

Supervisory Controller Setup with M400 VFD Drive

This document will guide you through setting up and commissioning the M400 VFD Drive in Supervisory Controllers (E3 and Site Supervisor).

Complete All Programming before you setup the M400 Drive.

Note that the M400 Drive requires Supervisory Controller firmware version 2.14F01 and above.

The keypad and display gives information about the operating status of the drive and trip codes. It provides the ability to change parameters, stopping and starting the drive, and the ability to perform a drive reset.



Figure 1 - Unidrive M400 Keypad Details

| Keypad Number | Keypad Description |
|----------------|--|
| 1 (Enter) | The Enter button is used to enter parameter view or edit mode, or to accept a parameter edit. |
| 2 (Navigation) | The Navigation keys can be used to select individual parameters or to edit parameter values. In keypad mode, the "Up" and "Down" keys are also used to increase or decrease the motor speed. |
| 3 (Start) | The Start key is used to start the drive in keypad mode. |
| 4 (Stop/Reset) | The Stop / Reset key is used to stop and reset the drive in keypad mode. It can also be used to reset the drive in terminal mode. |
| 5 (Escape) | The Escape key is used to exit from the parameter edit / view mode or disregard a parameter edit. |



Figure 2 - Unidrive M400 Keypad Details

STEP 1: Configuring M400 VFD Drive

Note: Do not connect the device communications to E2 Controller.

1. Press right/ left arrow key and go to **Pr MM.000** then press . Select **Reset 60Hz defs** then press .

Note: Pressing allows you to enter and exit parameter edit mode.

2. Press to return the drive into the **No Action** display.
3. Go to **Pr 00.005** (Drive Config), then press . Select **Preset**, then press .
4. Set **Pr 00.010** (User Security Status), then press . Select **All Menus**, then press .
5. Set **Pr 06.004** (Start/Stop Logic), then press . Select **6**, then press .
6. Set **Pr 11.023** (Serial Address), then press . Select **2**, then press .
7. Set **Pr 11.024** (Serial Mode), then press . Select **8 1 NP**, then press .
8. Set **Pr 11.020** (Serial Reset), then press . Select **On** to reset communications.
Note: The device will flash to On and returns to Off,
press .

9. Set **Pr 12.000** (Parameter mm.000), then press . Select **Save Parameters**, then press .
10. Press to return the drive into the **No Action** display.

Note: The drive is now ready to communicate with the Supervisory Controller and is ready for a test/run.

| | Model | Max # of Instances |
|---|-------|--------------------|
| 1 | SR | 20 |
| 2 | CXe | 16 |
| 3 | CX | 16 |
| 4 | BXe | 16 |
| 5 | BX | 16 |
| 6 | RXe | 16 |
| 7 | RX | 16 |
| 8 | SMF | No |

STEP 2: Setting the Baud Rate in the Supervisory Controller

- Gear icon > **Configure System Properties > General System Properties**

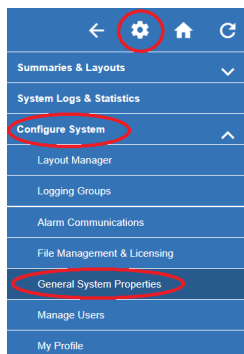


Figure 3 - General System Properties Tree Hierarchy

- Set the **Com Port** baud to **19.2**

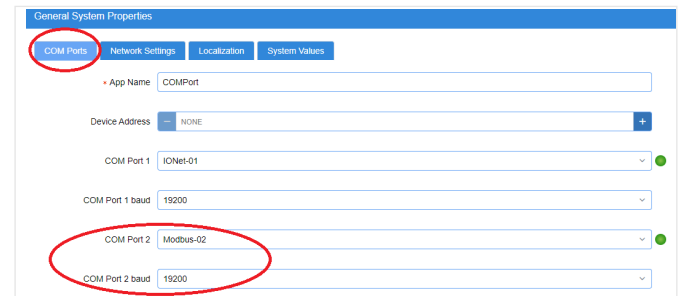


Figure 4 - Set the Baud Rate, Data Size, Parity, and Stop Bits

STEP 3: Wiring the M400 VFD Device to Copeland Controllers

Wire the device as shown below:

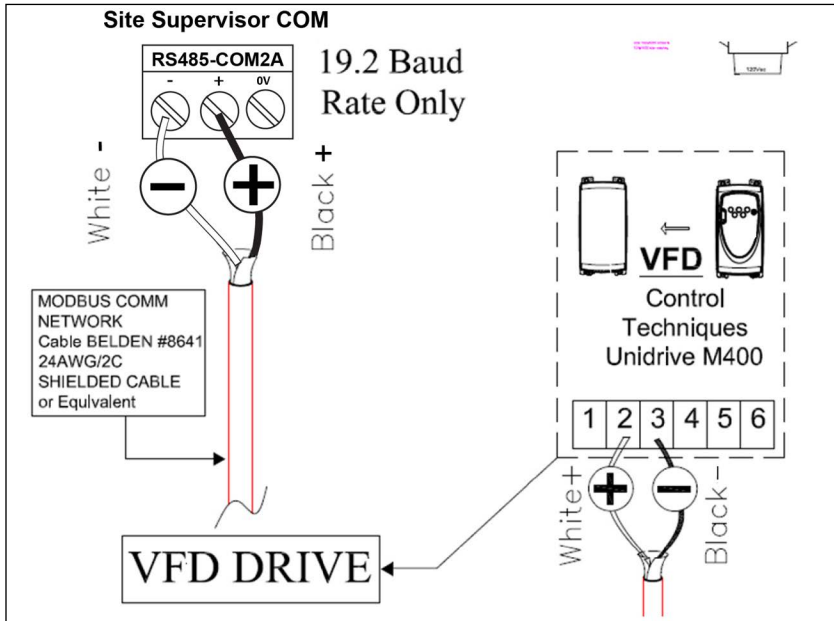


Figure 5 - Wire the M400 VFD Device to Site Supervisor

COM wiring is the REVERSE polarity of Site Supervisor.

- + On the Com port goes to - on the VFD.
- - On the Com port goes to the + on the VFD.
- Do NOT connect shield to any terminal on the controller or VFD. Connect shield directly to Earth Chassis at the controller; clip and insulate shield at VFD end of cable.
- If VFD is the last device at the end of Com segment, terminate with 150 ohms between terminals 2 and 3.

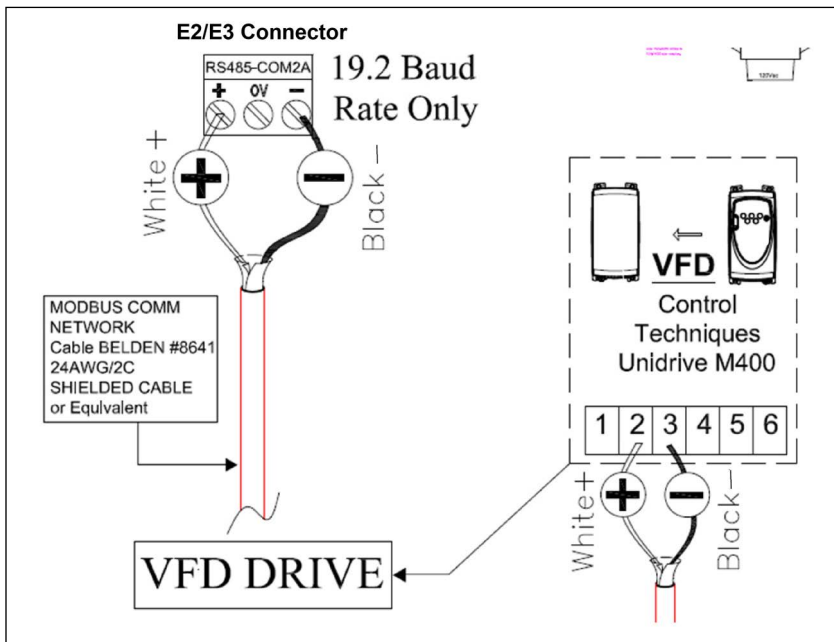


Figure 6 - Wire the M400 VFD Device to E2/E3

COM wiring is the same polarity as E2 and E3.

