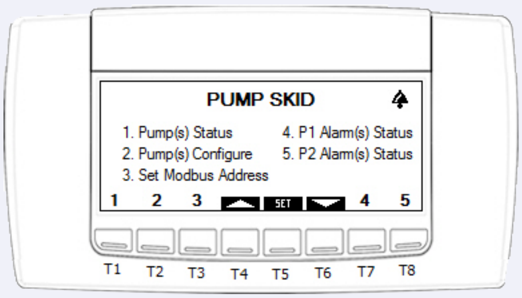
Pump Skid Controller

Installation and Operation Guide



COPELAND

Copeland
1065 Big Shanty Road NW, Suite 100
Kennesaw, GA 30144 USA
770-425-2724 • 1-800-829-2724
www.copeland.com
Email: ColdChain.TechnicalServices@copeland.com

 ©2024 Copeland LP.

 ©2024 Copeland LP.

1 *Introduction*

The Pump Skid controller *(P/N 818-9011)* is a standalone controller designed to control two pumps of the Refrigeration option with a primary/secondary/backup control strategy using on-board I/O and control algorithms. The pumps push glycol refrigeration to the cases for cooling. The Pump Skid controller can also interact with a Variable Frequency Drive (VFD) to send a 0-10V control signal, as well as manage VFD faults, resets, and bypass. Only one pump can run at a time.

With the primary/secondary control strategy, the user can enter the number of hours to switch the pumps to equalize runtime.

With the backup control strategy, if certain criteria are not met for the primary pump, the secondary pump, which acts as a backup for the system, will now become the primary.

The Pump Skid controller can manage two pumps, with one pump as primary, and the other as secondary. Each pump will have one relay output per pump and one analog output per pump. The relay output(s) will direct the pump(s) ON or OFF based on certain criteria that must be met. The analog output(s) modulates accordingly in order to maintain a user-defined setpoint. The Pump Skid controller supports local physical inputs and outputs.

Figure 1-1 - Pump Skid Controller

1.1 The Pump Skid Controller's I/O Points

The Pump Skid controller supports 4 analog inputs, 7 digital inputs, 2 analog outputs, and 7 relay outputs. The Pump Skid's 7 relay outputs are rated at 2.0 amps max.

1.2 Independent System Control

The Pump Skid controller can control two pumps with a primary/secondary/backup control strategy independently, but is also designed to interface with an E2 controller. Networking the Pump Skid controller to a central controller also allows you to view status on E2 and UltraSite32 Site Manger status screens, report alarms, and log point values.

The Pump Skid controller configuration can be programmed through the E2 front panel.

 ©2024 Copeland LP.

2 Mounting and Powering

All electrical code laws should be followed. The controller should be mounted in a location/environment that stays within a 20 to 85% relative humidity range (as specified by the label on the enclosure).

CAUTION	GND is Common (-), not earth ground. Do not earth ground this device.

2.1 Installation

The Pump Skid controller uses a DIN mount installation.

