

Hydra·Cell[®]
METERING SOLUTIONS™

Control Freak

Installation, Operation & Maintenance

150-999B



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CF Safety

Safety Precautions:



Indicates a potential hazard that, if not avoided, could result in a low probability of death or serious injury.



Indicates a potential hazard that, if not avoided, could result in minor injury or property damage.

Powerflex® VFD



Please refer to the Allen-Bradley Powerflex® Instruction Manual for all safety precautions and recommendations related to the Powerflex® Variable Frequency Drive (VFD).

The Powerflex® VFD, I/O Module and motor should be installed by a qualified electrician, following local and national electrical codes as required.

Connect the wiring according to the wiring diagram and instructions in this manual and the Powerflex® instruction manual. If you are uncertain of usage, contact Wanner Engineering.



Read all instructions, tags and labels before operating the equipment

The Touch screen and I/O module are rated for indoor use only.

Do not operate in ambient temperatures greater than 104 degrees F (40 degrees C).

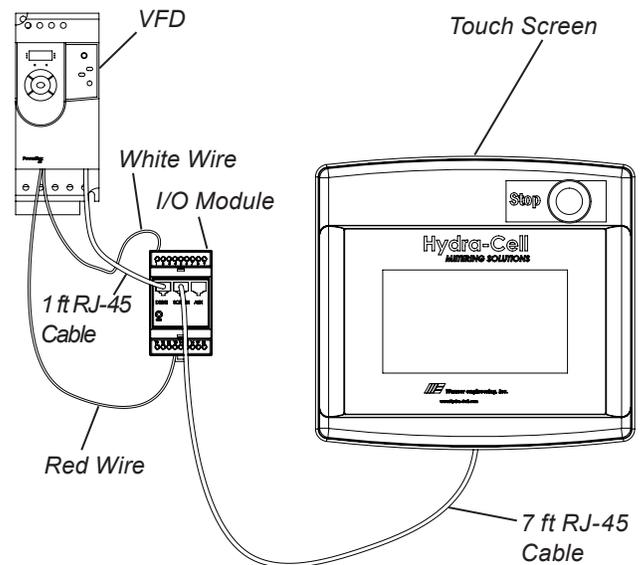
The Control Freak programming is designed to work with the Allen-Bradley Powerflex® Variable Frequency Drive (VFD) sold and supplied by Wanner Engineering only. Any attempt to use the Control Freak with a VFD not supplied by Wanner Engineering will render the warranty null and void.

There are no user serviceable parts inside. Please contact Wanner Engineering for service.

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CF Component Identification



CF Description and Features

Description:

The Metering Controller provides a motor speed control for Hydra-Cell P-series pumps * with an easy to use touchscreen display. The user can enter the desired flow rate or volume in gallons or liters and the controller automatically runs the pump manually or in pre-set batches.

Features:

- Seven inch color graphic touchscreen user interface in a NEMA-4x enclosure
- Calibration programming for greater measurement accuracy
- *Pre-set Hydra-Cell P-series pump performance algorithms
- Measurement units selectable - imperial (gallons/psi) or metric (liters/bar)
- Powerflex ® 4M variable frequency drive
- Manual operation - flow rate or volume total/time
- Batch operation - 10 separate batch setup screens
- Two totalizer displays – one fixed and one resettable
- Optional oil temperature probe with high/low limit alarm
- Analog and digital I/O for interfacing with external devices
- Two digital display modes - user configurable
- Capability to operate up to 6 pumps from one touch screen (requires a separate drive and I/O module for each pump)
- Emergency stop button
- Fault monitoring
- Pump/drive information screen
- Two levels of password protection
- Real-time clock
- Optional preprogrammed dedicated input on I/O module for closed loop function

* Control Freak can also be used with Hydra-Cell pumps through the H25/G25 model for metering applications. For API 675 performance, pumps must use X-cams and operate within the RPM range specified in the HCMS catalog.

CF Specifications

Specifications:

- Designed for indoor use only; with **Powerflex® Power-Flex variable frequency drives (VFDs)**
- Maximum ambient temperature: 40° C (104° F)
- Minimum ambient temperature: -20° C (-4° F)
- 24 Vdc power input from VFD or external power supply
- NEMA-4x enclosure (touchscreen)
- RS-485 half duplex for drive, full duplex for touch screen communication
- Four 4-20 mA or 0-10 Vdc analog inputs
- Four 24 Vdc opto-isolated discrete inputs
- Four Relay outputs, contacts rated at 1/2 A
- Built-in RTD interface for optional temperature monitor/alarm
- UL/CUL/CE approval
- **Touch screen enclosure (excluding the stop button):**

Polyamide UL Rating: V2/UL94. IP65 and NEMA-4X environmental protection

5 Vdc, 0.5 A maximum

24 Vdc, 100 mA maximum

Dimensions: 11 in. (279 mm) x 10 in. (254 mm) x 2.5 in. (64 mm)

Weight 2.5 lbs (1.1 kg)

- **I/O module:**

Electrical Ratings:

12-24 Vdc, 90 mA maximum

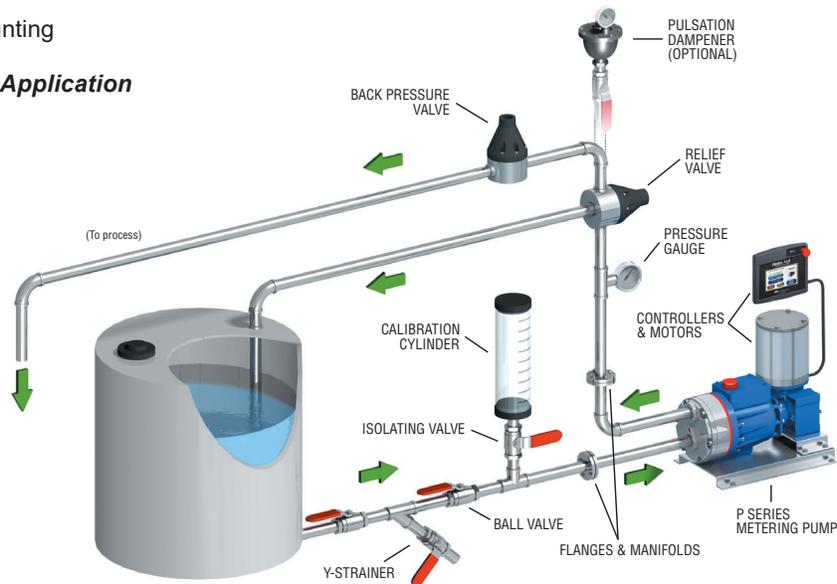
Relay contacts rated at: 12-24 Vdc, 0.5 A maximum

External DC supply required for loads greater than 0.5 A (total)

Dimensions: 2.1 in. (53 mm) x 3.6 in. (91 mm) x 2.3 in. (58 mm)

