance not specifically recommended by Knight Global is conducted, it must be ensured that product or personnel safety is not endangered by these actions. If not sure of an operation or maintenance procedure or step, personnel should place the E-Tractor in a safe condition and contact a supervisor and/or Knight Global service department for technical support.

Modifications to upgrade, re-rate or otherwise alter this equipment shall be authorized only by the original equipment manufacturer.

If a below-the-hook lifting device or sling is used with the E-Tractor, refer to ANSI/ASME B30.9, "Safety Standard for Slings" or ANSI/ASME B30.20, "Safety Standard for Below-the-Hook Lifting Devices".

Electrical equipment described in this manual are designed and built-in compliance with ANSI/NFPA 70, "National Electrical Code". It is the responsibility of the system designer, system manufacturer, crane or rail manufacturer, installer and user to ensure that the installation and associated wiring of the E-Tractor and components is in compliance with ANSI/NFPA 70, and all applicable Federal, State and Local Codes.

Hazardous voltages are present in the E-Tractor and components. Only properly trained and component personnel should perform inspections or repairs on the E-Tractor or accessories.
Prior to performing any maintenance (mechanical or electrical) on the E-Tractor de-energize (disconnect) the main switch supplying power to the E-Tractor. Lock out the power supply following standard plant procedures.
Ensuring that the installation, inspection, testing maintenance and operation is compliance with ANSI/ASME B30.16, "Safety Standard for Overhead Hoists", OSHA Regulations ANSI/NFPA 70, National Electric Code and ANSI/ASME B30 (if installed as part of an overhead crane system) is the responsibility of the owner/operator.
All personnel that will install, operate, inspect, test or maintain the tractor should read this manual and be familiar with all applicable portions of ANSI/ASME B30.16, "Safety Standard for Overhead Hoists", OSHA Regulations ANSI/NFPA 70, "National Electric Code" and ANSI/ASME B30 (if installed as part of an overhead crane system).

If clarification of any information in this manual or additional information is required contact Knight Global. Do not install, operate, inspect, test or maintain the tractor unless all information is understood. Ensuring that the installation, inspection, testing maintenance and operation is compliance with ANSI/ASME B30.16, "Safety Standard for Overhead Hoists", OSHA Regulations ANSI/NFPA 70, National Electric Code and ANSI/ASME B30 (if installed as part of an overhead crane system) is the responsibility of the owner/operator.
All personnel that will install, operate, inspect, test or maintain the tractor should read this manual and be familiar with all applicable portions of ANSI/ASME B30.16, "Safety Standard for Overhead Hoists", OSHA Regulations ANSI/NFPA 70, "National Electric Code" and ANSI/ASME B30 (if installed as part of an overhead crane system).

If clarification of any information in this manual or additional information is required contact Knight Global. Do not install, operate, inspect, test or maintain the tractor unless all information is understood.

This manual provides important information for all personnel involved in the installation, operation and maintenance of the Knight Global Lift Assist system. All personnel must read this document before operating the equipment.

It is the responsibility of the end user to exercise common sense and judgment when performing the tasks described in this manual. If any procedure seems inaccurate, incomplete or unsafe please put the equipment in a safe condition and contact Knight Global service department for assistance.

Throughout this manual there are steps and procedures that if not performed correctly can result in personal injury or equipment damage. The following signal words are used to identify the level of potential hazard.

⚠	**WARNING**
	Indicates a hazard which will cause severe injury, death or substantial equipment damage.

⚠	**CAUTION**
	Indicates a hazard which can or will cause injury or equipment damage.

⚠	**NOTE**
	Notifies personnel of installation, operation or maintenance information which is important but not hazard related.

General Safety Precautions

Safe operating instructions are provided to make the operator aware of hazards to avoid and are not necessarily limited to the following list:

- Do not operate the E-Tractor before reading this technical manual.
- Allow only personnel trained in safety and operation of this E-Tractor to operate the E-Tractor.
- If the E-Tractor is locked out or a "DO NOT OPERATE" sign is on the E-Tractor or controls do not operate the E-Tractor until the lock or sign is removed by designated personnel.
- Before each shift or prior to use inspect the E-Tractor in accordance with the procedures defined in the maintenance section of this manual.
- Pay attention to the load all times when operating the E-Tractor.
- Ensure no personnel are in the path of the load.
- Do not move a load over personnel.
- Never use a E-Tractor for moving people or livestock.
- Do not allow anyone to stand under a suspended load.
- Avoid collisions or bumping of the E-Tractor.
- Do not operate E-Tractor when damaged or malfunctioning.

RUN/STOP Push Button

If an operator needs to shut down the system immediately, the operator pushes the Run/Stop button. The system will not function until it is reset. To reset the system from the run/stop condition, the operator turns the button clockwise to release it from the down position. All over travel limits and parameters remain intact.
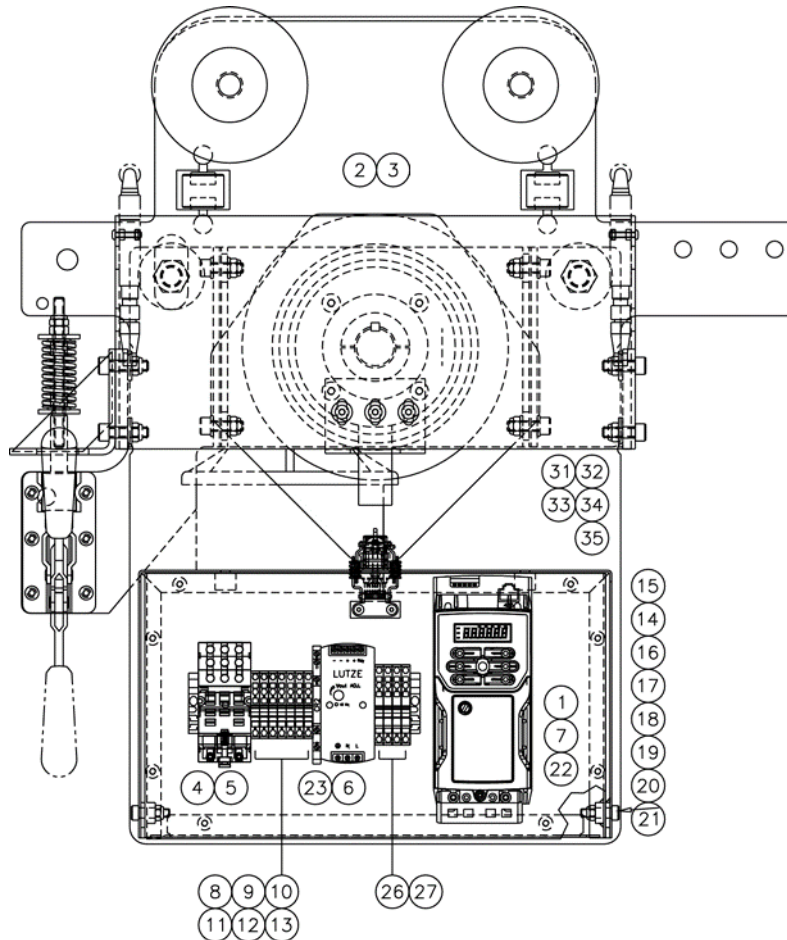
Introduction

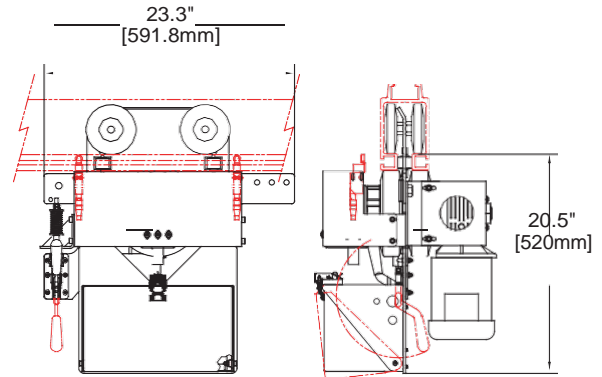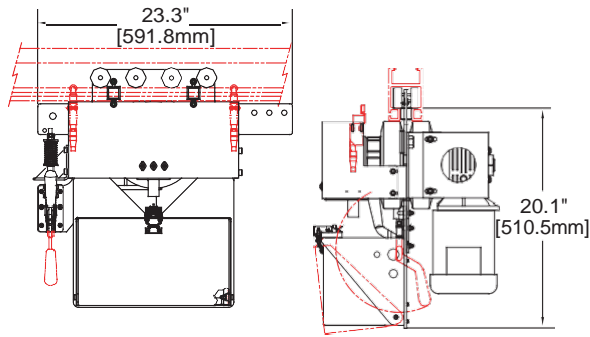**Figure 2**
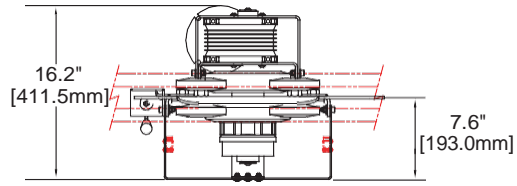
E-Tractor Callout's (Refer to Figure 2)

1. DRIVE, VFD, Unidrive M400, .5HP, 240V-4A
   or DRIVE, VFD, PowerFlex 525, .5HP, 480VAC
2. MOTOR, 1/2 HP, 1750RPM, 240V
3. GEARBOX
4. 24VDC RELAY
5. BASE FOR 700-HB RELAY
6. POWER SUPPLY 24VDC 60W
7. KEYPAD
8. TERMINAL BLOCK
9. CENTER JUMPERS
10. END PLATE
11. END ANCHOR
12. TERMINAL GROUND
13. DIN RAIL STEEL
14. CABLE, 14G, 3C, SOOW, 600V, BLK
15. RECEPT, PANEL, FEMALE, 8-PIN

16. 1.5mm2, 4-COND, FLEX, ORG CABLE
17. 3/4NPT STEEL LOCK NUT
18. 18. 3/4NPT CRDGRP (.312-.437)
19. LOCKING PLUG (M) 15A 250V
20. LOCKING CONN (F) 15A 250V
21. STRAIN RELIEF FLEXCOR, 3/4"
22. ADAPTOR, RS485 COM, M200-400
23. RELAY, 1NO-1NC, 24VDC COIL
26. END PLATE
27. TERMINAL BLOCK
31. SWITCH, LIMIT, 1NO/1NC, M12
32. SWITCH, ROLLER, STEEL
33. SWITCH, LIMIT, HEAD
34. CORD SET, 4-PIN, MICRO, M/F
35. RECEPTACLE, 4-PIN, MIC, FEMALE

Models and Specifications

RAD4110 Rail Series

16.2"
[411.5mm]

7.6"
[193.0mm]

23.3"
[591.8mm]

20.1"
[510.5mm]

RAD7510 Rail Series

16.2"
[411.5mm]

7.6"
[193.0mm]

23.3"
[591.8mm]

20.5"
[520mm]
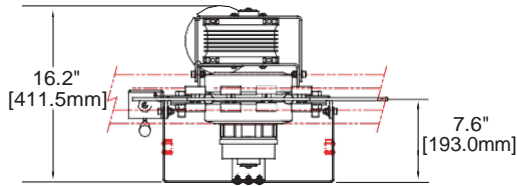
EXAMPLE:
ORDER # : KET37122DC

MODEL #					
KET	X	X	XX	X	X

1. SYSTEM CONFIGURATION
   VARIABLE SPEED TRACTOR = KET

2. LOAD CAPACITY
   3 = 3000 lbs [1360kg]

3. RAIL STYLE TRACTOR TO BE USED ON
   KNIGHT RAD4110 = 4
   KNIGHT RAD7510 = 7
   SPECIAL RAIL = S (SPECIFY)

4. MAXIMUM SPEED UNLOADED IN FPM
   090 FPM = 09
   120 FPM = 12
   180 FPM = 18
   SPECIAL FPM = S (SPECIFY)

5. PENDANT
   1 SPEED = 1
   2 SPEED = 2
   SPECIAL = S (SPECIFY)

6. OPTIONAL ACCESSORIES
   DC = DRIVE CLUTCH
   TL = TRAVEL LIMITS
   RH = RETURN TO HOME
   SA = SHOCK ABSORBER ASSEMBLY

Optional Accessories		
Accessory	Part #	Description
Shock Absorber Assemblies	VFDTA1003	Used on applications where the tractor will frequently contact the end of the rail or mid rail stop.
Travel Limits	VFDTA1005	Used to limit tractor travel within a predetermined work area.
Return to Home	VFDTA1006	Allows the tractor to return to Home position automatically.
Electrical Disconnect Box	EBA1003	Steps down electrical feed from 480v to 230v.

Installation

Prior to installation, visually inspect the E-Tractor for signs of damage.

⚠	**CAUTION**
	Prior to placing this unit into service, the owners and user are advised to examine specific local and/or other regulations, including ANSI and OSHA regulations that may apply to the use of this product.

⚠	**WARNING**
	A moving load can cause injury or death. Before installing this E-Tractor read the **"Safety"** section of this manual.

Follow all procedures in this section for installation and set-up of the E-Tractor.

Retain all product information supplied with the E-Tractor for future reference.

Ensure that the supporting structure is able to support the weight of the system and load. The structure should be able to support 300 percent of the combined weight of the E-Tractor and load. Do not use a supporting structure that tilts the E-Tractor to one side or the other.

For safe and proper installation into a rail system, refer to the installation manual provided by the rail system manufacturer.

When installation is complete and prior to placing the E-Tractor into operation, inspect the E-Tractor following the "Periodic Inspection" procedure on page 11 of the "Maintenance" section.

E-Tractor Installation

Prior to installation visually inspect the tractor for signs of damage or missing parts.

1. Remove end cap on rail system or open inspection gate.

⚠	**NOTE**
	Ensure that drive wheel engagement handle is in the up position. (Disengaged) (Refer to Figure 3).

2. Slide trolley into enclosed rail system. (Refer to Figure 5)

⚠	**NOTE**
	Ensure that the (3) hole pattern is facing towards tow bar. (Refer to Figure 4).

3. Once E-tractor is fully inserted within the rail system, replace end cap or close inspection gate.

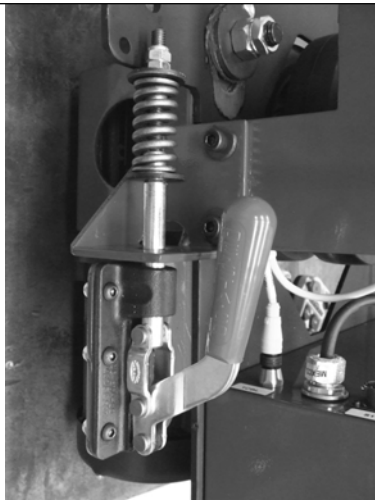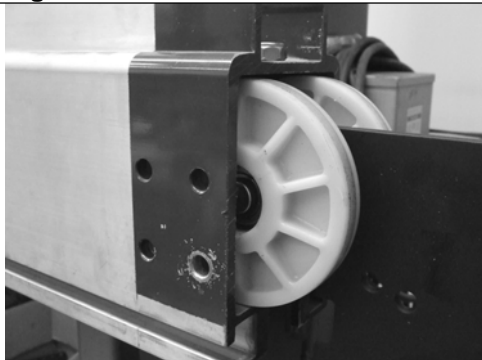| ⚠	**NOTE**
	Ensure that drive wheel engagement handle is in the down position. (Engaged). (Refer to Figure 5)

Figure 3

Figure 4

Figure 5

Drive Wheel Adjustment:

1. Ensure that the drive wheel is engaged and handle is in full down position. (Refer to Figure 6)

2. Check for contact between drive wheel and bottom of enclosed wheel. (Refer to Figure 7 and 8)

3. Adjust the hex nut located above spring on handle to increase or decrease contact pressure. (Refer to figure 9)

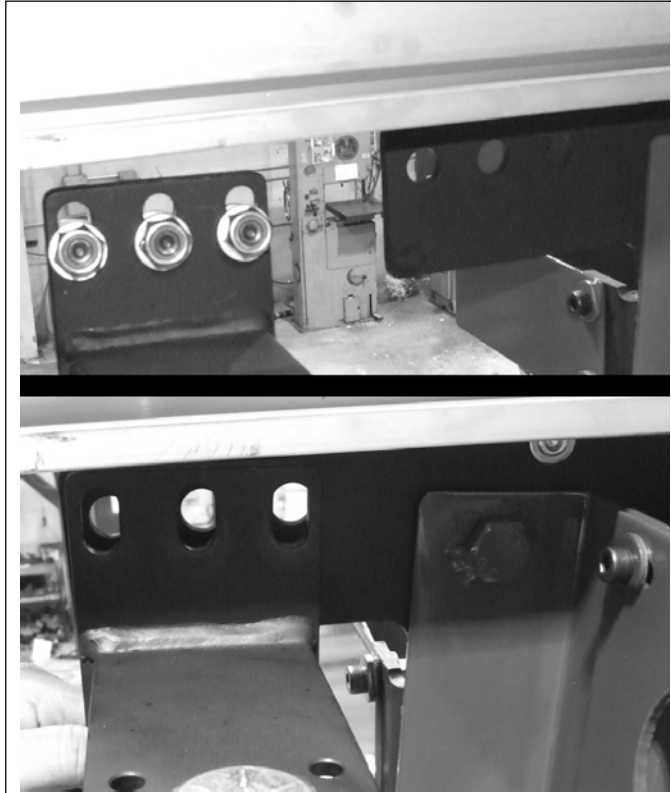**Figure 6**

Figure 7

Figure 8

Hex Nut

Figure 9

Tow Bar to E-Tractor Drive Connection:

1. Disengage Drive Wheel Handle which allows E-tractor to freewheel (If applicable).

2. Align the (3) hole pattern to mate with (3) hole pattern on tow bar. (Refer to Figure 10).

3. Secure supplied fasteners according to torque specifications.

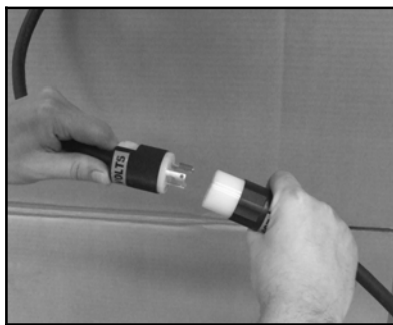4. See supplied drawings for further installations of tow bar hardware.

Figure 10

Power Supply to E-Tractor:
Power Requirements: Standard 240V AC Single Phase / 60 hertz

1. The E-Tractor System is operated by plug and cord power supply. Insert plug into electrical receptacle.

Figure 11

Unidrive M Connect

Connecting to a Knight E-Tractor

1. Getting started:
   Hardware required
   - PC – Laptop or Personal Computer with MS Windows OS
   - Emerson USB/Serial adaptor – P/N CT Comm cable USB-RS485

   Software required
   - Emerson M Connect – Unidrive M Connect version V02.00.00 or greater.
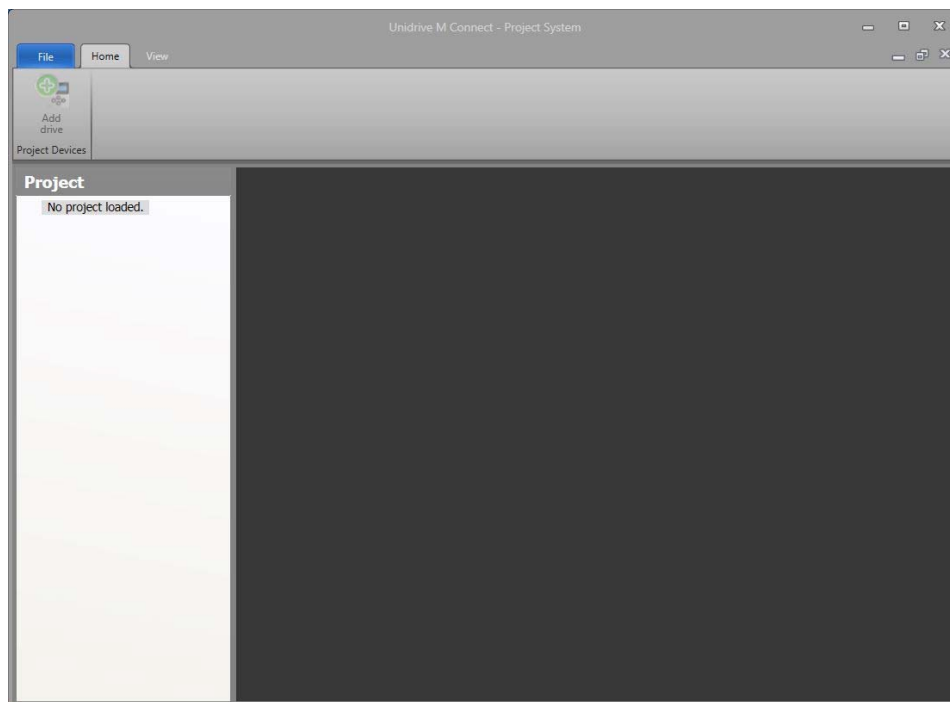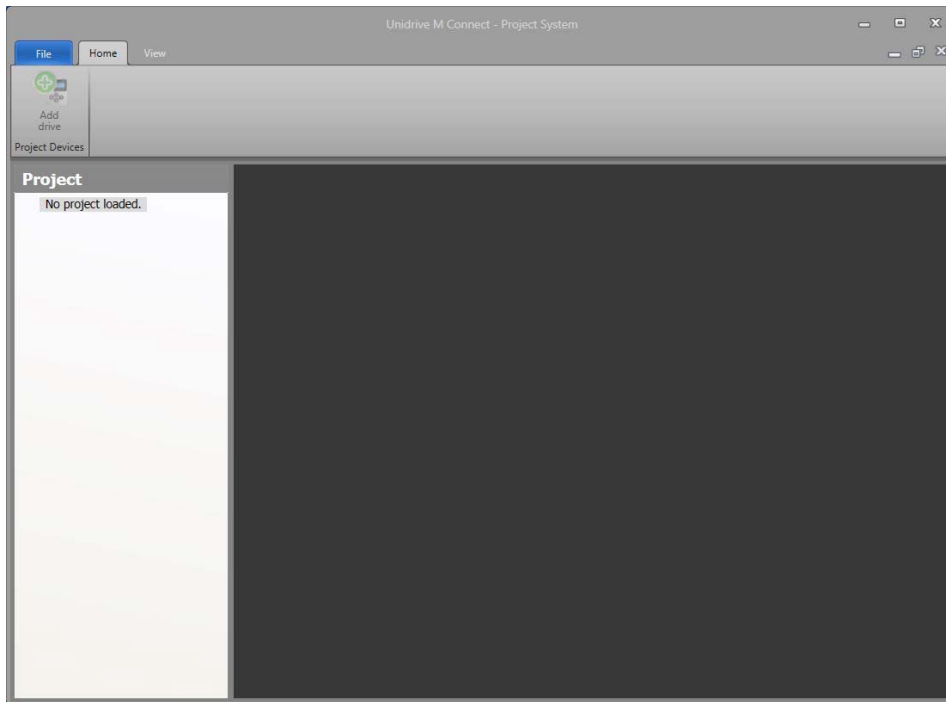   - Available at: http://www.emersonindustrial.com/
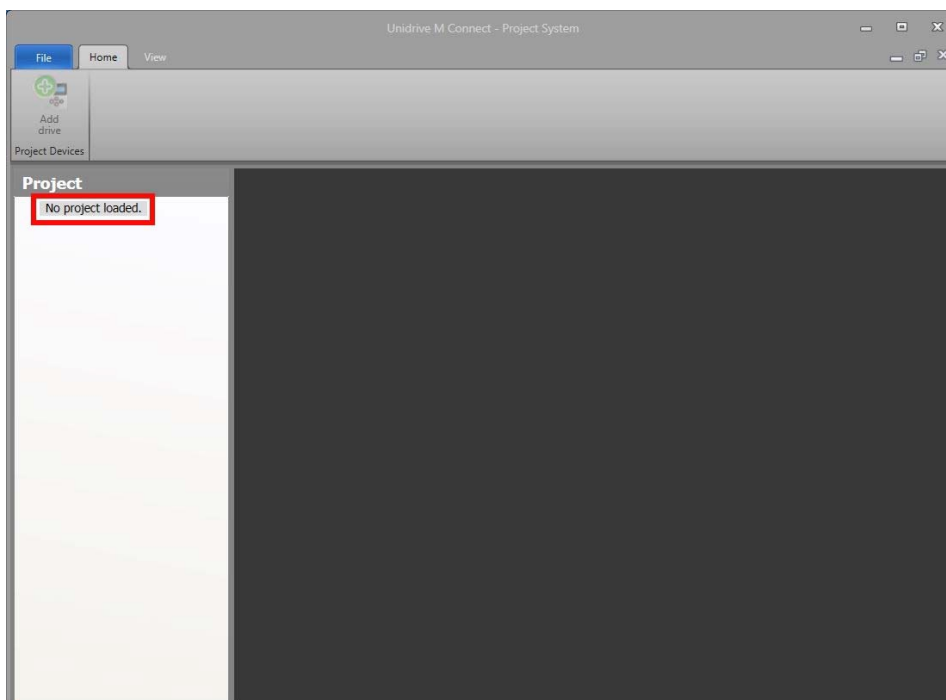

Figure 12

2. Open Unidrive M Connect software from the Start Button or Desktop Icon.

Figure 13

3. Configure communications port for the Emerson USB/Serial adaptor
   □ Plug the Emerson USB/Serial adaptor into an available USB port on the PC
   □ Open Emerson M Connect software.
   □ Double-click on No project loaded icon under Project.

Figure 14

4. Configure communications port for the Emerson USB/Serial adaptor:
   □ Select RTU network in New Project dialog-box.
   □ Click OK button
   □ M Connect software will start scanning for drive on the network
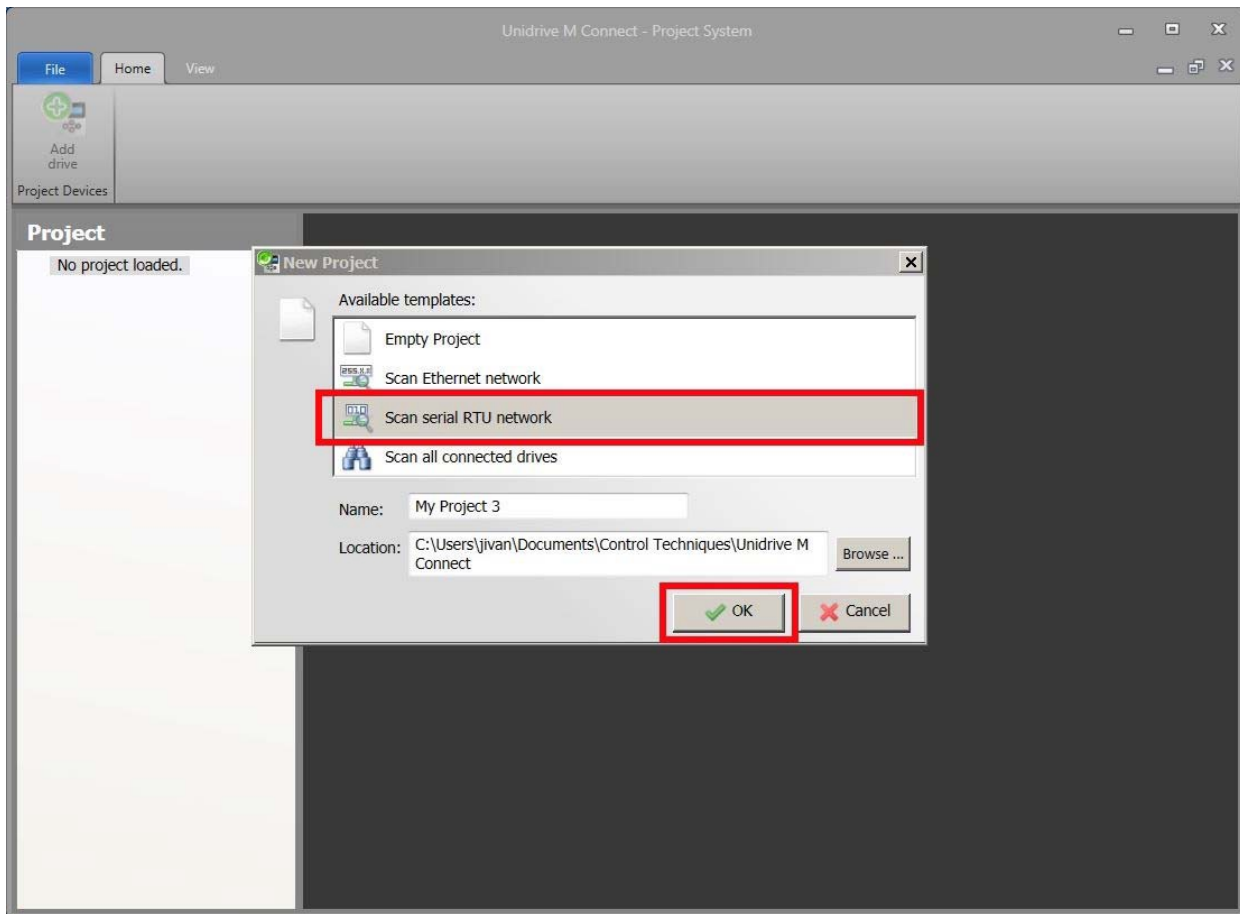
Figure 15

5. During the scan for on-line drives on the network a dialog-box similar to the image in Figure 16 will be displayed.
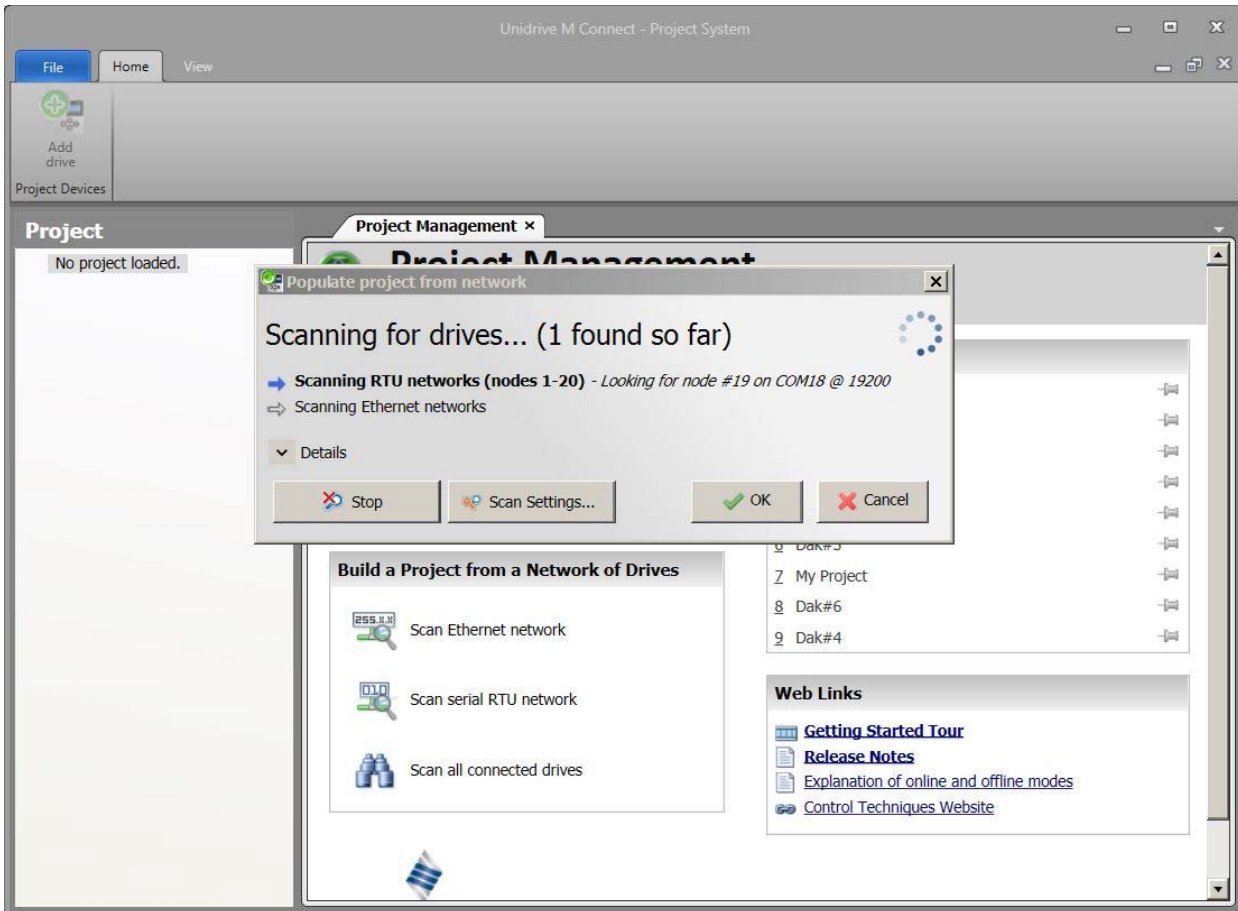

Figure 16

6. If, no on-line drives are found on the network a dialog-box similar to the image in Figure 17 will be displayed.
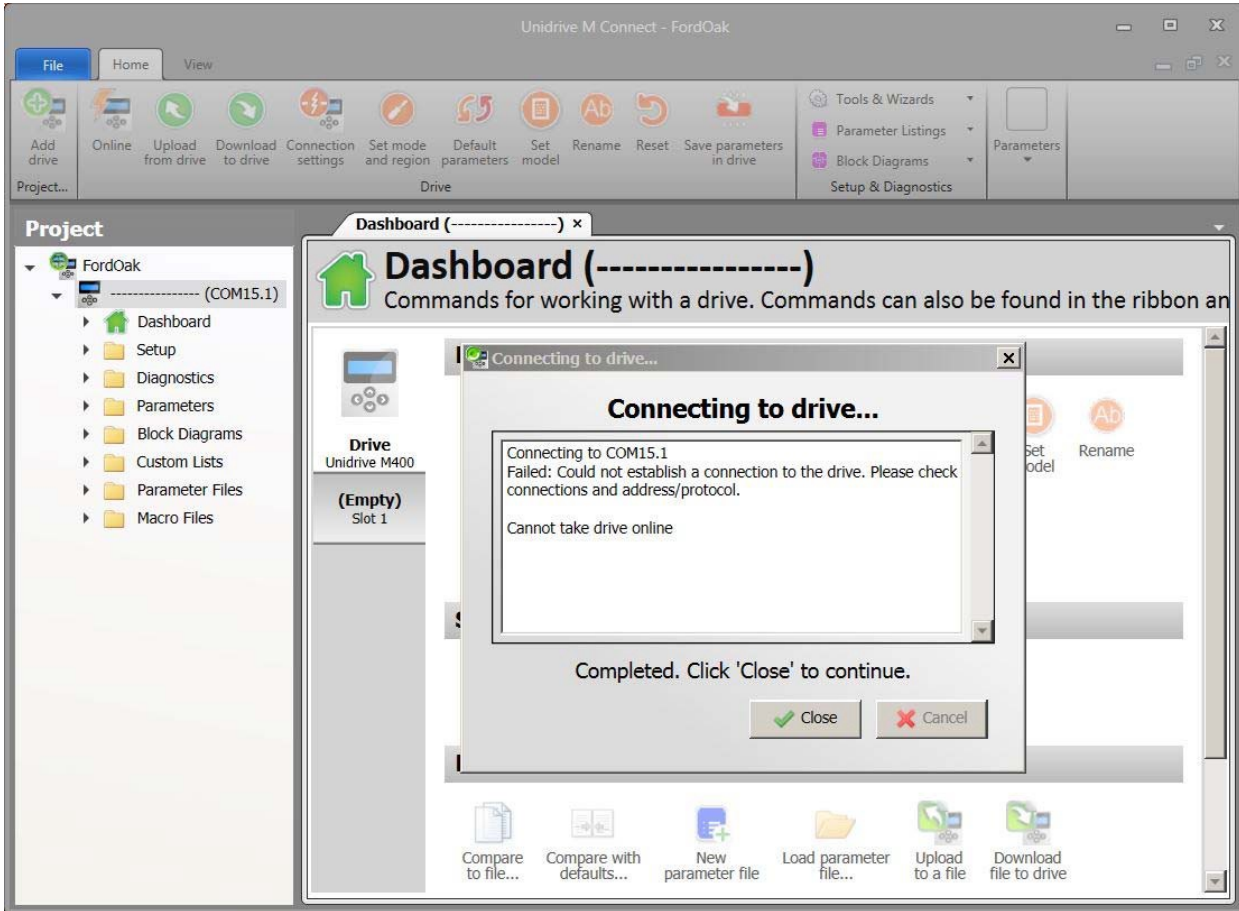
Figure 17