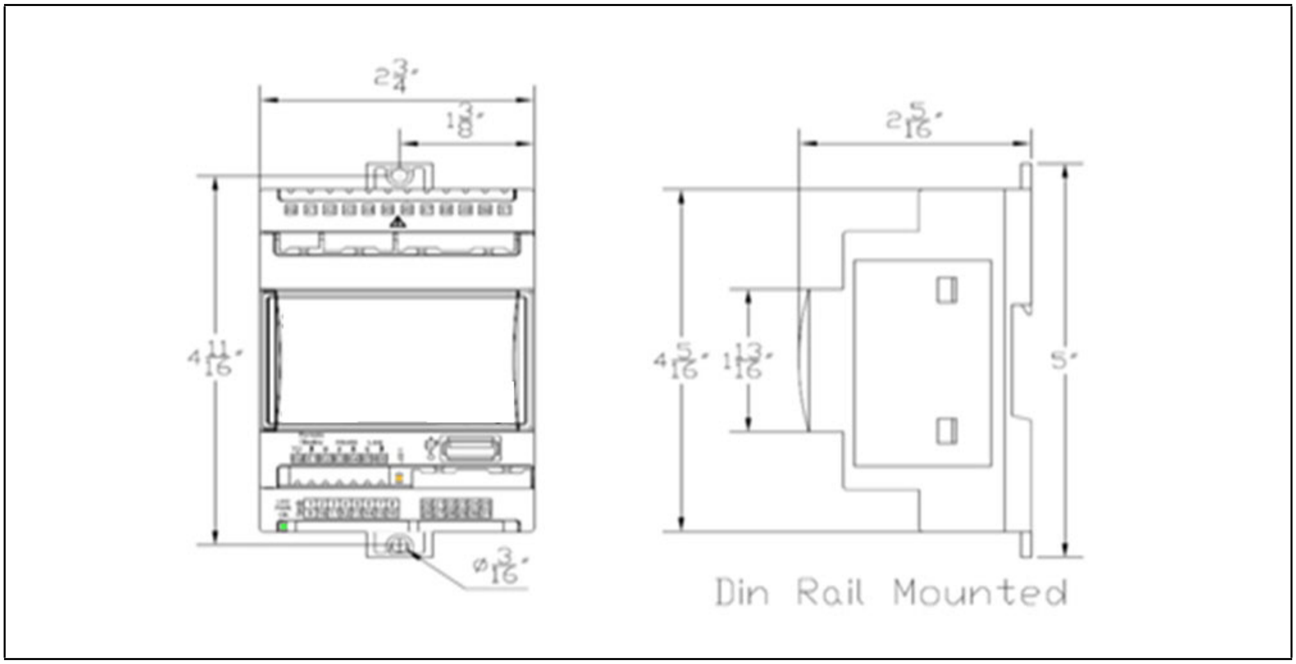


Figure 2-1 - DIN Mounting

Table 2-1 - Pump Skid Enclosure Specifications

Mount:	On a DIN rail (EN 50022, DIN 43880) Fastened with screws via the removable plastic flaps.
Material	PC-ABS Thermoplastic
Self-extinguishing:	V0 (UL94)
Comparative Tracking Index (CTI):	300V
Color:	White

 ©2024 Copeland LP.

2.2 Powering

Copeland offers 24VAC non-center typed transformers with varying sizes without center taps. **Table 2-2** shows the transformer sizes and are non- center-tapped.

CAUTION	GND is Common (-), not earth ground. Do not earth ground this device.

2.2.1 Choosing Transformer Sizes

The transformer used to power the Pump Skid controller should have at least a 20VA rating. The Pump Skid controller should not share a transformer with any other devices.

Table 2-2 - Transformers Compatible with Pump Skid

Transformer P/N	VA Rating	Primary Voltage
640-0041	50 VA	10 VAC
640-0042	50 VA	220 VAC

2.2.2 Power Wiring

The Pump Skid controller can be powered by one of the 50VA non-center-tapped transformers listed in **Table 2-2**. **Figure 2-2** shows how to wire the transformers to the Pump Skid controller board.

Neither side of the secondary should be connected to ground. Also, do not connect the center tap (if provided on the transformer) to ground. The entire secondary of the transformer should be isolated from any ground.