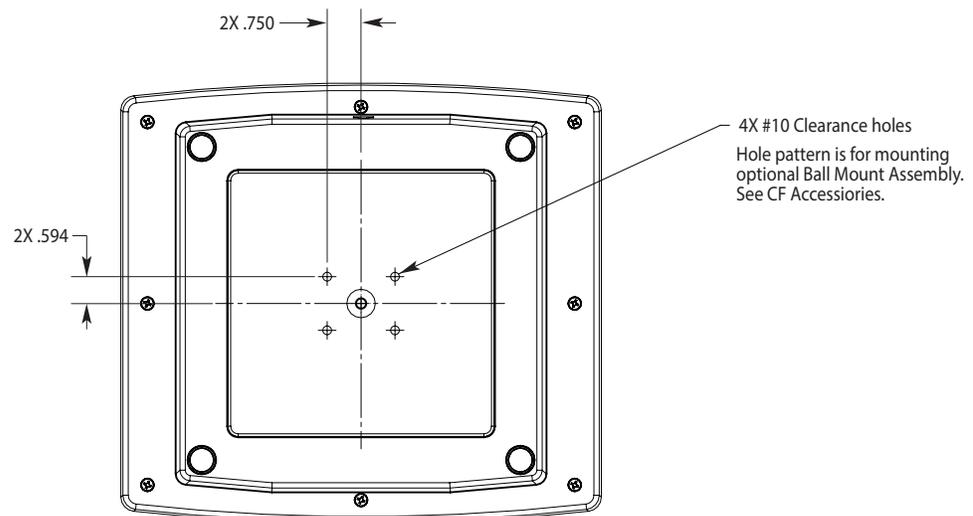
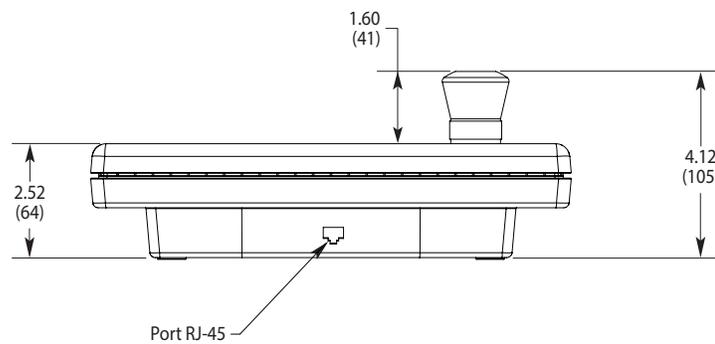
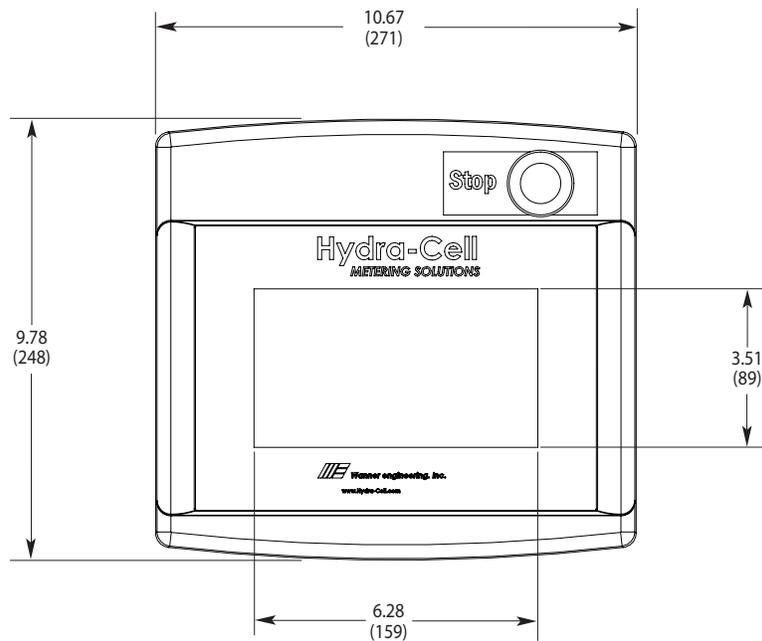
35mm DIN rail mounting

- **Typical Control Freak Application**



CF Dimensions

inches
(mm)



CF Setup

WARNING

The VFD and I/O module are intended to be installed in an appropriate electrical enclosure and wired to the pump motor. This system should be installed by a qualified electrician according to national and local electrical codes.

Setup/Installation:

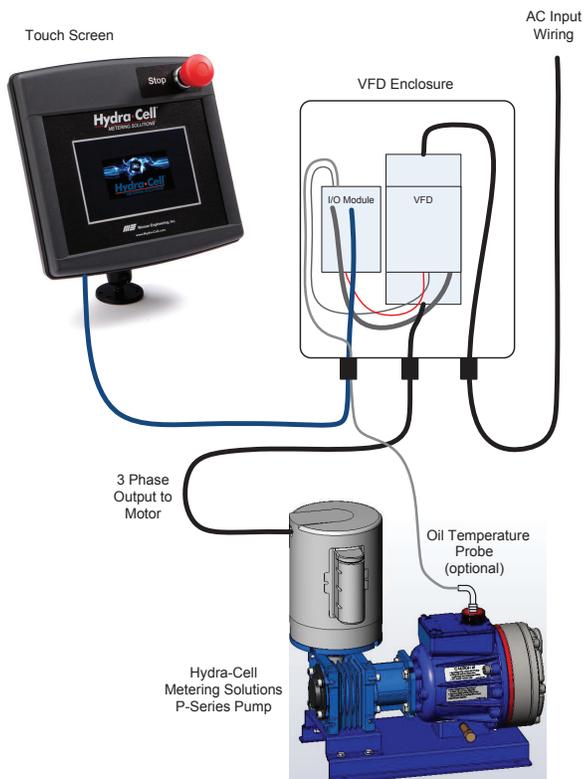
The control freak system includes the following items:

- Touch Screen Control Panel
- I/O Module
- ½ HP (0.37 kW) 115 Vac or 230 Vac Powerflex® 4M VFD
Note: Higher hp/kW VFDs are available.
- Two CAT5e Cables: 1 ft (0.3 m) and 7 ft (2 m)
- Two 22 gauge 1 ft (0.3 m) wires [1 red: E-Stop and 1 white: Vdc]
- IOM Manual

Optional equipment:

- Ball swivel mount
- Pump Oil Temperature Sensor Probe kit
- VFD Enclosure
- Additional Cat5e cables in alternate lengths.

Typical System



System Component Description

Touch Screen - controls the metering pump system.

VFD Enclosure - provides environmental protection for the I/O Module and Variable Frequency Drive (VFD).

I/O Module - wiring interface between the touch screen and the VFD.

VFD - provides variable frequency drive output to P-Series Pump.