7. If the no on-line drives are found on the network Discovery Setting or the Connection Address Editor must be set.
   Set-up Discovery Settings:
   - □ Select RTU Protocol
   - □ Address Range is 1 to 5
   - □ Check Discover COM Port
   - □ Click Apply button
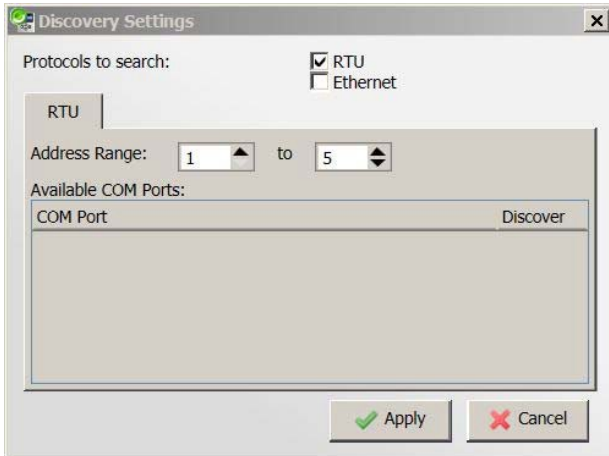
Figure 18

8. If the no on-line drives are found on the network Discovery Setting or the Connection Address Editor must be set.

   Set-up Connection Address Editor:
   - □ Select RTU Protocol
   - □ Set Address to a 1
   - □ Set COM Port to the available COM Port
   - □ Click OK button
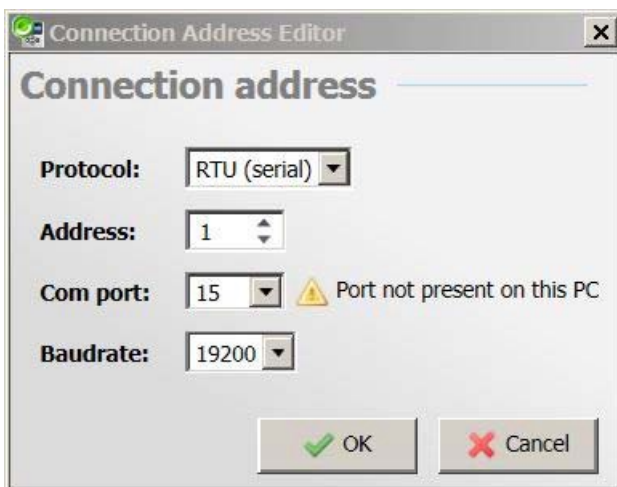
Figure 19

9. Unidrive M Connect will search for the drives in the set address range on the current COM/RTU connection.
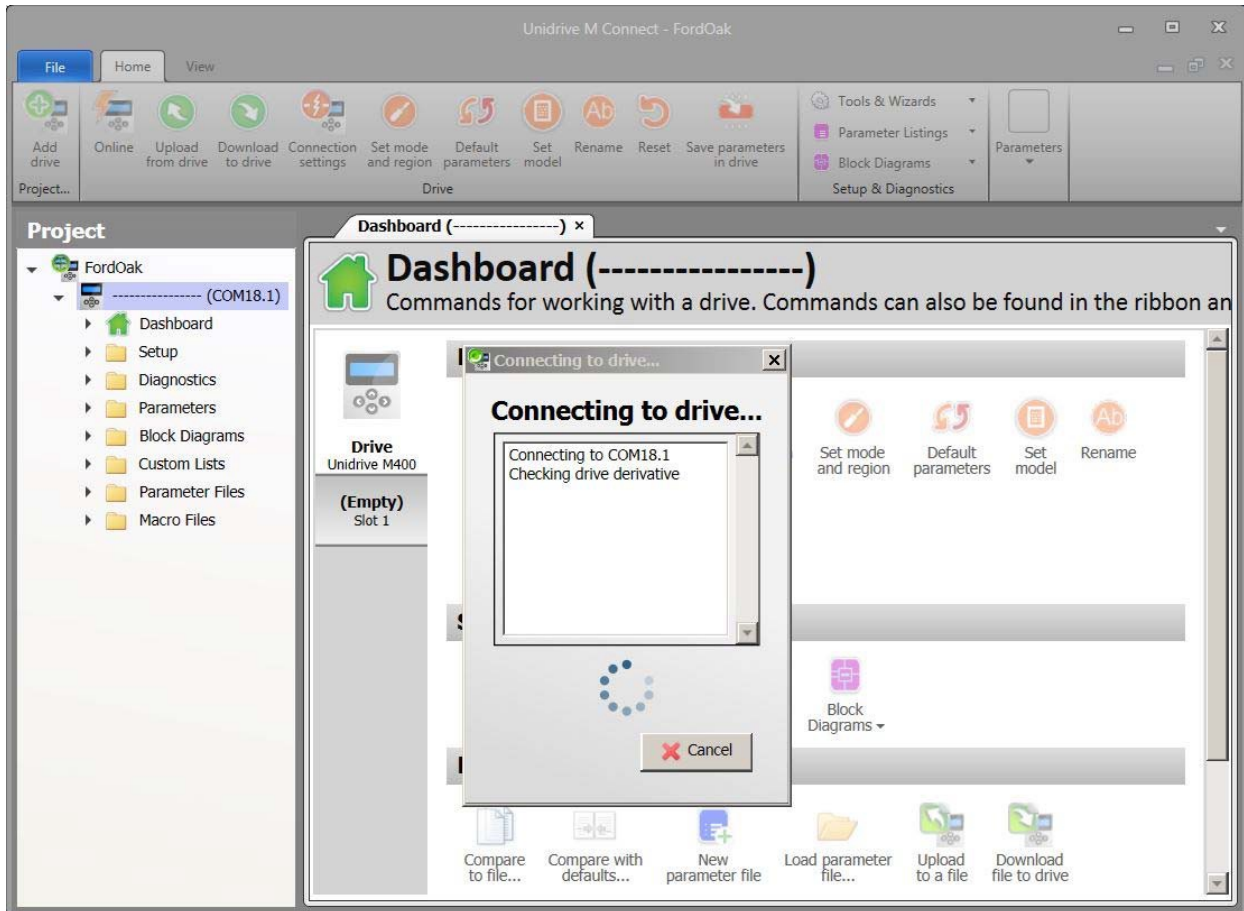
Figure 20

10. Available drives on this network will be listed on left side under the Project window.
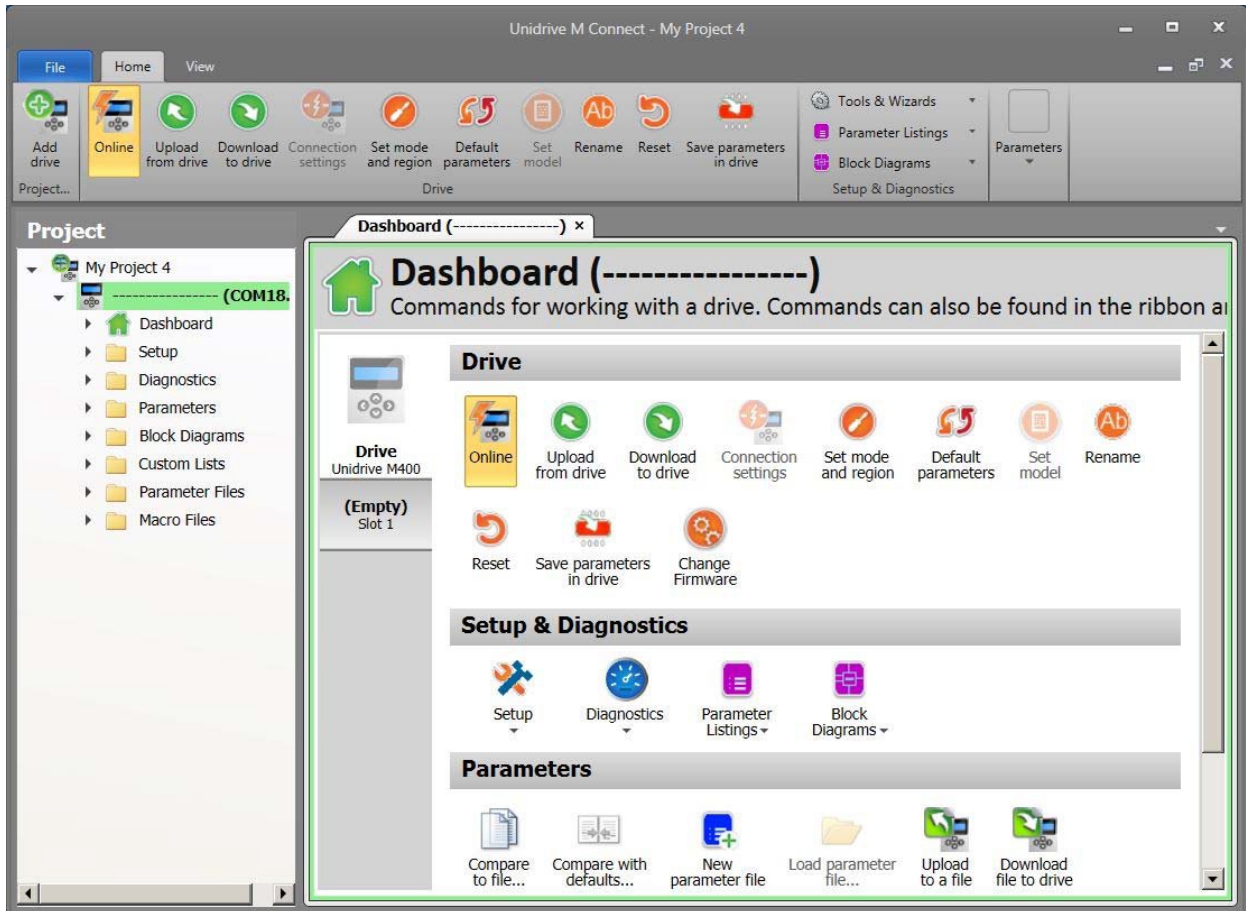
Figure 21

Accessing an online drive(s) through Unidrive M Connect

1. Click the Online icon under listed under the Drive section of the Dashboard tab.
2. Online drive's information will load and be listed in the large window to the right of the Project window under the Dashboard tab
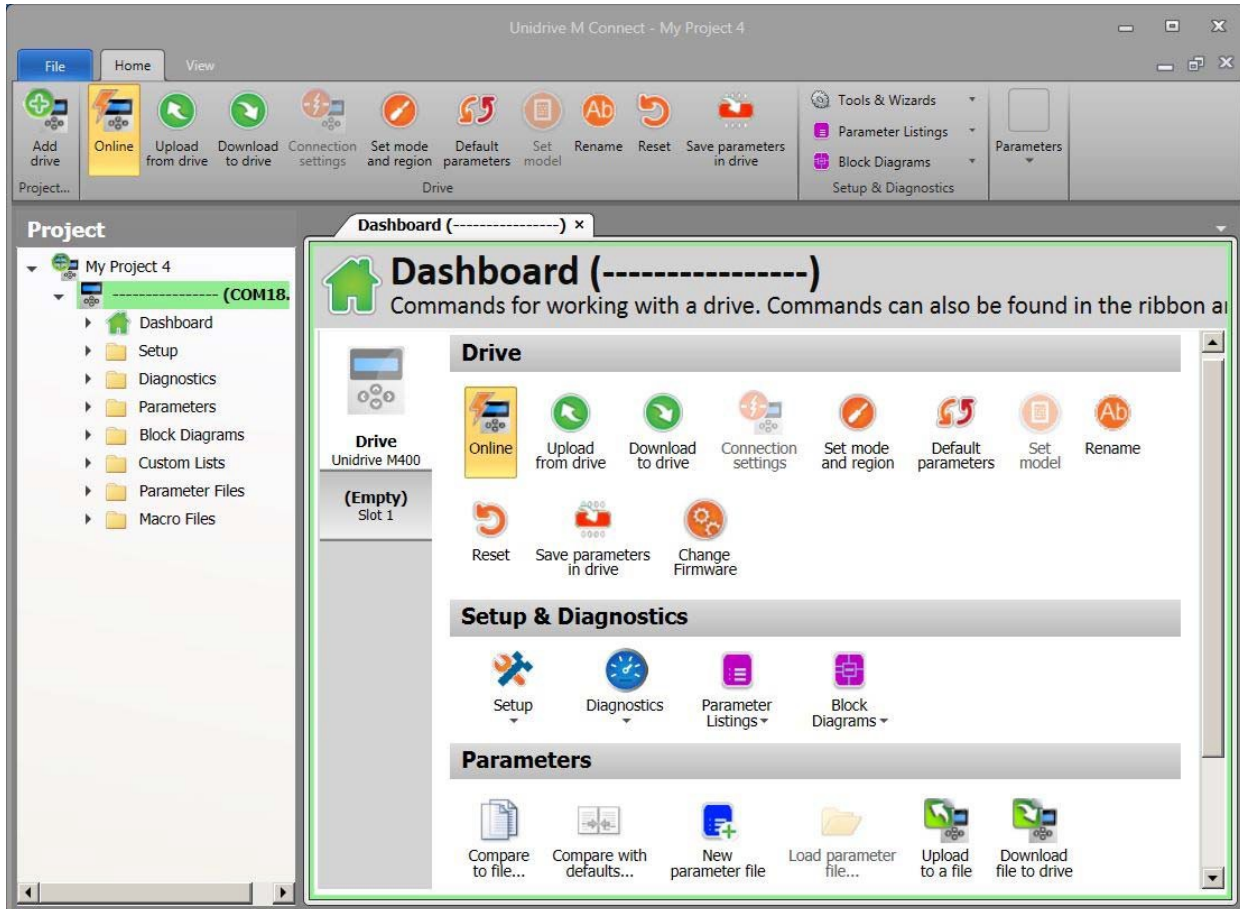
Figure 22

3. Online drive's information and parameter settings will be accessible in the Dashboard tab listed in the large window to the right of the Project window.
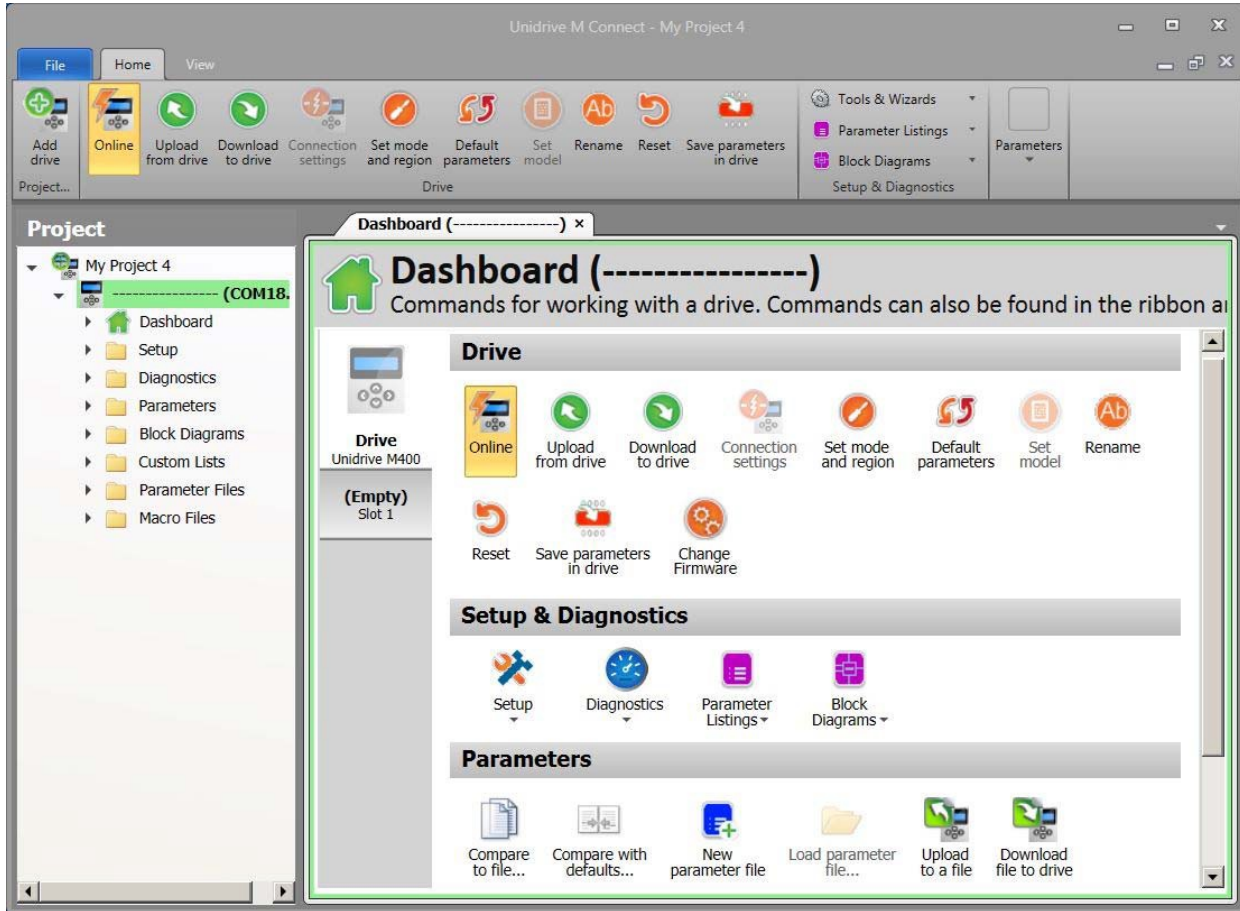
Figure 23

Saving a parameter file from a Knight E-Tractor

1. Connect to the Knight E-Tractor – for assistance see the Connecting to a Knight E-Tractor & Accessing an online drive(s) through Unidrive M Connect Sections.
2. Once connected to the on-line drive use the scroll bar on the right-hand side of the Dashboard tab to move down to the Parameters icon group

Figure 24

3. When the Parameters command group is in view click on the "Upload to a file" icon.

Figure 25

4. A file dialog box will appear to select the file that will be saved (uploaded) from the drive to the PC.
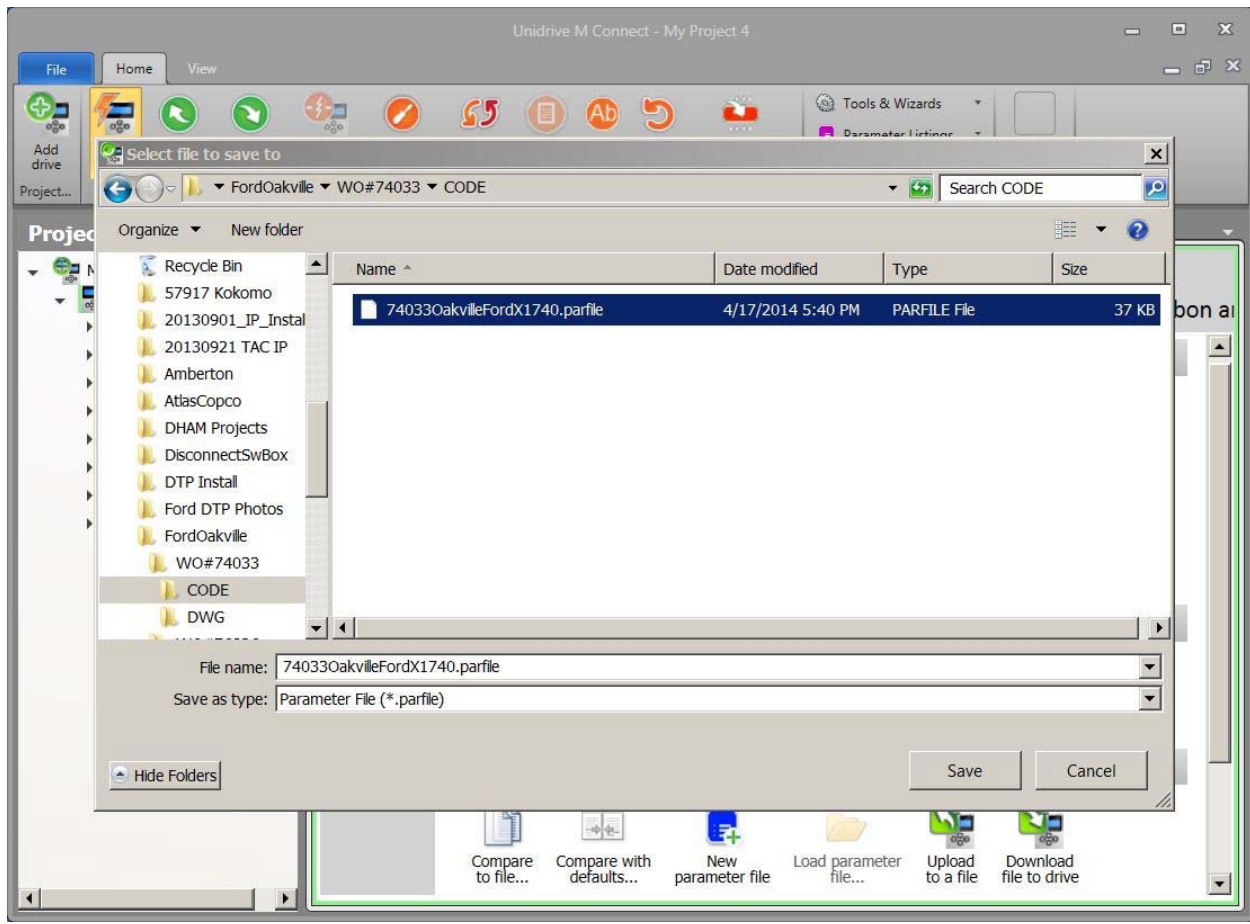
Figure 26

5. A file dialog box will appear to select the file that will be saved (uploaded) from the drive to the PC.

- Select the desired file that will be saved from the drive.
- Click the Open button.
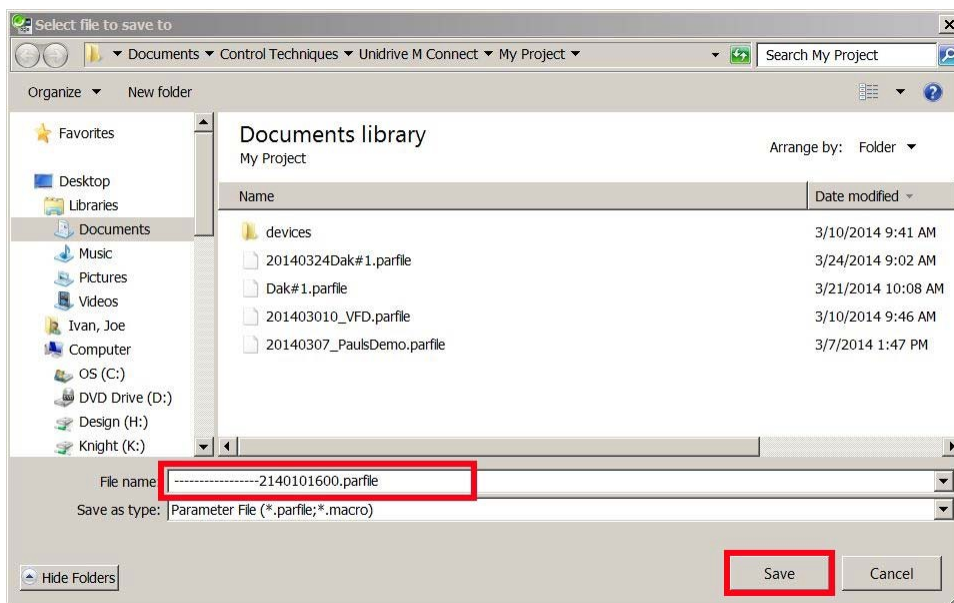
Figure 27

6. A status dialog box will appear to indicate direction of the file transfer and percentage of file transferred.
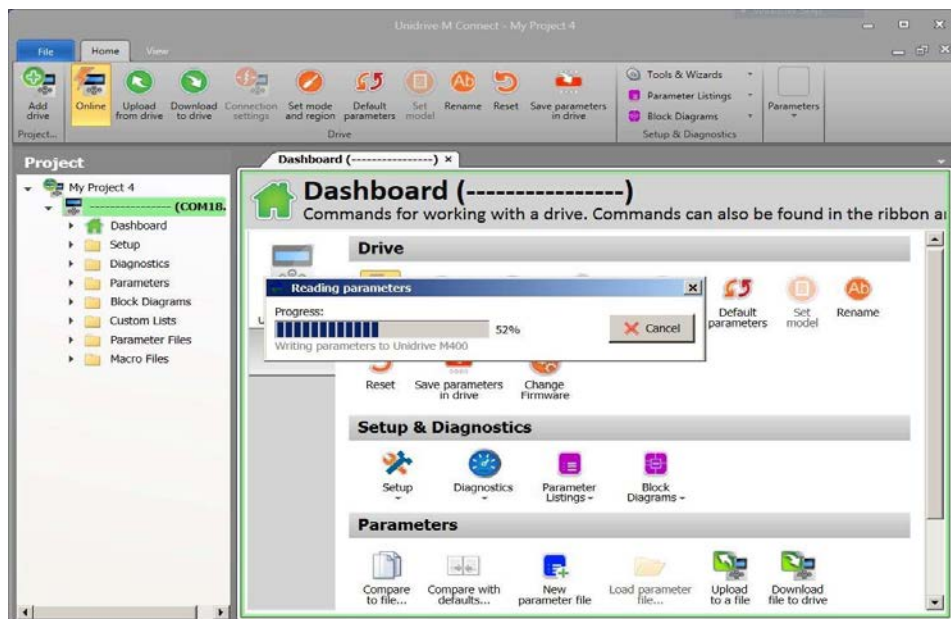
Figure 28

7. A status dialog box will indicate that the operation is complete. Click the "Close" button.
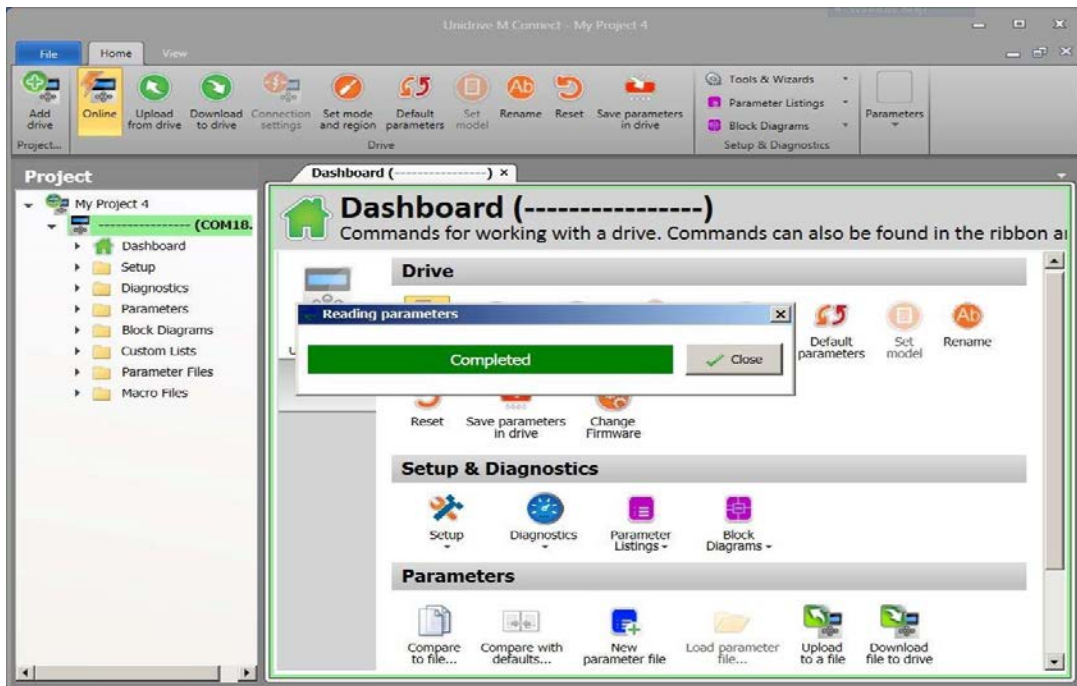
Figure 29

Restoring a parameter file to a Knight E-Tractor

1. Connect to the Knight E-Tractor – for assistance see the Connecting to a Knight E-Tractor & Accessing an online drive(s) through Unidrive M Connect Sections.
2. Once connected to the on-line drive use the scroll bar on the right-hand side of the Dashboard tab to move down to the Parameters icon group.
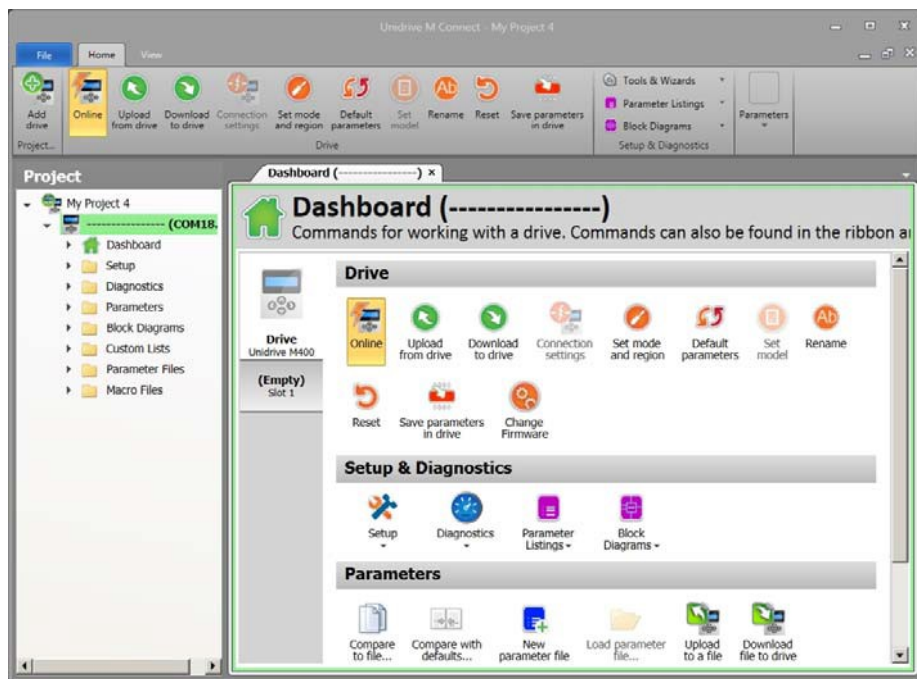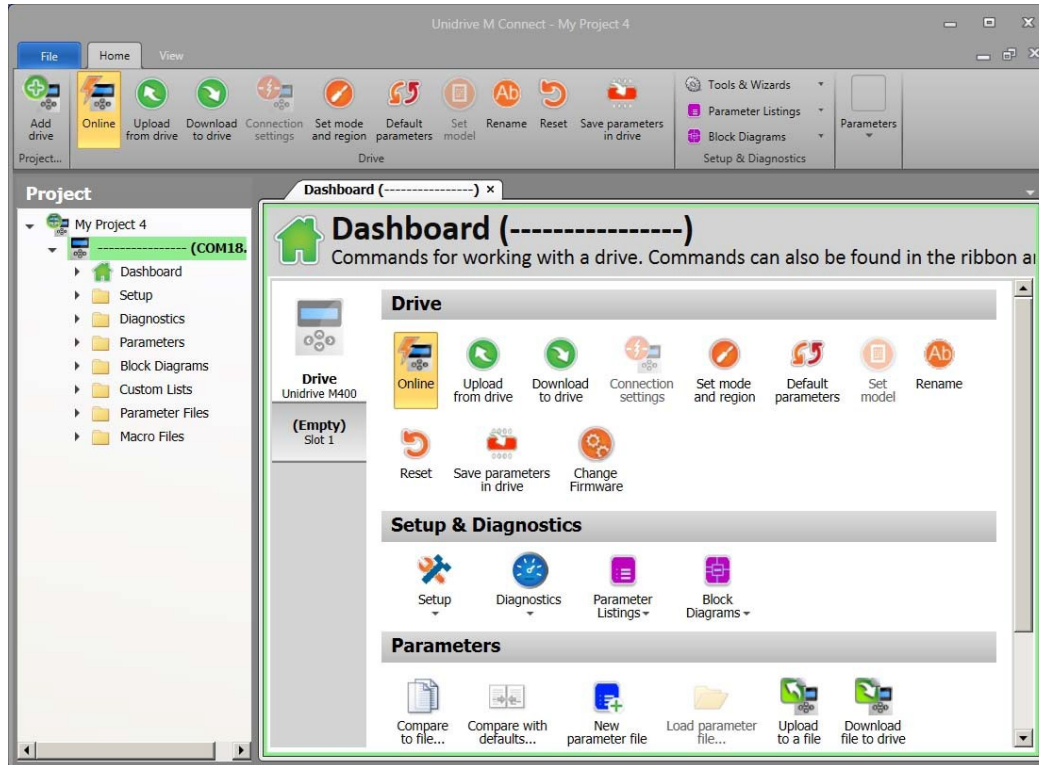