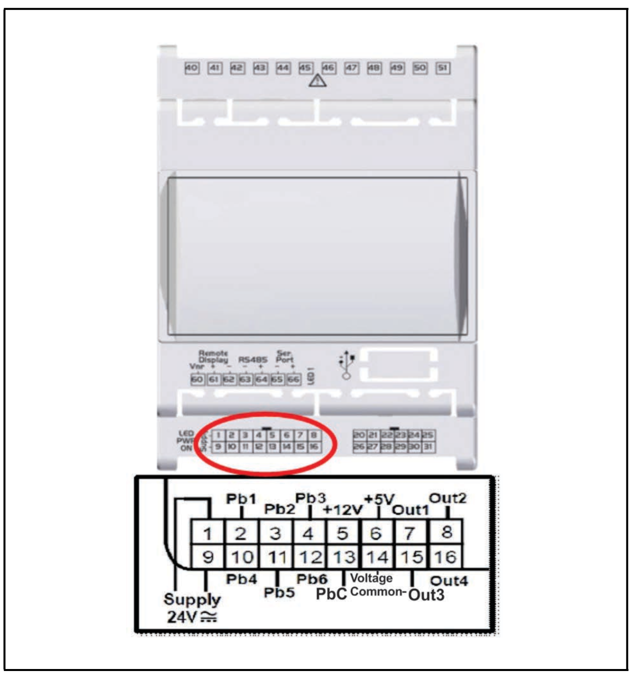


Figure 2-2 - Non-Center-Tapped Transformer Wiring

2.2.3 Wire Types and Maximum Distances

For powering I/O boards, use only the listed wire types in **Table 2-3**. Two-conductor non-shielded cables are the recommended wire for connecting the transformer to the Pump Skid controller. Shielded cable should not be used for power wiring. The center tap should be left disconnected, if present on the transformer.

Table 2-3 - Power Wiring Types

Power Wiring Types	
14 AWG	Belden 9495
18 AWG	Belden 9495

The wire length from the transformer determines the type wire gauge used. In most cases, the distance between the Pump Skid controller and the transformer that supplies power to it is not enough to be of concern; *however, it is very important NOT to exceed this maximum wire length or the controller will not operate correctly.*

Use these formulas to determine if the wire gauge you are using fits within specification:

Table 2-4 - Power Wire Lengths

14 AWG:
Feet = 1920/VA

18 AWG:
Feet = 739/VA

(VA is the total VA rating of the controller) For example, if you had an 80 VA load:
14 AWG: 24 ft.
18 AWG: 9 ft. (rounded down)

Sensors requiring 24VAC should not be powered from the same transformer powering the input board. *Any devices that will be connected to the Pump Skid controller's inputs or outputs must be powered with a separate 24VAC transformer.*

©2024 Copeland LP.

3 The MODBUS Network

Although the Pump Skid controller can operate as a standalone controller, it relies on an E2 unit for advanced features such as remote dial-in/dial-out, logging, and alarm control. The Pump Skid controller uses an RS485 network connection to communicate with E2 site controllers.

3.1 Wiring Types

Copeland specs Belden #8761 shielded twisted pair cables for use as MODBUS wiring (or Belden #82761 and Belden #88761 for plenum installations).

If the recommended cable is not available in your area, be sure the wiring meets or exceeds the following specifications:

Table 3-1 - Power Wiring Types

Shielded?	Yes
Conductor Type	Twisted Pair
Gauge	18 - 24 AWG
Capacitance between signal wires	31 pF/ft or less (9.45 m) or less
Capacitance between signal and shield	59 pF/ft or less (17.98 m) or less
Nominal Impedance	120Ω±50Ω

3.1.1 Daisy Chains

Connect the MODBUS network cable to the three-terminal connector on the E2 COM port you wish to assign as MODBUS. Reverse the polarity of +/- on the RS485 cable between the E2 and the Pump Skid controller.