- + On the Com port goes to - on the VFD.
- - On the Com port goes to the + on the VFD.
- Do NOT connect shield to any terminal on the controller or VFD. Connect shield directly to Earth Chassis at the controller; clip and insulate shield at VFD end of cable.
- If VFD is the last device at the end of Com segment, terminate with 150 ohms between terminals 2 and 3.

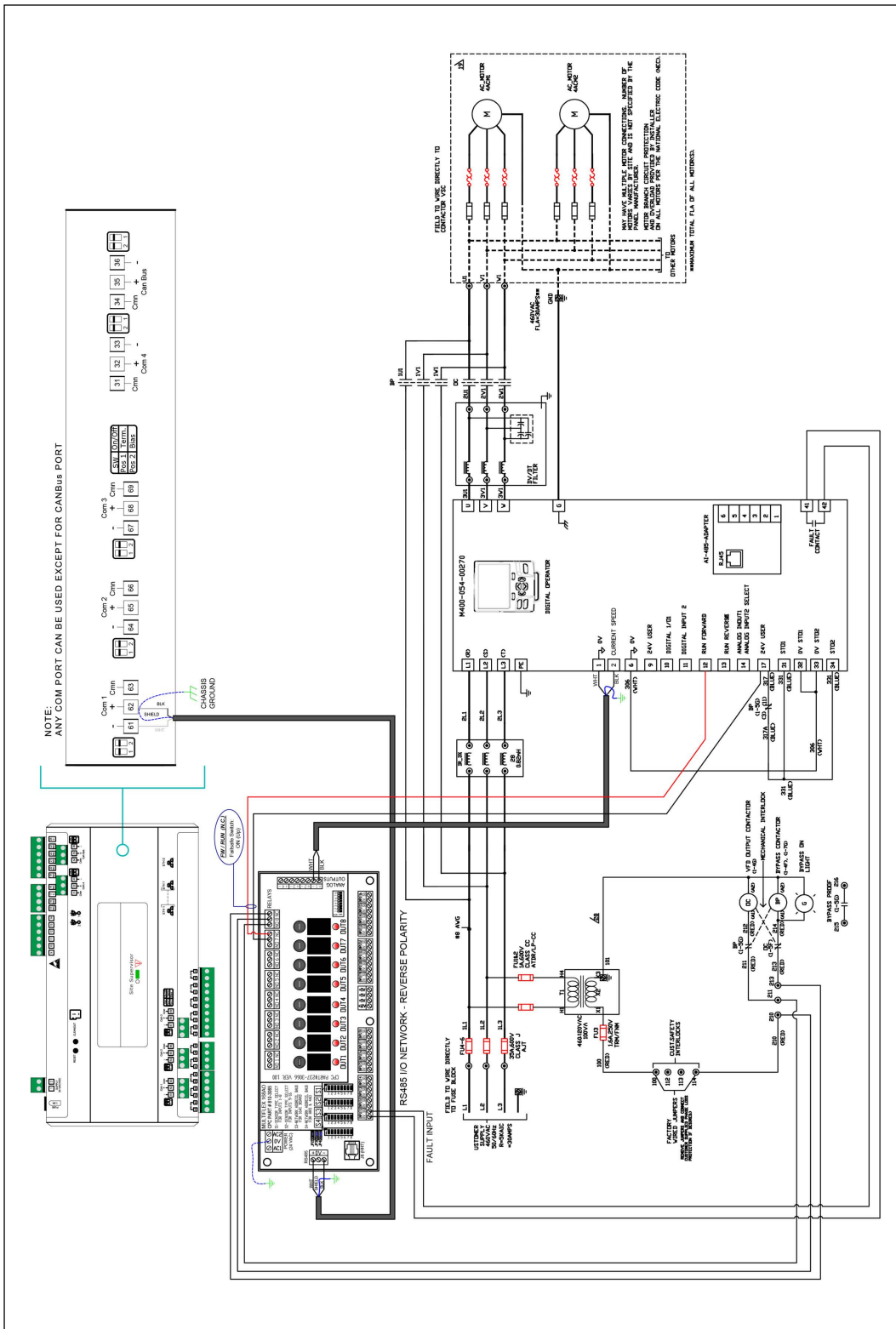
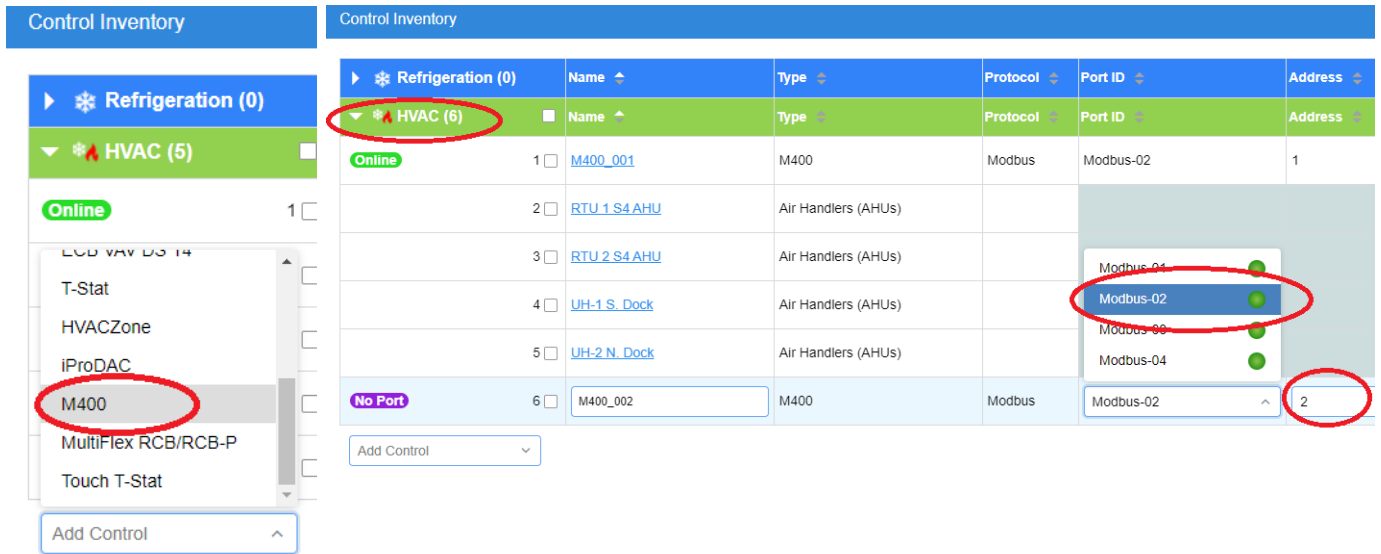