Figure 30

3. When the Parameters command group is in view click on the "Download to drive" icon.
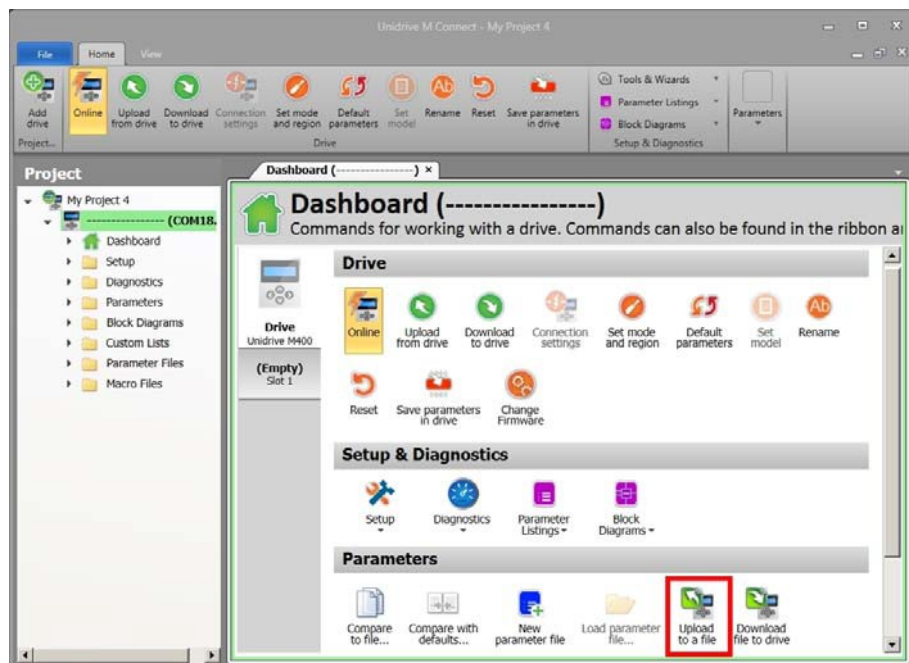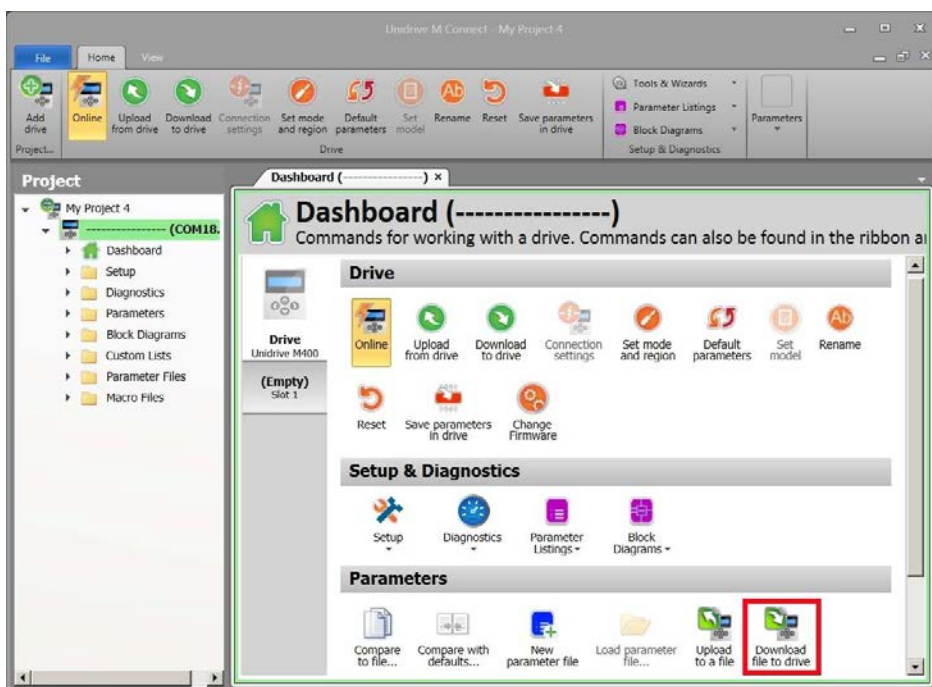

Figure 31

4. A file dialog box will appear to select the file that will be restored (downloaded) to the drive from the PC.
   - Select the desired file to restore the drive.
   - Click the Open button.
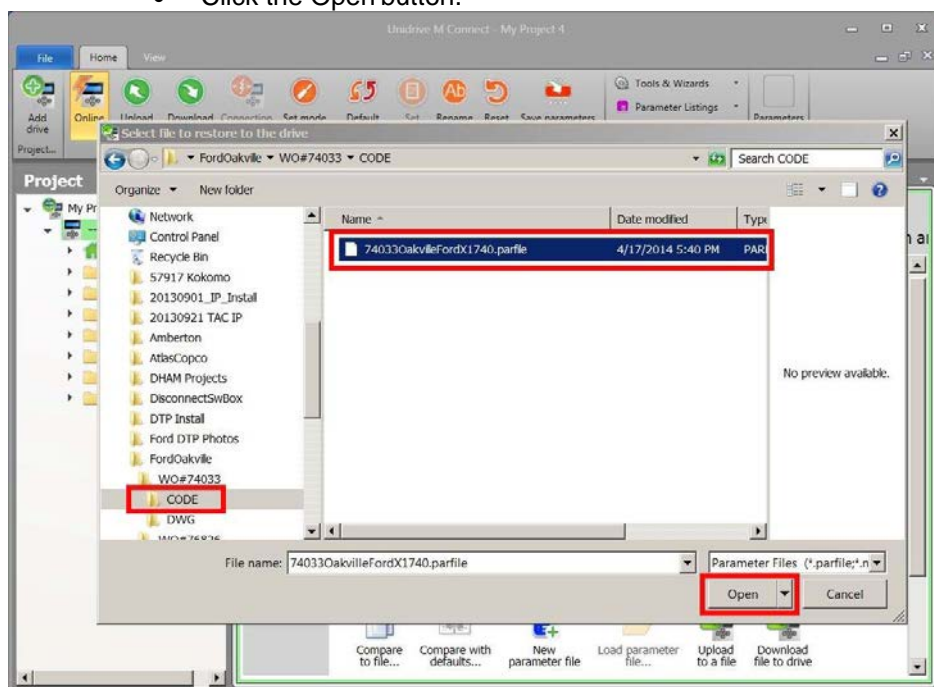
Figure 32

5. A status dialog box will appear to indicate direction of the file transfer and percentage of file transferred.
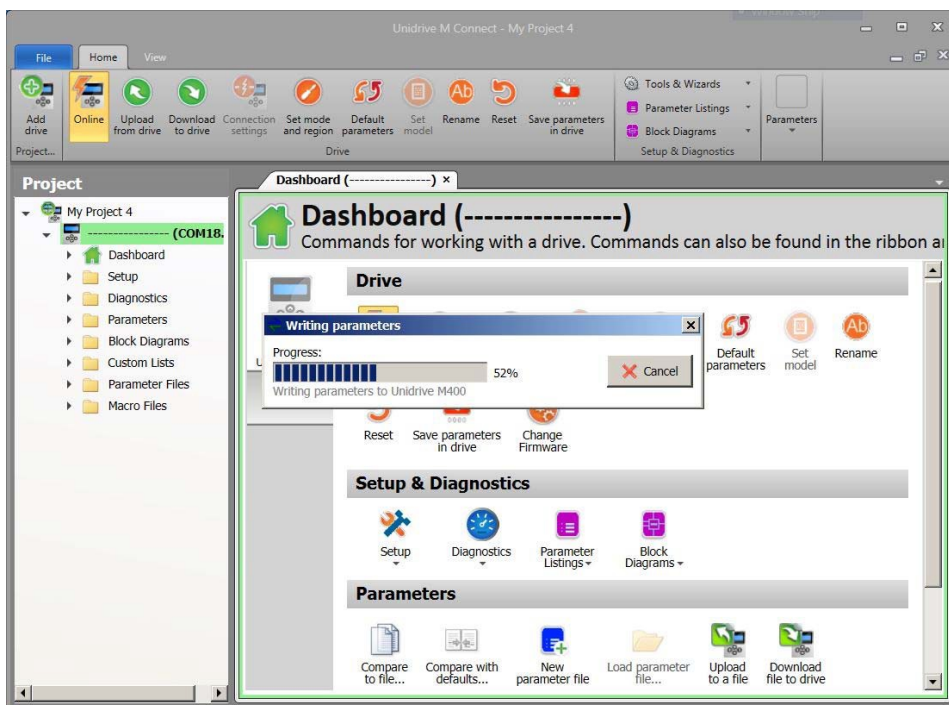
Figure 33

6. A status dialog box will indicate that the operation is complete. Click the "Close" button.
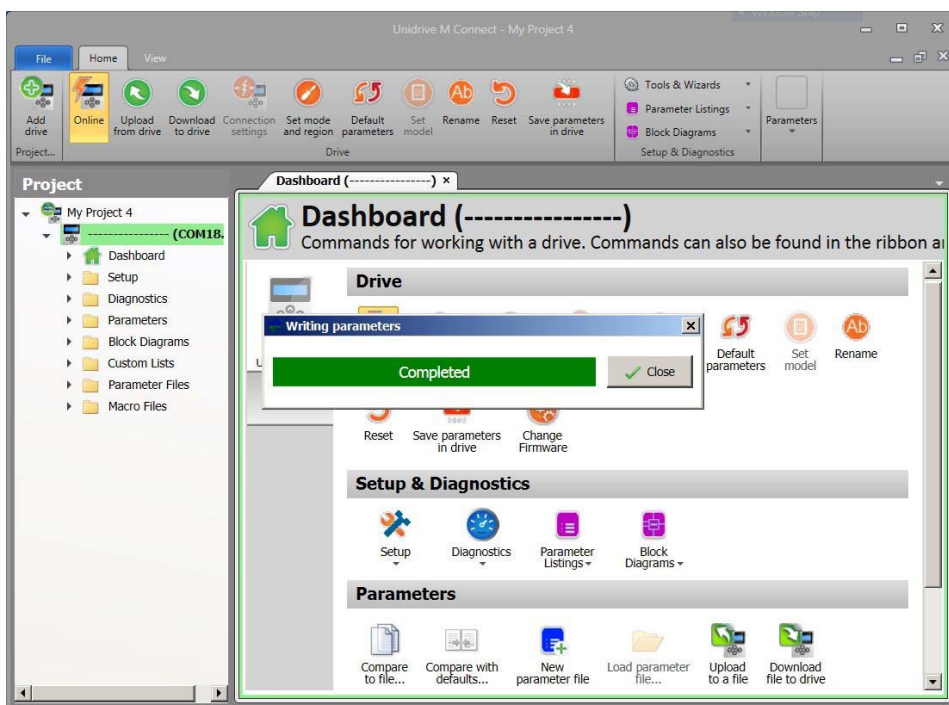
Figure 34

7. Under the Drive Operations icon group click on the Save icon to save the restored parameters and drive setting to the drive.
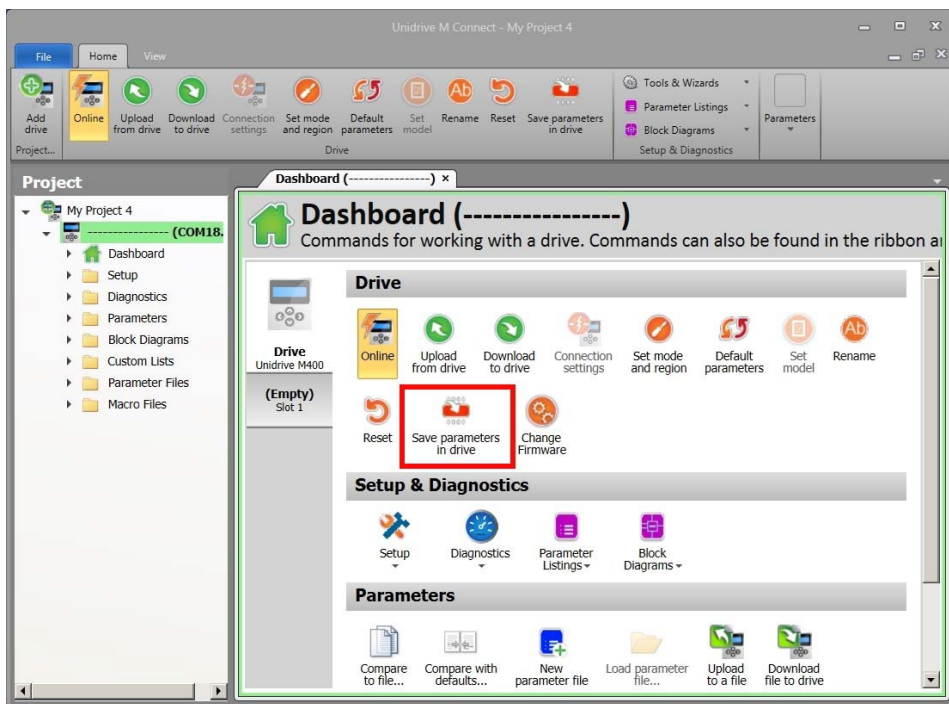
Figure 35

8. The Save parameters in drive dialog-box with appear during this process in the drive.
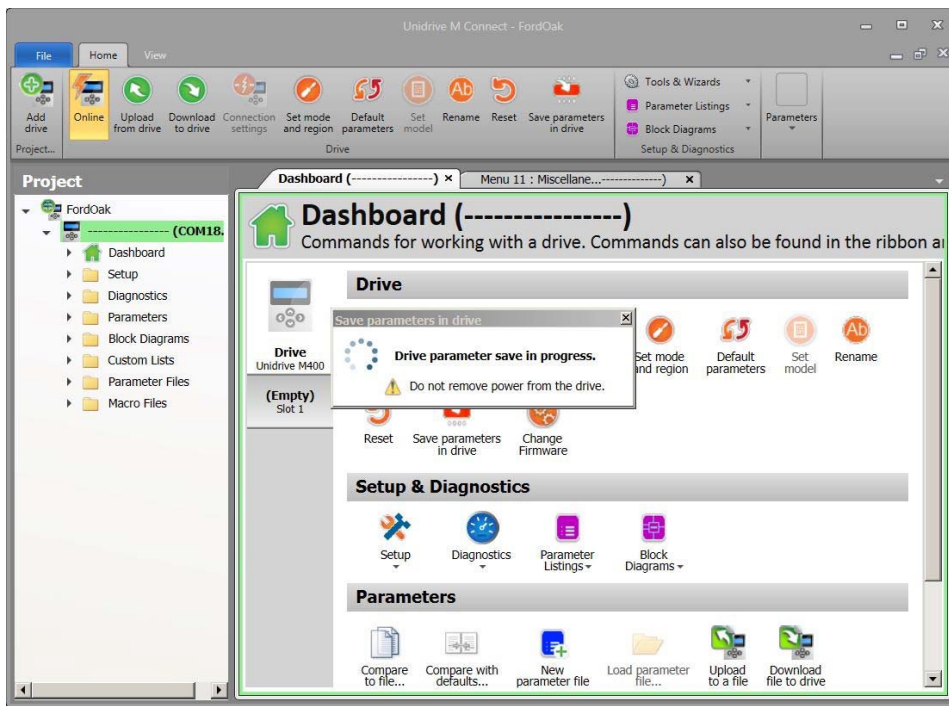
Figure 36

9. Under the Drive command group click on the Reset icon to cycle the drive and prepare it for operation.
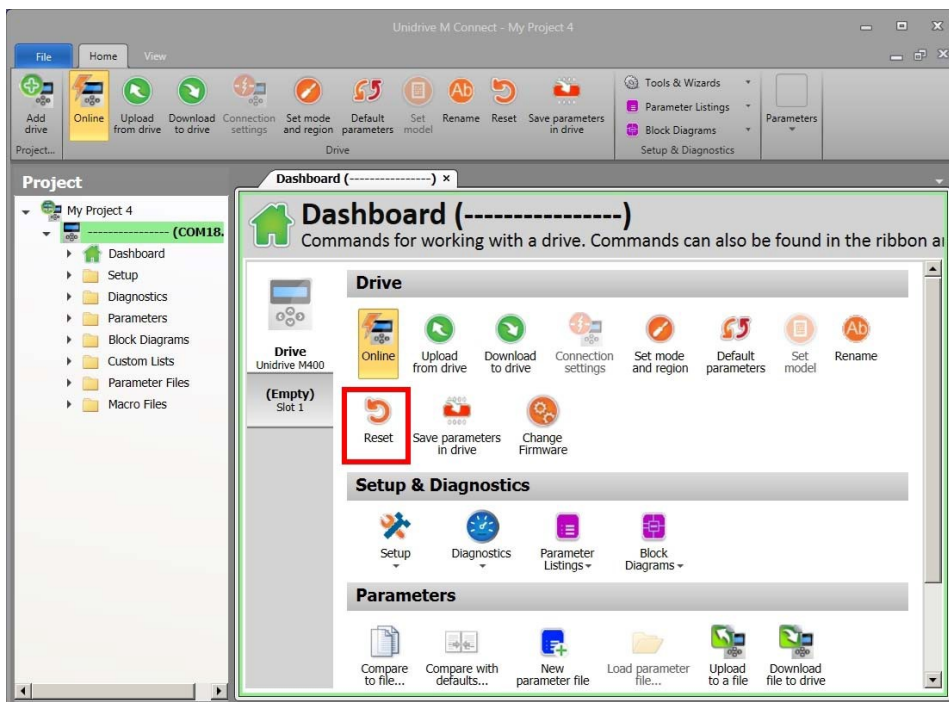
Figure 37

10. The Reset in progress dialog-box with appear during this process in the drive.
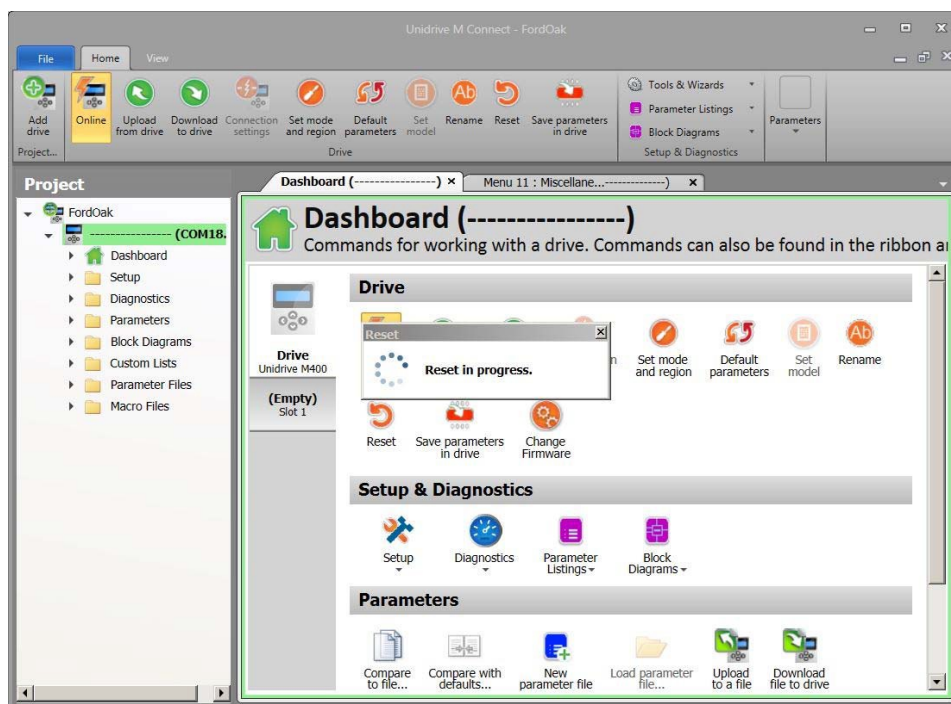
Figure 38

Adjusting Frequency References and Frequency Ramps:

The following steps are used for adjusting Frequency References (Speed) & Frequency Ramps (Accel/Decel rates) in the Knight E- Tractor.

1. Connect and go On-line with the Knight E-Tractor using Unidrive M Connect Software.

2. From the Dashboard Window select the Parameter Listings Icon and use the pull-down option arrow to view the range of the Parameter Listing Menus. Please see the figure below.
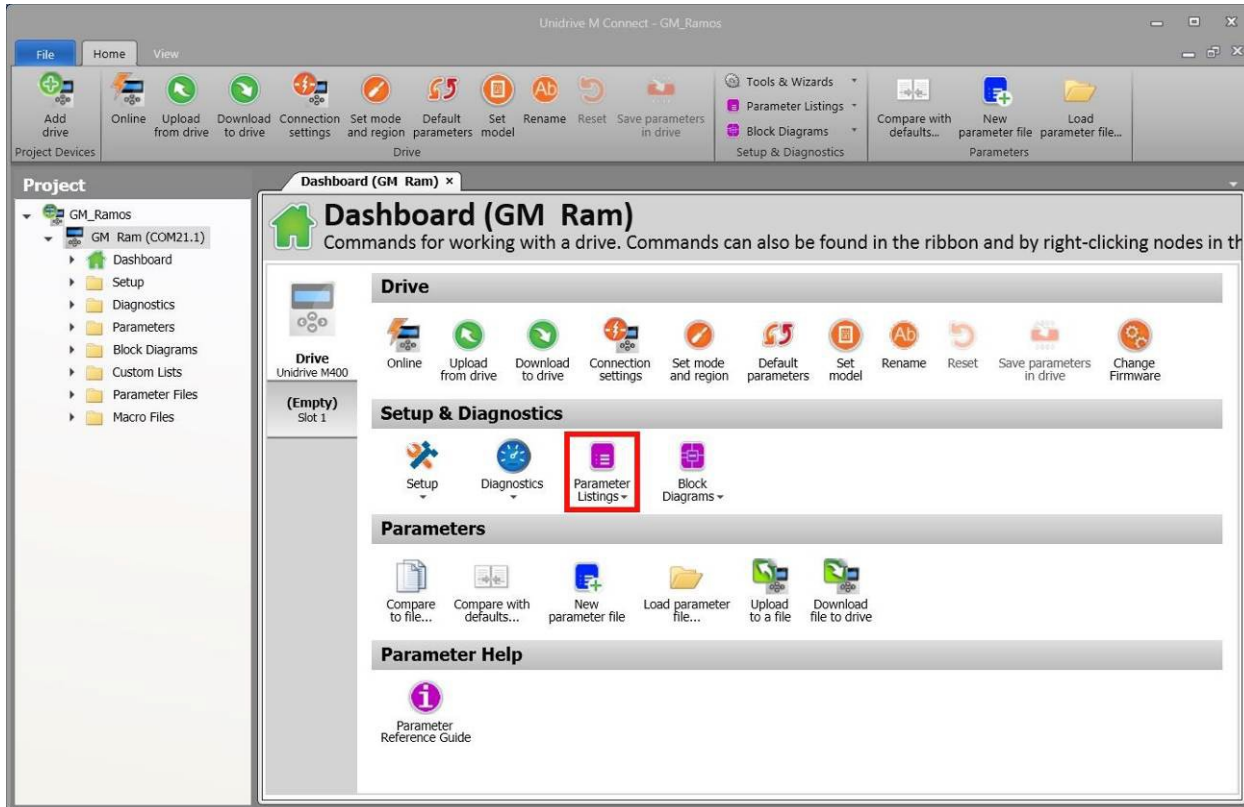
Figure 39

3. Select - Menu 1: Frequency References (Speed). Please see the figure below.
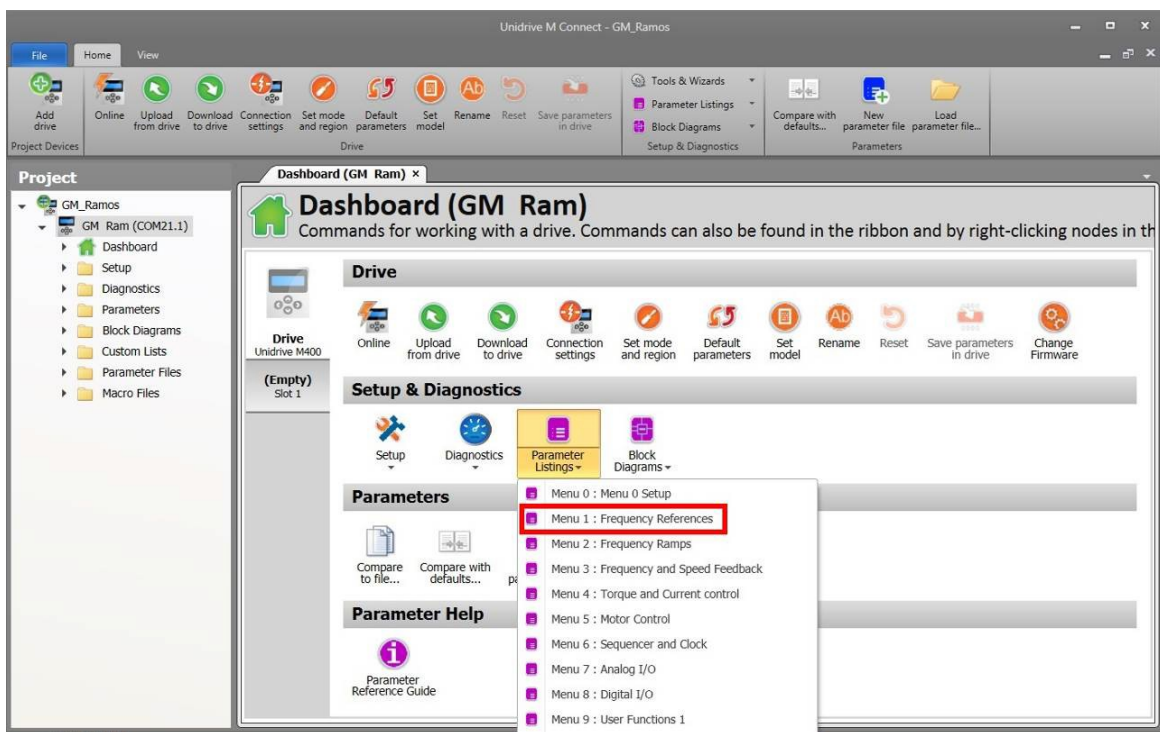
Figure 40

4. The Menu 1: Frequency References Tab will be displayed as shown in the figure below.
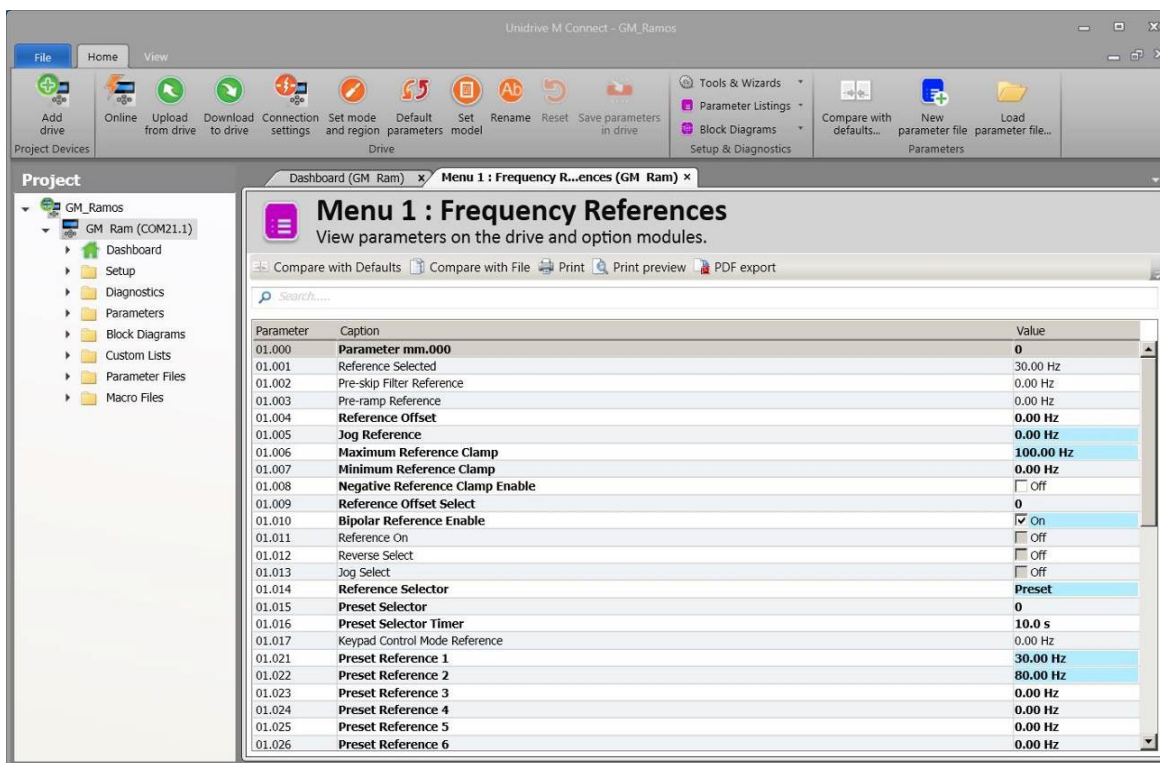
Figure 41

5. Select Parameter 01.021 – Preset Reference 1. To adjust the slow speed value of the Knight E-Tractor. The adjustment can be made by using the Up/Down Arrows located on the right side of the dialog box or by typing the desired value in the dialog box. Please reference the figure shown below.
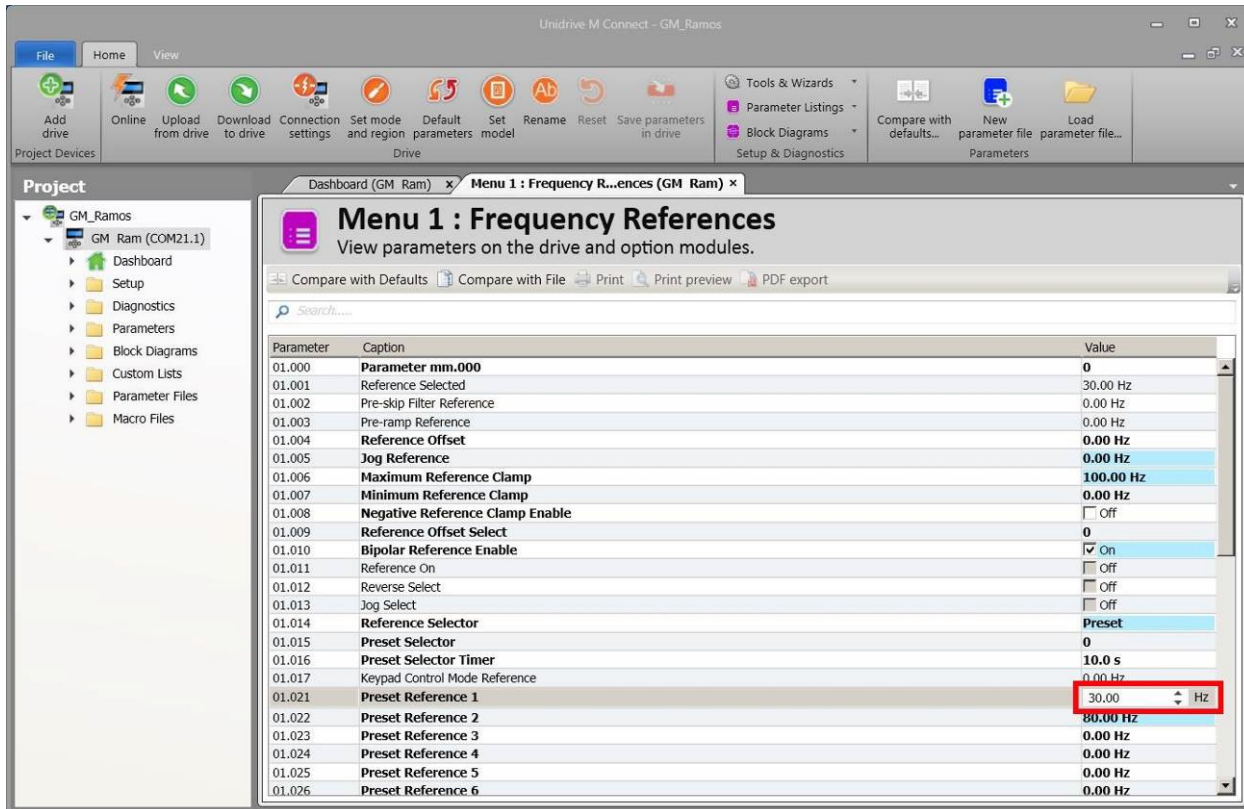
Figure 42

6. Select Parameter 01.022 – Preset Reference 2. To adjust the fast speed value of the Knight E-Tractor. The adjustment can be made by using the Up/Down Arrows located on the right side of the dialog box or by typing the desired value in the dialog box. Please reference the figure shown below.
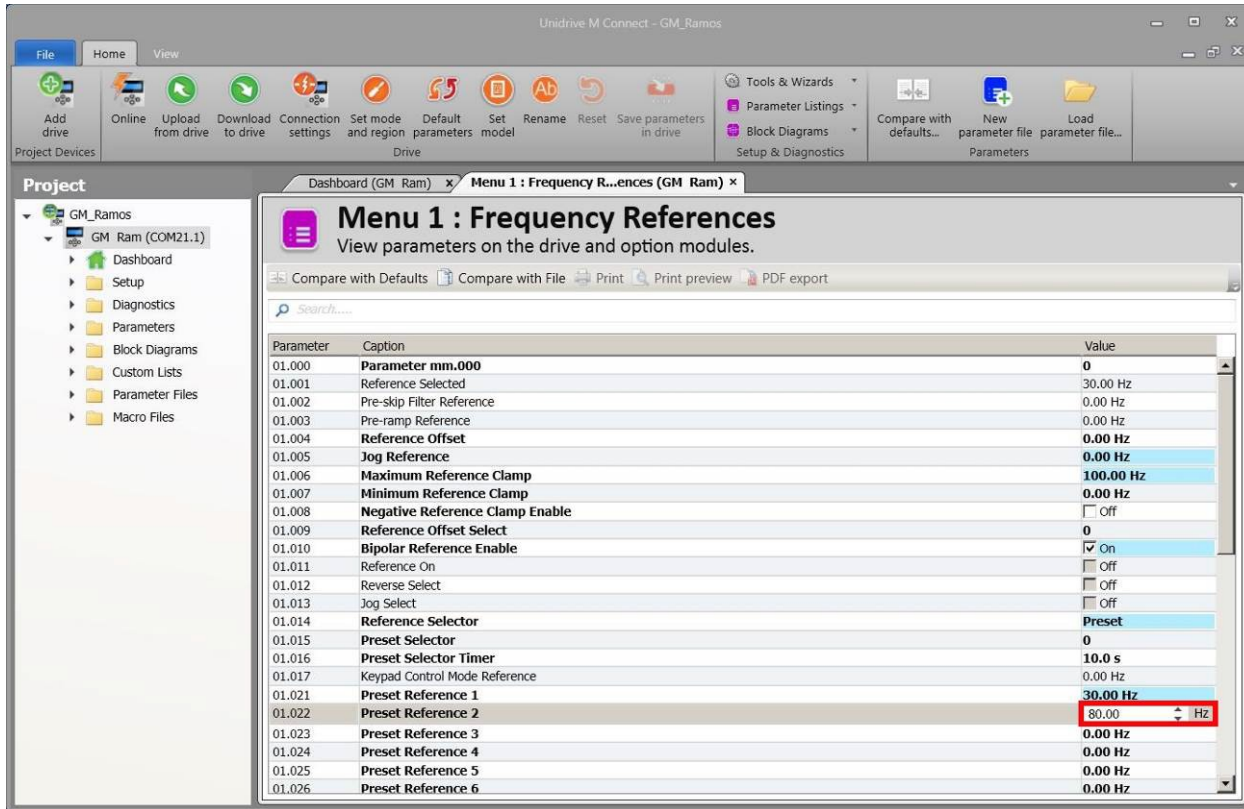
Figure 43

(Note: If the Frequency Ramps (Accel/Decel rates) are not going to be adjusted please proceed to Step #10 – Saving the parameters in the drive.)