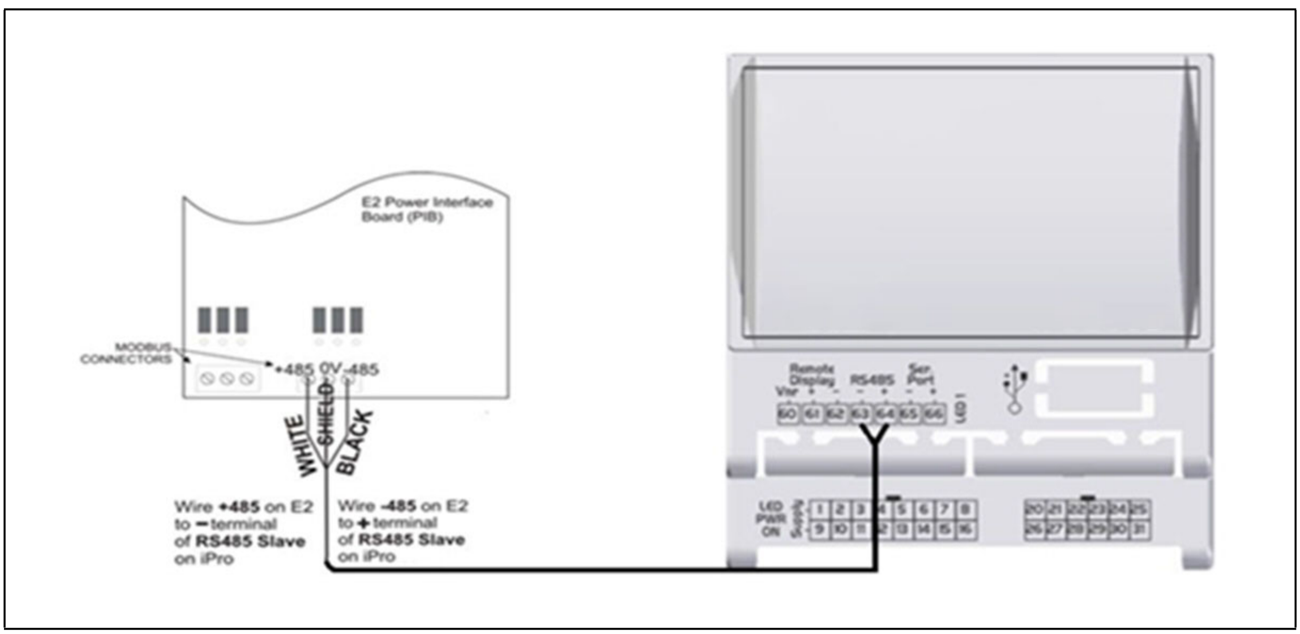


Figure 3-1 - MODBUS Networking

©2024 Copeland LP.

3.1.2 Network Addressing - Visograph

The MODBUS network address makes an Pump Skid controller unique from other boards on the network of the same type. This allows the site controller to find it and communicate with it easily.

The MODBUS network address of the Pump Skid controller is set using add-on devices called Visographs *(P/N 318-7272)*.

3.1.2.1 Connecting the Visograph

The visograph is connected with a 3-wire connection on pins 60, 61, and 62.