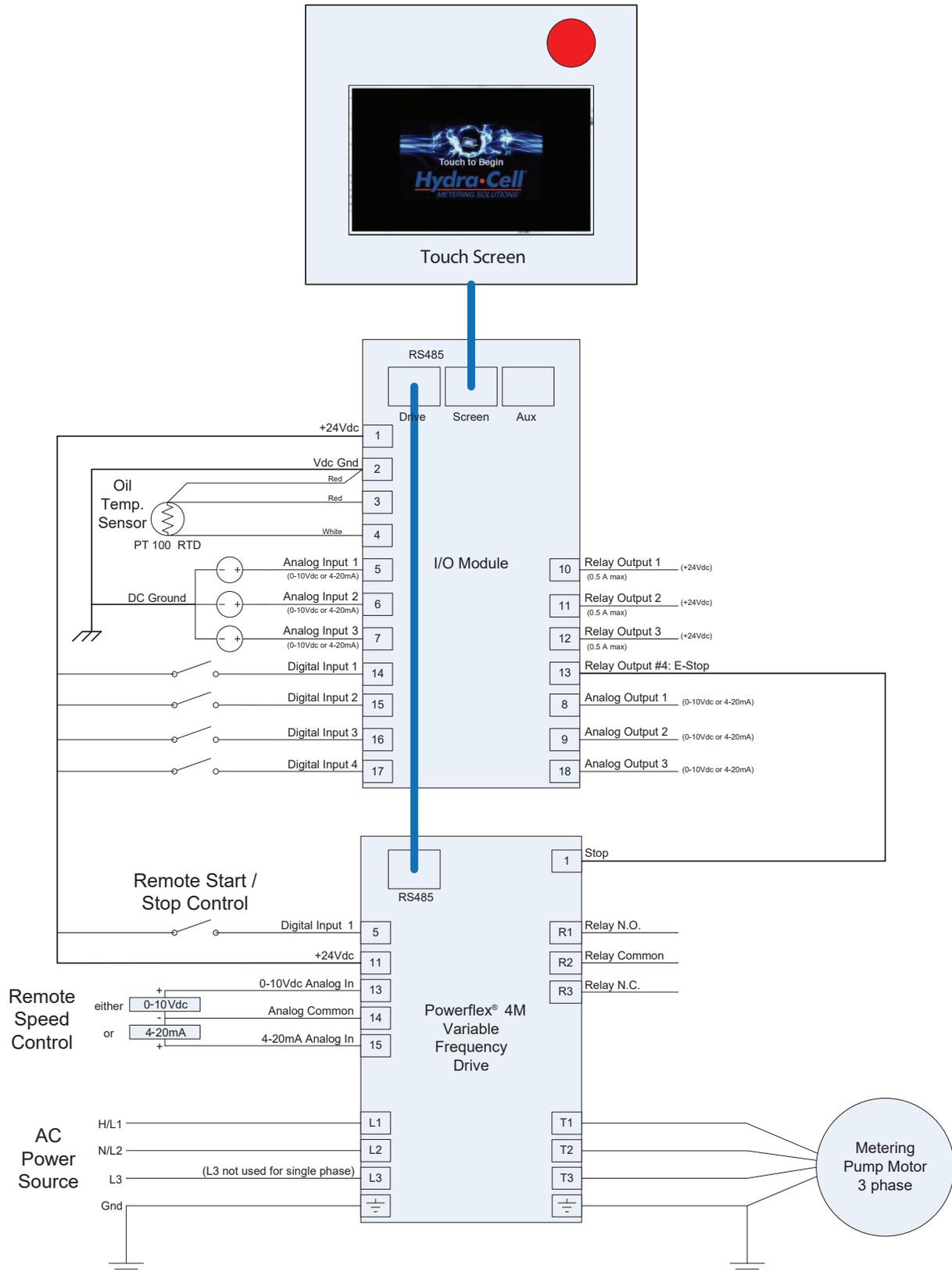
3 Phase Output to Motor - electrical power for P-Series Pump.

Oil Temperature Probe (optional) - monitors oil temperature.

Hydra-Cell Metering Solutions P-Series Pump - pumps precise quantities of liquid/medium.

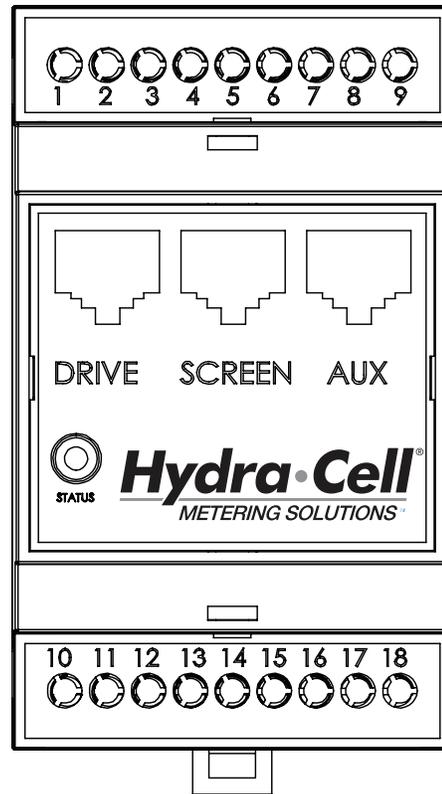
CF Setup (Cont'd) - System Wiring

System Wiring Diagram:



CF Setup (Cont'd) - I/O Module Wiring

I/O Module Pin Wiring:



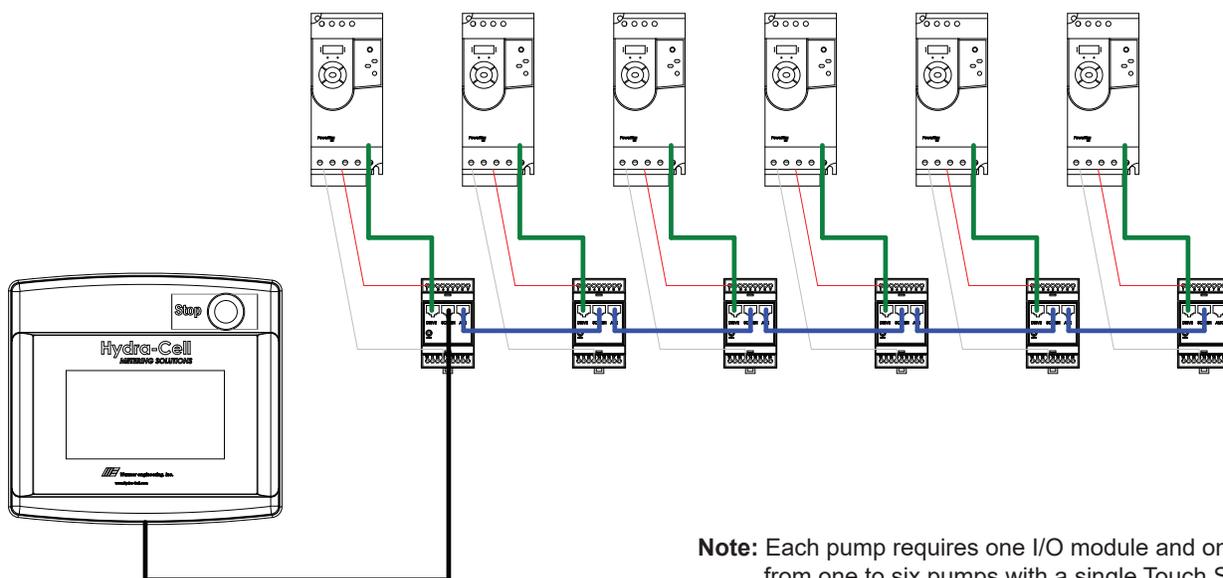
Top Pins

- 1: 12-24 Vdc (power input)
- 2: Ground RTD (red wire)
- 3: Ground side of RTD (red wire)
- 4: Positive side of RTD (white wire)
- 5: Analog input 1 (0-10 v or 4-20 mA)
- 6: Analog input 2 (0-10 v or 4-20 mA)
- 7: Analog input 3 (0-10 v or 4-20 mA)
- 8: Analog output 1 (0-10 v or 4-20 mA)
- 9: Analog output 2 (0-10 v or 4-20 mA)