7. Select - Menu 2: Frequency Ramps (Accel/Decel rates). Please see Figure 45 below.
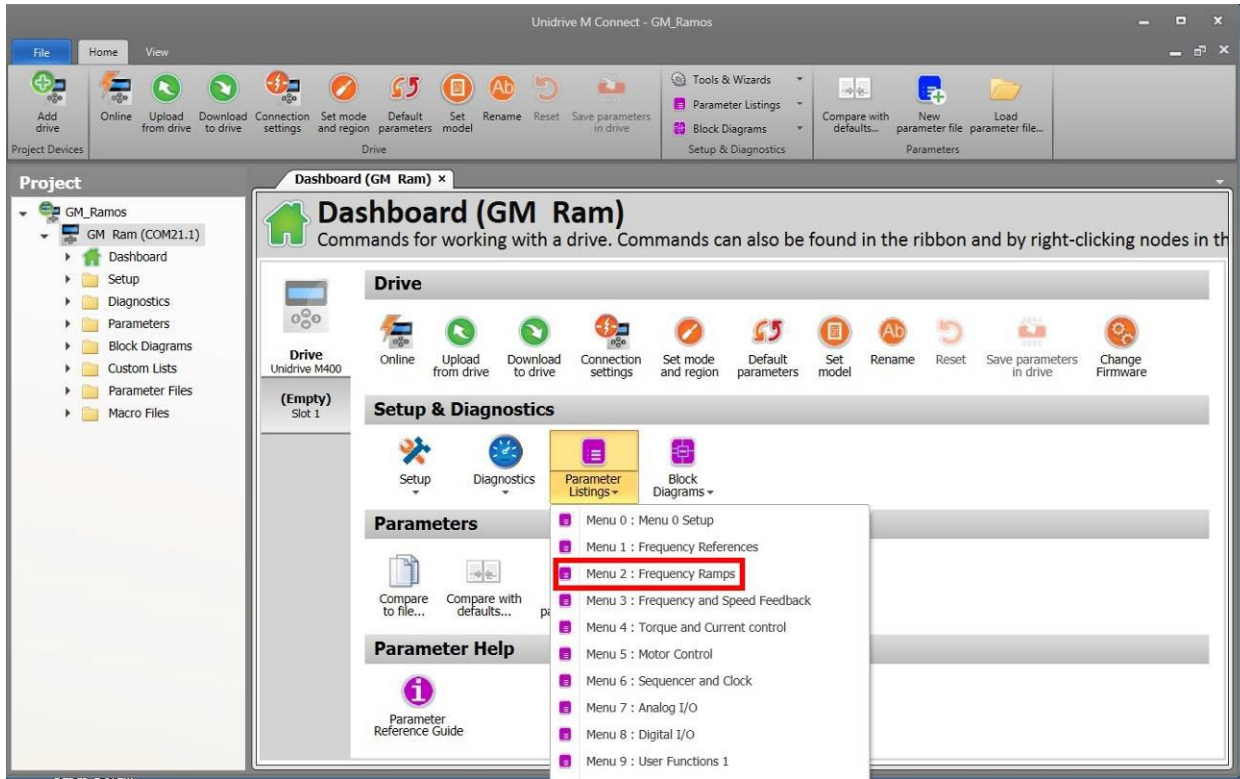
Figure 44

8. Select Parameter 02.011 – Acceleration Rate 1. To adjust the acceleration rate value of the Knight E-Tractor. The adjustment can be made by using the Up/Down Arrows located on the right side of the dialog box or by typing the desired value in the dialog box. Please reference the figure shown below. (Note: This parameter is in Seconds/Hertz units. So, the smaller the value the faster the rate of change.)
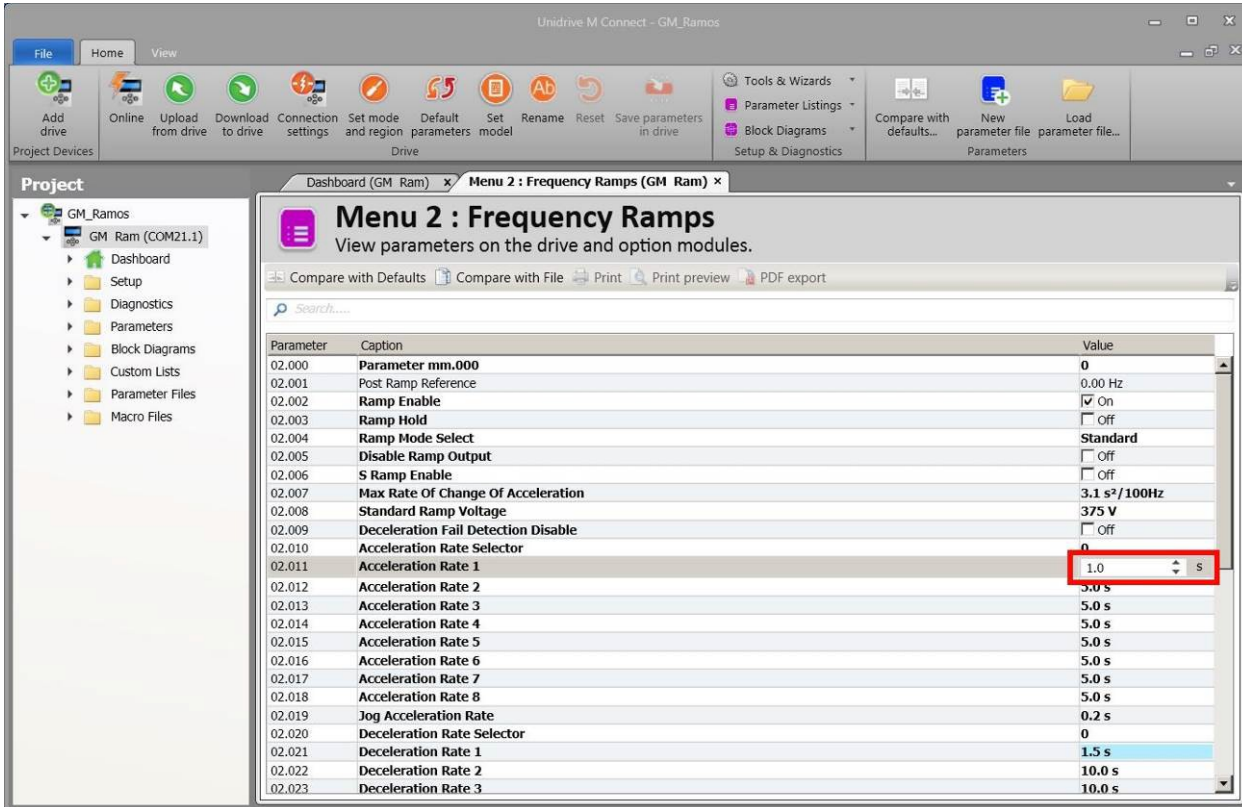
Figure 45

9.   Select Parameter 02.021 – Deceleration Rate 1. To adjust the deceleration rate value of the Knight E-Tractor. The adjustment can be made by using the Up/Down Arrows located on the right side of the dialog box or by typing the desired value in the dialog box. Please reference the figure shown below. (Note: This parameter is in Seconds/Hertz units. So, the smaller the value the faster the rate of change.)
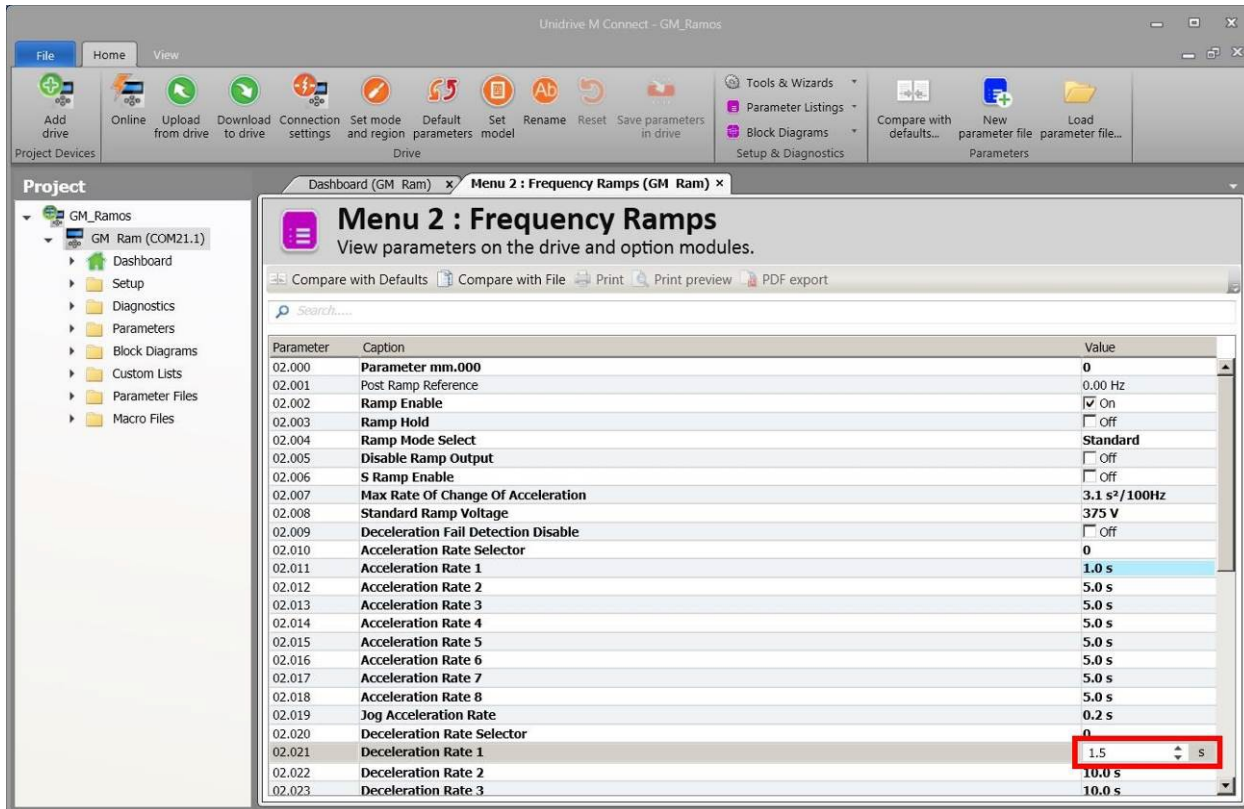
Figure 46

10. After these adjustments have been made and are acceptable. These parameter values must be saved in the drive. To save the parameters select the "Save parameters in drive" icon in one of two locations shown below.
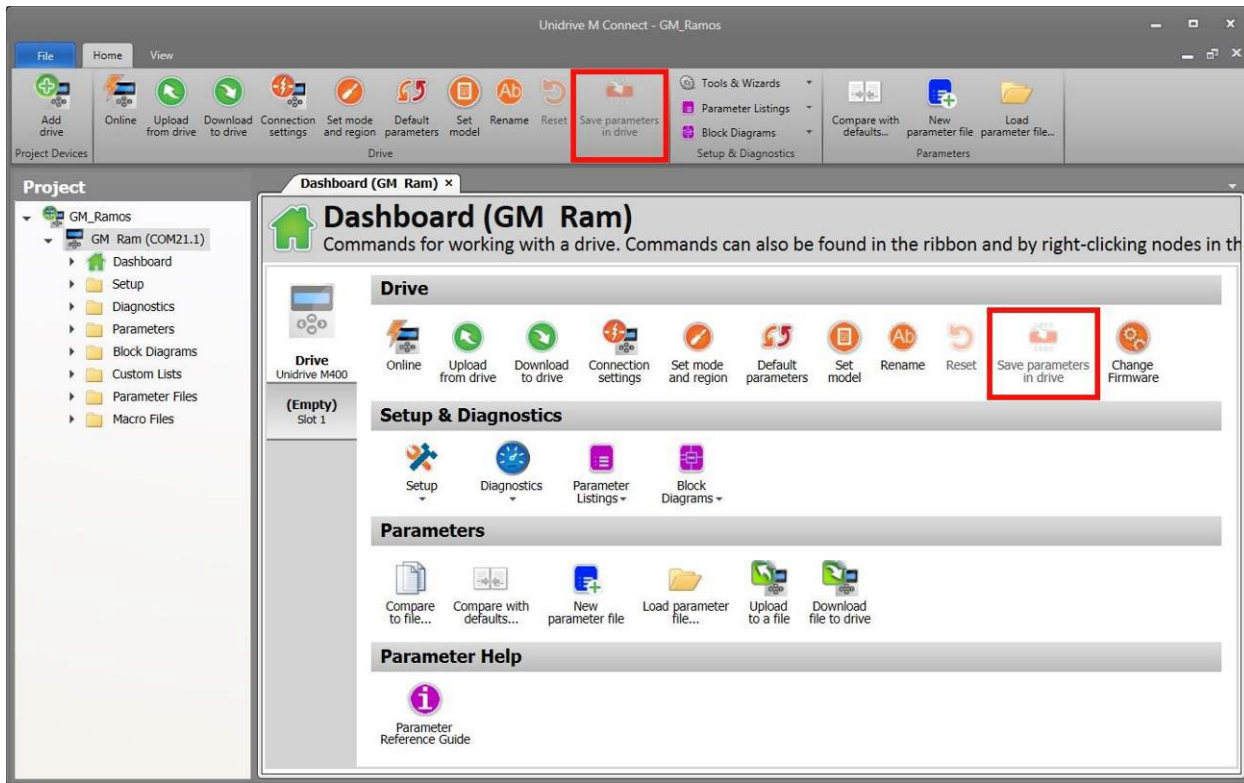
Figure 47

Operation

All operators should read and understand the instructions in this manual. Follow all instructions and warnings in this manual for safe and trouble-free operation.

Run/Stop:

1. The E-Tractor System is operated by plug and cord power supply. Insert plug into electrical receptacle.

   - Drive unit input is inhibited and motion is disabled.
   - The RUN-STOP button will illuminate red.

   Recovery:

1. Correct the situation that caused the run-stop.
2. Follow the Start Up procedure to restore power to the unit.

Shut Down:

1. Press the RUN-STOP button, located on the pendant control handle.
2. Disconnect the power supply to the unit (if required).

Start Up:

1. Connect the power supply to the unit (if required).
2. Reset the RUN-STOP button.
3. Push either Push Button (FWD/REV) to ensure that tractor is operational.

Over Travel Limit Switches:

⚠	**NOTE**
	During operation the tractor will ramp down in speed and stop as the over travel limits are actuated.

Fault Mode:
Red lift will flash

1. Press the RUN-STOP button, located on the pendant control handle.

   - Main power is removed and motion is disabled.
   - The RUN-STOP button will illuminate red.

Recovery

1. Correct the situation that caused the fault.
2. Follow the Start Up procedure to restore power to the unit.
3. Consult drive display for fault code (Refer to Figure 35)
   **Refer to Emerson Unidrive Manual Excerpts or the accompanying CD for further information.

Figure 48
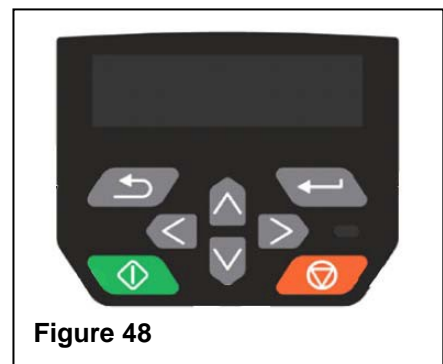
Preventive Maintenance

Inspection Overview:

The inspection procedures and recommendations in this manual are based on ANSI/ASME B30.16. The following definitions and recommendations are from ANSI/ASME B30.16 and pertain to the recommended inspection procedures in this manual.

- Qualified Person- a person who, by possession of a recognized degree in an applicable field, or certificate of professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter at work.

- Designated Person- a person selected or assigned by the employer or the employer's representative as being competent to perform specific duties.

- Normal Service- service that involves operation with randomly distributed loads within the rated load limit, or uniform loads less than 65% of rated load for not more than 25% of the time for electric tractors.

- Heavy Service- service that involves operation within the rated load limit, which exceeds normal service.

- Severe Service- service that involves normal or heavy service with abnormal operating conditions.

- Abnormal Operating Conditions- environmental conditions that are unfavorable, harmful, or detrimental to the operation of a tractor, such as excessively high or low ambient temperatures, exposure to weather, corrosive fumes, dust laden or moisture laden atmospheres, and hazardous locations.

Inspection Overview:

Duty Rating
Inspection frequency should be determined by a qualified person and is based on factors such as severity of environment, percentage of capacity lifts, cycle time and shock loading. Each E-Tractor should be rated individually and inspections performed in accordance with rating.

Frequent inspections can be performed by the operator or designated personal.
Periodic inspections must to be performed by designated personal.

Frequency of Documentation

Frequent Inspection (Non-Documented):
- Normal duty cycle - monthly.
- Heavy duty cycle- weekly.
- Severe duty cycle- daily.

Periodic Inspection (Documented):
- Normal duty cycle- annually.
- Heavy duty cycle- semiannually.
- Severe duty cycle- quarterly.

Documentation should be made available to personnel for review.

<u>Inspection</u>

Frequent Inspection (Non-Documented)
If any of the conditions listed below are evident the E-Tractor should be placed out of service and a detailed inspection and corrective action should be taken. Additionally, the operator should check the system continually during operation to ensure that no malfunctions are occurring.

<u>E-Tractor</u>:
- Visually inspect the E-Tractor, ensure that it is in good general working order. Repair or replace any broken or missing parts.

- Cycle the E-Tractor and listen for any abnormal noises (grinding etc.). If any abnormal noises are evident a periodic inspection of the E-Tractor must be performed.

- Inspect how the drive wheel contacts the rail. If any binding is evident adjust drive wheel accordingly. (Refer to Page 10)

- Cycle run stop.

Periodic Inspection (Documented)
Perform the items listed in the Frequent Inspection section in addition to the items listed below. All findings from this inspection should be recorded. An inspection record, which can be copied, is located on the inside back cover of this manual. If any of the conditions listed below are evident the E-Tractor should be placed out of service and corrective actions can be taken.

<u>Supporting Structure:</u>
- Check for distortion, wear and continued ability to support the load. Refer to manufacturers' instructions for overhead rail systems.

<u>Rail Trolley (if applicable):</u>
- Ensure wheels and side rollers run smoothly and are not excessively worn. Replace the wheels and side rollers as necessary.

- Check all fasteners ensure they are intact and properly tightened.

- Visually check the nylon at the bearing and along the face of the wheel for cracks.

<u>Fasteners:</u>
- Check all fasteners ensure they are not loose, missing or damaged.

<u>E-Tractor Not In Regular Use:</u>
- Idle for more than one month, but less than one year, perform the daily inspection on the E-Tractor before placing it into service.

- Idle for more than one year perform the detailed inspection before placing the E-Tractor into service.

- Stand-by E-Tractor should have the daily inspection performed at regular intervals as conditions require.

<u>Wheel Wear:</u>
- Check the rubber on the wheels. Rubber will wear with normal use. The wheels should be inspected periodically dependent upon application.

- Approximately 5/8" [1.6cm] of wear is allowable before the wheel needs to be replaced. Some cracking and material loss is allowable. Continued use past the recommended level will cause damage to the track or system operation.
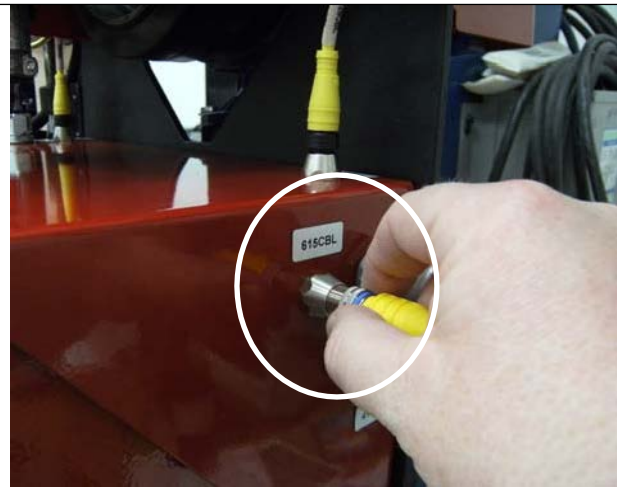
Pendant Cable Installation / Replacement:

1. Remove power from E-tractor.

2. Remove Pendant Cable from top of E-tractor control box and control pendant. (Refer to Figure 49)

3. Install new Pendant Cable to top of E-Tractor control box and control pendant. (Refer to Figure 50)

Figure 49

Figure 50

Troubleshooting Chart

Problem	Cause	Solution
E-Tractor does not move	Power loss	Check circuit breaker, switches, and connections of all power lines. Check run stop, reset if necessary.
	Incorrect voltage	Check supply voltage and frequency of power supply to ensure it is correct for the E-Tractor.
	Tractor overload / Bin	Reduce load to within the rated capacity of the tractor.
	Electrical fault	Secure power to the tractor; check all wiring and connections on the E-Tractor.
E-Tractor moves forward but does not move in reverse	"REV Limit Stop" set incorrectly	Check REV Limit Stop switch and ensure it is functioning properly.
	Open circuit	Check circuit for loose connections or broken conductors. Repair or replace as necessary.
	Damaged cord	Check each conductor in the pendant/switch cable for continuity. Replace damaged cable(s) as required.
	Switch malfunctioning	Check continuity in switch and electrical connections. Repair or replace as needed.
E-Tractor moves in reverse but does not move forward	"FWD Limit Stop" set incorrectly	Check FWD Limit Stop switch and ensure it is functioning properly.
	Open circuit	Check circuit for loose connections or broken conductors. Repair or replace as necessary.
	Damaged cord	Check each conductor in the pendant/switch cable for continuity. Replace damaged cable(s) as required.
	Switch malfunctioning	Check continuity in switch and electrical connections. Repair or replace as needed.
E-Tractor does not move at proper speed	Tractor Binding	Check for mechanical binds and interferences.
	Tractor Speed Changed	Check display for current speed.
E-Tractor operates intermittently	Open circuit	Check circuit for loose connections or broken conductors. Repair or replace as necessary.
	Damaged pendant cord	Check each conductor in the pendant cable for continuity. Replace damaged cable as required.
	Damaged handle	Check each conductor in the pendant cable for continuity. Replace damaged conductors as required. Check connections and replace if necessary.

Refer to the appropriate technical manual for additional troubleshooting or contact the Knight Customer Service Department at (248) 377-4950, Extension 162.

M400KETD3K DRAWING PACKAGE

Programming Parameters

Excerpts from Unidrive M400 User Guide: Issue 4

(http://www.emersonindustrial.com/en-EN/controltechniques/downloads/userguidesandsoftware/Pages/unidrivem.aspx)

Chapter 5 Getting Started
Chapter 6 Basic Parameters
Chapter 13 Diagnostics

**Refer to the CD accompanying this manual for the Unidrive M400 User Guide: Issue 4 in its entirety.

5   Getting started

This chapter introduces the user interfaces, menu structure and security levels of the drive.

5.1   Understanding the display

The keypad can only be mounted on the drive.

5.1.1   CI-Keypad

The CI-Keypad display consists of up to four rows of text. The upper two rows show the drive status or the menu and parameter number currently being viewed. When in status mode, an area one character wide and four lines high on the right-hand side of the display, is reserved for displaying actions that are active on the drive. The possible active actions are given in Table 5-2.

When the drive is powered up, the lower two rows will show the status mode parameters defined by *Status Mode Parameter 1* (11.018) and *Status Mode Parameter 2* (11.019).

Figure 5-1   CI-Keypad
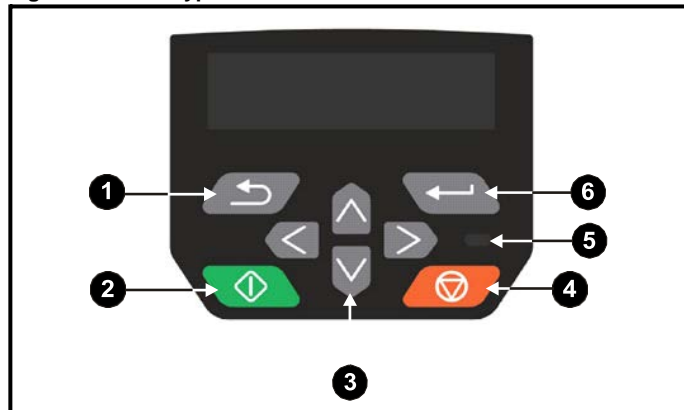
1. Escape button
2. Start button
3. Navigation keys (x4)
4. Stop / Reset button (red)
5. Status LED
6. Enter button

NOTE

The red stop button is also used to reset the drive.

The parameter value is correctly displayed on the keypad display as shown in the below table.

Table 5-1   Keypad display formats

Display formats	Value
IP Address	127. 0. 0. 0
MAC Address	01ABCDEF2345
Time	12:34:56
Date	31-12-13 or 12-31-13
Version number	01.02.00.00
Character	ABCD
32 bit number with decimal point	21474836.47
16 bit binary number	0100001011100101

Table 5-2   Active action icon

Active action icon	Description
	Alarm active
	NV media card being accessed
	Drive security active
	User security unlocked
	Motor map 2 active
	User program running
	Keypad reference active

5.2   Keypad operation

5.2.1   Control buttons

The keypad consists of:

*   Navigation keys - Used to navigate the parameter structure and change parameter values.

*   Enter / Mode button Used to toggle between parameter edit and view mode.

*   Escape / Exit button Used to exit from parameter edit or view mode. In parameter edit mode, if parameter values are edited and the exit button pressed the parameter value will be restored to the value it had on entry to edit mode.

*   Start button Used to provide a 'Run' command if keypad mode is selected.

*   Stop / Reset button Used to reset the drive. In keypad mode can be used for 'Stop'.

Figure 5-2   Display modes
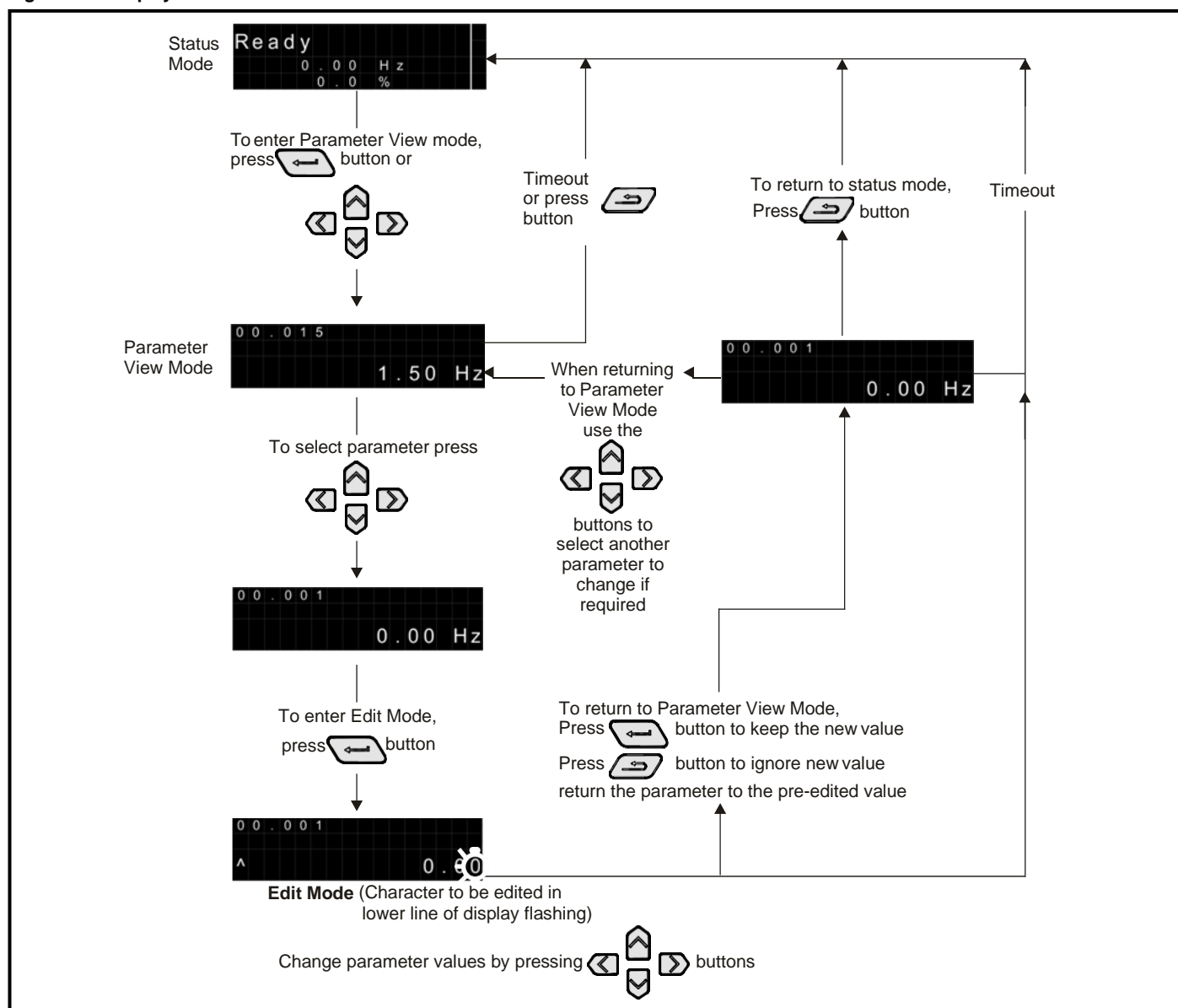
5.2.2 Quick access mode

The quick access mode allows direct access to any parameter without scrolling through menus and parameters.

To enter the quick access mode, press and hold the Enter button on the keypad while in 'parameter view mode'.

Figure 5-3 Quick access mode

5.2.3 Keypad shortcuts

In 'parameter view mode':

If the up and down keypad buttons are pressed together, then the keypad display will jump to the start of the parameter menu being viewed, i.e. Pr **05.005** being viewed, when the above buttons pressed together will jump to Pr **05.000**.

If left and right keypad buttons are pressed together, then the keypad display will jump to the last viewed parameter in Menu 0.

In 'parameter edit mode':

If the up and down keypad buttons are pressed together, then the parameter value of the parameter being edited will be set to 0.

If left and right keypad buttons are pressed together, the least significant digit (furthest right) will be selected on the keypad display for editing.

Figure 5-4 Mode examples
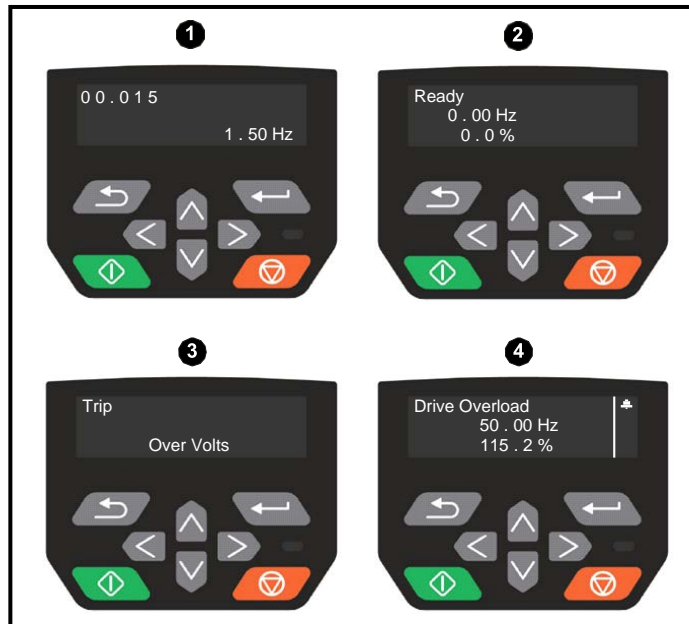
1. **Parameter view mode: Read write or Read only**
2. **Status mode: Drive OK status**

If the drive is ok and the parameters are not being edited or viewed, the upper row of the display will show one of the following:

• Inhibit', 'Ready' or 'Run'.

3. Status mode: trip status

When the drive is in trip condition, the upper row of the display will indicate that the drive has tripped and the lower row of the display will show the trip code. For further information regarding trip codes, refer to Table 13-2 *Trip indications* on page 209.

4. Status mode: Alarm status

During an 'alarm' condition the upper row of the display alternates between the drive status (Inhibit, Ready or Run, depending on what is displayed) and the alarm.

> ⚠ **WARNING**
> Do not change parameter values without careful consideration; incorrect values may cause damage or a safety hazard.

NOTE

When changing the values of parameters, make a note of the new values in case they need to be entered again.

NOTE

For new parameter values to apply after the line power supply to the drive is interrupted, new values must be saved. Refer to section 5.6 *Saving parameters* on page 91.
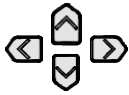
5.3 Menu structure

The drive parameter structure consists of menus and parameters.

The drive initially powers up so that only Menu 0 can be viewed. The up and down arrow buttons are used to navigate between parameters and once Pr **00.010** has been set to 'All Menus', the left and right buttons are used to navigate between menus. For further information, refer to section 5.8 *Parameter access level and security* on page 91.

Figure 5-5 Parameter navigation
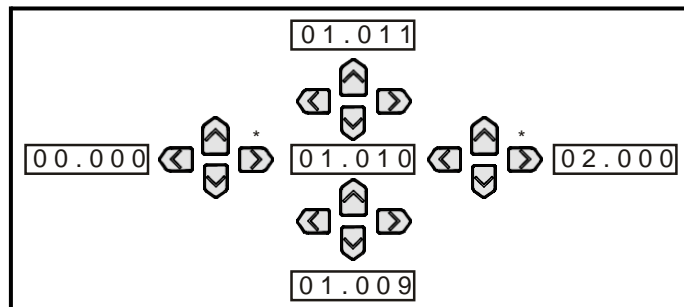
* Can only be used to move between menus if all menus have been enabled (Pr **00.010**). Refer to section 5.8 *Parameter access level and security* on page 91.

The menus and parameters roll over in both directions. i.e. if the last parameter is displayed, a further press will cause the display to rollover and show the first parameter. When changing between menus the drive remembers which parameter was last viewed in a particular menu and thus displays that parameter.

5.3.1 CI-Keypad set-up menu

To enter the keypad set-up menu, press and hold the Escape ⟨⤶⟩ button on the keypad from status mode. All the keypad parameters are saved to the keypad non-volatile memory when exiting from the keypad set-up menu. To exit from the keypad set-up menu, press the Escape ⟨⤶⟩ or ⟨◁⟩ or ⟨▷⟩ button. Below are the keypad set-up parameters.

Table 5-3 CI-Keypad set-up parameters

Parameters		Range	Type
Keypad.00	Language	Classic English or English	RW
Keypad.01	Show Units	Off or On	RW
Keypad.02	Backlight Level	0 to 100 %	RW
Keypad.05	Show Raw Text Parameter Values	Off or On	RW
Keypad.06	Software Version	00.00.00.00 to 99.99.99.99	RO

NOTE

It is not possible to access the keypad parameters via any communications channel.