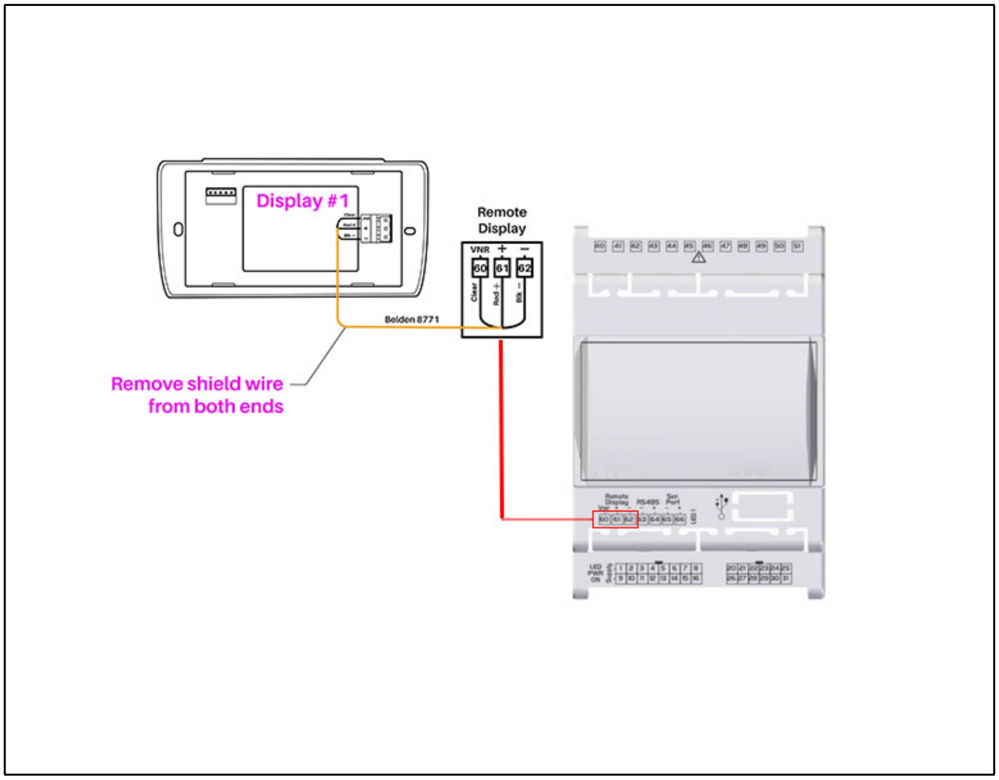


Figure 3-2 - Visograph connection

⚠ CAUTION **The Pump Skid controller may be damaged if the wires are crossed when connecting the visograph, especially if pin 60 (Vnr) is connected to + or - accidentally.**

 ©2024 Copeland LP.

3.1.2.2 Visograph Navigation

- Five menu items are available to choose from (see **Figure 3-4**).
- Press the corresponding button along the bottom (**T1**-**T6**) to navigate to desired item.

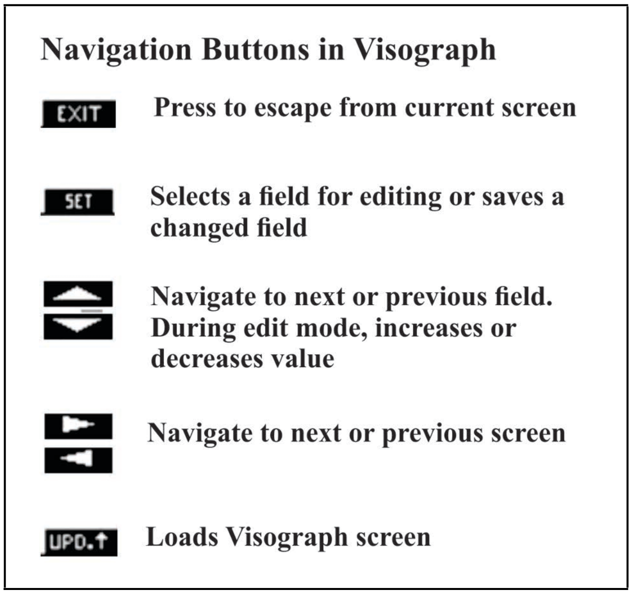


Figure 3-3 - Visograph Buttons

3.1.2.3 Setting the MODBUS Address

Boards of the same type are typically numbered in sequence, starting with one and continuing with two, three, and so forth.

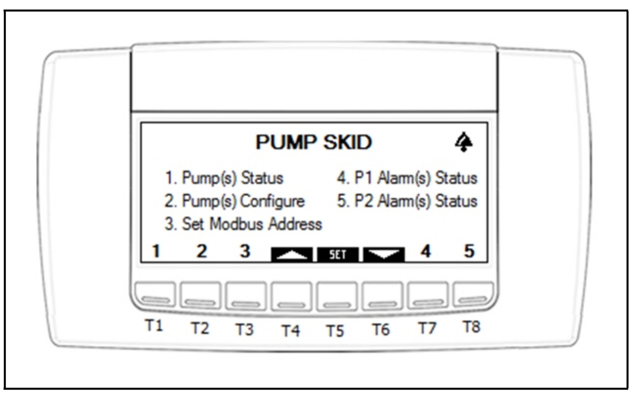


Figure 3-4 - Pump Skid controller Main Menu - Use the arrows to scroll to 3 to Set Address

1. Use the arrows to scroll to 3 - **Set Modbus Address** on the main menu to see the Controller Info screen.

The first field highlighted by the cursor is the **MODBUS ADDRESS**. To change the address:

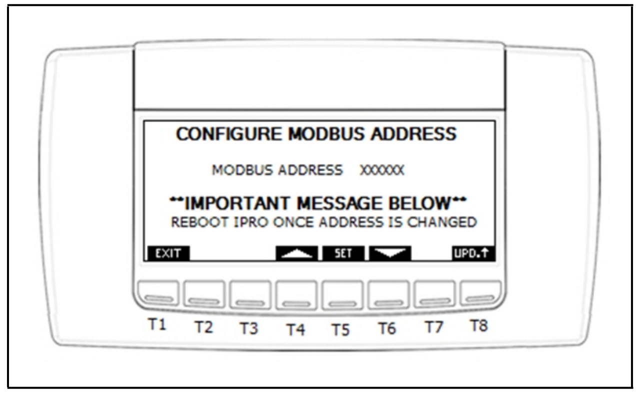


Figure 3-2 - Configure Modbus Address

2. Press the **SET** key (**T5**). The address field should start flashing.
3. Using the up and down arrows (**T4** and **T6**), change the address to the desired value.
4. Press **ENTER** to save new address. The address field should stop blinking.
5. Reboot controller (power down, then power up) to establish the Modbus address.