Bottom Pins

- 10: Relay output 1 (Common is tied to pin 1)
- 11: Relay output 2 (Common is tied to pin 1)
- 12: Relay output 3 (Common is tied to pin 1)
- 13: Relay output 4 (Common is tied to pin 1 through e-stop switch)
- 14: 12 to 24 Vdc input 1 (source 12/24 Vdc to activate input)
- 15: 12 to 24 Vdc input 2 (source 12/24 Vdc to activate input)
- 16: 12 to 24 Vdc input 3 (source 12/24 Vdc to activate input)
- 17: 12 to 24 Vdc input 4 (source 12/24 Vdc to activate input)
- 18: Analog output 3 (0-10v or 4-20 mA)

CF Setup (Cont'd) - I/O Module Wiring



Note: Each pump requires one I/O module and one VFD; from one to six pumps with a single Touch Screen.

Single Touch Screen Multiple Pump Networking Wiring Diagram

- Connect each VFD RS485 jack to its I/O module Drive jack with a Cat5 cable. **(shown in green above)**
- The Touchscreen cable plugs in to the Screen jack on the first I/O module. **(shown in black above)**
- The Aux jack on the I/O module plugs into the next I/O module screen jack. **(shown in blue above)**
- Each I/O module requires the E-stop wire to its VFD (VFD pin 1 to I/O pin 13) **(shown in gray above)**
- Each I/O module requires the 24V power from its VFD (VFD pin 11 to I/O pin 1) **(shown in red above)**

Note: The touch screen can display and control one pump at a time by using the “Select a Pump” feature in the main menu. Other pumps can remain running in the background simultaneously. See Operating the Controller paragraph in the CF Operation Section.

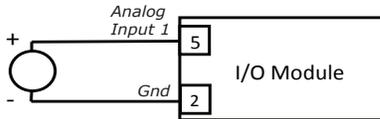
CF Setup (Cont'd)- I/O Module Wiring

Typical Examples of I/O Module Wiring:

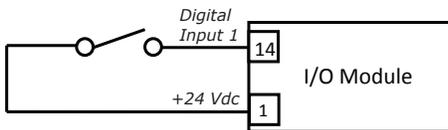
The following are examples of wiring configurations for the I/O Module.

Wiring an analog input

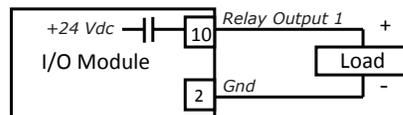
(For 0-10 Vdc or 4-20 mA input)



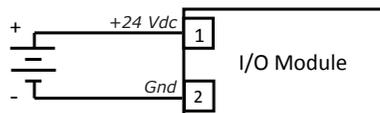
Wiring a digital input



Wiring a relay output



Wiring an external power supply

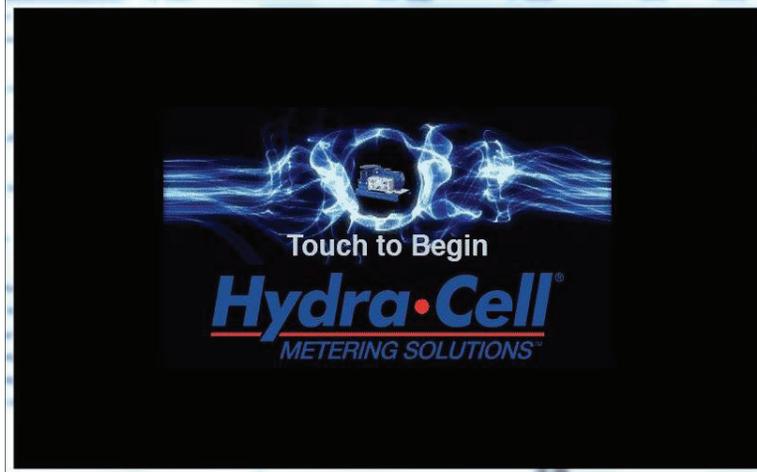


CF Setup (Cont'd)

Getting Started:

Once the system is powered up, the animated blue flame logo screen will appear. Use the touchscreen for the following setup procedures.

PRESS touchscreen to access main menu



Press SETUP



Press SET TIME & DATE to synchronize real time clock.



CF Setup (Cont'd)

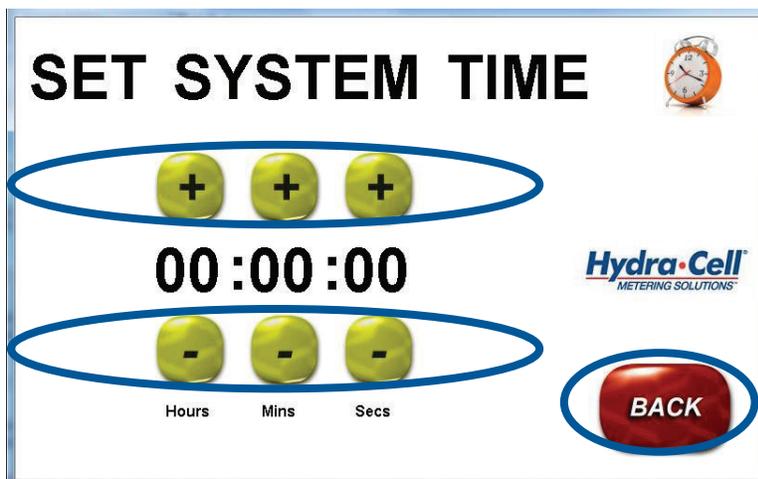
Time and Date:

Press SET SYSTEM TIME.



Press + and - buttons to set time to 24 hour clock format.