5.4 Advanced menus

The advanced menus consist of groups or parameters appropriate to a specific function or feature of the drive. Menus 0 to 22 can be viewed on the Keypad.

The option module menu (S.mm.ppp) is only displayed if the option module is installed. Where S signifies the option module slot number and the mm.ppp signifies the menu and parameter number of the option module's internal menus and parameter.

Table 5-4 Advanced menu descriptions

Menu	Description
0	Commonly used basic set up parameters for quick / easy programming
1	Frequency reference
2	Ramps
3	Frequency control
4	Torque and current control
5	Motor control
6	Sequencer and clock
7	Analog I/O
8	Digital I/O
9	Programmable logic, motorized pot, binary sum, timers and scope
10	Status and trips
11	Drive set-up and identification, serial communications
12	Threshold detectors and variable selectors
14	User PID controller
15	Option module slot 1 set-up menu
18	General option module application menu 1
20	General option module application menu 2
21	Second motor parameters
22	Menu 0 set-up
Slot 1	Slot 1 option menus*

* Only displayed when the option module is installed.

5.4.1 Display messages

The following tables indicate the various possible mnemonics which can be displayed by the drive and their meaning.

Table 5-5 Status indications

Upper row string	Description	Drive output stage
Inhibit	The drive is inhibited and cannot be run. The SAFE TORQUE OFF signals are not applied to the SAFE TORQUE OFF terminals or Pr **06.015** is set to 0. The other conditions that can prevent the drive from enabling are shown as bits in *Enable Conditions* (06.010).	Disabled
Ready	The drive is ready to run. The drive enable is active, but the drive inverter is not active because the final drive run is not active.	Disabled
Stop	The drive is stopped / holding zero frequency.	Enabled
Run	The drive is active and running.	Enabled
Supply Loss	Supply loss condition has been detected	Enabled
Deceleration	The motor is being decelerated to zero frequency because the final drive run has been deactivated.	Enabled
dc Injection	The drive is applying dc injection braking.	Enabled
Trip	The drive has tripped and no longer controlling the motor. The trip code appears in the lower display.	Disabled
Under Voltage	The drive is in the under-voltage state either in low voltage or high voltage mode.	Disabled

5.4.2 Alarm indications

An alarm is an indication given on the display by alternating the alarm string with the drive status string on the display. Alarms strings are not displayed when a parameter is being edited.

Table 5-6 Alarm indications

Alarm string	Description
Brake Resistor	Brake resistor overload. *Braking Resistor Thermal Accumulator* (10.039) in the drive has reached 75.0 % of the value at which the drive will trip.
Motor Overload	*Motor Protection Accumulator* (04.019) in the drive has reached 75.0 % of the value at which the drive will trip and the load on the drive is >100 %.
Drive overload	Drive over temperature. *Percentage Of Drive Thermal Trip Level* (07.036) in the drive is greater than 90 %.
Auto Tune	The autotune procedure has been initialized and an autotune in progress.
Limit Switch	Limit switch active. Indicates that a limit switch is active and that is causing the motor to be stopped.
Option Slot 1	Option slot alarm.
Low AC	Low voltage mode. See *Low AC Alarm* (10.107).
Current Limit	Current limit active. See *Current Limit Active* (10.009).

5.5 Changing the operating mode

Procedure

Use the following procedure only if a different operating mode is required:

1. Ensure the drive is not enabled, i.e. terminal 31 & 34 are open or Pr **06.015** is OFF (0)
2. Change the setting of Pr **00.079** as follows:

Pr **00.079** setting		Operating mode
00.079 ^ Open-loop	1	Open-loop
00.079 v RFC-A	2	RFC-A

The figures in the second column apply when serial communications are used.

NOTE

When the operating mode is changed, a parameter save is carried out.

3. Either:

Press the red 🛑 reset button

Carry out a drive reset through serial communications by setting Pr **10.038** to 100 (ensure that Pr **mm.000** returns to 0)

5.6 Saving parameters

When changing a parameter in Menu 0, the new value is saved when

pressing the Enter button ⏎ to return to parameter view mode from parameter edit mode.

If parameters have been changed in the advanced menus, then the change will not be saved automatically. A save function must be carried out.

Procedure

1. Select 'Save parameters'* in Pr **mm.000** (alternatively enter a value of 1000* in Pr **mm.000**)
2. Either:
- Press the red 🛑 reset button
- Carry out a drive reset through serial communications by setting Pr **10.038** to 100

* If the drive is in the under-voltage state (i.e. when the AI-Backup adaptor terminals are being supplied from a +24 Vdc supply) a value of 1001 must be entered into Pr **mm.000** to perform a save function.

5.7 Restoring parameter defaults

Restoring parameter defaults by this method saves the default values in the drives memory. *User security status* (00.010) and *User security code* (00.025) are not affected by this procedure).

Procedure

1. Ensure the drive is not enabled, i.e. terminal 31 & 34 is open or Pr **06.015** is OFF (0)
2. Select 'Reset 50 Hz Defs' or 'Reset 60 Hz Defs' in Pr **mm.000**. (alternatively, enter 1233 (50 Hz settings) or 1244 (60 Hz settings) in Pr **mm.000**).
3. Either:
- Press the red 🛑 reset button
- Carry out a drive reset through serial communications by setting Pr **10.038** to 100

5.8 Parameter access level and security

The parameter access level determines whether the user has access to Menu 0 only or to all the advanced menus (Menus 1 to 22) in addition to Menu 0.

The User Security determines whether the access to the user is read only or read write.

Both the User Security and Parameter Access Level can operate independently of each other as shown in Table 5-7.

Table 5-7 Parameter access level and security

User security status (11.044)	Access level	User security	Menu 0 status	Advanced menu status
0	Menu 0	Open	RW	Not visible
		Closed	RO	Not visible
1	All Menus	Open	RW	RW
		Closed	RO	RO
2	Read-only Menu 0	Open	RO	Not visible
		Closed	RO	Not visible
3	Read-only	Open	RO	RO
		Closed	RO	RO
4	Status only	Open	Not visible	Not visible
		Closed	Not visible	Not visible
5	No access	Open	Not visible	Not visible
		Closed	Not visible	Not visible

The default settings of the drive are Parameter Access Level Menu 0 and user Security Open i.e. read / write access to Menu 0 with the advanced menus not visible.

5.8.1 User Security Level / Access Level

The drive provides a number of different levels of security that can be set by the user via *User Security Status* (11.044); these are shown in the table below.

User Security Status (Pr 11.044)	Description
Menu 0 (0)	All writable parameters are available to be edited but only parameters in Menu 0 are visible
All menus (1)	All parameters are visible and all writable parameters are available to be edited
Read-only Menu 0 (2)	Access is limited to Menu 0 parameters only. All parameters are read-only
Read-only (3)	All parameters are read-only however all menus and parameters are visible
Status only (4)	The keypad remains in status mode and no parameters can be viewed or edited
No access (5)	The keypad remains in status mode and no parameters can be viewed or edited. Drive parameters cannot be accessed via a comms/ fieldbus interface in the drive or any option module

5.8.2 Changing the User Security Level/Access Level

The security level is determined by the setting of Pr **00.010** or Pr **11.044**. The Security Level can be changed through the keypad even if the User Security Code has been set.

5.8.3 User Security Code

The User Security Code, when set, prevents write access to any of the parameters in any menu.

Setting User Security Code

Enter a value between 1 and 9999 in Pr **00.025** and press the ⏎ button; the security code has now been set to this value. In order to activate the security, the Security level must be set to desired level in Pr **00.010**. When the drive is reset, the security code will have been activated and the drive returns to Menu 0 and the 🔒 symbol is displayed in the right-hand corner of the keypad display. The value of Pr **00.025** will return to 0 in order to hide the security code.

Unlocking User Security Code

Select a parameter that need to be edited and press the ⏎ button, the display will now show 'security code'. Use the arrow buttons to set the security code and press the ⏎ button. With the correct security code entered, the display will revert to the parameter selected in edit mode.

If an incorrect security code is entered, the following message 'incorrect security code' is displayed, and the display will revert to parameter view mode.

Disabling User Security

Unlock the previously set security code as detailed above. Set Pr **00.025** to 0 and press the ⏎ button. The User Security has now been disabled, and will not have to be unlocked each time the drive is powered up to allow read / write access to the parameters.

5.9 Displaying parameters with non-default values only

By selecting 'Show non-default' in Pr **mm.000** (Alternatively, enter 12000 in Pr **mm.000**), the only parameters that will be visible to the user will be those containing a non-default value. This function does not require a drive reset to become active. In order to deactivate this function, return to Pr **mm.000** and select 'No action' (alternatively enter a value of 0). Please note that this function can be affected by the access level enabled, refer to section 5.8 *Parameter access level and security* on page 91 for further information regarding access level.

5.10 Displaying destination parameters only

By selecting 'Destinations' in Pr **mm.000** (Alternatively enter 12001 in Pr **mm.000**), the only parameters that will be visible to the user will be destination parameters. This function does not require a drive reset to become active. In order to deactivate this function, return to Pr **mm.000** and select 'No action' (alternatively enter a value of 0).

Please note that this function can be affected by the access level enabled, refer to section 5.8 *Parameter access level and security* on page 91 for further information regarding access level.

5.11 Communications

Installing an AI-485 adaptor provides the drive with a 2 wire 485 serial communications interface. This enables the drive set-up, operation and monitoring to be carried out with a PC or controller as required.

5.11.1 485 Serial communications

Communication is via the RJ45 connector or screw terminals (parallel connection). The drive only supports Modbus RTU protocol.

The communications port applies a $^1/_4$ unit load to the communications network.

USB to EIA485 Communications

An external USB hardware interface such as a PC cannot be used directly with the 2-wire EIA485 interface of the drive. Therefore, a suitable converter is required.

A suitable USB to EIA485 isolated converter is available from Control Techniques as follows:

• CT USB Comms cable (CT Part No. 4500-0096)

When using one of the above converters or any other suitable converter with the drive, it is recommended that no terminating resistors be connected on the network. It may be necessary to 'link out' the terminating resistor within the converter depending on which type is used. The information on how to link out the terminating resistor will normally be contained in the user information supplied with the converter.

Serial communications set-up parameters

The following parameters need to be set according to the system requirements.

Serial communications set-up parameters		
Serial Mode (11.024)	8 2 NP (0), 8 1 NP (1), 8 1 EP (2), 8 1 OP (3), 8 2 NP M (4), 8 1 NP M (5), 8 1 EP M (6), 8 1 OP M (7), 7 1 EP (8), 7 1 OP (9), 7 1 EP M (10), 7 1 OP M (11)	The drive only supports the Modbus RTU protocol and is always a slave. This parameter defines the supported data formats used by the 485 comms port (if installed) on the drive. This parameter can be changed via the drive keypad, via a option module or via the comms interface itself.
Serial Baud Rate (11.025)	300 (0), 600 (1), 1200 (2), 2400 (3), 4800 (4), 9600 (5), 19200 (6), 38400 (7), 57600(8), 76800(9), 115200 (10)	This parameter can be changed via the drive keypad, via a option module or via the comms interface itself. If it is changed via the comms interface, the response to the command uses the original baud rate. The master should wait at least 20 ms before sending a new message using the new baud rate.
Serial Address (11.023)	1 to 247	This parameter defines the serial address and an address between 1 and 247 is permitted.

6 Basic parameters

Menu 0 is used to bring together various commonly used parameters for basic easy set up of the drive. All the parameters in Menu 0 appear in other menus in the drive (denoted by {…}). Menus 22 can be used to configure the parameters in Menu 0.

6.1 Menu 0: Basic parameters

Parameter		Range (⊠)		Default (○)		Type					
		OL	RFC-A	OL	RFC-A						
00.001	Minimum Reference Clamp	±VM_NEGATIVE_REF_CLAMP1 Hz		0.00 Hz		RW	Num				US
00.002	Maximum Reference Clamp	±VM_POSITIVE_REF_CLAMP Hz		50 Hz default: 50.00 Hz 60 Hz default: 60.00 Hz		RW	Num				US
00.003	Acceleration Rate 1	±VM_ACCEL_RATE s		5.0 s		RW	Num				US
00.004	Deceleration Rate 1	±VM_ACCEL_RATE s		10.0 s		RW	Num				US
00.005	Drive Configuration	AV (0), AI (1), AV Preset (2), AI Preset (3), Preset (4), Keypad (5), Keypad Ref (6), Electronic Pot (7), Torque Control (8), Pid Control (9)		AV (0)		RW	Txt			PT	US
00.006	Motor Rated Current	±VM_RATED_CURRENT A		Maximum Heavy-Duty Rating (11.032) A		RW	Num		RA		US
00.007	Motor Rated Speed	0.0 to 80000.0 rpm		50 Hz default: 1500.0 rpm 60 Hz default: 1800.0 rpm	50 Hz default: 1450.0 rpm 60 Hz default: 1750.0 rpm	RW	Num				US
00.008	Motor Rated Voltage	±VM_AC_VOLTAGE_SET V		110 V drive: 230 V 200 V drive: 230 V 400 V drive 50 Hz: 400 V 400 V drive 60 Hz: 460 V 575 V drive: 575 V 690 V drive: 690 V		RW	Num		RA		US
00.009	Motor Rated Power Factor	0.00 to 1.00		0.85		RW	Num		RA		US
00.010	User Security Status	Menu 0 (0), All Menus (1), Read only Menu 0 (2), Read only (3), Status Only (4), No Access (5)		Menu 0 (0)		RW	Txt	ND	NC	PT	
00.012	Input Logic Polarity	Negative Logic (0) or Positive Logic (1)		Positive Logic (1)		RW	Txt				US
00.015	Jog Reference	0.00 to 300.00 Hz		1.50 Hz		RW	Num				US
00.016	Analog Input 1 Mode	4-20 mA Stop (-6), 20-4 mA Stop (-5), 4-20 mA Low (-4), 20-4 mA Low (-3), 4-20 mA Hold (-2), 20-4 mA Hold (-1), 0-20 mA (0), 20-0 mA (1), 4-20 mA Trp (2), 20-4 mA Trp (3), 4-20 mA (4), 20-4 mA (5), Voltage (6)		Voltage (6)		RW	Txt				US
00.017	Bipolar Reference Enable	Off (0) or On (1)		Off (0)		RW	Bit				US
00.018	Preset Reference 1	±VM_SPEED_FREQ_REF Hz		0.00 Hz		RW	Num				US
00.025	User Security Code	0 to 9999		0		RW	Num	ND	NC	PT	US
00.027	Power-up Keypad Control Mode Reference	Reset (0), Last (1), Preset (2)		Reset (0)		RW	Txt				US
00.028	Ramp Mode Select	Fast (0), Standard (1), Std boost (2), Fast boost (3)		Standard (1)		RW	Txt				US
00.029	Ramp Enable		Off (0) or On (1)		On (1)	RW	Bit				US
00.030	Parameter Cloning	None (0), Read (1), Program (2), Auto (3), Boot (4)		None (0)		RW	Txt		NC		US
00.031	Stop Mode	Coast (0), Ramp (1), Ramp dc I (2), dc I (3), Timed dc I (4), Disable (5), No Ramp (6)		Ramp (1)		RW	Txt				US
00.032	Dynamic V to F Select / Flux Optimization Select	0 to 1		0		RW	Num				US
00.033	Catch A Spinning Motor	Disable (0), Enable (1), Fwd Only (2), Rev Only (3)		Disable (0)		RW	Txt				US
00.034	Digital Input 5 Select	Input (0), Therm Short Cct (1), Thermistor (2), Therm No Trip (3)		Input (0)		RW	Txt				US
00.035	Digital Output 1 Control	0 to 21		0		RW					US
00.036	Analog Output 1 Control	0 to 15		0		RW					US
00.037	Maximum Switching Frequency	0.667 (0), 1 (1), 2 (2), 3 (3), 4 (4), 6 (5), 8 (6), 12 (7), 16 (8) kHz	2 (2), 3 (3), 4 (4), 6 (5), 8 (6), 12 (7), 16 (8)	3 (3) kHz		RW	Txt				US

Parameter		Range (☒)		Default (O)		Type					
		OL	RFC-A	OL	RFC-A						
00.038	Auto-tune	0 to 2	0 to 3	0		RW	Num		NC		US
00.039	Motor Rated Frequency	0.00 to VM_SPEED_FREQ_REF_UNIPOLAR Hz		50Hz: 50.00 Hz 60Hz: 60.00 Hz		RW	Num		RA		US
00.040	Number of Motor Poles*	Automatic (0) to 32 (16) Poles		Automatic (0) Poles		RW	Txt				US
00.041	Control Mode	Ur S (0), Ur (1), Fixed (2), Ur Auto (3), Ur I (4), Square (5)		Ur I (4)		RW	Txt				US
00.042	Low Frequency Voltage Boost	0.0 to 25.0 %		3.0 %		RW	Num				US
00.043	Serial Baud Rate	300 (0), 600 (1), 1200 (2), 2400 (3), 4800 (4), 9600 (5), 19200 (6), 38400 (7), 57600 (8), 76800 (9), 115200 (10)		19200 (6)		RW	Txt				US
00.044	Serial Address	1 to 247		1		RW	Num				US
00.045	Reset Serial Communications	Off (0) or On (1)		Off (0)		RW	Bit	ND	NC		
00.046	Brake Release Current Threshold	0 to 200 %		50 %		RW	Num				US
00.047	Brake Apply Current Threshold	0 to 200 %		10 %		RW	Num				US
00.048	BC Brake Release Frequency	0.00 to 20.00 Hz		1.00 Hz		RW	Num				US
00.049	BC Brake Apply Frequency	0.00 to 20.00 Hz		2.00 Hz		RW	Num				US
00.050	BC Brake Delay	0.0 to 25.0 s		1.0 s		RW	Num				US
00.051	BC Post-brake Release Delay	0.0 to 25.0 s		1.0 s		RW	Num				US
00.053	BC Initial Direction	Ref (0), Forward (1), Reverse (2)		Ref (0)		RW	Txt				US
00.054	BC Brake Apply Through Zero Threshold	0.00 to 25.00 Hz		0.00 Hz		RW	Num				US
00.055	BC Enable	Disable (0), Relay (1), Digital IO (2), User (3)		Disable (0)		RW	Txt				US
00.059	OUP Enable	Stop (0) or Run (1)		Run (1)		RW	Txt				US
00.065	Frequency Controller Proportional Gain Kp1		0.000 to 200.000 s/rad		0.100 s/rad	RW	Num				US
00.066	Frequency Controller Integral Gain Ki1		0.00 to 655.35 s^2/rad		0.10 s^2/rad	RW	Num				US
00.067	Sensorless Mode Filter		4 (0), 5 (1), 6 (2), 8 (3), 12 (4), 20 (5) ms		4 (0) ms	RW	Txt				US
00.069	Spin Start Boost	0.0 to 10.0		1.0		RW	Num				US
00.076	Action on Trip Detection	00000 to 11111		00000		RW	Bin				US
00.077	Maximum Heavy-Duty Current Rating	0.00 to 9999.99 A				RO	Num	ND	NC	PT	
00.078	Software Version	00.00.00.00 to 99.99.99.99				RO	Num	ND	NC	PT	
00.079	User Drive Mode	Open loop (1), RFC A (2)		Open-loop (1)		RW	Txt	ND	NC	PT	US
00.080	User Security Status	Menu 0 (0), All Menus (1), Read only Menu 0 (2), Read only (3), Status Only (4), No Access (5)		Menu 0 (0)		RW	Txt	ND		PT	

* If this parameter is read via serial communications, it will show pole pairs.

RW	Read / Write	RO	Read only	Num	Number parameter	Bit	Bit parameter	Txt	Text string	Bin	Binary parameter	FI	Filtered
ND	No default value	NC	Not copied	PT	Protected parameter	RA	Rating dependent	US	User save	PS	Power-down save	DE	Destination

Figure 6-1   Menu 0 logic diagram

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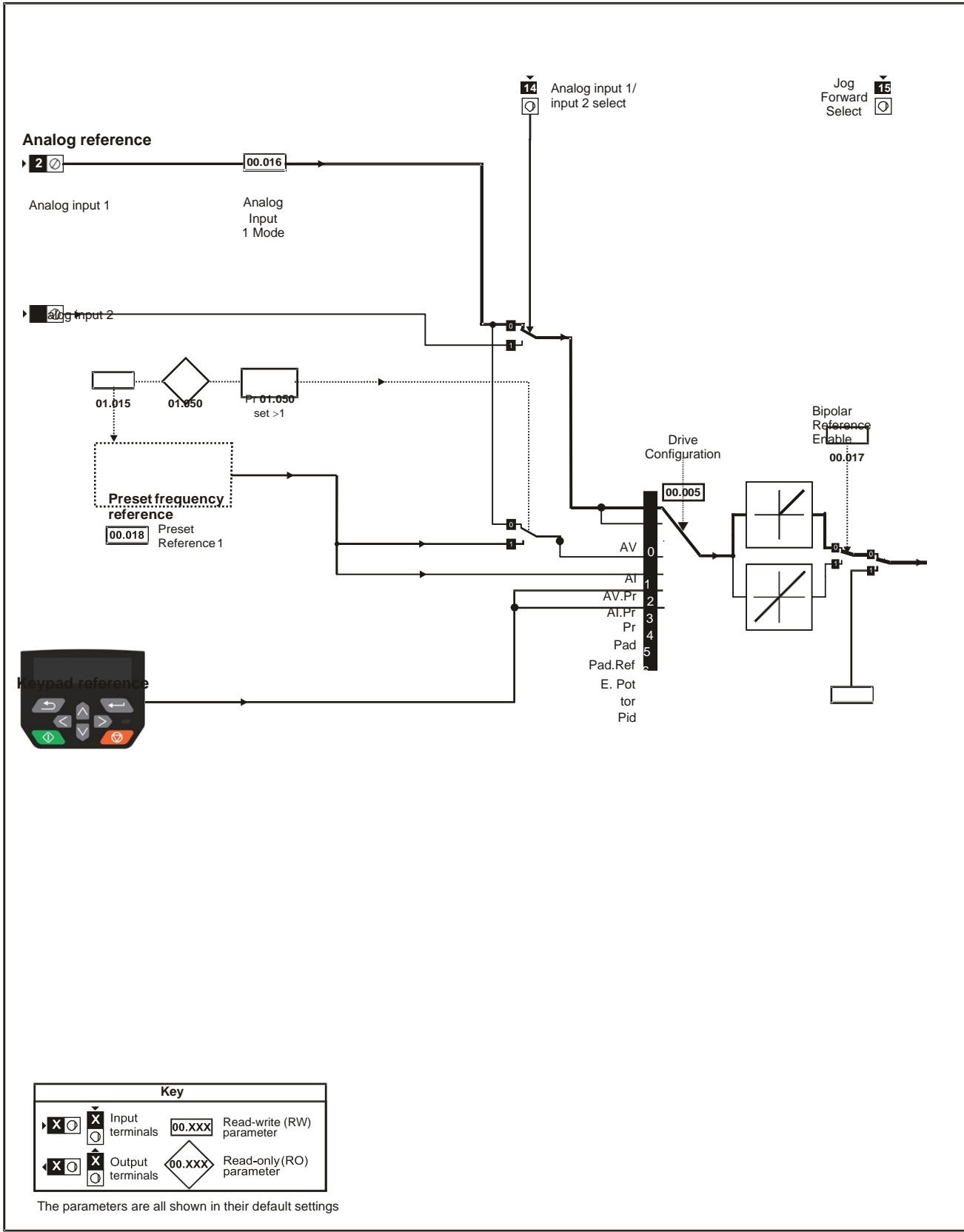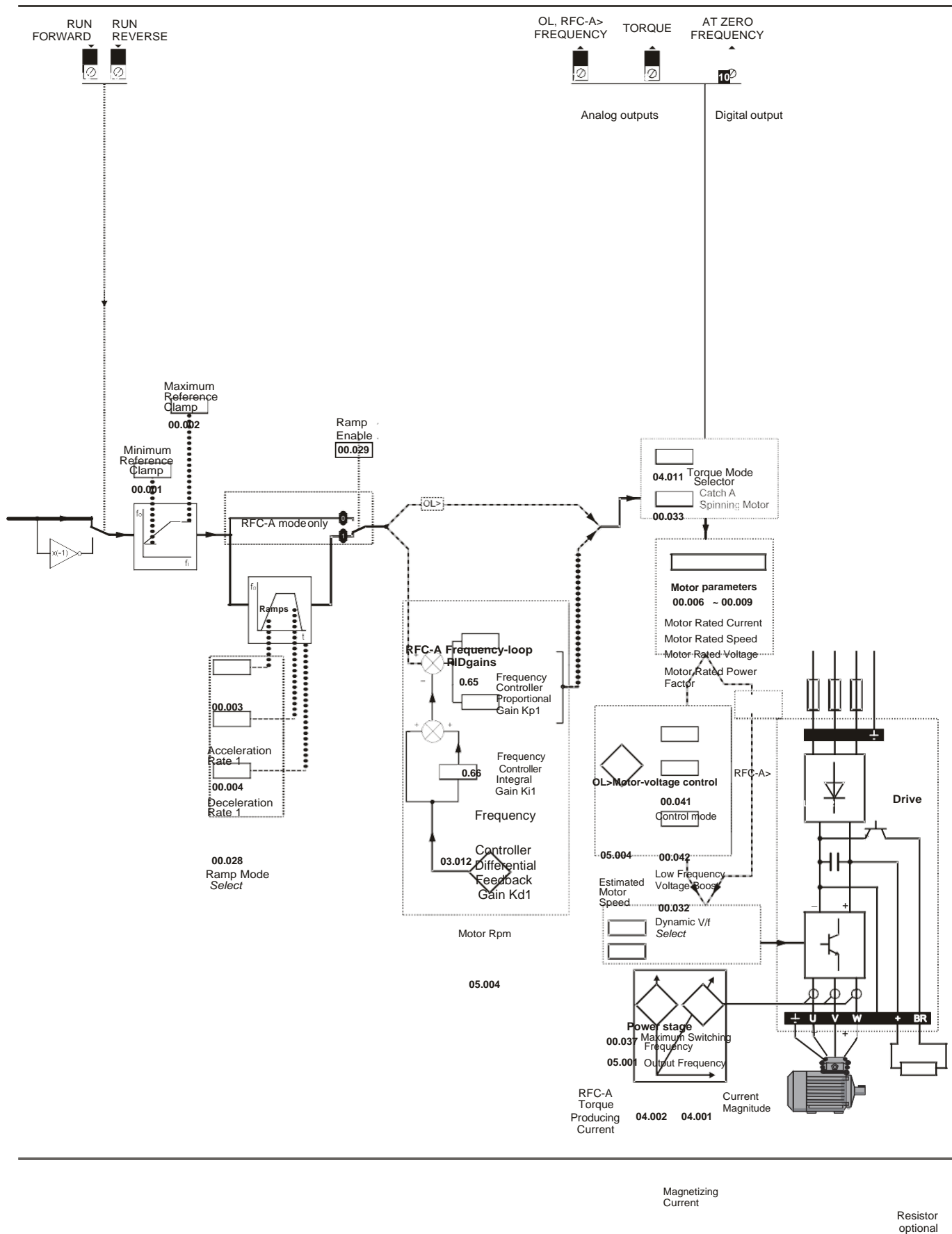
6.2 Parameter descriptions

6.2.1 Pr mm.000

Pr **mm.000** is available in all menus, commonly used functions are provided as text strings in Pr **mm.000** shown in Table 6-1. The functions in Table 6-1 can also be selected by entering the appropriate numeric values (as shown in Table 6-2) in Pr **mm.000**. For example, enter 7001 in Pr **mm.000** to store drive parameters on an NV media card.

Table 6-1 Commonly used functions in xx.000

Value	Equivalent value	String	Action
0	0	**No Action**	No action
1000	1	**Save Parameters**	Save drive parameters to non-volatile memory
6001	2	**Load file 1**	Load the data from file 1 on a non-volatile media card into the drive provided it is a parameter file
4001	3	**Save to file 1**	Store the drive parameters in file 1 on a non-volatile media card
6002	4	**Load file 2**	Load the data from file 2 on a non-volatile media card into the drive provided it is a parameter file
4002	5	**Save to file 2**	Store the drive parameters in file 2 on a non-volatile media card
6003	6	**Load file 3**	Load the data from file 3 on a non-volatile media card into the drive provided it is a parameter file
4003	7	**Save to file 3**	Store the drive parameters in file 3 on a non-volatile media card
12000	8	**Show non-default**	Only display parameters that are different from their default value
12001	9	**Destinations**	Only display parameters that are used to set-up destinations
1233	10	**Reset 50 Hz defs**	Load 50 Hz defaults
1244	11	**Reset 60 Hz defs**	Load 60 Hz defaults
1070	12	**Reset modules**	Reset all option modules

Table 6-2 Functions in Pr mm.000

Value	Action
1000	Save parameters when *Under Voltage Active* (Pr **10.016**) is not active.
1001	Save parameter under all conditions
1070	Reset option module
1233	Load standard (50 Hz) defaults
1234	Load standard (50 Hz) defaults to all menus except option module menu 15
1244	Load US (60 Hz) defaults
1245	Load US (60 Hz) defaults to all menus except option module menu 15
1299	Reset {Stored HF} trip.
2001*	Create a boot file on a non-volatile media card based on the present drive parameters including all Menu 20 parameters
4yyy*	NV media card: Transfer the drive parameters to parameter file yyy
5yyy*	NV media card: Transfer the onboard user program to onboard user program file yyy
6yyy*	NV media card: Load the drive parameters from parameter file yyy or the onboard user program from onboard user program file yyy
7yyy*	NV media card: Erase file yyy
8yyy*	NV Media card: Compare the data in the drive with file yyy
9555*	NV media card: Clear the warning suppression flag
9666*	NV media card: Clear the warning suppression flag
9777*	NV media card: Clear the read-only flag
9888*	NV media card: Set the read-only flag
12000**	Only display parameters that are different from their default value. This action does not require a drive reset.
12001**	Only display parameters that are used to set-up destinations (i.e. DE format bit is 1). This action does not require a drive reset.
40yyy	Backup all drive data (parameter differences from defaults, an onboard user program and miscellaneous option data), including the drive name; the store will occur to the </fs/MCDF/driveyyy/> folder; if it does not exist, it will be created. Since the name is stored, this is a backup, rather than a clone. The command code will be cleared when all drive and option data have been saved.
60yyy	Load all drive data (parameter differences from defaults, an onboard user program and miscellaneous option data); the load will come from the </fs/MCDF/driveyyy/> folder. The command code will not be cleared until the drive and all option data have been loaded.

* See Chapter 9 *NV Media Card Operation* on page 114 for more information on these functions.
** These functions do not require a drive reset to become active.
All other functions require a drive reset to initiate the function. Equivalent values and strings are also provided in the table above.

13 Diagnostics

The keypad display on the drive gives various information about the status of the drive. The keypad display provides information on the following categories:

- Trip indications
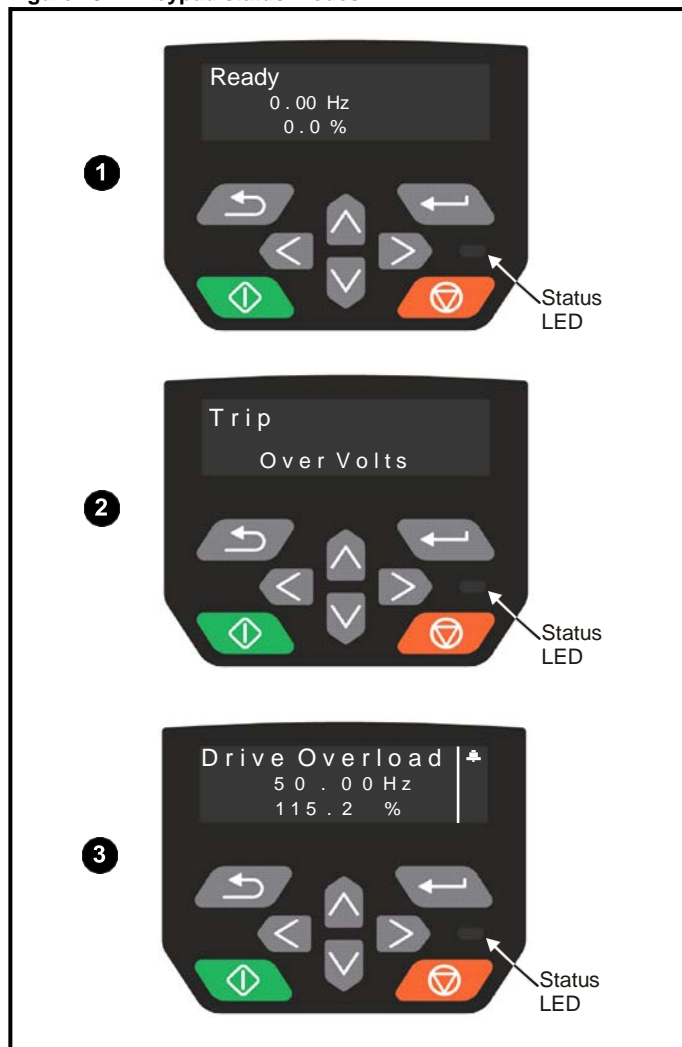- Alarm indications
- Status indications

⚠️ **WARNING**
Users must not attempt to repair a drive if it is faulty, nor carry out fault diagnosis other than through the use of the diagnostic features described in this chapter.
If a drive is faulty, it must be returned to an authorized Control Techniques distributor for repair.

13.1 Status modes (Keypad and LED status)

Figure 13-1 Keypad status modes

1 Drive OK status

2 Trip status

3 Alarm status

13.2 Trip indications

The output of the drive is disabled under any trip condition so that the drive stops controlling the motor. If the motor is running when the trip occurs it will coast to a stop.

During a trip condition, where a CI-Keypad is being used, the upper row of the display indicates that a trip has occurred and the lower row of the keypad display will show the trip string. Some trips have a sub-trip number to provide additional information about the trip. If a trip has a sub-trip number, the sub-trip number is flashed alternately with the trip string unless there is space on the second row for both the trip string and the sub-trip number in which case both the trip string and sub-trip information is displayed separated by a decimal point.

If a display is not being used, the drive LED Status indicator will flash with 0.5 s duty cycle if the drive has tripped. Refer to Figure 13-2 *Key to sub-trip number.*

Trips are listed alphabetically in Table 13-3 *Serial communications look up table* on page 225 based on the trip indication shown on the drive display. Alternatively, the drive status can be read in Pr **10.001** 'Drive OK' using communication protocols. The most recent trip can be read in Pr **10.020** providing a trip number. It must be noted that the hardware trips (HF01 to HF19) do not have trip numbers. The trip number must be checked in Table 13-3 to identify the specific trip.

Example

1. Trip code 2 is read from Pr **10.020** via serial communications.
2. Checking Table 13-2 shows Trip 2 is an Over Volts trip.