NOTE	**When the MODBUS address is changed, reboot the Pump Skid controller. To reboot, once the address has been changed, power down the controller and power back up to establish the MODBUS address.**

Versions

The Pump Skid controller and Visograph versions are also shown on the Controller Info screen.

If the Visograph version shown is not the most recent, set the **Reload Display** field to **Yes**. This will cause the display to download the latest screens contained in the Pump Skid controller.

 ©2024 Copeland LP.

4 Input and Outputsoller Inputs

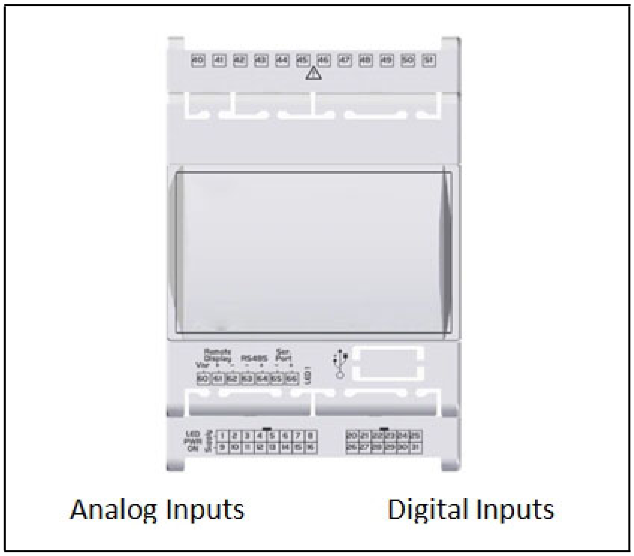


Figure 4-1 - Pump Skid Controller Input Locations

The Pump Skid controller will be able to use input data from physical inputs only. The Pump Skid controller has connections to analog and digital sensors, transducers, switches, and other input types typically used in a rooftop HVAC unit application. The input type and function for each point must be programmed in the Pump Skid controller software by the installer.

The Pump Skid controller application will support the following analog inputs:

Table 4-1 - Pump Skid Controller Analog Inputs

Analog Input	Type	Description
Pump 1 Outlet PSI or Temperature	Physical	Local Pressure Transducer/Temp Probe
Pump 2 Outlet PSI or Temperature	Physical	Local Pressure Transducer/Temp Probe
Pump 1 Inlet PSI or Temperature	Physical	Local Pressure Transducer/Temp Probe
Pump 2 Inlet PSI or Temperature	Physical	Local Pressure Transducer/Temp Probe

The Pump Skid will support the following digital inputs:

NOTE	The Digital Inputs of the Pump Skid Pump Skid controller are user-defined and can be changed.

Table 4-2 - Pump Skid Controller Digital Inputs

Digital Input	Description
Pump Switch	Local Pump Switch Input
Pump 1 Run Proof	Local Run Proof Input
Pump 2 Run Proof	Local Run Proof Input
Pump 1 VFD Fault	Local VFD Fault Input
Pump 2 VFD Fault	Local VFD Fault Input
Pump 1 VFD Bypass	Local VFD Bypass Input
Pump 2 VFD Bypass	Local VFD Bypass Input
System ON/OFF	Local ON/OFF Switch
Chiller Alarm	Local Chiller Alarm Input
E-Stop	Local Emergency Stop Input
Remote Trip	Local Pump Trip Input

4.0.1 Wiring Analog Inputs on the Pump Skid Controller

The analog inputs are located on the same connector as the controller power supply.