Figure 8 - Site Supervisor to M400 (ANALOG 0-10V)

STEP 4: Adding the Device to the Supervisory Controller

1. From the home page click the control inventory icon  to go to the Control Inventory page.
2. From the HVAC drop-down list, select M400 from the list.




The screenshot shows the 'Control Inventory' page. On the left, a sidebar shows a tree view with 'HVAC (5)' expanded, and 'M400' selected. The main table lists devices under 'HVAC (6)'. The first device is 'M400_001' with 'Modbus' protocol and 'Modbus-02' port ID. A dropdown menu for 'Modbus-02' is open, showing 'Modbus-02' selected. The 'Address' column for the second row shows the value '2'.

| Name | Type | Protocol | Port ID | Address |
|--------------|---------------------|----------|-----------|---------|
| M400_001 | M400 | Modbus | Modbus-02 | 1 |
| RTU_1_S4_AHU | Air Handlers (AHUs) | | | |
| RTU_2_S4_AHU | Air Handlers (AHUs) | | | |
| UH-1_S_Dock | Air Handlers (AHUs) | | | |
| UH-2_N_Dock | Air Handlers (AHUs) | | | |
| M400_002 | M400 | Modbus | Modbus-02 | 2 |

Figure 11 - Adding M400 and Addressing

STEP 5: Commissioning the Device to the Supervisory Controller

From the **Control Inventory** screen select the Modbus address for the M400 and click the checkmark  to save and start commissioning. (**Best practices tip: Set the Modbus number to match the connected Com Port and the Address to match the M400 addressing in STEP 1).**)

Drive Setup:

1. Click the **M400** to go to the M400 setup page.
2. Go to the **General** tab.
3. Set **CfgSyncAction** on the to **Write to Device**.
4. On the **Inputs** tab, set **DIRECTION** to **Forward** or **Reverse**. This verifies that the drive should run correctly.
5. Set **RUN** to **OFF**. This verifies that the drive should inhibit.
6. **Inputs** tab on the **Details** screen:

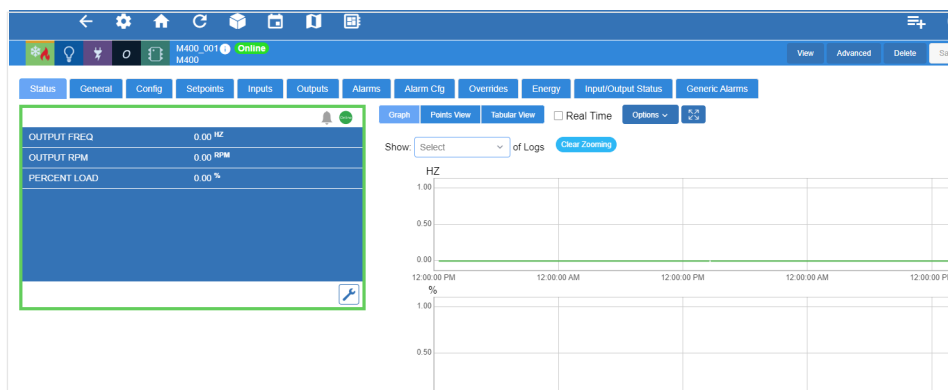


Figure 12 - Details Screen

7. Inputs tab on the **Details** screen:

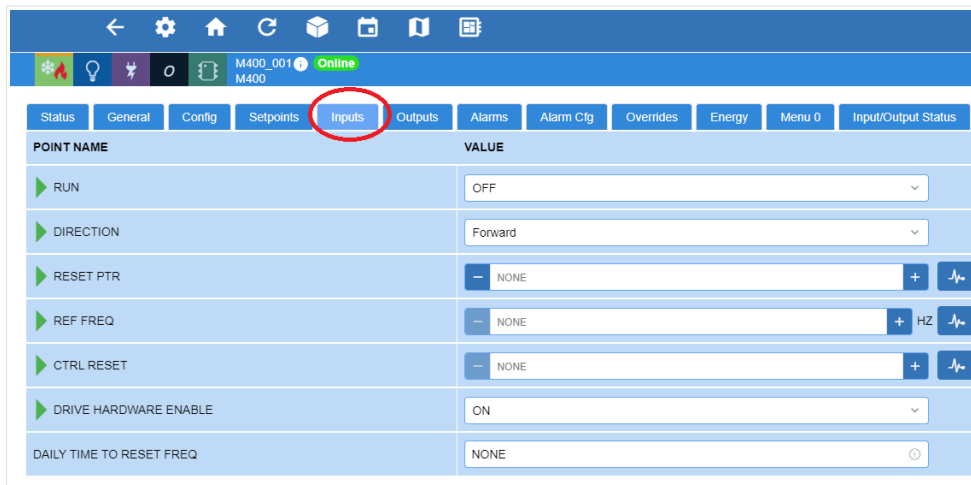


Figure 13 - Input Tab

8. Go to the **Setpoints** tab to set the values for **MOTOR VOLT**, **MOTOR RPM**, and **MOTOR FLA** from the motor plate of the device.