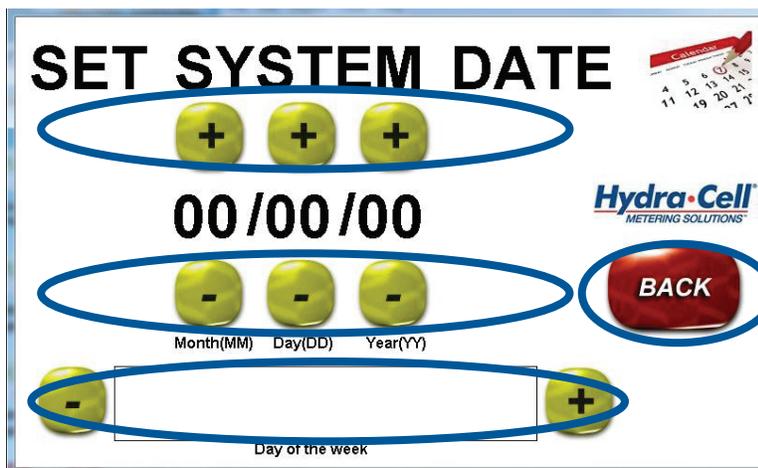
Press BACK to save settings and return to SET TIME & DATE menu.



Press SET SYSTEM DATE.

Press + and - buttons to set Date and Day of the Week.

Press BACK twice to save settings and return to SETUP menu.



CF Setup (Cont'd)

User Settings:

Most options can be viewed or changed from the USER SETTINGS screen.

Press USER SETTINGS.



Enter Model #, Motor RPM, and System Pressure for your pump.

Select small buttons on right side of screen to set pump for:

- gallons or liters
- CALIBRATION or FACTORY SET for accuracy
- use an Oil Temp Sensor

The screenshot shows the 'USER SETTINGS' screen for 'Pump1'. The fields are: Model # (P100NMESS030A), Motor RPM (1730), System Pressure (100), and Motor Amps (2.5). On the right, there are radio buttons for Imperial (GAL) and Metric (Liter), and checkboxes for Use CALIBRATION, Use FACTORY SET, and Use Oil Temp Sensor. At the bottom, there are buttons for CONFIG ANALOG 1, CONFIG ANALOG 2, PUMP INFO, SECURITY SETTINGS, and BACK. A red button labeled 'OIL TEMP SETUP' is also visible.

- Note:** The Model #, Motor RPM, and System Pressure entries are used to provide maximum metering accuracy.
- Model # must match the Hydra-Cell P-series pump nameplate.
 - Motor RPM is set to match the Motor Nameplate RPM rating at 60 Hz.
 - System Pressure is the operating pressure of the system.

Press SECURITY SETTINGS

Enter User Password and Admin Password.

Press BACK.

The screenshot shows the 'PASSWORD SETUP' screen. It has two input fields: User PW (1111) and Admin PW (2222). To the right of the User PW field is a checkbox for 'Use only USER Password', and to the right of the Admin PW field is a checkbox for 'Use ADMIN + USER Password'. A red 'BACK' button is at the bottom right.

- Note:** The SECURITY SETTINGS allow two choices:
- A USER only choice (for a single level of security)
 - An ADMIN and USER choice (for two levels of security)
- The two levels of security choice allows a user to operate the controller, but only an administrator can make controller setting changes.

Note: If setting up a multiple pump system, repeat the setup for each additional pump, starting from the main menu.

CF Calibration

Calibrating the Controller:

The controller and pump can be calibrated for more precise metering.

Note: A calibration column must be plumbed into the metering pump system in order to perform the calibration.

To Start:

Use the touchscreen for the following calibration procedures.

Once the system is powered up, PRESS the touchscreen to access the main menu



Now press CALIBRATION



CF Calibration (Cont'd)

Calibrating the Controller:

Press YES to calibrate

CALIBRATE PUMP

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Do you wish to calibrate your pump?



NO YES

Press YES when calibration column is setup and filled

CALIBRATE PUMP

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METERING SOLUTIONS

Do you have your calibration column setup and filled?



NO YES

CF Calibration (Cont'd)

Calibrating the Controller:

Enter the desired RPM for calibration. For best accuracy, use the same speed as used in actual operation.

Press NEXT.

CALIBRATE PUMP

Enter desired pump RPM for calibration:

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RPM

BACK **NEXT**

Enter the desired drawdown time in seconds.

Press NEXT.

CALIBRATE PUMP

Enter desired run time in seconds:

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BACK **NEXT**

Press START

The pump will run for the pre-set time and speed.

CALIBRATE PUMP

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METERING SOLUTIONS



PRESS START WHEN READY TO BEGIN CALIBRATION.

BACK **START**

CF Calibration (Cont'd)

Calibrating the Controller:

When pump is finished, enter milliliters of total metered liquid pumped as shown on the calibration column

Press ENTER

CALIBRATE PUMP

Enter total metered liquid:

mL





CANCEL

ENTER

Pump Information will be shown on Summary Screen

Press MAIN MENU

PUMP INFORMATION

MODEL NUMBER: XXXXXX

Liquid measured: XXXXXX

Flow/RPM: XXXXXX

Note: should any application parm. change please remember to recalibrate your pump.



Congratulations!

You have successfully calibrated your pump.

MAIN MENU

Now that the system is calibrated, go to the User Settings screen and select "Use Calibration"

USER SETTINGS

Pump1 Pump Name 01

Model #

Motor RPM RPM

System Pressure

Motor Amps Amps

- Imperial (GAL)
- Metric (Liter)
- Use CALIBRATION
- Use FACTORY SET
- Use Oil Temp Sensor

OIL TEMP SETUP

CONFIG ANALOG 1

CONFIG ANALOG 2

PUMP INFO

SECURITY SETTINGS

BACK

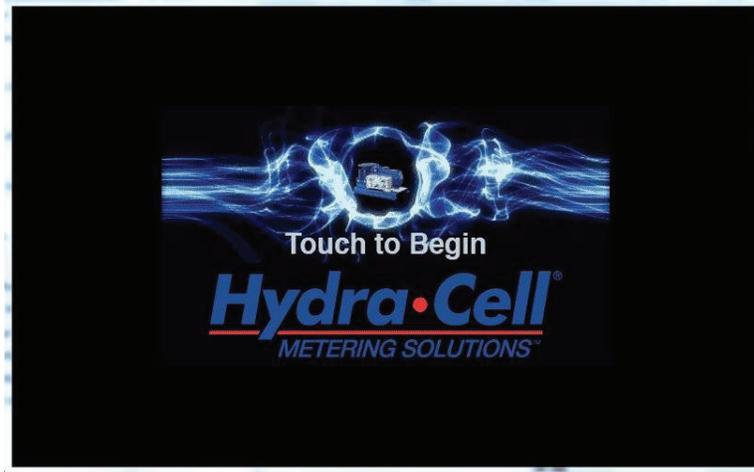
Note: If calibrating a multiple pump system, select the next pump (from the main menu) and repeat the procedure for the remaining pumps.

CF Operation

Operating the Controller:

Use the touchscreen for Operation and Programming.

Once the system is powered up, PRESS the touchscreen to access the main menu



PRESS the desired menu item



Note: Observe the location of the SELECT A PUMP button and indicated pump information above it.