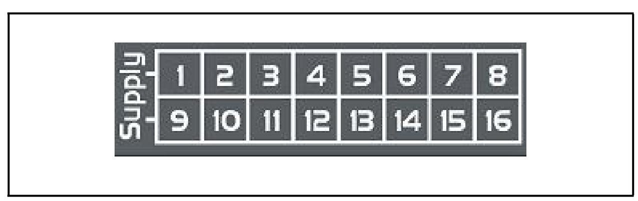


Figure 4-2 - Analog Input Connectors

The Pump Skid controller provides separate input commons depending on the type of sensor connected. For temperature probes, all commons should be wired to PbC on terminal 13.

©2024 Copeland LP.

For voltage output transducers, all commons should be wired to Voltage Common (-) on terminal 14.

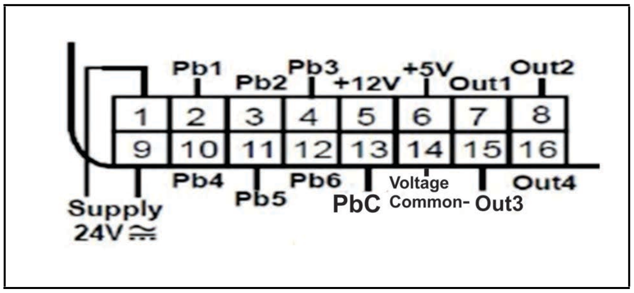


Figure 4-2 - Analog Inputs

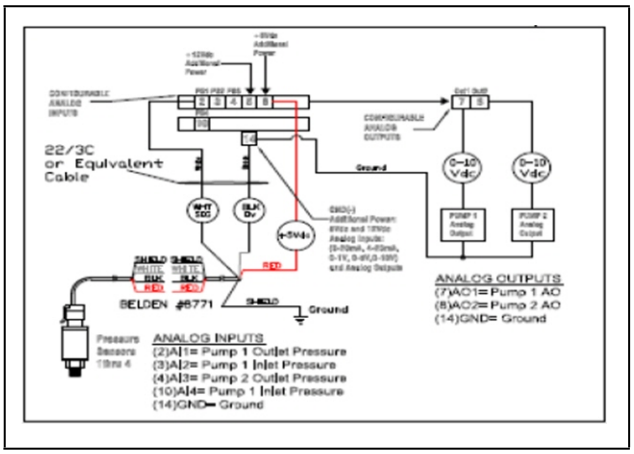


Figure 4-3 - Transducer Wiring for +5V Powered Devices and Analog Output Wiring

⚠ **CAUTION**	Terminal 14 is labeled Voltage Common (-) for use as common and should NOT be earth chassis grounded.

⚠ **CAUTION**	Miswiring a sensor to the wrong common can result in damage to the Pump Skid controller.

⚠ **CAUTION**	Any inputs that are powered with voltage that differs from that supplied by the Pump Skid controller (+12V or +5V) must be powered separately with a separate transformer in order to prevent the inputs from malfunctioning or being damaged. Do not use the same secondary of the controller's power to power the sensors.

Table 4-3 - Analog Input Connector Terminal Numbers

Terminal Number on Connector	Name
1	24VAC Supply (-)
2	Probe Input 1
3	Probe Input 2
4	Probe Input 3
5	+12VDC
6	+5VDC
7	Analog Output 1: 0-10V
8	Analog Output 2: 0-10V
9	24VAC Supply (+)
10	Probe Input 4
11	Probe Input 5
12	Probe Input 6
13	Temperature Common (PbC)
14	+5VDC/+12VDC/Analog Output Reference (Voltage Common (-))
15	Analog Output 3: 0-10V
16	Analog Output 4: 0-10V

4.0.2 Wiring Digital Inputs on the Pump Skid Controller

The digital inputs are located on a separate 12-pin connector.