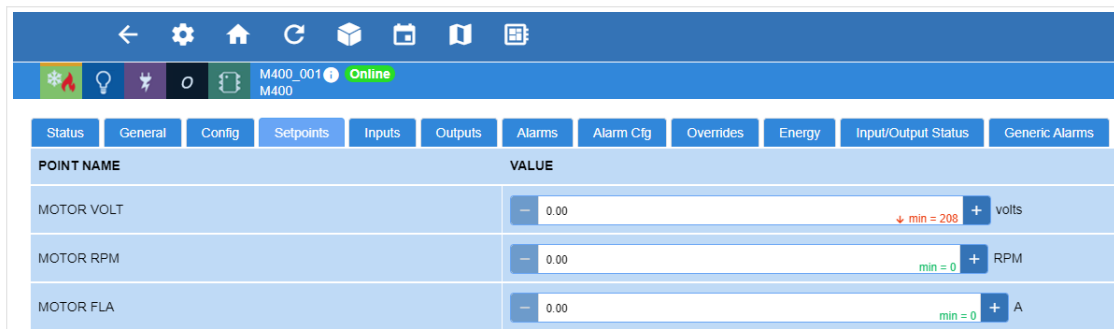


Figure 14 - Setpoints Parameters

9. Go to the **Status** screen and the device will appear online:

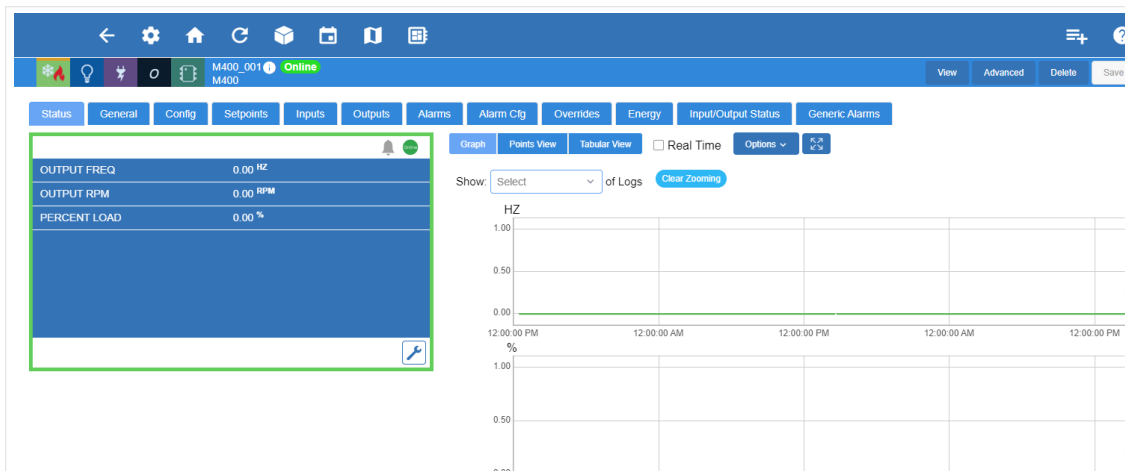


Figure 15 - M400 VFD Device Status

10. **General** tab screen **Verify Write to Device** is set (default).