CF Operation - Manual

Manual Operation:

Press **MANUAL OPERATION**



Program the pump for manual operation by choosing either:

- FLOWRATE (enter flowrate with **Run time** or without) OR
- TOTALIZATION (enter **Run time** required)

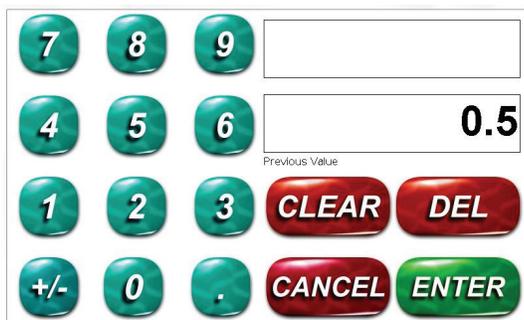
When a **Run time** is entered, the pump runs until it times out. (The display counts down as it runs)

If no **Run time** is entered, the pump will run continuously until STOP is pressed. (The display indicates the time)

When TOTALIZATION is selected, a **Run time** must be entered. (Determines the flow rate)

If PAUSE is pressed during operation, the time will be retained and continue when START is pressed again.

ENTER desired manual operation mode information:
 FLOWRATE (flowrate with or without **Run time**) OR
 TOTALIZATION (enter **Run time**).



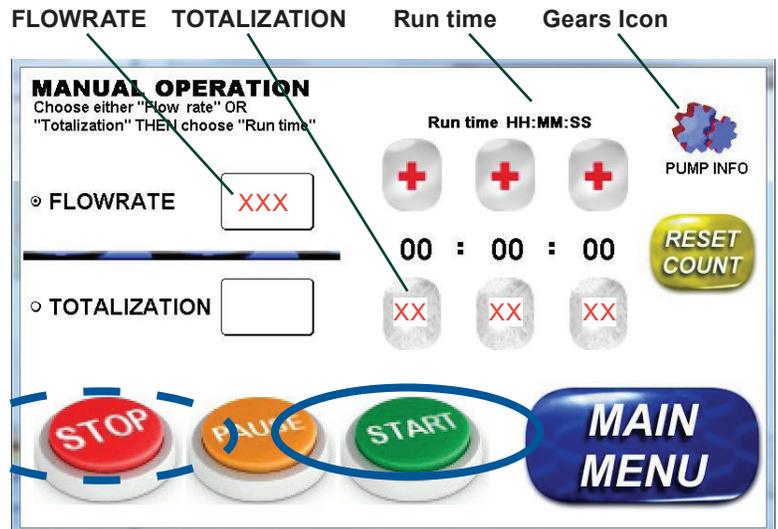
Press **START**

(The **Gears Icon** will show animated rotation when the pump is running.)

Press **STOP** (as desired, if no **Run time** is entered)

Note:

Pressing the **Gears Icon** during operation will show the MANUAL OPERATION screen information.



CF Operation - Batch

Batch Operation:

Press the desired menu item:

- “ENABLE BATCHING” allows the pre-defined batches to take automatic control of the pump.
- “DISABLE BATCHING” stops the automatic feature.
- “EDIT BATCH SERIES” goes to the batch setup CFreen.

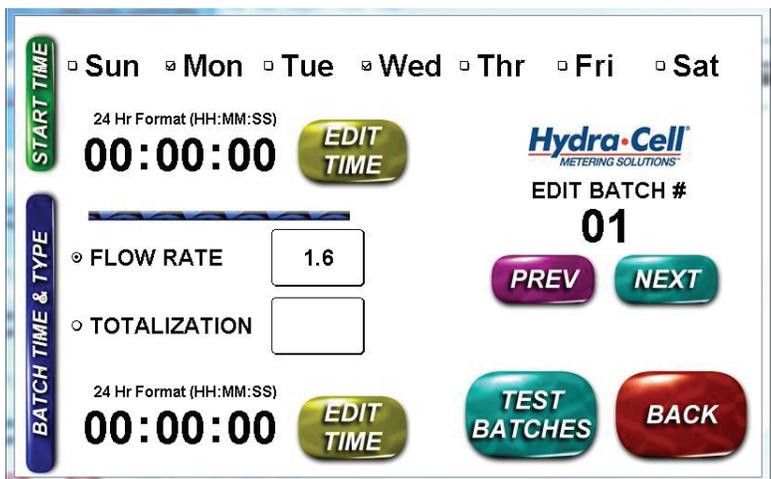


Batch Edit

In order to run in batching mode, the batch start time and run duration must first be entered:

START TIME:

- Select a day of the week or multiple days.
- Press EDIT TIME to enter the start time (24 hour format).
- Select FLOW RATE or TOTALIZATION and press the appropriate box to enter the desired number.
- Press EDIT TIME at the bottom to enter the batch run duration time (24 hour format).
- Up to 10 batches can be entered by pressing the PREVIOUS or NEXT buttons to access the next batch edit Screen.
- Press BACK button when finished to go back to the Batch Operation Screen.



Note: As indicated above, the user can run 10 batches per pump.

CF Operation - Batch (Cont'd)

Batch Run:

Button Functions:

- START button will begin batching.
- STOP will shut off batching.
- PAUSE if a batch needs to be temporarily stopped.
- START will resume a batch that has been paused.

Note: The batch status and next batch information is displayed on the Screen.



CF Operation - Remote

CF Remote Operation:

The pump speed, manual run, and batch run can be operated remotely.

Control the pump speed remotely:

1) Wire either a 0-10V DC or 4-20 mA DC analog input to the Powerflex® VFD terminals as shown in step a. or step b.

a. For 0-10 V input:

0-10 V Analog Input Terminal 13

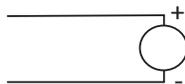
Analog Ground Terminal 14



b. For 4-20 mA input:

4-20 mA Input Terminal 15

Analog Ground Terminal 14



2) Configure the Controller

Main Menu > Setup > System Settings > Config Manual > Setup Analog

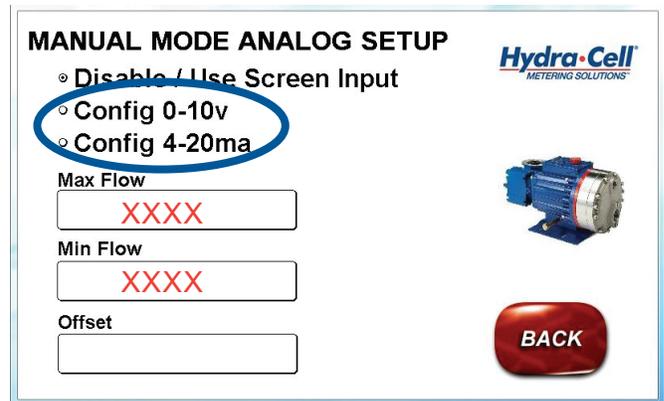
ENABLE:

Select either the **Config 0-10v** radio button or the **Config 4-20ma** radio button

SCALING:

For 10 V or 20 mA, enter a Gallons Per Hour value in the **Max Flow** box

For 0 V or 4 mA, enter a Gallons Per Hour value in the **Min Flow** box



Offset:

This provides for a situation where a 0-10 volt signal or 4-20 ma signal has an offset. (Not exactly zero volts or 4 milliamps when the analog device is at zero.) The offset value is entered in volumetric units. To aid in the programming of the offset, there is an indication of both volts or milliamps and the equivalent volumetric value. This display is on the manual mode analog input setup screen.