3. Look up Over Volts in Table 13-2.
4. Perform checks detailed under *Diagnosis*.

13.3 Identifying a trip / trip source

Some trips only contain a trip string whereas some other trips have a trip string along with a sub-trip number which provides the user with additional information about the trip.

A trip can be generated from a control system or from a power system. The sub-trip number associated with the trips listed in Table 13-1 is in the form xxyzz and used to identify the source of the trip.
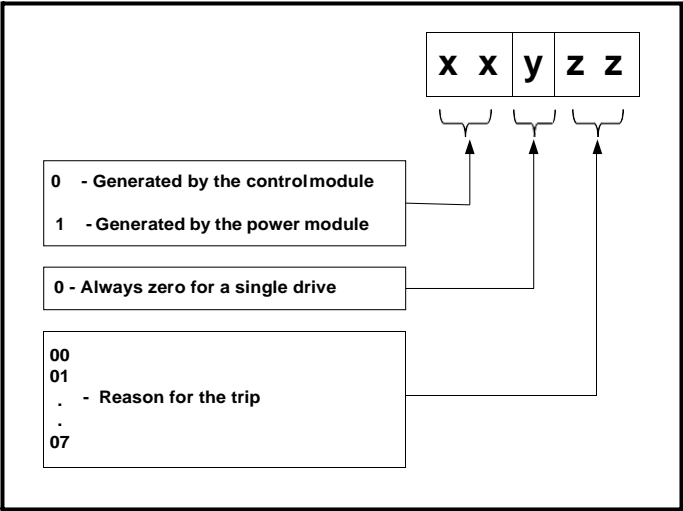
Table 13-1 Trips associated with xxyzz sub-trip number

Over Volts	Phase Loss
OI ac	Power Comms
OI Brake	OI Snubber
PSU	OHt Rectifier
OHt Inverter	Temp Feedback
OHt Power	Power Data
OHt dc bus	Soft Start

The digits xx are 00 for a trip generated by the control system. For a drive, if the trip is related to the power system then xx will have a value of 01, when displayed the leading zeros are suppressed.

For a control system trip (xx is zero), the y digit where relevant is defined for each trip. If not relevant, the y digit will have a value of zero.

The zz digits give the reason for the trip and are defined in each trip description.

Figure 13-2   Key to sub-trip number

13.4 Trips, Sub-trip numbers

Table 13-2 Trip indications

Trip	Diagnosis
An Input 1 Loss 28	**Analog input 1 current loss** The *An Input 1 Loss* trip indicates that a current loss was detected in current mode on Analog input 1 (Terminal 2). In 4-20 mA and 20-4 mA modes loss of input is detected if the current falls below 3 mA. **Recommended actions:** • Check control wiring is correct • Check control wiring is undamaged • Check the *Analog Input 1 Mode* (07.007) • Current signal is present and greater than 3 mA
An Input 1 OI	**Analog input 1 over-current**
189	Current input on analog input 1 exceeds 24mA.
An Input 2 Loss 29	**Analog input 2 current loss** The *An Input 2 Loss* trip indicates that a current loss was detected in current mode on Analog input 2 (Terminal 5). In 4-20 mA and 20-4 mA modes loss of input is detected if the current falls below 3 mA. Recommend actions: • Check control wiring is correct • Check control wiring is undamaged • Check the Analog Input 2 Mode (07.011) • Current signal is present and greater than 3 mA
An Input 2 OI	**Analog input 2 over-current**
190	Current input on analog input 2 exceeds 24 mA.
Autotune 13	**Measured inertia has exceeded the parameter range** The drive has tripped during a rotating autotune or mechanical load measurement test. The cause of the trip can be identified from the associated sub-trip number. <table><tr><th>Sub-trip</th><th>Reason</th></tr><tr><td>1</td><td>Measured inertia has exceeded the parameter range during a mechanical load measurement</td></tr></table> **Recommended actions:** • Check motor cable wiring is correct
Autotune Stopped 18	**Autotune test stopped before completion** The drive was prevented from completing an autotune test, because either the drive enable or the drive run were removed. **Recommended actions:** • Check the drive enable signal (Terminal 31 & 34) were active during the autotune
Brake R Too Hot 19	**Braking resistor overload timed out (I²t)** The *Brake R Too Hot* trip indicates that braking resistor overload has timed out. The value in *Braking Resistor Thermal Accumulator* (10.039) is calculated using *Braking Resistor Rated Power* (10.030), *Braking Resistor Thermal Time Constant* (10.031) and *Braking Resistor Resistance* (10.061). The *Brake R too Hot* trip is initiated when the *Braking Resistor Thermal Accumulator* (10.039) reaches 100 %. **Recommended actions:** • Ensure the values entered in Pr **10.030**, Pr **10.031** and Pr **10.061** are correct • If an external thermal protection device is being used and the braking resistor software overload protection is not required, set Pr **10.030**, Pr **10.031** or Pr **10.061** to 0 to disable the trip.
Card Access 185	**NV Media Card Write fail** The *Card Access* trip indicates that the drive was unable to access the NV Media Card. If the trip occurs during the data transfer to the card then the file being written may be corrupted. If the trip occurs when the data being transferred to the drive then the data transfer may be incomplete. If a parameter file is transferred to the drive and this trip occurs during the transfer, the parameters are not saved to non-volatile memory, and so the original parameters can be restored by powering the drive down and up again. **Recommended actions:** • Check NV Media Card is installed / located correctly • Replace the NV Media Card
Card Boot 177	**The Menu 0 parameter modification cannot be saved to the NV Media Card** Menu 0 changes are automatically saved on exiting edit mode. The *Card Boot* trip will occur if a write to a Menu 0 parameter has been initiated via the keypad by exiting edit mode and Pr **11.042** is set for auto or boot mode, but the necessary boot file has not been created on the NV Media Card to take the new parameter value. This occurs when Pr **11.042** is changed to Auto (3) or Boot (4) mode, but the drive is not subsequently reset. **Recommended actions:** • Ensure that Pr **11.042** is correctly set, and then reset the drive to create the necessary file on the NV Media Card • Re-attempt the parameter write to the Menu 0 parameter

Card Busy	**NV Media Card cannot be accessed as it is being accessed by an option module**
178	The *Card Busy* trip indicates that an attempt has been made to access a file on NV Media Card, but the NV Media Card is already being accessed by an Option Module. No data is transferred.
	Recommended actions:
	• Wait for the option module to finish accessing the NV Media Card and re-attempt the required function

Card Compare	**NV Media Card file/data is different to the one in the drive**
188	A compare has been carried out between a file on the NV Media Card, a *Card Compare* trip is initiated if the parameters on the NV Media Card are different to the drive.
	Recommended actions:
	• Set Pr **mm.000** to 0 and reset the trip
	• Check to ensure the correct data block on the NV Media Card has been used for the compare

Card Data Exists	**NV Media Card data location already contains data**
179	The *Card Data Exists* trip indicates that an attempt has been made to store data on a NV Media Card in a data block which already contains data.
	Recommended actions:
	• Erase the data in data location
	• Write data to an alternative data location

Card Drive Mode	**NV Media Card parameter set not compatible with current drive mode**
187	The *Card Drive Mode* trip is produced during a compare if the drive mode in the data block on the NV Media Card is different from the current drive mode. This trip is also produced if an attempt is made to transfer parameters from a NV Media Card to the drive if the operating mode in the data block is outside the allowed range of operating modes.
	Recommended actions:
	• Ensure the destination drive supports the drive operating mode in the parameter file.
	• Clear the value in Pr **mm.000** and reset the drive
	• Ensure destination drive operating mode is the same as the source parameter file

Card Error	**NV Media Card data structure error**
182	The *Card Error* trip indicates that an attempt has been made to access the NV Media Card but an error has been detected in the data structure on the card. Resetting the trip will cause the drive to erase and create the correct folder structure. The cause of the trip can be identified by the sub-trip.

Sub-trip	Reason
1	The required folder and file structure is not present
2	The HEADER.DAT file is corrupted
3	Two or more files in the <MCDF\> folder have the same file identification number

Recommended actions:
- Erase all the data block and re-attempt the process
- Ensure the card is located correctly
- Replace the NV Media Card

Card Full	**NV Media Card full**
184	The *Card Full* trip indicates that an attempt has been made to create a data block on a NV Media Card, but there is not enough space left on the card.
	Recommended actions:
	• Delete a data block or the entire NV Media Card to create space
	• Use a different NV Media Card

Card No Data	**NV Media Card data not found**
183	The *Card No Data* trip indicates that an attempt has been made to access non-existent file or block on the NV Media Card.
	Recommended actions:
	• Ensure data block number is correct

Card Option	**NV Media Card trip; option modules installed are different between source drive and destination drive**
180	The *Card Option* trip indicates that parameter data or default difference data is being transferred from the NV Media Card to the drive, but the option module category is different between the source and destination drives. This trip does not stop the data transfer, but is a warning that the data for the option module that is different will be set to the default values and not the values from the card. This trip also applies if a compare is attempted between the data block and the drive.
	Recommended actions:
	• Ensure the correct option module is installed.
	• Press the red reset button to acknowledge that the parameters for the option module installed will be at their default values
	• This trip can be suppressed by setting Pr **mm.000** to 9666 and resetting the drive.

Card Product	**NV Media Card data blocks are not compatible with the drive derivative**
175	The *Card Product* trip is initiated either at power-up or when the card is accessed, If *Drive Derivative* (11.028) is different between the source and target drives. This trip can be reset and data can be transferred in either direction between the drive and the card.
	Recommended actions:
	• Use a different NV Media Card
	• This trip can be suppressed by setting Pr **mm.000** to 9666 and resetting the drive

Card Rating	**NV Media Card Trip; The voltage and / or current rating of the source and destination drives are different**
186	The *Card Rating* trip indicates that parameter data is being transferred from the NV Media Card to the drive, but the current and / or voltage ratings are different between source and destination drives. This trip also applies if a compare (using Pr **mm.000** set to 8yyy) is attempted between the data block on a NV Media Card and the drive. The Card Rating trip does not stop the data transfer but is a warning that rating specific parameters with the RA attribute may not be transferred to the destination drive.
	Recommended actions:
	• Reset the drive to clear the trip
	• Ensure that the drive rating dependent parameters have transferred correctly

Card Read Only	**NV Media Card has the Read Only bit set**
181	The *Card Read Only* trip indicates that an attempt has been made to modify a read-only NV Media Card or a read-only data block. A NV Media Card is read-only if the read-only flag has been set.
	Recommended actions:
	• Clear the read only flag by setting Pr **mm.000** to 9777 and reset the drive. This will clear the read-only flag for all data blocks in the NV Media Card

Card Slot	**NV Media Card trip; Option module file transfer has failed**
174	The Card Slot trip is initiated, if the transfer of an option module file to or from a module failed because the option module does not respond correctly. If this happens this trip is produced with the sub-trip number indicating the option module slot number.

Control Word	**Trip initiated from the *Control Word* (06.042)**
35	The *Control Word* trip is initiated by setting bit 12 on the control word in Pr **06.042** when the control word is enabled (Pr **06.043** = On).
	Recommended actions:
	• Check the value of Pr **06.042.**
	• Disable the control word in *Control Word Enable* (Pr **06.043**)
	Bit 12 of the control word set to a one causes the drive to trip on Control Word
	When the control word is enabled, the trip can only be cleared by setting bit 12 to zero

Current Offset	**Current feedback offset error**
225	The *Current Offset* trip indicates that the current offset is too large to be trimmed.
	Recommended actions:
	• Ensure that there is no possibility of current flowing in the output phases of the drive when the drive is not enabled
	• Hardware fault – Contact the supplier of the drive

Data Changing	**Drive parameters are being changed**
97	A user action or a file system write is active that is changing the drive parameters and the drive has been commanded to enable, i.e. *Drive Active* (10.002) = 1.
	Recommended actions:
	• Ensure the drive is not enabled when defaults are loading

Derivative ID	**Derivative file error**
246	Derivative file error with sub-trips:

Sub-trip	Reason
1	Derivative file different
2	Derivative file missing

Derivative Image	**Derivative product image error**

The *Derivative Image* trip indicates that an error has been detected in the derivative product image. The reason for the trip can be identified by the sub-trip number.

Sub-trip	Reason	Comments
1	Divide by zero	
2	Undefined trip	
3	Attempted fast parameter access set-up with non-existent parameter	
4	Attempted access to non-existent parameter	
5	Attempted write to read-only parameter	
6	Attempted and over-range write	
7	Attempted read from write-only parameter	
30	The image has failed because either its CRC is incorrect, or there are less than 6 bytes in the image or the image header version is less than 5	Occurs when the drive powers-up or the image is programmed. The image tasks will not run
31	The image requires more RAM for heap and stack than can be provided by the drive.	As 30
32	The image requires an OS function call that is higher than the maximum allowed.	As 30
33	The ID code within the image is not valid	As 30
34	The derivative image has been changed for an image with a different derivative number	As 30
40	The timed task has not completed in time and has been suspended	
41	Undefined function called, i.e. a function in the host system vector table that has not been assigned	As 40
51	Core menu customization table CRC check failed	As 30
52	Customizable menu table CRC check failed	As 30
53	Customizable menu table changed	Occurs when the drive powers-up or the image is programmed and the table has changed. Defaults are loaded for the derivative menu and the trip will keep occurring until drive parameters are saved.
61	The option module installed in slot 1 is not allowed with the derivative image	As 30
80	Image is not compatible with the control board	Initiated from within the image code
81	Image is not compatible with the control board serial number	As 80

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Recommended actions:

• Contact the supplier of the drive

Destination	**Two or more parameters are writing to the same destination parameter**

The *Destination* trip indicates that destination output parameters of two or more logic functions (Menus 7, 8, 9, 12 or 14) within the drive are writing to the same parameter.

(199)

Recommended actions:

• Set Pr **mm.000** to 'Destinations' or 12001 and check all visible parameters in all menus for parameter write conflicts

Drive config	**Drive configuration**
232	The hardware ID does not match the user software ID.

EEPROM Fail	**Default parameters have been loaded**
31	The *EEPROM Fail* trip indicates that default parameters have been loaded. The exact cause/reason of the trip can be identified from the sub-trip number.

Sub-trip	Reason
1	The most significant digit of the internal parameter database version number has changed
2	The CRC's applied to the parameter data stored in internal non-volatile memory indicate that a valid set of parameters cannot be loaded
3	The drive mode restored from internal non-volatile memory is outside the allowed range for the product or the derivative image does not allow the previous drive mode
4	The drive derivative image has changed
5	The power stage hardware has changed
6	The internal I/O hardware has changed
7	Reserved
8	The control board hardware has changed
9	The checksum on the non-parameter area of the EEPROM has failed

Recommended actions:

- Default the drive and perform a reset
- Allow sufficient time to perform a save before the supply to the drive is removed
- If the trip persists - return drive to supplier

External Trip	**An External trip is initiated**
6	An *External Trip* trip has occurred. The cause of the trip can be identified from the sub trip number displayed after the trip string. See table below. An external trip can also be initiated by writing a value of 6 in Pr **10.038**.

Sub-trip	Reason
1	*External Trip* (10.032) = 1

Recommended actions:

- Check the value of Pr **10.032**.
- Select 'Destinations' (or enter 12001) in Pr **mm.000** and check for a parameter controlling Pr **10.032**.
- Ensure Pr **10.032** or Pr **10.038** (= 6) is not being controlled by serial comms

Fan Fail	**Fan fail**
173	Recommended actions: • Check that the fan is installed and connected correctly. • Check that the fan is not obstructed. • Contact the supplier of the drive to replace the fan.

File changed	**File changed**
247	Recommended action: • Power cycle the drive.

FW incompatible	Firmware incompatibility
237	The *FW incompatible* trip indicates that the user firmware is incompatible with the power firmware. **Recommended actions:** • Re-program the drive with the latest version of the drive firmware for Unidrive M400.

HF01	**Data processing error: CPU hardware fault**
	The *HF01* trip indicates that a CPU address error has occurred. This trip indicates that the control PCB on the drive has failed. **Recommended actions:** • Hardware fault – Contact the supplier of the drive

HF02	**Data processing error: CPU memory management fault**
	The *HF02* trip indicates that a DMAC address error has occurred. This trip indicates that the control PCB on the drive has failed. **Recommended actions:** • Hardware fault – Contact the supplier of the drive

HF03	**Data processing error: CPU has detected a bus fault**
	The *HF03* trip indicates that a bus fault has occurred. This trip indicates that the control PCB on the drive has failed. **Recommended actions:** • Hardware fault – Contact the supplier of the drive

HF04	**Data processing error: CPU has detected a usage fault**
	The *HF04* trip indicates that a usage fault has occurred. This trip indicates that the control PCB on the drive has failed. **Recommended actions:** • Hardware fault – Contact the supplier of the drive

HF05	Reserved

HF06	Reserved

HF07	**Data processing error: Watchdog failure**

The *HF07* trip indicates that a watchdog failure has occurred. This trip indicates that the control PCB on the drive has failed.

Recommended actions:

- Hardware fault – Contact the supplier of the drive

HF08	**Data processing error: CPU Interrupt crash**

The *HF08* trip indicates that a CPU interrupt crash has occurred. This trip indicates that the control PCB on the drive has failed. The crash level is indicated by the sub-trip number.

Recommended actions:

- Hardware fault – Contact the supplier of the drive

HF09	**Data processing error: Free store overflow**

The *HF09* trip indicates that a free store overflow has occurred. This trip indicates that the control PCB on the drive has failed.

Recommended actions:

- Hardware fault – Contact the supplier of the drive

HF10	Reserved

HF11	**Data processing error: Non-volatile memory comms error**

The *HF11* trip indicates that a non-volatile memory comms error has occurred.

Sub-trip	Reason	Recommended action
1	Non-volatile memory comms error.	Hardware fault – contact the supplier of the drive.
2	EEPROM size is incompatible with the user firmware.	Re-program drive with compatible user firmware.

HF12	**Data processing error: Main program stack overflow**

The HF12 trip indicates that the main program stack over flow has occurred. The stack can be identified by the sub-trip number. This trip indicates that the control PCB on the drive has failed.

Sub-trip	Stack
1	Freewheeling tasks
2	Reserved
3	Main system interrupts

Recommended actions:

- Hardware fault - Contact the supplier of the drive

HF13	Reserved

HF14	Reserved

HF15	Reserved

HF16	**Data processing error: RTOS error**

The *HF16* trip indicates that a RTOS error has occurred. This trip indicates that the control PCB on the drive has failed.

Recommended actions:

- Hardware fault – Contact the supplier of the drive

HF17	Reserved

HF18	**Data processing error: Internal flash memory has failed**

The HF18 trip indicates that the internal flash memory has failed when writing option module parameter data. The reason for the trip can be identified by the sub-trip number.

Sub-trip	Reason
1	Option module initialization timed out
2	Programming error while writing menu in flash
3	Erase flash block containing setup menus failed
4	Erase flash block containing application menus failed
5	Incorrect setup menu CRC contained in flash
6	Incorrect application menu CRC contained in flash

Recommended actions:

• Hardware fault - Contact the supplier of the drive

HF19	**Data processing error: CRC check on the firmware has failed**

HF19 trip indicates that the CRC check on the drive firmware has failed.

Recommended actions:

• Re-program the drive
• Hardware fault - Contact the supplier of the drive

Hot Rect/Brake	**Hot rectifier/brake**
250	Over-temperature detected on input rectifier or braking IGBT.

I cal. range	Current calibration range
231	Current calibration range error.

I/O Overload	**Digital output overload**

The *I/O Overload* trip indicates that the total current drawn from 24 V user supply or from the digital output has exceeded the limit. A trip is initiated if the following condition is met:

• Maximum output current from one digital output is 100 mA.

Recommended actions:

• Check total loads on digital outputs
• Check control wiring is correct
• Check output wiring is undamaged

(sub-trip: 26)

Keypad Mode	**Keypad has been removed when the drive is receiving the reference from the keypad**

The *Keypad Mode* trip indicates that the drive is in keypad mode [*Reference Selector* (01.014) = 4 or 6] and the keypad has been removed or disconnected from the drive.

Recommended actions:

• Re-install keypad and reset
• Change *Reference Selector* (01.014) to select the reference from another source

(sub-trip: 34)

LF Power Comms	**Communication has been lost / errors detected between power, control and rectifier modules**

This trip is initiated if there is no communications between power, control or the rectifier module or if excessive communication errors have been detected. The reason for the trip can be identified by the sub-trip number.

Source	xx	y	zz
Control system	00	0	01: No communications between the control system and the power system.
Control system	00	0	02: Excessive communication errors between the control system and power system.
Control system	01	1	00: Excessive communications errors detected by the rectifier module.

Recommended actions:

• Hardware fault - contact the supplier of the drive.

(sub-trip: 9 0)

Motor Too Hot	**Output current overload timed out (I²t)**

The *Motor Too Hot* trip indicates a motor thermal overload based on the output current (Pr **05.007**) and motor thermal time constant (Pr **04.015**). Pr **04.019** displays the motor temperature as a percentage of the maximum value. The drive will trip on *Motor Too Hot* when Pr **04.019** gets to 100 %.

Recommended actions:

• Ensure the load is not jammed / sticking
• Check the load on the motor has not changed
• Tune the motor rated speed parameter (Pr **5.008**) (RFC-A mode only)
• Ensure the motor rated current is not zero

(sub-trip: 20)

No power board	**No power board**
236	No communication between the power and control boards. **Recommended actions**: • Check connection between power and control board.

OHt Brake	**Braking IGBT over-temperature**
101	The *OHt Brake* over-temperature trip indicates that braking IGBT over-temperature has been detected based on software thermal model. **Recommended actions:** • Check braking resistor value is greater than or equal to the minimum resistance value

OHt Control	**Control stage over temperature**
219	This trip indicates that a control stage over-temperature has been detected if Cooling Fan control (06.045) = 0. Recommended actions: • Increase ventilation by setting Cooling Fan control (06.045) > 0

OHt dc bus — **DC bus over temperature**

The *OHt dc bus* trip indicates a DC bus component over temperature based on a software thermal model. The drive includes a thermal protection system to protect the DC bus components within the drive. This includes the effects of the output current and DC bus ripple. The estimated temperature is displayed as a percentage of the trip level in Pr **07.035**. If this parameter reaches 100 % then an *OHt dc bus* trip is initiated. The drive will attempt to stop the motor before tripping. If the motor does not stop in 10 seconds the drive trips immediately.

Source	xx	y	zz	Description
Control system	00	2	00	DC bus thermal model gives trip with sub-trip 0

Recommended actions:

• Check the AC supply voltage balance and levels
• Check DC bus ripple level
• Reduce duty cycle
• Reduce motor load
• Check the output current stability. If unstable;
    Check the motor map settings with motor nameplate (Pr **05.006**, Pr **05.007**, Pr **05.008**, Pr **05.009**, Pr **05.010**, Pr **05.011**) – (All Modes)
    Disable slip compensation (Pr **05.027** = 0) – (Open loop)
    Disable dynamic V to F operation (Pr **05.013** = 0) - (Open loop)
    Select fixed boost (Pr **05.014** = Fixed) – (Open loop)
    Select high stability space vector modulation (Pr **05.019** = 1) – (Open loop)
    Disconnect the load and complete a rotating auto-tune (Pr **05.012**)
    Reduce frequency loop gains (Pr **03.010**, Pr **03.011**, Pr **03.012**) – (RFC-A)

(trip number: 27)

OHt Inverter — **Inverter over temperature based on thermal model**

This trip indicates that an IGBT junction over-temperature has been detected based on a software thermal model.

Source	xx	y	zz	Description
Control system	00	1	00	Inverter thermal model gives {OHt Inverter} trip with sub-trip 0

Recommended actions:

• Reduce the selected drive switching frequency
• Ensure *Auto-switching Frequency Change Disable* (05.035) is set to OFF
• Reduce duty cycle
• Increase acceleration / deceleration rates
• Reduce motor load
• Check DC bus ripple
• Ensure all three input phases are present and balanced

(trip number: 21)

OHt Power	**Power stage over temperature**

This trip indicates that a power stage over-temperature has been detected. From the sub-trip 'xxyzz', the Thermistor location is identified by 'zz'.

Source	xx	y	zz	Description
Power system	01	0	zz	Thermistor location in the drive defined by zz

Recommended actions:

- Check enclosure / drive fans are still functioning correctly
- Force the heatsink fans to run at maximum speed
- Check enclosure ventilation paths
- Check enclosure door filters
- Increase ventilation
- Reduce the drive switching frequency
- Reduce duty cycle
- Increase acceleration / deceleration rates
- Reduce motor load
- Check the derating tables and confirm the drive is correctly sized for the application.
- Use a drive with larger current / power rating

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OHt Rectifier	**Rectifier over temperature**

The *Oht Rectifier* trip indicates that a rectifier over-temperature has been detected. The thermistor location can be identified from the sub-trip number.

Source	xx	y	zz	Description
Power system	Power module number	Rectifier number	zz	Thermistor location defined by zz

Recommend actions:

- Check the motor and motor cable insulation with an insulation tester
- Fit an output line reactor or sinusoidal filter
- Force the heatsink fans to run at maximum speed by setting Pr **06.045** = 1
- Check enclosure / drive fans are still functioning correctly
- Check enclosure ventilation paths
- Check enclosure door filters
- Increase ventilation
- Increase acceleration / deceleration rates
- Reduce duty cycle
- Reduce motor load

102

OI ac	**Instantaneous output over current detected**

The instantaneous drive output current has exceeded VM_DRIVE_CURRENT_MAX.

Source	xx	y	zz	Description
Control system	00	0	00	Instantaneous over-current trip when the measured a.c. current exceeds VM_DRIVE_CURRENT[MAX].

Recommended actions/checks:

- Increase acceleration/deceleration rate
- If seen during auto-tune reduce the voltage boost
- Check for short circuit on the output cabling
- Check integrity of the motor insulation using an insulation tester
- Is the motor cable length within limits for the frame size?
- Reduce the values in the frequency loop gain parameters - (Pr **03.010**, **03.011**, **03.012**) or (Pr **03.013**, **03.014**, **03.015**)
- Reduce the values in the current loop gain parameters

3

OI Snubber	**Snubber over-current detected**
92	This trip indicates that an over-current condition has been detected in the rectifier snubbing circuit, The exact cause of the trip can be identified by the sub-trip number.

Source	xx	y	zz
Power system	01	1	00: Rectifier snubber over-current trip detected.

Recommended actions:

- Ensure the internal EMC filter is installed.
- Ensure the motor cable length does not exceed the maximum for selected switching frequency.
- Check for supply voltage imbalance.
- Check for supply disturbance such as notching from a DC drive.
- Check the motor and motor cable insulation with a Megger.
- Fit an output line reactor or sinusoidal filter

OI.Brake	**Braking IGBT over current detected: short circuit protection for the braking IGBT activated**
4	The *OI.Brake* trip indicates that over current has been detected in braking IGBT or braking IGBT protection has been activated.

Source	xx	y	zz	Description
Power system	01	0	00	Braking IGBT instantaneous over-current trip

Recommended actions:

- Check brake resistor wiring
- Check braking resistor value is greater than or equal to the minimum resistance value
- Check braking resistor insulation

OI.dc	**Power module over current detected from IGBT on state voltage monitoring**
109	The *OI.dc* trip indicates that the short circuit protection for the drive output stage has been activated.

Recommended actions:

- Disconnect the motor cable at the drive end and check the motor and cable insulation with an insulation tester
- Replace the drive

Option Disable	**Option module does not acknowledge during drive mode changeover**
215	The *Option Disable* trip indicates that the option module did not acknowledge notifying the drive that communications with the drive has been stopped during the drive mode changeover with in the allocated time.

Recommended trip:

- Reset the trip
- If the trip persists replace the option module

Out Phase Loss	**Output phase loss detected**
98	The *Out Phase Loss* trip indicates that a phase loss has been detected at the drive output. If *Output Phase Loss Detection Enable* (06.059) = 1 then output phase loss is detected as follows:

1. When the drive is enabled short pulses are applied to make sure each output phase is connected.
2. During running the output current is monitored and the output phase loss condition is detected if the current contains more than TBD % negative phase sequence current for TBDs.

Recommended action:

- Check motor and drive connections
- To disable the trip set *Output Phase Loss Detection Enable* (06.059) = 0

Output phase s/c	**Output phase short-circuit**
228	Over-current detected on drive output when enabled. Possible motor ground fault.

Recommended actions:

- Check for short circuit on the output cabling
- Check integrity of the motor insulation using an insulation tester
- Is the motor cable length within limits for the frame size?

Over Speed	**Motor frequency has exceeded the over frequency threshold**
7	In open loop mode, if the *Post-ramp Reference* (02.001) exceeds the threshold set in the *Over Frequency Threshold* (03.008) in either direction an Over Speed trip is produced. In RFC-A mode, if the estimated frequency (03.002) exceeds the Over Frequency Threshold in Pr **03.008** in either direction an Over Speed trip is produced. If Pr **03.008** is set to 0.0 the threshold is then equal to 1.2 x the value set in Pr **01.006**.

Recommended actions:

- Reduce the *Frequency Controller Proportional Gain* (03.010) to reduce the speed overshoot (RFC-A mode only)

Over Volts	**DC bus voltage has exceeded the peak level or maximum continuous level for 15 seconds**

The *Over Volts* trip indicates that the DC bus voltage has exceeded the VM_DC_VOLTAGE[MAX] or VM_DC_VOLTAGE_SET[MAX] for 15 s. The trip threshold varies depending on voltage rating of the drive as shown below.

Voltage rating	VM_DC_VOLTAGE[MAX]	VM_DC_VOLTAGE_SET[MAX]
100	415	410
200	415	410
400	830	815

Sub-trip Identification

Source	xx	y	zz
Control system	00	0	01: Instantaneous trip when the DC bus voltage exceeds VM_DC_VOLTAGE[MAX].
Control system	00	0	02: Time delayed trip indicating that the DC bus voltage is above VM_DC_VOLTAGE_SET[MAX].
Power system	01	0	00: Instantaneous trip when the DC bus voltage exceeds VM_DC_VOLTAGE[MAX].

(Trip number: 2)

Recommended actions:
- Increase deceleration ramp (Pr **00.004**)
- Decrease the 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
- Check motor insulation using a insulation tester

Phase Loss	**Supply phase loss**

The *Phase Loss* trip indicates that the drive has detected an input phase loss or large supply imbalance. The drive will attempt to stop the motor before this trip is initiated. If the motor cannot be stopped in 10 seconds the trip occurs immediately. The *Phase Loss* trip works by monitoring the ripple voltage on the DC bus of the drive, if the DC bus ripple exceeds the threshold, the drive will trip on Phase Loss. Potential causes of the DC bus ripple are input phase loss, Large supply impedance and severe output current instability.

Source	xx	y	zz
Control system	00	0	00: Phase loss detected based on control system feedback. The drive attempts to stop the drive before tripping unless bit 2 of *Action On Trip Detection* (10.037) is set to one.

(Trip number: 32)

Input phase loss detection can be disabled when the drive is required to operate from the DC supply or from a single phase supply in *Input Phase Loss Detection Mode* (06.047).

Recommended actions:
- Check the AC supply voltage balance and level at full load
- Check the DC bus ripple level with an isolated oscilloscope
- Check the output current stability
- Reduce the duty cycle
- Reduce the motor load
- Disable the phase loss detection, set Pr **06.047** to 2.

Power Board HF	**Power board HF**

Power processor hardware fault.

(Trip number: 235)

Recommended action:
- Hardware fault - Contact the supplier of the drive

Power Comms	**Communication has been lost / errors detected between power control**

The *Power Comms* trip is initiated if there is no communications between power control. The reason for the trip can be identified by the sub-trip number.

Sub-trip	Reason
1	PLL operating range out of lock
2	Power board lost communications with user board
3	User board lost communication with power board
4	Communication CRC error

(Trip number: 93)

Recommended actions:
- Hardware fault – Contact the supplier of the drive

Power Data	Power system configuration data error				
	The *Power Data* trip indicates that there is an error in the configuration data stored in the power system.				

	Source	xx	y	zz	Description
	Control system	00	0	01	No data was obtained from the power board.
	Control system	00	0	02	There is no data table in node 1.
	Control system	00	0	03	The power system data table is bigger than the space available in the control pod to store it.
220	Control system	00	0	04	The size of the table given in the table is incorrect.
	Control system	00	0	05	Table CRC error.
	Control system	00	0	06	The version number of the generator software that produced the table is too low.
	Control system	0	0	07	The power data table failed to be stored in the power board.
	Power system	01	0	00	The power data table used internally by the power module has an error.
	Power system	01	0	01	The power data table that is uploaded to the control system on power up has an error.
	Power system	01	0	02	The power data table used internally by the power module does not match the hardware identification of the power module.

Recommended actions:

- Hardware fault – Contact the supplier of the drive

Power Down Save	Power down save error
37	The *Power Down Save* trip indicates that an error has been detected in the power down save parameters saved in non-volatile memory.
	Recommended actions:
	- Perform a 1001 save in Pr **mm.000** to ensure that the trip doesn't occur the next time the drive is powered up.

PSU	Internal power supply fault				
	The *PSU* trip indicates that one or more internal power supply rails are outside limits or overloaded.				

	Source	xx	y	zz	Description
5	Control system	00	0	00	Internal power supply overload.
	Power system	01	1		

Recommended actions:

- Remove the option module and perform a reset
- There is a hardware fault within the drive – return the drive to the supplier

Reserved	Reserved trips	
14-17 11 09 01 94 - 95 103 - 108 191 - 198 168 - 173 238 - 245 23, 39, 99, 176, 205 - 214 223 - 224	These trip numbers are reserved trip numbers for future use. These trips should not be used by the user application programs.	

Trip Number	Description
01	Reserved resettable trip
94 -95	Reserved resettable trip
103 - 108	Reserved resettable trip
191 – 198	Reserved resettable trip
168 - 173	Reserved resettable trip
238 - 245	Reserved non-resettable trip

Resistance	**Measured resistance has exceeded the parameter range**
33	The *Resistance* trip indicates that the measured stator resistance during an auto-tune test has exceeded the maximum possible value of *Stator Resistance* (05.017).
	The stationary auto-tune is initiated using the auto-tune function (Pr **05.012**) or in open loop vector mode (Pr **05.014**) on the first run command after power up in mode 4 (Ur_I) or on every run command in modes 0 (Ur_S) or 3 (Ur_Auto). This trip can occur if the motor is very small in comparison to the rating of the drive.
	Recommended actions:
	• Check the motor cable / connections
	• Check the integrity of the motor stator winding using a insulation tester
	• Check the motor phase to phase resistance at the drive terminals
	• Check the motor phase to phase resistance at the motor terminals
	• Ensure the stator resistance of the motor falls within the range of the drive model
	• Select fixed boost mode (Pr **05.014** = Fd) and verify the output current waveforms with an oscilloscope
	• Replace the motor

Slot 1 Different	**Option module in option slot 1 has changed**
204	The *Slot 1 Different* trip indicates that the option module in option slot 1 on the drive is a different type to that installed when parameters were last saved on the drive. The reason for the trip can be identified by the sub-trip number.