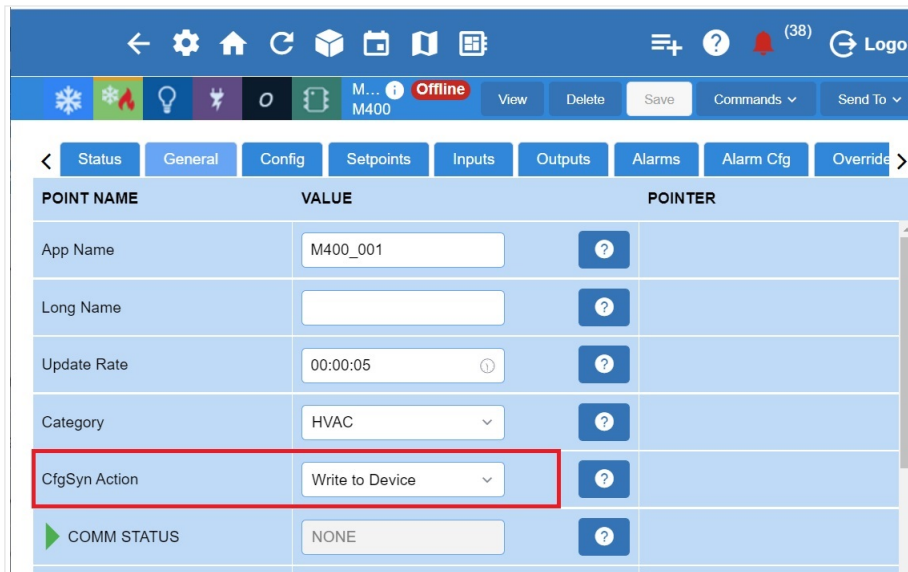


Figure 16 - General Tab Screen

11. From the **Details** screen, click **Commands** on the far right and select **NVM_SAVE**:

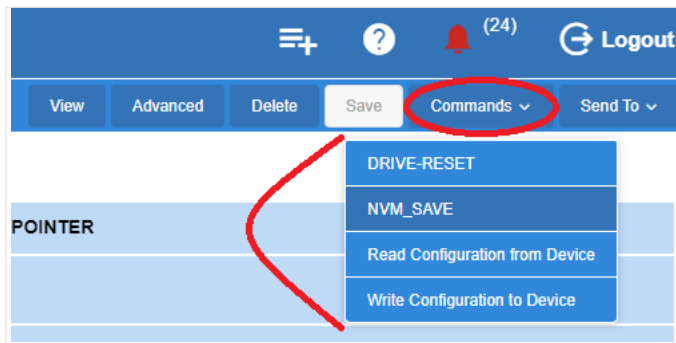


Figure 17 - Application Commands - NVM_SAVE

12. From the **Details** screen, click **Commands** on the far right and select **DRIVE-RESET**. The drive is now reset with the needed configuration.

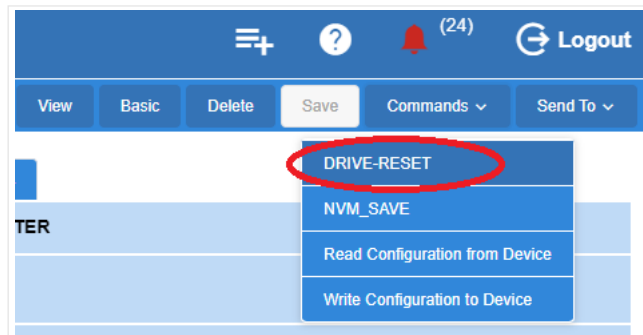


Figure 18 - Application Commands - DRIVE-RESET

STEP 6: Verification of Settings

- After commissioning the new device, verify that the following values are set in the drive:
 - 0.009 (MOTOR_PWR_FACTOR) = 0.85 or the value that you set
 - 6.004 (Start/Stop Logic) = 6
 - 8.023 (Digital input 3) = 0.000

The following parameters must be set up in the **Inputs** tab to run the drive.

- RUN (ON)
- DIRECTION (FORWARD, REVERSE)
- REF FREQ (the speed setting of the motor)