For example, a flow meter is connected to analog input 1 and has an analog output of 0.1 volts when the flow meter is at zero. Go to Setup - System Settings - Config Manual - Setup Analog. The input volts 0.10V is displayed near the center of the screen with the Calc Flow of 0.0200 gph. Enter -0.02 gph into the Offset (use the +/- key to make the value negative). Now the Calc Flow can be viewed as 0.0000 gph on the display, indicating that the offset has been corrected.

CF Operation - Remote (Cont'd)

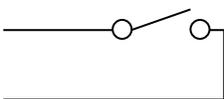
For Remote Manual Operation:

The Manual operation or batch operation of the controller can be remotely operated by an external switch or interfaced with another controller.

Connect a switch or relay contact to the Digital Input 1 of the Powerflex ® Drive.

Digital Input 1 Terminal 5
+ 24 VDC Terminal 11

SELECT:
MANUAL OPERATION BY REMOTE



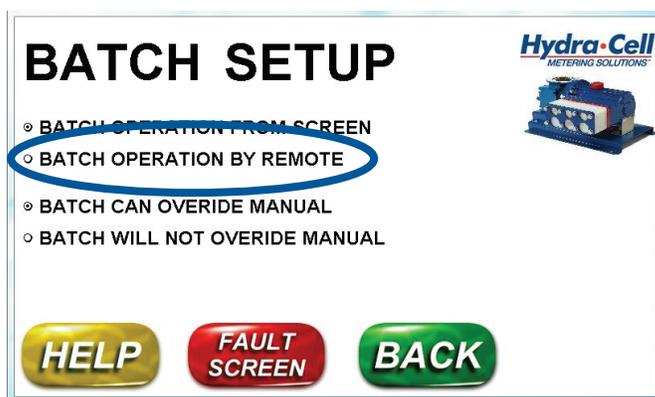
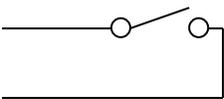
For Remote Batch Operation:

The Manual operation or batch operation of the controller can be remotely operated by an external switch or interfaced with another controller.

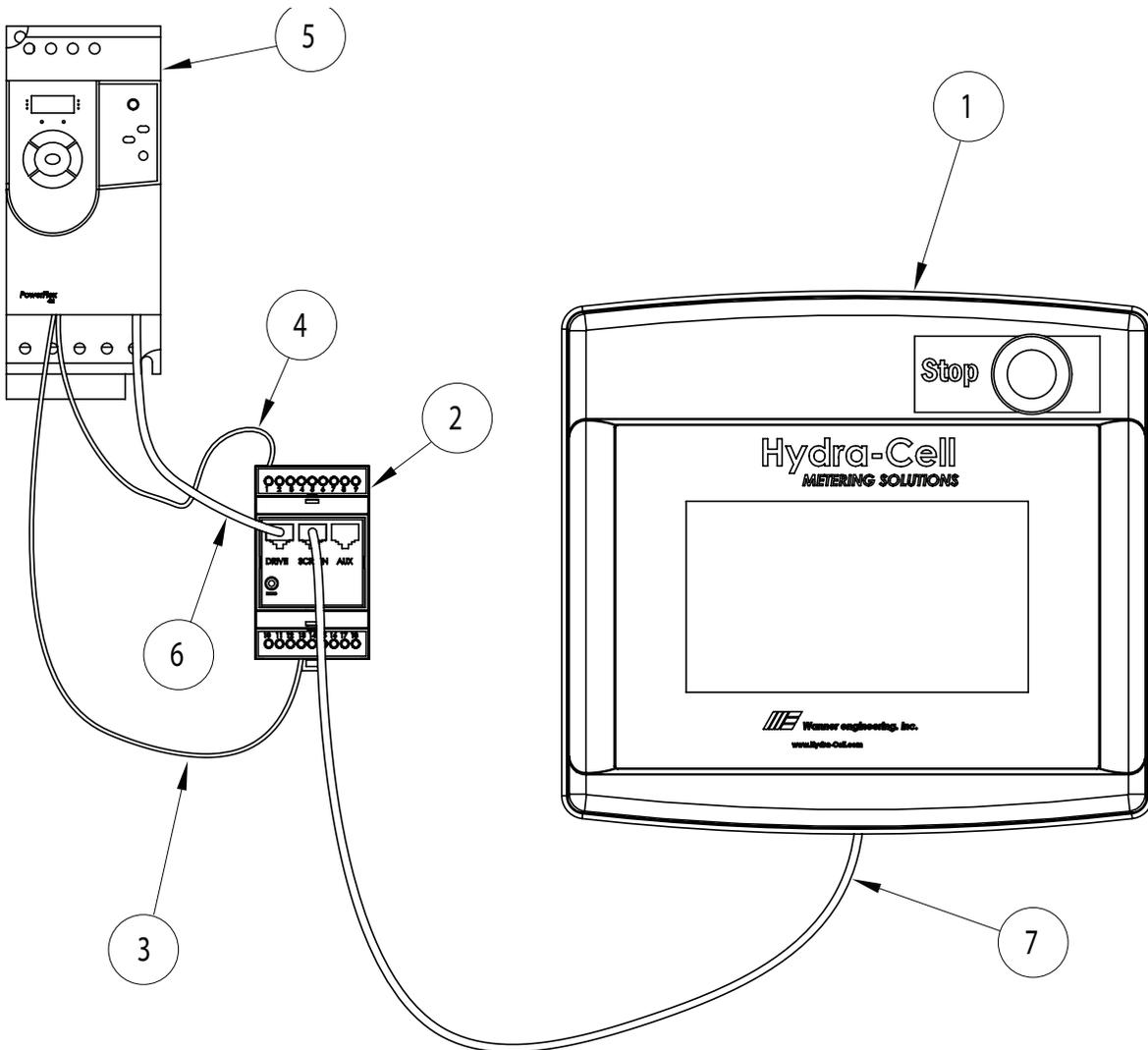
Connect connect switch or relay contact to the Digital Input 1 of the Powerflex ® Drive.