Sub-trip	Reason
1	No module was installed previously
2	A module with the same identifier is installed, but the set-up menu for this option slot has been changed, and so default parameters have been loaded for this menu.
3	A module with the same identifier is installed, but the applications menu for this option slot has been changed, and so default parameters have been loaded for this menu.
4	A module with the same identifier is installed, but the set-up and applications menu for this option slot have been changed, and so default parameters have been loaded for these menus.
>99	Shows the identifier of the module previously installed.

Recommended actions:

• Turn off the power, ensure the correct option module is installed in the option slot and re-apply the power.
• Confirm that the currently installed option module is correct, ensure option module parameters are set correctly and perform a user save in Pr **mm.000.**

Slot 1 Error	**Option module in option slot 1 has detected a fault**
202	The *Slot 1 Error* trip indicates that the option module in option slot 1 on the drive has detected an error. The reason for the error can be identified by the sub-trip number.
	Recommended actions:
	• See relevant *option module User Guide* for details of the trip

Slot 1 HF	**Option module 1 hardware fault**
200	The *Slot 1 HF* trip indicates that the option module in option slot 1 on the drive has indicated a hardware fault. The possible causes of the trip can be identified by the sub-trip number.

Sub-trip	Reason
1	The module category cannot be identified
2	All the required customized menu table information has not been supplied or the tables supplied are corrupt
3	There is insufficient memory available to allocate the comms buffers for this module
4	The module has not indicated that it is running correctly during drive power-up
5	Module has been removed after power-up or it has stopped working
6	The module has not indicated that it has stopped accessing drive parameters during a drive mode change
7	The module has failed to acknowledge that a request has been made to reset the drive processor

Recommended actions:

• Ensure the option module is installed correctly
• Replace the option module
• Replace the drive

Slot 1 Not Fitted	**Option module in option slot 1 has been removed**
203	The *Slot 1 Not Fitted* trip indicates that the option module in option slot 1 on the drive has been removed since the last power up.
	Recommended actions:
	• Ensure the option module is installed correctly.
	• Re-install the option module.
	• To confirm that the removed option module is no longer required perform a save function in Pr **mm.000**.

Slot 1 Watchdog	Option module watchdog function service error
201	The *Slot 1 Watchdog* trip indicates that the option module installed in Slot 1 has started the option watchdog function and then failed to service the watchdog correctly. **Recommended actions:** • Replace the option module

Soft Start	Soft start relay failed to close, soft start monitor failed
226	The *Soft Start* trip indicates that the soft start relay in the drive failed to close or the soft start monitoring circuit has failed. The cause of the trip can be identified by the sub-trip number.

Sub-trip	Reason
1	Soft-start failure
2	DC bus capacitor failure on 110 V drive (size 2 only)

Recommended actions:
• Hardware fault – Contact the supplier of the drive

STO Error	No Safe Torque Off board fitted
234	STO board not fitted

Stored HF	Hardware trip has occurred during last power down
221	The *Stored HF* trip indicates that a hardware trip (HF01 –HF19) has occurred and the drive has been power cycled. The sub-trip number identifies the HF trip i.e. stored HF19. **Recommended actions:** • Enter 1299 in Pr **mm.000** and press reset to clear the trip

Sub-array RAM	RAM allocation error
227	The *Sub-array RAM* trip indicates that an option module derivative image has requested more parameter RAM than is allowed. The RAM allocation is checked in order of resulting sub-trip numbers, and so the failure with the highest sub-trip number is given. The sub-trip is calculated as (parameter size) + (parameter type) + sub-array number.

Parameter size	Value
1 bit	1
8 bit	2
16 bit	3
32 bit	4
64 bit	5

Parameter type	Value
Volatile	0
User save	1
Power-down save	2

Sub-array	Menus	Value
Derivative image	29	2
Option slot 1 set-up	15	4

Temp Feedback	Internal thermistor has failed
218	The *Temp Feedback* trip indicates that an internal thermistor has failed. The thermistor location can be identified by the sub-trip number.

Source	xx	y	zz
Power system	01	0	Thermistor location defined by zz

Recommended actions:
• Hardware fault – Contact the supplier of the drive

Th Brake Res	Brake resistor over temperature
10	The *Th Brake Res* trip is initiated if the hardware based braking resistor thermal monitoring is connected and the resistor overheats. If the braking resistor is not used, then this trip must be disabled with bit 3 of Action *On Trip Detection* (10.037) to prevent this trip. **Recommended actions:** • Check brake resistor wiring • Check braking resistor value is greater than or equal to the minimum resistance value • Check braking resistor insulation

Th Short Circuit	Motor thermistor short circuit
25	The *Th Short Circuit* trip indicates that the motor thermistor connected to terminal 14 (digital input 5) on the control connections, is short circuit or low impedance (<50 $\wedge$). **Recommended actions:** • Check thermistor continuity • Replace motor / motor thermistor

Thermistor	**Motor thermistor over-temperature**
24	The *Thermistor* trip indicates that the motor thermistor connected to terminal 14 (digital input 5) on the control connections has indicated a motor over temperature. **Recommended actions:** • Check motor temperature • Check thermistor continuity
User 24V	**User 24 V supply is not present on Adaptor Interface terminals (1, 2)**
91	A *User 24V* trip is initiated if the *User Supply Select* (Pr **06.072**), is set to 1 and no user 24 V supply is present on the user 24 V input on the Adaptor Interface. **Recommended actions:** • Ensure the user 24 V supply is present on the user terminals on the Adaptor Interface.
User OI ac	**User OI ac**
8	A *User OI ac* trip is initiated if the output current of the drive exceeds the trip level set by User Over Current Trip Level (Pr **04.041**).
User Prog Trip	**Trip generated by an onboard user program**
96	This trip can be initiated from within an onboard user program using a function call which defines the sub-trip number. Recommended actions: • Check the user program

User Program	**On board user program error**

An error has been detected in the onboard user program image. The sub-trip indicated the reason for the trip.

Sub-trip	Reason	Comments
1	Divide by zero.	
2	Undefined trip.	
3	Attempted fast parameter access set-up with non-existent parameter.	
4	Attempted access to non-existent parameter.	
5	Attempted write to read-only parameter.	
6	Attempted an over-range write.	
7	Attempted read from write-only parameter.	
30	The image has failed because either its CRC is incorrect, or there are less than 6 bytes in the image or the image header version is less than 5.	Occurs when the drive powers-up or the image is programmed. The image tasks will not run.
31	The image requires more RAM for heap and stack than can be provided by the drive.	As 30.
32	The image requires an OS function call that is higher than the maximum allowed.	As 30.
33	The ID code within the image is not valid.	As 30.
34	The user program image has been changed for an image with a different user program number.	As 30.
40	The timed task has not completed in time and has been suspended.	*Onboard User Program: Enable* (11.047) is reset to zero when the trip is initiated.
41	Undefined function called, i.e. a function in the host system vector table that has not been assigned.	As 40.
52	Customizable menu table CRC check failed.	As 30.
53	Customizable menu table changed.	An error has been detected in the onboard user program image. The sub-trip indicated the reason for the trip.
80	*Image is not compatible with the control board	Initiated from within the image code.
81	*Image is not compatible with the control board serial number	
100	Image has detected and prevented attempted pointer access outside of the IEC task's heap area.	
101	Image has detected and prevented misaligned pointer usage.	
102	Image has detected an array bounds violation and prevented its access.	
103	Image has attempted to convert a data type to or from an unknown data type, has failed and has shut itself down.	
104	Image has attempted to use an unknown user service function.	
200	User program has invoked a "divide" service with a denominator of zero. (Note that this is raised by the downloaded image and has therefore been given a distinct error code despite being the same fundamental problem as sub-trip 1.)	

(249 — row label spanning the Sub-trip column region on the left)

The following table shows the differences when compared to the derivative product image.

Sub-trip	Difference
40, 41	Onboard User Program: Enable (11.047) is reset to zero when the trip is initiated.
51	Not applicable as core menu Customization not allowed.
6x	Not applicable as option module restrictions not allowed.
7x	Not applicable as option module restrictions not allowed.
100	Image has detected and prevented attempted pointer access outside of the IEC task's heap area.
101	Image has detected and prevented misaligned pointer usage.
102	Image has detected an array bounds violation and prevented its access.
103	Image has attempted to convert a data type to or from an unknown data type, has failed and has shut itself down.
104	Image has attempted to use an unknown user service function.
200	User program has invoked a "divide" service with a denominator of zero. (Note that this is raised by the downloaded image and has therefore been given a distinct error code despite being the same fundamental problem as sub-trip 1)

User Save	User Save error / not completed
36	The *User Save* trip indicates that an error has been detected in the user save parameters saved in non-volatile memory. For example, following a user save command, If the power to the drive was removed when the user parameters were being saved. **Recommended actions:** • Perform a user save in Pr **mm.000** to ensure that the trip doesn't occur the next time the drive is powered up. • Ensure that the drive has enough time to complete the save before removing the power to the drive.
Watchdog	Control word watchdog has timed out
30	The *Watchdog* trip indicates that the control word has been enabled and has timed out **Recommended actions:**

Table 13-3   Serial communications look up table

No	Trip	No	Trip	No	Trip
1	Reserved	90	LF Power Comms	200	Slot 1 HF
2	Over Volts	91	User 24V	201	Slot 1 Watchdog
3	OI ac	92	OI Snubber	202	Slot 1 Error
4	OI Brake	93	Power Comms	203	Slot 1 Not Fitted
5	PSU	94 - 95	Reserved	204	Slot 1 Different
6	External Trip	96	User Prog Trip	205 - 214	Reserved
7	Over Speed	97	Data Changing	215	Option Disable
8	User OI ac	98	Out Phase Loss	216 - 217	Reserved
9	Reserved	99	Reserved	218	Temp Feedback
10	Th Brake Res	100	Reset	219	OHt Control
11	Reserved	101	OHt Brake	220	Power Data
12	Reserved	102	OHt Rectifier	221	Stored HF
13	Autotune	103 - 108	Reserved	222	Reserved
14 - 17	Reserved	109	OI dc	223 - 224	Reserved
18	Autotune Stopped	110 - 111	Reserved	225	Current Offset
19	Brake R Too Hot	112 - 167	t112 - t167	226	Soft Start
20	Motor Too Hot	168 - 172	Reserved	227	Sub-array RAM
21	OHt Inverter	173	Fan Fail	228	Output phase s/c
22	OHt Power	174	Card Slot	229	Reserved
23	Reserved	175	Card Product	230	Reserved
24	Thermistor	176	Reserved	231	I cal. range
25	Th Short Circuit	177	Card Boot	232	Drive config
26	I/O Overload	178	Card Busy	233	Reserved
27	OHt dc bus	179	Card Data Exists	234	STO Error
28	An Input 1 Loss	180	Card Option	235	Power Board HF
29	An Input 2 Loss	181	Card Read Only	236	No power board
30	Watchdog	182	Card Error	237	FW incompatible
31	EEPROM Fail	183	Card No Data	238 - 245	Reserved
32	Phase Loss	184	Card Full	246	Derivative ID
33	Resistance	185	Card Access	247	File changed
34	Keypad Mode	186	Card Rating	248	Derivative Image
35	Control Word	187	Card Drive Mode	249	User Program
36	User Save	188	Card Compare	250	Hot Rect/Brake
37	Power Down Save	189	An Input 1 OI	252 - 254	Reserved
38	Reserved	190	An Input 2 OI	255	Reset logs
39	Reserved	191 - 198	Reserved		
40 - 89	t040 - t089	199	Destination		

The trips can be grouped into the following categories. It should be noted that a trip can only occur when the drive is not tripped or is already tripped but with a trip with a lower priority number.

Table 13-4   Trip categories

Priority	Category	Trips	Comments
1	Internal faults	HF01, HF02, HF03, HF04, HF05, HF06, HF07, HF08, HF09, HF10, HF11, HF12, HF13, HF14, HF15, HF16, HF17, HF 18, HF 19	These indicate internal problems and cannot be reset. All drive features are inactive after any of these trips occur.
1	Stored HF trip	{Stored HF}	This trip cannot be cleared unless 1299 is entered into *Parameter* (**mm.000**) and a reset is initiated.
2	Non-resettable trips	Trip numbers 218 to 247, {Slot 1 HF}	These trips cannot be reset.
3	Volatile memory failure	{EEPROM Fail}	This can only be reset if Parameter **mm.000** is set to 1233 or 1244, or if *Load Defaults* (11.043) is set to a non-zero value.
4	NV Media Card trips	Trip numbers 174, 175 and 177 to 188	These trips are priority 5 during power-up.
4	Internal 24V	{PSU}	
5	Trips with extended reset times	{OI.ac}, {OI.Brake}, {OI.dc} and {Fan Fail}	These trips cannot be reset until 10 s after the trip was initiated.
5	Phase loss and d.c. link power circuit protection	{Phase Loss} and {OHt dc bus}	The drive will attempt to stop the motor before tripping if a {Phase Loss}. 000 trip occurs unless this feature has been disabled (see *Action On Trip Detection* (10.037). The drive will always attempt to stop the motor before tripping if an {OHt dc bus} occurs.
5	Standard trips	All other trips	

13.5   Internal / Hardware trips

Trips {HF01} to {HF19} are internal faults that do not have trip numbers. If one of these trips occurs, the main drive processor has detected an irrecoverable error. All drive functions are stopped and the trip message will be displayed on the drive keypad. If a non permanent trip occurs this may be reset by power cycling the drive. On power up after it has been power cycled, the drive will trip on Stored HF. Enter 1299 in **mm.000** to clear the Stored HF trip.

13.6   Alarm indications

In any mode, an alarm is an indication given on the display by alternating the alarm string with the drive status string display. If an action is not taken to eliminate any alarm except "Auto Tune and Limit Switch" the drive may eventually trip. Alarms are not displayed when a parameter is being edited.

Table 13-5   Alarm indications

Alarm string	Description
Brake Resistor	Brake resistor overload. *Braking Resistor Thermal Accumulator* (10.039) in the drive has reached 75.0 % of the value at which the drive will trip.
Motor Overload	*Motor Protection Accumulator* (4.019) in the drive has reached 75.0 % of the value at which the drive will trip and the load on the drive is >100 %.
Drive Overload	Drive over temperature. *Percentage of Drive Thermal Trip Level* (07.036) in the drive is greater than 90 %.
Auto Tune	The autotune procedure has been initialized and an autotune in progress.
Limit Switch	Limit switch active. Indicates that a limit switch is active and that is causing the motor to be stopped.
Option Slot 1	Option slot alarm
Low AC	Low voltage mode. See *Low AC Alarm* (10.107).
Current limit	Current limit active. See *Current Limit Active* (10.009).

13.7 Status indications

Table 13-6 Status indications

Upper row string	Description	Drive output stage
Inhibit	The drive is inhibited and cannot be run. The SAFE TORQUE OFF signals are not applied to the SAFE TORQUE OFF terminals or Pr **06.015** is set to 0. The other conditions that can prevent the drive from enabling are shown as bits in *Enable Conditions* (06.010).	Disabled
Ready	The drive is ready to run. The drive enable is active, but the drive inverter is not active because the final drive run is not active.	Disabled
Stop	The drive is stopped / holding zero frequency.	Enabled
Run	The drive is active and running.	Enabled
Supply Loss	Supply loss condition has been detected.	Enabled
Deceleration	The motor is being decelerated to zero frequency because the final drive run has been deactivated.	Enabled
dc Injection	The drive is applying dc injection braking.	Enabled
Trip	The drive has tripped and no longer controlling the motor. The trip code appears in the lower display.	Disabled
Under Voltage	The drive is in the under-voltage state either in low voltage or high voltage mode.	Disabled

Table 13-7 Option module and other status indications at power-up

First row string	Second row string	Status
Waiting For	**Power System**	Waiting for power stage
The drive is waiting for the processor in the power stage to respond after power-up.		
Waiting For	**Option**	Waiting for an option module
The drive is waiting for the option module to respond after power-up		
Uploading From	**Option**	Loading parameter database
At power-up it may be necessary to update the parameter database held in the drive because an option module has changed. This may involve data transfer between the drive and option module. During this period 'Uploading From Option' is displayed.		

13.8 Displaying the trip history

The drive retains a log of the last ten trips that have occurred. *Trip 0* (10.020) to *Trip 9* (10.029) store the most recent 10 trips that have occurred where *Trip 0* (10.020) is the most recent and *Trip 9* (10.029) is the oldest. When a new trip occurs it is written to *Trip 0* (10.020) and all the other trips move down the log, with oldest being lost. The date and time when each trip occurs are also stored in the date and time log, i.e. *Trip 0 Date* (10.041) to *Trip 9 Time* (10.060). The date and time are taken from *Date* (06.016) and *Time* (06.017). Some trips have sub-trip numbers which give more detail about the reason for the trip. If a trip has a sub-trip number its value is stored in the sub-trip log, i.e. *Trip 0 Sub-trip Number* (10.070) to *Trip 9 Sub-trip Number* (10.079). If the trip does not have a sub-trip number then zero is stored in the sub-trip log.

If any parameter between Pr **10.020** and Pr **10.029** inclusive is read by serial communication, then the trip number in Table 13-2 is the value transmitted.

NOTE

The trip logs can be reset by writing a value of 255 in Pr **10.038**.

13.9 Behavior of the drive when tripped

If the drive trips, the output of the drive is disabled so the load coasts to a stop. If any trip occurs, the following read only parameters are frozen until the trip is cleared. This is to help diagnose the cause of the trip.

Parameter	Description
01.001	Frequency reference
01.002	Pre-skip filter reference
01.003	Pre-ramp reference
02.001	Post-ramp reference
03.001	Final demand ref
03.002	Estimated frequency
03.003	Frequency error
03.004	Frequency controller output
04.001	Current magnitude
04.002	Active current
04.017	Reactive current
05.001	Output frequency
05.002	Output voltage
05.003	Power
05.005	DC bus voltage
07.001	Analog input 1
07.002	Analog input 2
07.037	Temperature nearest to trip level

If the parameters are not required to be frozen then this can be disabled by setting bit 4 of Pr **10.037**.

Excerpts from PowerFlex 520 series drive manual

**Refer to the USB accompanying this manual for the PowerFlex 520 User Guide in its entirety.

Start Up

This chapter describes how to start up the PowerFlex 520-series drive. To simplify drive setup, the most commonly programmed parameters are organized in a single Basic Program Group.

> **IMPORTANT** Read the *General Precautions* section before proceeding.

> ⚠ **ATTENTION:** Power must be applied to the drive to perform the following start-up procedures. Some of the voltages present are at incoming line potential. To avoid electric shock hazard or damage to equipment, only qualified service personnel should perform the following procedure. Thoroughly read and understand the procedure before beginning. If an event
> does not occur while performing this procedure, **Do Not Proceed. Remove All**
> **Power** including user supplied control voltages. User supplied voltages may
> exist even when main AC power is not applied to the drive. Correct the
>   malfunction before
>   continuing.

Prepare for Drive Start-Up

Drive Startup Task List

1. Disconnect and lock out power to the machine.

2. Verify that AC line power at the disconnect device is within the rated value of the drive.

3. If replacing a drive, verify the current drive's catalog number. Verify all options installed on the drive.

4. Verify that any digital control power is 24 volts.

5. Inspect grounding, wiring, connections, and environmental compatibility.

6. Verify that the Sink (SNK)/Source (SRC) jumper is set to match your control wiring scheme. See the and for location.

IMPORTANT   The default control scheme is Source (SRC). The Stop terminal is jumpered to allow starting from the keypad or comms. If the control scheme is changed to Sink (SNK), the jumper must be removed from I/O Terminals 01 and 11 and installed between I/O Terminals 01 and 04.

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7. Wire I/O as required for the application.

8. Wire the power input and output terminals.

9. Confirm that all inputs are connected to the correct terminals and are secure.

10. Collect and record motor nameplate and encoder or feedback device information. Verify motor connections.
    - Is the motor uncoupled?
    - What direction will the motor need to turn for the application?

11. Verify the input voltage to the drive. Verify if the drive is on a grounded system. Ensure the MOV jumpers are in the correct position. See for more information.

12. Apply power and reset the drive and communication adapters to factory default settings. To reset the drive, see parameter P053 [Reset to Defalts]. To reset the communication adapters, see the user manual of the adapter for more information.

13. Configure the basic program parameters related to the motor. See .

14. Complete the autotune procedure for the drive. See parameter P040 [Autotune] for more information.

15. If you are replacing a drive and have a backup of the parameter settings obtained using the USB utility application, use the USB utility application to apply the backup to the new drive. See for more information.

    Otherwise, set the necessary parameters for your application using the LCD keypad interface, Connected Components Workbench, or RSLogix or Logix Designer if using an Add-on Profile through EtherNet/IP.
    - Configure the communication parameters needed for the application (node number, IP address, Datalinks in and out, communication rate, speed reference, start source, and so on). Record these settings for your reference.
    - Configure the other drive parameters needed for the drive analog and digital I/O to work correctly. Verify the operation. Record these settings for your reference.

16. Verify the drive and motor perform as specified.

- Verify that the Stop input is present or the drive will not start.

IMPORTANT	If I/O Terminal 01 is used as a stop input, the jumper between I/O Terminals 01 and 11 must be removed.

- Verify the drive is receiving the speed reference from the correct place and that the reference is scaled correctly.
- Verify the drive is receiving start and stop commands correctly.
- Verify input currents are balanced.
- Verify motor currents are balanced.

17. Save a backup of the drive settings using the USB utility application. See <u>Using the USB Port on page 67</u> for more information.

Start, Stop, Direction and Speed Control

Factory default parameter values allow the drive to be controlled from the keypad. No programming is required to start, stop, change direction and control speed directly from the keypad.

IMPORTANT	To disable reverse operation, see A544 [Reverse Disable].

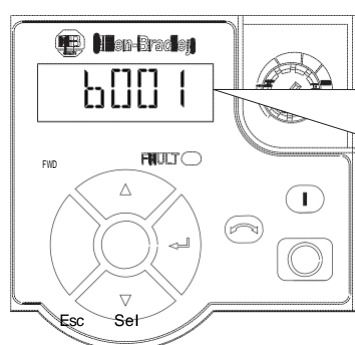If a fault appears on power up, see <u>Fault Descriptions on page 159</u> for an explanation of the fault code.

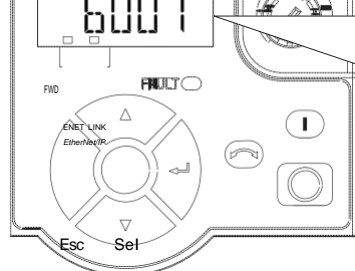## Variable Torque Fan/Pump Applications

For improved motor and drive performance, tune the motor in SVC mode using parameter P040 [Autotune]. If V/Hz mode is selected, use parameter A530 [Boost Select] to adjust the boost.

Display and Control Keys

PowerFlex 523

PowerFlex 525

Menu	Parameter Group and Description
b	**Basic Display** Commonly viewed drive operating
P	**Basic Program** Commonly used programmable
t	**Terminal Blocks** Programmable terminal functions.
C	**Communications** Programmable communication
L	**Logic (PowerFlex 525 only)** Programmable logic functions.
d	**Advanced Display** Advanced drive operating conditions.
A	**Advanced Program** Remaining programmable functions.
N	**Network** Network functions that are shown only when a comm card is used.
M	**Modified** Functions from the other groups with values changed from default.
f	**Fault and Diagnostic** Consists of list of codes for specific
G	**AppView and CustomView** Functions from the other groups organized for specific applications.
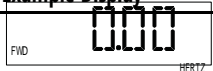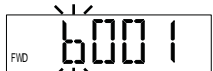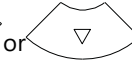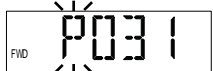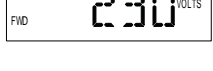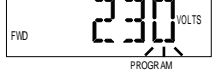
Control and Navigation Keys
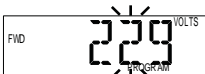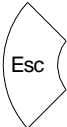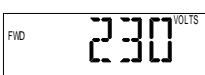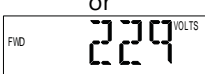
Display	Display State	Description
ENET (PowerFlex 525 only)	Off	Adapter is not connected to the network.
	Steady	Adapter is connected to the network and drive is controlled through Ethernet.
	Flashing	Adapter is connected to the network but drive is not controlled through Ethernet.
LINK (PowerFlex 525 only)	Off	Adapter is not connected to the network.
	Steady	Adapter is connected to the network but not
	Flashing	Adapter is connected to the network and

LED	LED State	Description
FAULT	Flashing	Indicates drive is faulted.

Key	Name	Description
△ ▽	Up Arrow Down	Scroll through user-selectable display parameters or groups. Increment values.
Esc	Escape	Back one step in programming menu. Cancel a change to a parameter value and exit Program Mode.
Sel	**Select**	**Advance one step in programming menu. Select a**
↵	Enter	Advance one step in programming menu. Save a change to a parameter value.

Key	Name	Description
Reverse symbol	Reverse	Used to reverse direction of the drive. Default is active. Controlled by parameters P046, P048 and P050 [Start Source x] and
Start symbol	Start	Used to start the drive. Default is active. Controlled by parameters P046, P048 and
Stop symbol	Stop	Used to stop the drive or clear a fault. This key is always active.
Potentiometer symbol	Potentiometer	Used to control speed of drive. Default is active. Controlled by parameters P047, P049 and P051

Viewing and Editing Parameters

The following is an example of basic integral keypad and display functions. This example provides basic navigation instructions and illustrates how to program a parameter.

Step	Key(s)	Example Display
1. When power is applied, the last user-selected Basic Display Group parameter number is briefly displayed with flashing characters. The display then defaults to that parameter's current value. (Example shows the value of b001 [Output Freq] with the drive stopped.)		FWD 0.00 HERTZ
2. Press Esc to display the Basic Display Group parameter number shown on power-up. The parameter number will flash.	Esc	FWD b001
	Esc	FWD b001
3. Press Esc to enter the parameter group list. The parameter group letter will flash.	△ or ▽	FWD P031
	↵ or Sel	FWD P031
4. Press the Up Arrow or Down Arrow to scroll through the group list (b, P, t, C, L, d, A, f and Gx).	△ or ▽	FWD P031
5. Press Enter or Sel to enter a group. The right digit of the last viewed parameter in that group will flash.	↵	FWD 230 VOLTS
6. Press the Up Arrow or Down Arrow to scroll through the parameter list.	↵ or Sel	FWD 230 VOLTS PROGRAM
7. Press Enter to view the value of the parameter. Or Press Esc to return to the	△ or ▽	FWD 229 VOLTS PROGRAM

Step	Key(s)	Example Display
10. If desired, press Sel to move from digit to digit or bit to bit. The digit or bit that you can change will flash.	Sel	
11. Press Esc to cancel a change and exit Program Mode. Or Press Enter to save a change and exit Program Mode. The digit will stop flashing and the word Program on the LCD display will turn off.	Esc or ↵	or
12. Press Esc to return to the	Esc	

Drive Programming Tools

Some features in the PowerFlex 520-series drive are not supported by older configuration software tools. It is strongly recommended that customers using such tools migrate to RSLogix 5000 (version 17.0 or greater) or Logix Designer (version 21.0 or greater) with Add-On-Profile (AOP), or Connected Components Workbench (version 5.0 or greater) to enjoy a richer, full-featured configuration experience. For Automatic Device Configuration (ADC) support, RSLogix 5000 version 20.0 or greater is required.

Description	Catalog Number/Release Version
Connected Components Workbench[1]	Version 5.0 or greater
Logix Designer	Version 21.0 or greater
RSLogix 5000	Version 17.0 or greater
Built-in USB software tool	–
Serial Converter Module[2]	22-SCM-232
USB Converter Module[2]	1203-USB
Remote Panel Mount, LCD Display[2]	22-HIM-C2S
Remote Handheld, LCD Display[2]	22-HIM-A3

(1) Available as a free download at http://ab.rockwellautomation.com/programmable-controllers/connected-components- workbench-software.

(2) Does not support the new dynamic parameter groups (AppView, CustomView), and CopyCat functionality is limited to the linear parameter list.

Language Support

Language	Keypad/LCD Display	RSLogix 5000/ Logix Designer	Connected Components Workbench
English	Y	Y	Y
French	Y	Y	Y
Spanish	Y	Y	Y
Italian	Y	Y	Y
German	Y	Y	Y
Japanese	–	Y	–
Portuguese	Y	Y	–
Chinese Simplified	–	Y	Y
Korean	–	Y	–

Language	Keypad/LCD Display	RSLogix 5000/ Logix Designer	Connected Components Workbench
Polish[1]	Y	–	–
Turkish[1]	Y	–	–
Czech[1]	Y	–	–

(1)   Due to a limitation of the LCD Display, some of the characters for Polish, Turkish, and Czech will be modified.

Smart Start-Up with Basic Program Group Parameters

The PowerFlex 520-series drive is designed so that start up is simple and efficient. The Basic Program Group contains the most commonly used parameters. See for detailed descriptions of the parameters listed here, as well as the full list of available parameters.

⬚ = Stop drive before changing this parameter.

PF 525 = Parameter is specific to PowerFlex 525 drives only.

No.	Parameter	Min/Max	Display/Options	Default
P030	[Language] Selects the language displayed. **Important:** The setting takes effect after the drive is power cycled.	1/15	1 = English 2 = Français 3 = Español 4 = Italiano 5 = Deutsch 6 = Reserved 7 = Português 8 = Reserved 9 = Reserved 10 = Reserved 11 = Reserved 12 = Polish 13 = Reserved 14 = Turkish 15 = Czech	1
P031 ⬚	[Motor NP Volts] Sets the motor nameplate rated	10V (for 200V Drives), 20V (for 400V Drives), 25V (for	1V	Based on Drive Rating
P032 ⬚	[Motor NP Sets the motor nameplate rated	15/500 Hz	1 Hz	60 Hz
P033	[Motor OL Sets the motor nameplate overload	0.0/(Drive Rated	0.1 A	Based on Drive Rating
P034	[Motor NP Sets the motor nameplate FLA.	0.0/(Drive Rated	0.1 A	Drive Rated Amps
P035	[Motor NP Sets the number of poles in the	2/40	1	4
P036 ⬚	[Motor NP Sets the rated nameplate rpm of	0/24000 rpm	1 rpm	1750 rpm
P037 PF 525	[Motor NP Sets the motor nameplate power. Used in PM regulator.	0.00/Drive Rated	0.01 kW	Drive Rated Power
P038 ⬚	[Voltage Class] Sets the voltage class of 600V drives. Only applicable to 600V drives.	2/3	2 = "480V" 3 = "600V"	3

⬭ = Stop drive before changing
　　　 this parameter.

PF 525 = Parameter is specific to PowerFlex
　　　 525 drives only.

No.	Parameter	Min/Max	Display/Options	Default
P039 ⬭	[Torque Perf	0/4	0 = "V/Hz" 1 = "SVC" 2 = "Economize" 3 = "Vector"[1] 4 = "PM Control"[1][2][3]	1
	Selects the motor control mode. (1)　Setting is specific to PowerFlex 525 drives only. (2)　Setting is available in PowerFlex 525 FRN 5.xxx and later. (3)　When P039 [Torque Perf Mode] is set to 4 and 　　A535 [Motor Fdbk Type] is set to 0, 1, 2 or 3, the drive is in open loop PM motor control mode. 　　When P039 [Torque Perf Mode] is set to 4 and 　　A535 [Motor Fdbk Type] is set to 4 or 5, the drive is in closed loop PM motor control mode.			
P040 ⬭	[Autotune]	0/2	0 = "Ready/Idle" 1 = "Static Tune" 2 = "Rotate Tune"	0
	Enables a static (not spinning) or dynamic (motor spinning)			
P041	[Accel Time 1]	0.00/600.00 s	0.01 s	10.00 s
	Sets the time for the drive to accel from 0 Hz to			
P042 ⬭	[Decel Time 1]	0.00/600.00 s	0.01 s	10.00 s
	Sets the time for the drive to decel from [Maximum			
P043	[Minimum	0.00/500.00 Hz	0.01 Hz	0.00 Hz
	Sets the lowest frequency the drive			
P044	[Maximum	0.00/500.00 Hz	0.01 Hz	60.00 Hz
	Sets the highest frequency the drive			
P045 ⬭	[Stop Mode]	0/11	0 = "Ramp, CF"[1] 1 = "Coast, CF"[1] 2 = "DC Brake, CF"[1] 3 = "DCBrkAuto,CF"[1] 4 = "Ramp" 5 = "Coast" 6 = "DC Brake" 7 = "DC BrakeAuto" 8 = "Ramp+EMB,CF"[1] 9 = "Ramp+EM Brk" 10 = "PointStp,CF"[1] 11 = "PointStop"	0
	Stop command for normal stop. **Important:** I/O Terminal 01 is always a stop input. The stopping mode is determined by the drive setting. **Important:** The drive is shipped with a jumper installed between I/O Terminals 01 and 11. Remove this jumper when using I/O Terminal 01 as a stop or enable input. (1)　Stop input also clears active fault.			
P046, P048, P050	[Start Source	1/5	1 = "Keypad"[1] 2 = "DigIn TrmBlk"[2] 3 = "Serial/DSI" 4 = "Network Opt" 5 = "Ethernet/IP"[3]	P046 = 1 P048 = 2 P050 = 3 (PowerFlex 523) 　　5 (PowerFlex 525)
	Sets the default control scheme used to start the drive unless overriden by P048 [Start Source 2] or P050 [Start Source 3]. (1)　When active, the Reverse key is also active unless disabled by A544 [Reverse Disable]. (2)　If "DigIn TrmBlk" is selected, ensure that the digital			

⬛ = Stop drive before changing
     this parameter.

PF 525 = Parameter is specific to PowerFlex
     525 drives only.

No.	Parameter	Min/Max	Display/Options	Default
P047, P049, P051	[Speed Sets the default speed command of the drive unless overridden by P049 [Speed Reference2] or P051 [Speed Reference3]. (1) Setting is specific to PowerFlex 525 drives only. ⬛	1/16	1 = "Drive Pot" 2 = "Keypad Freq" 3 = "Serial/DSI" 4 = "Network Opt" 5 = "0-10V Input" 6 = "4-20mA Input" 7 = "Preset Freq" 8 = "Anlg In Mult"[1] 9 = "MOP" 10 = "Pulse Input" 11 = "PID1 Output" 12 = "PID2 Output"[1] 13 = "Step Logic"[1] 14 = "Encoder"[1] 15 = "Ethernet/IP"[1] 16 = "Positioning"[1]	P047 = 1 P049 = 5 P051 = 3 (PowerFlex 523) 15 (PowerFlex 525)
P052	[Average kWh Sets the average cost per kWh.	0.00/655.35	0.01	0.00
P053	[Reset To Resets parameters to their factory defaults values. After a Reset command, the value of this parameter returns to zero. (1) Power cycle of the drive, **NO** parameters are reset. (2) Setting is available in PowerFlex 525 FRN 5.xxx and later.	0/4	0 = "Ready/Idle" 1 = "Param Reset" 2 = "Factory Rset" 3 = "Power Reset" 4 = "Module Reset"[1][2][3]	0

LCD Display with QuickView Technology

QuickView™ technology enables text to scroll across the LCD display of the PowerFlex 520-series drive. This allows you to easily configure parameters, troubleshoot faults and view diagnostic items without using a separate device. Use parameter A556 [Text Scroll] to set the speed at which the text scrolls across the display. Select 0 "Off " to turn off text scrolling. See for the languages supported by the PowerFlex 520-series drive.