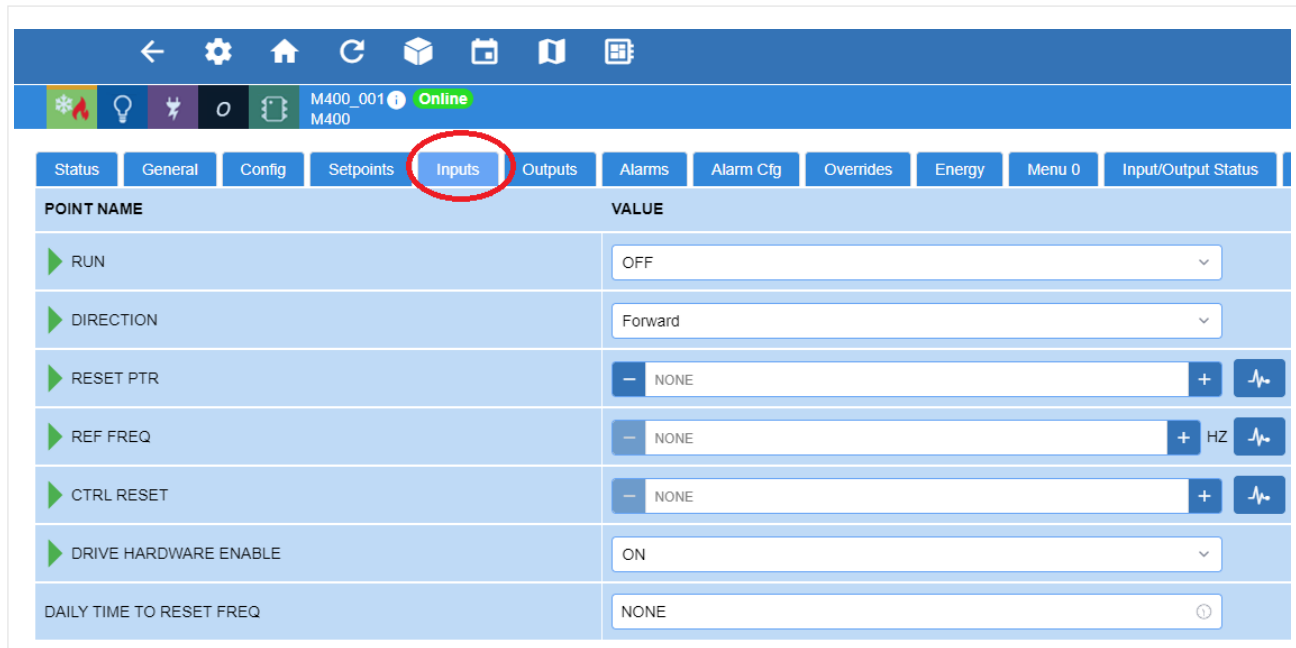


Figure 19 - Setting Up Inputs Tab

- Use **Table 1- Menu 0 Guide** to verify values set in the M400 drive.

Note: Table 1- Menu 0 Guide gives diagnostic information about the system. It allows you to double check to make sure that the E2 Controller sent the correct parameters.

Table 1: Menu 0 Guide

| Menu 0 Pr | Description | Value to Write | Comments | Parameter | Type |
|-----------|-----------------------------|----------------|---|-----------|-------|
| 1 | Drive Configuration | Preset | Sets drive mode to Preset | 11.034 | Mode |
| 2 | Serial Baud Rate | 19200 | Sets baud to 19200 | 11.025 | Mode |
| 3 | Serial Address | 2 | Set the address for each drive on network | 11.023 | Mode |
| 4 | Serial Mode | 8 1 NP | Set to match mode of E2E | 11.024 | Mode |
| 5 | Reset Serial Communications | Toggle ON/OFF | Set this to ON / OFF to reset communications. Connects. | 11.02 | Mode |
| 6 | Motor Rated Current | See Motor | Set from motor nameplate | 5.007 | Motor |

Table 1: Menu 0 Guide

| Menu 0 Pr | Description | Value to Write | Comments | Parameter | Type |
|-----------|-----------------------------|------------------|---|-----------|--------|
| 7 | Motor Rated Speed | See Motor | Set from motor nameplate | 5.008 | Motor |
| 8 | Motor Rated Voltage | See Motor | Set from motor nameplate | 5.009 | Motor |
| 9 | Motor Power Factor | See Motor | Set from motor nameplate (Use 0.85 if absent) | 5.010 | Motor |
| 10 | Security / Parameter Access | Set to All Menus | Set to all Menus to see access Menu 1 to 22 | 11.044 | Access |
| 12 | STO 1 State | RO | 0=disabled, 1=enabled | 8.039 | Info |
| 13 | STO 2 State | RO | 0=disabled, 1=enabled | 8.040 | Info |
| 14 | Reference Selected | RO | Shows reference selected. Hz desired | 1.001 | Info |
| 15 | Value of reference in rpm | RO | Shows reference in rpm | 1.069 | Info |
| 16 | Hz sent from controller | RW | Can see speed sent from controller here | 1.021 | Info |
| 20 | Preset Speed 2 (Manual) | RW | Use this to set manual / test speed | 1.022 | Manual |
| 21 | Preset Selector | 0 or 2 | Use this to turn on manual / test speed | 1.015 | Manual |
| 30 | Current Trip (Trip 0) | RO | Gives code for current trip. (Trip 0) | 10.020 | Trip |
| 31 | Trip 1 | RO | Previous trip - before Trip 0 | 10.021 | Trip |
| 32 | Trip 2 | RO | Previous trip - before Trip 1 | 10.022 | Trip |
| 33 | Trip 3 | RO | Previous trip - before Trip 2 | 10.023 | Trip |
| 34 | Trip 4 | RO | Previous trip - before Trip 3 | 10.024 | Trip |
| 35 | Trip 5 | RO | Previous trip - before Trip 4 | 10.025 | Trip |
| 36 | Trip 6 | RO | Previous trip - before Trip 5 | 10.026 | Trip |
| 37 | Trip 7 | RO | Previous trip - before Trip 6 | 10.027 | Trip |
| 38 | Trip 8 | RO | Previous trip - before Trip 7 | 10.028 | Trip |
| 39 | Trip 9 | RO | Previous trip - before Trip 8 | 10.029 | Trip |

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