Digital Input 1 Terminal 5
+ 24 VDC Terminal 11

SELECT:
MANUAL OPERATION BY REMOTE



CF System Component Parts



Ref Part Number	Description	Qty	No.
1 150-100	7" Touchscreen	1	
2 150-200	I/O Module, Single Pump	1	
3 150-012	Wiring Motor, 22 GA. 1 ft, Red	1	
4 150-013	Wiring Motor, 22 GA. 1 ft, White.....	1	
5 C50IP-1P3P-115-AB	VFD, Powerflex ® 1/2 HP 115Vac, single phase	1	
C50IP-1P3P-230	VFD, Powerflex ® 1/2 HP 230Vac, single phase	1	
C100IP-1P3P-115-AB	VFD, Powerflex ® 1 HP 115Vac, single phase	1	
C100IP-1P3P-230	VFD, Powerflex ® 1 HP 230Vac, single phase	1	
C200IP-1P3P-230	VFD, Powerflex ® 2 HP 230Vac, single phase	1	
C300IP-1P3P-230	VFD, Powerflex ® 3 HP 230Vac, single phase	1	
C50IP-3P3P-230	VFD, Powerflex ® 1/2 HP 230Vac, three phase.....	1	

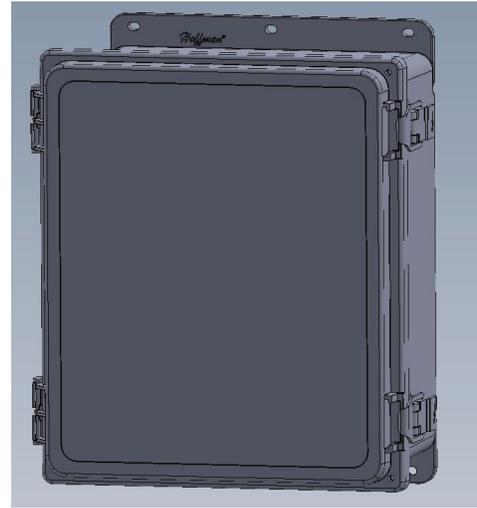
Ref Part Number	Description	Qty	No.
C50IP-3P3P-230	VFD, Powerflex ® 1/2 HP 230Vac, three phase.....	1	
C100IP-3P3P-230	VFD, Powerflex ® 1 HP 230Vac, three phase.....	1	
C200IP-3P3P-230	VFD, Powerflex ® 2 HP 230Vac, three phase.....	1	
C300IP-3P3P-230	VFD, Powerflex ® 3 HP 230Vac, three phase.....	1	
C100IP-3P3P-460	VFD, Powerflex ® 1 HP 460Vac, three phase.....	1	
C200IP-3P3P-460	VFD, Powerflex ® 2 HP 460Vac, three phase.....	1	
C300IP-3P3P-460	VFD, Powerflex ® 3 HP 460Vac, three phase.....	1	
6 150-401	RJ-45 Cable, 1 ft	1	
7 150-407	RJ-45 Cable, 7 ft	1	

Note: The part numbers above are for replacement parts only. The Control Freak product consists of two kits with part numbers listed in the CF Accessories Section.

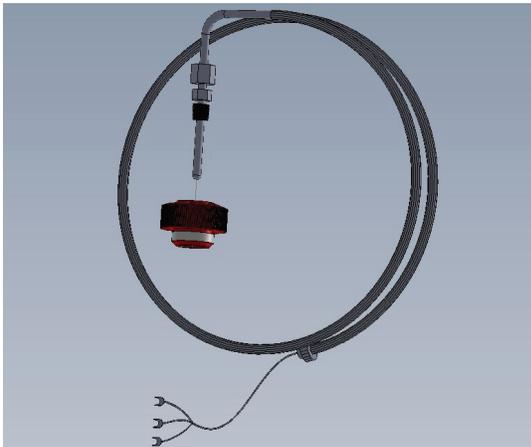
CF Accessories



150-030 Ball Mount Assembly



150-005 VFD Enclosure



150-006 Oil Temperature Probe Kit

Cables

CF Cables can be used with the CF Touch Screen and VFD Drives.

- 150-401 Cable, CAT5e, 1 ft
- 150-403 Cable, CAT5e, 3 ft
- 150-407 Cable, CAT5e, 7 ft
- 150-410 Cable, CAT5e, 10 ft
- 150-430 Cable, CAT5e, 30 ft

CF Kits

Kit Number	Description
150-150	7 in. Touch Screen Assembly (includes 7 ft. CAT5e cable)

VFD Kits*

Each VFD Kit includes:

- VFD from the chart below
- I/O Module
- I/O wiring kit (1 ft. CAT5e Cable, 1-ft. 22 ga. red wire, 1-ft. 22 ga. white wire)

Kit Number	Power/Voltage/Phase
150-250	1/2 HP (0.37 kW)/115V/1 Phase in-3 Phase out
150-251	1/2 HP (0.37 kW)/230V/1 Phase in-3 Phase out
150-252	1 HP (0.75 kW)/115V/1 Phase in-3 Phase out
150-253	1 HP (0.75 kW)/230V/1 Phase in-3 Phase out
150-254	2 HP (1.5 kW)/230V/1 Phase in-3 Phase out
150-255	3 HP (2.2 kW)/230V/1 Phase in-3 Phase out
150-256	1/2 HP (0.37 kW)/230V/3 Phase in-3 Phase out
150-257	1 HP (0.75 kW)/230V/3 Phase in-3 Phase out
150-258	2 HP (1.5 kW)/230V/3 Phase in-3 Phase out
150-259	3 HP (2.2 kW)/230V/3 Phase in-3 Phase out
150-264	1 HP (0.75 kW)/460V/3 Phase in-3 Phase out
150-265	2 HP (1.5 kW)/460V/3 Phase in-3 Phase out
150-266	3 HP (2.2 kW)/460V/3 Phase in-3 Phase out

*Higher HP VFDs are available. Consult factory.

CF Troubleshooting

Troubleshooting Table:

Problem	Cause	Solution*
Touch Screen is blank	Cabling/Wiring Issue	Check that the cables are plugged in to the appropriate connectors on the I/O Module and the +24V wire is connected from pin 1 on the I/O Module to pin 11 on the VFD.
	Power Issue	Check that the VFD is powered up and the status light on the I/O Module is flashing.
Motor will not run	E-Stop Button is pressed	Pull out the E-stop Button.
	Wiring Issue	Check that the E-Stop wire is connected from pin 13 on the I/O Module to pin 1 on the VFD.
Drive fault - communication loss	Cable has been disconnected	Check the cables between the I/O Module, VFD, and the Touch Screen. From the Main Menu, press the Fault Button, then Clear Fault. Resume Operation.

* Please contact Wanner Engineering if additional troubleshooting/installation assistance is desired.

CF Warranty

Limited Warranty

Wanner Engineering, Inc. extends to the original purchaser of equipment manufactured by it and bearing its name, a limited one-year warranty from the date of purchase against defects in material or workmanship, provided that the equipment is installed and operated in accordance with the recommendations and instructions of Wanner Engineering, Inc. Wanner Engineering, Inc. will repair or replace, at its option, defective parts without charge if such parts are returned with transportation charges prepaid to Wanner Engineering, Inc., 1204 Chestnut Avenue, Minneapolis, Minnesota 55403.

This warranty does not cover:

1. The electric motors (if any), which are covered by the separate warranties of the manufacturers of these components.
2. Normal wear and/or damage caused by or related to abrasion, corrosion, abuse, negligence, accident, faulty installation or tampering in a manner which impairs normal operation.
3. Transportation costs.

This limited warranty is exclusive, and is in lieu of any other warranties (express or implied) including warranty of merchantability or warranty of fitness for a particular purpose and of any non-contractual liabilities including product liabilities based on negligence or strict liability. Every form of liability for direct, special, incidental or consequential damages or loss is expressly excluded and denied.



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