Using the USB Port

The PowerFlex 520-series drive has a USB port that connects to a PC for the purpose of upgrading drive firmware or uploading/downloading a parameter configuration.

IMPORTANT   To use the USB feature of the PowerFlex 520-series drive, Microsoft .Net Framework 2.0 and Windows XP or later is required.

MainsFree Programming

The MainsFree™ programming feature allows you to quickly configure your PowerFlex 520-series drive without having to power up the control module or install additional software. Simply connect the control module to your PC with a USB Type B cable and you can download a parameter configuration to your drive. You can also easily upgrade your drive with the latest firmware.

**Connecting a PowerFlex 520-series drive to a
PC**

USB Type B cable

Control Module

USB port

Connect to PC

Connect to Control Module
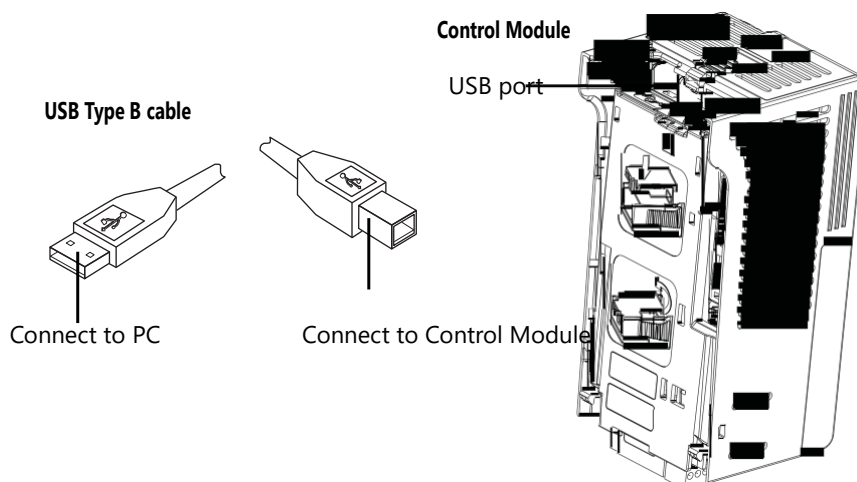
When connected, the drive appears on the PC and contains two files:

- GUIDE.PDF
  This file contains links to relevant product documentation and software downloads.

- PF52XUSB.EXE
  This file is an application to flash upgrade firmware or upload/download a parameter configuration.

  It is not possible to delete these files or add more to the drive.

Double-click on the PF52XUSB.EXE file to launch the USB utility application. The main menu is displayed. Follow the program instructions to upgrade the firmware or upload/download configuration data.
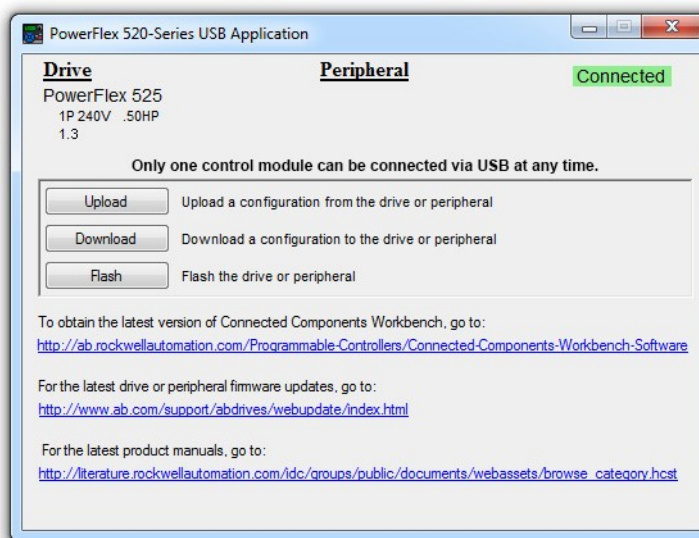
IMPORTANT	Make sure your PC is powered by an AC power outlet or has a fully charged battery before starting any operation. This prevents the operation from terminating before completion due to insufficient power.

Limitation in Downloading .pf5 Configuration Files with the USB Utility Application

Before downloading a .pf5 configuration file using the USB utility application, parameter C169 [MultiDrv Sel] in the destination drive must match the incoming configuration file. If it does not, set the parameter manually to match and then cycle drive power. Also, the drive type of the .pf5 file must match the drive.

This means you cannot apply a multi-drive configuration using the USB utility application to a drive in single mode (parameter C169 [MultiDrv Sel] set to 0 "Disabled"), or apply a single mode configuration to a drive in multi-drive mode.

Notes:

Notes:

Chapter 3

Programming and Parameters

This chapter provides a complete listing and description of the PowerFlex 520-series drive parameters. Parameters are programmed (viewed/edited) using either the drive's built-in keypad, RSLogix 5000 version 17.0 or greater, Logix Designer version 21.0 or greater, o r Connected Components Workbench version 5.0 or greater software. The Connected Components Workbench software can be used offline (through USB) to upload parameter configurations to the drive or online (through Ethernet connection).

Limited functionality is also available when using the Connected Components Workbench software online (through DSI and serial converter module), a legacy external HIM, or legacy software online (DriveTools SP™). When using these methods, the parameter list can only be displayed linearly, and there is no access to communications option card programming.

About Parameters

To configure a drive to operate in a specific way, drive parameters may have to be set. Three types of parameters exist:

- **ENUM**
  ENUM parameters allow a selection from 2 or more items. Each item is represented by a number.

- **Numeric Parameters**
  These parameters have a single numerical value (0.1V).

- **Bit Parameters**
  Bit parameters have five individual digits associated with features or conditions. If the digit is 0, the feature is off or the condition is false. If the digit is 1, the feature is on or the condition is true.

Some parameters are marked as follows.

🔴 = Stop drive before changing
this parameter.

▽ ₃₂ = 32 bit
parameter.

PF 525 = Parameter is specific to PowerFlex
525 drives only.

32-bit Parameters

Parameters marked 32-bit will have two parameter numbers when using RS485 communications and programming software. For example, parameters b010 [Process Display] and b011 [Process Fract] are scaled and displayed as follows.

- P043 [Minimum Freq] = 0 Hz
- P044 [Maximum Freq] = 60 Hz
- A481 [Process Display Lo] = 0
- A482 [Process Display Hi] = 10

Using the forumla,

Scaled Process Value (PV) = $\dfrac{([\text{Process Disp Hi}] - [\text{Process Disp Lo}]) \times ([\text{Output Freq}] - [\text{Minimum Freqp}])\ [\text{Maximum Freq}] - [\text{Minimum Freq}]}{}$

when the drive is running at 10 Hz, the Process Value will be 1.66.

On the drive LCD display, only parameter b010 [Process Display] is shown.

In Connected Components Workbench software, parameter b010 [Process Display] and b011 [Process Fract] are shown separately.

Parameter Groups

Basic Display

Output Freq	b001	Output Voltage	b004	Control Source	b012	Elapsed Run Time	b019	Accum CO2 Sav	b026
Commanded Freq	b002	DC Bus Voltage	b005	Contrl In Status	b013	Average Power	b020	Drive Temp	b027
Output Current	b003	Drive Status	b006	Dig In Status	b014	Elapsed kWh	b021	Control Temp	b028
		Fault 1 Code	b007	Output RPM	b015	Elapsed MWh	b022	Control SW Ver	b029
		Fault 2 Code	b008	Output Speed	b016	Energy Saved	b023		
		Fault 3 Code	b009	Output Power	b017	Accum kWh Sav	b024		
		Process Display	b010	Power Saved	b018	Accum Cost Sav	b025		

Basic Program

Language	P030	Motor NP Hertz	P032	Voltage Class	P038	Maximum Freq	P044	Start Source 3	P050
Motor NP Volts	P031	Motor OL Current	P033	Torque Perf Mode	P039	Stop Mode	P045	Speed Reference3	P051
		Motor NP FLA	P034	Autotune	P040	Start Source 1	P046	Average kWh Cost	P052
		Motor NP Poles	P035	Accel Time 1	P041	Speed Reference1	P047	Reset To Defalts	P053
		Motor NP RPM	P036	Decel Time 1	P042	Start Source 2	P048		
		Motor NP Power[1]	P037	Minimum Freq	P043	Speed Reference2	P049		

Terminal Blocks

DigIn TermBlk 02	t062	DigIn TermBlk 07[1]	t067	Relay 1 On Time	t079	Analog Out High[2]	t089	Anlg Loss Delay	t098
DigIn TermBlk 03	t063	DigIn TermBlk 08[1]	t068	Relay 1 Off Time	t080	Anlg Out Setpt[2]	t090	Analog In Filter	t099
2-Wire Mode	t064	Opto Out1 Sel[1]	t069	Relay Out2 Sel[1]	t081	Anlg In 0-10V Lo	t091	Sleep-Wake Sel	t100
DigIn TermBlk 05	t065	Opto Out1 Level[1]	t070	Relay Out2 Level[1]	t082	Anlg In 0-10V Hi	t092	Sleep Level	t101
DigIn TermBlk 06	t066	Opto Out2 Sel[1]	t072	Relay 2 On Time[1]	t084	10V Bipolar Enbl[1]	t093	Sleep Time	t102
		Opto Out2 Level[1]	t073	Relay 2 Off Time[1]	t085	Anlg In V Loss	t094	Wake Level	t103
		Opto Out Logic[1]	t075	EM Brk Off Delay	t086	Anlg In4-20mA Lo	t095	Wake Time	t104
		Relay Out1 Sel	t076	EM Brk On Delay	t087	Anlg In4-20mA Hi	t096	Safety Open En[1]	t105
		Relay Out1 Level	t077	Analog Out Sel[2]	t088	Anlg In mA Loss	t097	SafetyFlt RstCfg[1][3]	t106

Communications

Comm Write Mode	C121	EN Addr Sel[1]	C128	EN Gateway Cfg 3[1]		EN Data In 1[1]	C153	Opt Data In 4	C164
Cmd Stat Select[1]	C122	EN IP Addr Cfg 1[1]	C129		C139	EN Data In 2[1]	C154	Opt Data Out 1	C165
RS485 Data Rate	C123	EN IP Addr Cfg 2[1]	C130	EN Gateway Cfg 4[1]		EN Data In 3[1]	C155	Opt Data Out 2	C166
RS485 Node Addr	C124	EN IP Addr Cfg 3[1]	C131		C140	EN Data In 4[1]	C156	Opt Data Out 3	C167
Comm Loss Action	C125	EN IP Addr Cfg 4[1]	C132	EN Rate Cfg[1]	C141	EN Data Out 1[1]	C157	Opt Data Out 4	C168
Comm Loss Time	C126	EN Subnet Cfg 1[1]	C133	EN Comm Flt Actn[1]		EN Data Out 2[1]	C158	MultiDrv Sel	C169
RS485 Format	C127	EN Subnet Cfg 2[1]	C134		C143	EN Data Out 3[1]	C159	Drv 1 Addr	C171
		EN Subnet Cfg 3[1]	C135	EN Idle Flt Actn[1]	C144	EN Data Out 4[1]	C160	Drv 2 Addr	C172
		EN Subnet Cfg 4[1]	C136	EN Flt Cfg Logic[1]	C145	Opt Data In 1	C161	Drv 3 Addr	C173
		EN Gateway Cfg 1[1]		EN Flt Cfg Ref[1]	C146	Opt Data In 2	C162	Drv 4 Addr	C174
			C137	EN Flt Cfg DL 1[1]	C147	Opt Data In 3	C163	DSI I/O Cfg	C175
		EN Gateway Cfg 2[1]		EN Flt Cfg DL 2[1]	C148				
			C138	EN Flt Cfg DL 3[1]	C149				
				EN Flt Cfg DL 4[1]	C150				

Logic[1]

Stp Logic 0	L180	Stp Logic 2	L182	Stp Logic Time 0	L190	Stp Logic Time 6	L196	Step Units 4	L208
Stp Logic 1	L181	Stp Logic 3	L183	Stp Logic Time 1	L191	Stp Logic Time 7	L197	Step Units 5	L210
		Stp Logic 4	L184	Stp Logic Time 2	L192	Step Units 0	L200	Step Units 6	L212
		Stp Logic 5	L185	Stp Logic Time 3	L193	Step Units 1	L202	Step Units 7	L214
		Stp Logic 6	L186	Stp Logic Time 4	L194	Step Units 2	L204		
		Stp Logic 7	L187	Stp Logic Time 5	L195	Step Units 3	L206		

Advanced Display

Analog In 0-10V	d360	Elapsed Time-min	d363	Speed Feedback	d376	PID2 Fdbk Displ[1]	d385	RdyBit Mode Act[2][4]	
Analog In 4-20mA	d361	Counter Status	d364	Encoder Speed[2]	d378	PID2 Setpnt Disp[1]	d386		d392
Elapsed Time-hr	d362	Timer Status	d365	DC Bus Ripple	d380	Position Status[1]	d387	Drive Status 2[2][3]	d393
		Drive Type	d367	Output Powr Fctr	d381	Units Traveled H[1]	d388	Dig Out Status[2][3]	d394
		Testpoint Data	d368	Torque Current	d382	Units Traveled L[1]	d389		
		Motor OL Level	d369	PID1 Fdbk Displ	d383	Fiber Status	d390		
		Slip Hz Meter	d375	PID1 Setpnt Disp	d384	Stp Logic Status[1]	d391		

Advanced Program

Parameter	Code	Parameter	Code	Parameter	Code	Parameter	Code	Parameter	Code
Preset Freq 0	A410	Accel Time 2	A442	PID 2 Preload[1]	A478	PM HIFI NS Cur[1][3]	A519	Reset Meters	A555
Preset Freq 1	A411	Decel Time 2	A443	PID 2 Invert Err[1]	A479	PM Bus Reg Kd[1][3]	A520	Text Scroll	A556
Preset Freq 2	A412	Accel Time 3	A444	Process Disp Lo	A481	Freq 1 Kp[1]	A521	Out Phas Loss En	A557
Preset Freq 3	A413	Decel Time 3	A445	Process Disp Hi	A482	Freq 1 Ki[1]	A522	Positioning Mode[1]	A558
Preset Freq 4	A414	Accel Time 4	A446	Testpoint Sel	A483	Freq 2 Kp[1]	A523	Counts Per Unit[1]	A559
Preset Freq 5	A415	Decel Time 4	A447	Current Limit 1	A484	Freq 2 Ki[1]	A524	Enh Control Word[1]	A560
Preset Freq 6	A416	Skip Frequency 1	A448	Current Limit 2[1]	A485	Freq 3 Kp[1]	A525	Home Save[1]	A561
Preset Freq 7	A417	Skip Freq Band 1	A449	Shear Pin1 Level	A486	Freq 3 Ki[1]	A526	Find Home Freq[1]	A562
Preset Freq 8[1]	A418	Skip Frequency 2	A450	Shear Pin 1 Time	A487	PM FWKn 1 Kp[1][3]	A527	Find Home Dir[1]	A563
Preset Freq 9[1]	A419	Skip Freq Band 2	A451	Shear Pin2 Level[1]	A488	PM FWKn 2 Kp[1][3]	A528	Encoder Pos Tol[1]	A564
Preset Freq 10[1]	A420	Skip Frequency 3[1]	A452	Shear Pin 2 Time[1]	A489	PM Control Cfg[1][3]	A529	Pos Reg Filter[1]	A565
Preset Freq 11[1]	A421	Skip Freq Band 3[1]	A453	Load Loss Level[1]	A490	Boost Select	A530	Pos Reg Gain[1]	A566
Preset Freq 12[1]	A422	Skip Frequency 4[1]	A454	Load Loss Time[1]	A491	Start Boost	A531	Max Traverse	A567
Preset Freq 13[1]	A423	Skip Freq Band 4[1]	A455	Stall Fault Time	A492	Break Voltage	A532	Traverse Inc	A568
Preset Freq 14[1]	A424	PID 1 Trim Hi	A456	Motor OL Select	A493	Break Frequency	A533	Traverse Dec	A569
Preset Freq 15[1]	A425	PID 1 Trim Lo	A457	Motor OL Ret	A494	Maximum Voltage	A534	P Jump	A570
Keypad Freq	A426	PID 1 Trim Sel	A458	Drive OL Mode	A495	Motor Fdbk Type[2]	A535	Sync Time	A571
MOP Freq	A427	PID 1 Ref Sel	A459	IR Voltage Drop	A496	Encoder PPR[1]	A536	Speed Ratio	A572
MOP Reset Sel	A428	PID 1 Fdback Sel	A460	Flux Current Ref	A497	Pulse In Scale	A537	Mtr Options Cfg[2][5]	A573
MOP Preload	A429	PID 1 Prop Gain	A461	Motor Rr[1]	A498	Ki Speed Loop[2]	A538	RdyBit Mode Cfg[2][4]	A574
MOP Time	A430	PID 1 Integ Time	A462	Motor Lm[1]	A499	Kp Speed Loop[2]	A539	Flux Braking En[2][3]	A575
Jog Frequency	A431	PID 1 Diff Rate	A463	Motor Lx[1]	A500	Var PWM Disable	A540	Phase Loss Level[2][3]	A576
Jog Accel/Decel	A432	PID 1 Setpoint	A464	PM IR Voltage[1][3]	A501	Auto Rstrt Tries	A541	Current Loop BW[1][3]	A580
Purge Frequency	A433	PID 1 Deadband	A465	PM IXd Voltage[1][3]	A502	Auto Rstrt Delay	A542	PM Stable 1 Freq[1][3]	A581
DC Brake Time	A434	PID 1 Preload	A466	PM IXq Voltage[1][3]	A503	Start At PowerUp	A543	PM Stable 2 Freq[1][3]	A582
DC Brake Level	A435	PID 1 Invert Err	A467	PM BEMF Voltage[1][3]	A504	Reverse Disable	A544	PM Stable 1 Kp[1][3]	A583
DC Brk Time@Strt	A436	PID 2 Trim Hi[1]	A468	Speed Reg Sel[1]	A509	Flying Start En	A545	PM Stable 2 Kp[1][3]	A584
DB Resistor Sel	A437	PID 2 Trim Lo[1]	A469	Freq 1[1]	A510	FlyStrt CurLimit	A546	PM Stable Brk Pt[1][3]	A585
DB Threshold	A438	PID 2 Trim Sel[1]	A470	Freq 1 BW[1]	A511	Compensation	A547	PM Stepload Kp[1][3]	A586
S Curve %	A439	PID 2 Ref Sel[1]	A471	Freq 2[1]	A512	Power Loss Mode	A548		
PWM Frequency	A440	PID 2 Fdback Sel[1]	A472	Freq 2 BW[1]	A513	Half Bus Enable	A549		
Droop Hertz@ FLA[1]	A441	PID 2 Prop Gain[1]	A473	Freq 3[1]	A514	Bus Reg Enable	A550		
		PID 2 Integ Time[1]	A474	Freq 3 BW[1]	A515	Fault Clear	A551		
		PID 2 Diff Rate[1]	A475	PM Initial Sel[1][3]	A516	Program Lock	A552		
		PID 2 Setpoint[1]	A476	PM DC Inject Cur[1][3]	A517	Program Lock Mod	A553		
		PID 2 Deadband[1]	A477	PM Align Time[1][3]	A518	Drv Ambient Sel	A554		

Network

This group contains parameters for the network option card that is installed.
See the network option card's user manual for more information on the available parameters.

Modified

This group contains parameters that have their values changed from the factory default.
When a parameter has its default value changed, it is automatically added to this group. When a parameter has its value changed back to the factory default, it is automatically removed from this group.

Fault and Diagnostic

Parameter	Code	Parameter	Code	Parameter	Code	Parameter	Code	Parameter	Code
		Fault 5 Time-min	F625	Fault10 Current[1]	F650	EN Rate Act[1]	F685	Drv 1 Reference	F710
		Fault 6 Time-min[1]	F626	Fault 1 BusVolts	F651	DSI I/O Act	F686	Drv 1 Logic Sts	F711
		Fault 7 Time-min[1]	F627	Fault 2 BusVolts	F652	HW Addr 1[1]	F687	Drv 1 Feedback	F712
		Fault 8 Time-min[1]	F628	Fault 3 BusVolts	F653	HW Addr 2[1]	F688	Drv 2 Logic Cmd	F713
Fault 4 Code	F604	Fault 9 Time-min[1]	F629	Fault 4 BusVolts	F654	HW Addr 3[1]	F689	Drv 2 Reference	F714
Fault 5 Code	F605	Fault10 Time-min[1]	F630	Fault 5 BusVolts	F655	HW Addr 4[1]	F690	Drv 2 Logic Sts	F715
Fault 6 Code	F606	Fault 1 Freq	F631	Fault 6 BusVolts[1]	F656	HW Addr 5[1]	F691	Drv 2 Feedback	F716
Fault 7 Code	F607	Fault 2 Freq	F632	Fault 7 BusVolts[1]	F657	HW Addr 6[1]	F692	Drv 3 Logic Cmd	F717
Fault 8 Code	F608	Fault 3 Freq	F633	Fault 8 BusVolts[1]	F658	EN IP Addr Act 1[1]	F693	Drv 3 Reference	F718
Fault 9 Code	F609	Fault 4 Freq	F634	Fault 9 BusVolts[1]	F659	EN IP Addr Act 2[1]	F694	Drv 3 Logic Sts	F719
Fault10 Code	F610	Fault 5 Freq	F635	Fault10 BusVolts[1]	F660	EN IP Addr Act 3[1]	F695	Drv 3 Feedback	F720
Fault 1 Time-hr	F611	Fault 6 Freq[1]	F636	Status @ Fault 1	F661	EN IP Addr Act 4[1]	F696	Drv 4 Logic Cmd	F721
Fault 2 Time-hr	F612	Fault 7 Freq[1]	F637	Status @ Fault 2	F662	EN Subnet Act 1[1]	F697	Drv 4 Reference	F722
Fault 3 Time-hr	F613	Fault 8 Freq[1]	F638	Status @ Fault 3	F663	EN Subnet Act 2[1]	F698	Drv 4 Logic Sts	F723
Fault 4 Time-hr	F614	Fault 9 Freq[1]	F639	Status @ Fault 4	F664	EN Subnet Act 3[1]	F699	Drv 4 Feedback	F724
Fault 5 Time-hr	F615	Fault10 Freq[1]	F640	Status @ Fault 5	F665	EN Subnet Act 4[1]	F700	EN Rx Overruns[1]	F725
Fault 6 Time-hr[1]	F616	Fault 1 Current	F641	Status @ Fault 6[1]	F666	EN Gateway Act 1[1]	F701	EN Rx Packets[1]	F726
Fault 7 Time-hr[1]	F617	Fault 2 Current	F642	Status @ Fault 7[1]	F667	EN Gateway Act 2[1]	F702	EN Rx Errors[1]	F727
Fault 8 Time-hr[1]	F618	Fault 3 Current	F643	Status @ Fault 8[1]	F668	EN Gateway Act 3[1]	F703	EN Tx Packets[1]	F728
Fault 9 Time-hr[1]	F619	Fault 4 Current	F644	Status @ Fault 9[1]	F669	EN Gateway Act 4[1]	F704	EN Tx Errors[1]	F729
Fault10 Time-hr[1]	F620	Fault 5 Current	F645	Status @ Fault10[1]	F670	Drv 0 Logic Cmd	F705	EN Missed IO Pkt[1]	F730
Fault 1 Time-min	F621	Fault 6 Current[1]	F646	Comm Sts - DSI	F681	Drv 0 Reference	F706	DSI Errors	F731
Fault 2 Time-min	F622	Fault 7 Current[1]	F647	Comm Sts - Opt	F682	Drv 0 Logic Sts	F707		
Fault 3 Time-min	F623	Fault 8 Current[1]	F648	Com Sts-Emb Enet[1]	F683	Drv 0 Feedback	F708		
Fault 4 Time-min	F624	Fault 9 Current[1]	F649	EN Addr Src[1]	F684	Drv 1 Logic Cmd	F709		

(1)   Parameter is specific to PowerFlex 525 drives only.

(2)   Parameter is also available in PowerFlex 523 FRN 3.xxx and later. (3)   Parameter is available in PowerFlex 525 FRN 5.xxx and later.

(4)   Parameter is available in PowerFlex 525 FRN 3.xxx and later. (5)   Parameter is available in PowerFlex 525 FRN 2.xxx and later.

AppView Parameter Groups

PowerFlex 520-series drives include various AppView™ parameter groups that groups certain parameters together for quick and easy access based on different types of applications. See for more information.

Conveyor (G1)

Param	Code	Param	Code	Param	Code	Param	Code
Language	P030						
Output Freq	b001						
Commanded Freq	b002						
Motor NP Volts	P031	Decel Time 1	P042	DigIn TermBlk 03	t063	Anlg In mA Loss	t097
Motor NP Hertz	P032	Minimum Freq	P043	Opto Out1 Sel	t069	Slip Hz Meter	d375
Motor OL Current	P033	Maximum Freq	P044	Relay Out1 Sel	t076	Preset Freq 0	A410
Motor NP FLA	P034	Stop Mode	P045	Anlg In 0-10V Lo	t091	Jog Frequency	A431
Motor NP Poles	P035	Start Source 1	P046	Anlg In 0-10V Hi	t092	Jog Accel/Decel	A432
Autotune	P040	Speed Reference1	P047	Anlg In4-20mA Lo	t095	S Curve %	A439
Accel Time 1	P041	DigIn TermBlk 02	t062	Anlg In4-20mA Hi	t096	Reverse Disable	A544

Mixer (G2)

Param	Code	Param	Code	Param	Code	Param	Code
Language	P030						
Output Freq	b001						
Commanded Freq	b002	Motor NP Poles	P035	Stop Mode	P045	Anlg In4-20mA Lo	t095
Output Current	b003	Autotune	P040	Start Source 1	P046	Anlg In4-20mA Hi	t096
Motor NP Volts	P031	Accel Time 1	P041	Speed Reference1	P047	Anlg In mA Loss	t097
Motor NP Hertz	P032	Decel Time 1	P042	Relay Out1 Sel	t076	Preset Freq 0	A410
Motor OL Current	P033	Minimum Freq	P043	Anlg In 0-10V Lo	t091	Stall Fault Time	A492
Motor NP FLA	P034	Maximum Freq	P044	Anlg In 0-10V Hi	t092		

Compressor (G3)

Param	Code	Param	Code	Param	Code	Param	Code
Language	P030						
Output Freq	b001						
Commanded Freq	b002						
Motor NP Volts	P031						
Motor NP Hertz	P032	Maximum Freq	P044	Anlg In 0-10V Lo	t091	Start At PowerUp	A543
Motor OL Current	P033	Stop Mode	P045	Anlg In 0-10V Hi	t092	Reverse Disable	A544
Motor NP FLA	P034	Start Source 1	P046	Anlg In4-20mA Lo	t095	Power Loss Mode	A548
Motor NP Poles	P035	Speed Reference1	P047	Anlg In4-20mA Hi	t096	Half Bus Enable	A549
Autotune	P040	Relay Out1 Sel	t076	Anlg In mA Loss	t097		
Accel Time 1	P041	Analog Out Sel	t088	Preset Freq 0	A410		
Decel Time 1	P042	Analog Out High	t089	Auto Rstrt Tries	A541		
Minimum Freq	P043	Anlg Out Setpt	t090	Auto Rstrt Delay	A542		

Centrifugal Pump (G4)

Param	Code	Param	Code	Param	Code	Param	Code
Language	P030						
Output Freq	b001						
Commanded Freq	b002						
Motor NP Volts	P031						
Motor NP Hertz	P032						
Motor OL Current	P033	Start Source 1	P046	Anlg In4-20mA Hi	t096	PID 1 Diff Rate	A463
Motor NP FLA	P034	Speed Reference1	P047	Anlg In mA Loss	t097	PID 1 Setpoint	A464
Motor NP Poles	P035	Relay Out1 Sel	t076	Preset Freq 0	A410	PID 1 Deadband	A465
Autotune	P040	Analog Out Sel	t088	PID 1 Trim Hi	A456	PID 1 Preload	A466
Accel Time 1	P041	Analog Out High	t089	PID 1 Trim Lo	A457	Auto Rstrt Tries	A541
Decel Time 1	P042	Anlg Out Setpt	t090	PID 1 Ref Sel	A459	Auto Rstrt Delay	A542
Minimum Freq	P043	Anlg In 0-10V Lo	t091	PID 1 Fdback Sel	A460	Start At PowerUp	A543
Maximum Freq	P044	Anlg In 0-10V Hi	t092	PID 1 Prop Gain	A461	Reverse Disable	A544
Stop Mode	P045	Anlg In4-20mA Lo	t095	PID 1 Integ Time	A462		

Blower/Fan (G5)

Param	Code	Param	Code	Param	Code	Param	Code
Language	P030						
Output Freq	b001						
Commanded Freq	b002						
Motor NP Volts	P031						
Motor NP Hertz	P032						
Motor OL Current	P033	Start Source 1	P046	Anlg In4-20mA Hi	t096	PID 1 Diff Rate	A463
Motor NP FLA	P034	Speed Reference1	P047	Anlg In mA Loss	t097	PID 1 Setpoint	A464
Motor NP Poles	P035	Relay Out1 Sel	t076	Preset Freq 0	A410	PID 1 Deadband	A465
Autotune	P040	Analog Out Sel	t088	PID 1 Trim Hi	A456	PID 1 Preload	A466
Accel Time 1	P041	Analog Out High	t089	PID 1 Trim Lo	A457	Auto Rstrt Tries	A541
Decel Time 1	P042	Anlg Out Setpt	t090	PID 1 Ref Sel	A459	Auto Rstrt Delay	A542
Minimum Freq	P043	Anlg In 0-10V Lo	t091	PID 1 Fdback Sel	A460	Start At PowerUp	A543
Maximum Freq	P044	Anlg In 0-10V Hi	t092	PID 1 Prop Gain	A461	Reverse Disable	A544
Stop Mode	P045	Anlg In4-20mA Lo	t095	PID 1 Integ Time	A462	Flying Start En	A545

Extruder (66)

Language	P030
Output Freq	b001
Commanded Freq	b002
Output Current	b003
Motor NP Volts	P031

Motor NP Hertz	P032	Stop Mode	P045	Anlg In4-20mA Lo	t095	Encoder PPR	A536
Motor OL Current	P033	Start Source 1	P046	Anlg In4-20mA Hi	t096	Pulse In Scale	A537
Motor NP FLA	P034	Speed Reference1	P047	Anlg In mA Loss	t097	Ki Speed Loop	A538
Motor NP Poles	P035	Relay Out1 Sel	t076	Slip Hz Meter	d375	Kp Speed Loop	A539
Autotune	P040	Analog Out Sel	t088	Speed Feedback	d376	Power Loss Mode	A548
Accel Time 1	P041	Analog Out High	t089	Encoder Speed	d378	Half Bus Enable	A549
Decel Time 1	P042	Anlg Out Setpt	t090	Motor Fdbk Type	A535		
Minimum Freq	P043	Anlg In 0-10V Lo	t091	Preset Freq 0	A410		
Maximum Freq	P044	Anlg In 0-10V Hi	t092	Stall Fault Time	A492		

Positioning[(1)] (67)

Language	P030
Output Freq	b001
Commanded Freq	b002
Motor NP Volts	P031
Motor NP Hertz	P032
Motor OL Current	P033
Motor NP FLA	P034
Motor NP Poles	P035
Autotune	P040
Accel Time 1	P041
Decel Time 1	P042
Minimum Freq	P043
Maximum Freq	P044

Stop Mode	P045	Stp Logic 5	L185	Step Units 6	L212	Jog Accel/Decel	A432
Start Source 1	P046	Stp Logic 6	L186	Step Units 7	L214	DB Threshold	A438
Speed Reference1	P047	Stp Logic 7	L187	Slip Hz Meter	d375	S Curve %	A439
DigIn TermBlk 02	t062	Stp Logic Time 0	L190	Speed Feedback	d376	Motor Fdbk Type	A535
DigIn TermBlk 03	t063	Stp Logic Time 1	L191	Encoder Speed	d378	Encoder PPR	A536
DigIn TermBlk 05	t065	Stp Logic Time 2	L192	Units Traveled H	d388	Pulse In Scale	A537
DigIn TermBlk 06	t066	Stp Logic Time 3	L193	Units Traveled L	d389	Ki Speed Loop	A538
Opto Out1 Sel	t069	Stp Logic Time 4	L194	Preset Freq 0	A410	Kp Speed Loop	A539
Opto Out2 Sel	t072	Stp Logic Time 5	L195	Preset Freq 1	A411	Bus Reg Enable	A550
Relay Out1 Sel	t076	Stp Logic Time 6	L196	Preset Freq 2	A412	Positioning Mode	A558
EM Brk Off Delay	t086	Stp Logic Time 7	L197	Preset Freq 3	A413	Counts Per Unit	A559
EM Brk On Delay	t087	Step Units 0	L200	Preset Freq 4	A414	Enh Control Word	A560
Stp Logic 0	L180	Step Units 1	L202	Preset Freq 5	A415	Find Home Freq	A562
Stp Logic 1	L181	Step Units 2	L204	Preset Freq 6	A416	Find Home Dir	A563
Stp Logic 2	L182	Step Units 3	L206	Preset Freq 7	A417	Encoder Pos Tol	A564
Stp Logic 3	L183	Step Units 4	L208	Preset Freq 8	A418	Pos Reg Filter	A565
Stp Logic 4	L184	Step Units 5	L210	Jog Frequency	A431	Pos Reg Gain	A566

Textile/Fiber (68)

Language	P030
Output Freq	b001
Commanded Freq	b002
Motor NP Volts	P031
Motor NP Hertz	P032
Motor OL Current	P033

Motor NP FLA	P034	DigIn TermBlk 02	t062	Slip Hz Meter	d375	Max Traverse	A567
Motor NP Poles	P035	DigIn TermBlk 03	t063	Fiber Status	d390	Traverse Inc	A568
Autotune	P040	Opto Out1 Sel	t069	Preset Freq 0	A410	Traverse Dec	A569
Accel Time 1	P041	Opto Out2 Sel	t072	Jog Frequency	A431	P Jump	A570
Decel Time 1	P042	Relay Out1 Sel	t076	Jog Accel/Decel	A432	Sync Time	A571
Minimum Freq	P043	Anlg In 0-10V Lo	t091	S Curve %	A439	Speed Ratio	A572
Maximum Freq	P044	Anlg In 0-10V Hi	t092	Reverse Disable	A544		
Stop Mode	P045	Anlg In4-20mA Lo	t095	Power Loss Mode	A548		
Start Source 1	P046	Anlg In4-20mA Hi	t096	Half Bus Enable	A549		
Speed Reference1	P047	Anlg In mA Loss	t097	Bus Reg Enable	A550		

(1)   This AppView parameter group is specific to PowerFlex 525 drives only.

Custom View
Parameter Group

Custom Group

PowerFlex 520-series drives include a CustomView™ parameter group for you to store frequently used parameters for your application. See for more information.

This group can store up to 100 parameters.

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