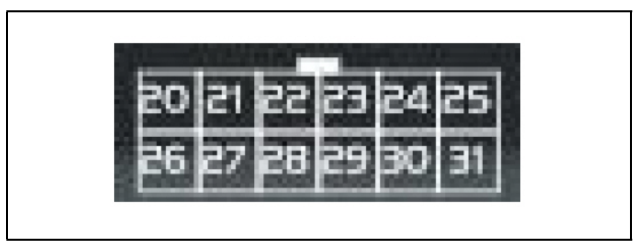


Figure 4-5 - Digital Input Connectors

 ©2024 Copeland LP.

The Pump Skid controller provides a maximum of 11 opto-insulated digital inputs. All digital inputs require an external 24VAC/DC power source.

⚠ CAUTION	Use a separate transformer to power digital inputs. Do not use same secondary of Pump Skid controller's power.

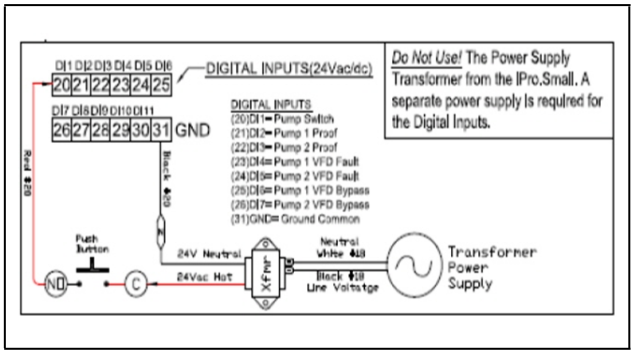


Figure 4-4 - Digital Input Wiring - 31 GND is Digital Common -

⚠ CAUTION	Terminal 31 is labeled Digital Common (-) for use as common and <u>should NOT be earth chassis grounded</u>.

Table 4-4 - Digital Input Connector Terminal Numbers

Terminal Number on Connector	Name
20	Digital Input 1
21	Digital Input 2
22	Digital Input 3
23	Digital Input 4
24	Digital Input 5
25	Digital Input 6
26	Digital Input 7
27	Digital Input 8
28	Digital Input 9
29	Digital Input 10
30	Digital Input 11
31	Common for Digital Inputs 1-11 (GND(-))

4.1 The Pump Skid Controller Outputs

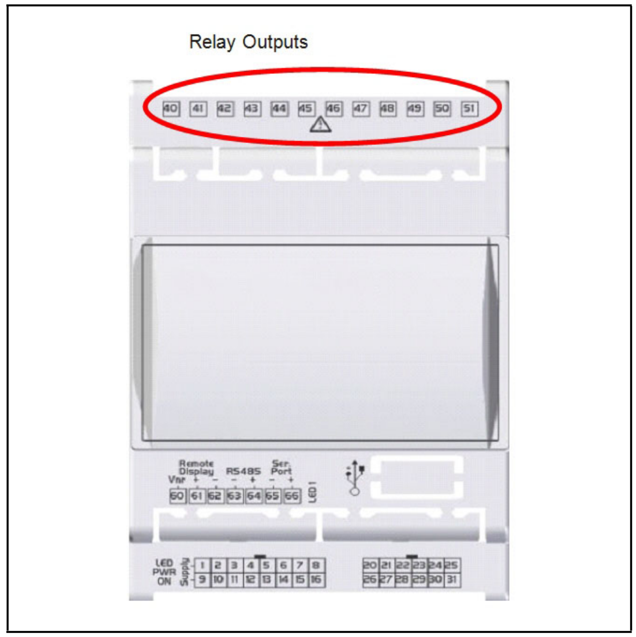


Figure 4-7 - Pump Skid Controller Output Locations

The Pump Skid controller has 8 relay outputs for connection loads. The relay output type and function for each point must be programmed in the Pump Skid controller software by the installer.

The Pump Skid controller supports the following relay outputs:

Table 4-5 - Pump Skid Controller Relay Outputs

Relay Output	Description
Pump 1 ON/OFF	Pump 1 Relay Output
Pump 2 ON/OFF	Pump 2 Relay Output
Pump 1 VFD Reset	Pump 1 VFD Reset Relay Output
Pump 2 VFD Reset	Pump 2 VFD Reset Relay Output
Pump 1 VFD Bypass	Pump 1 VFD Bypass Relay Output
Pump 2 VFD Bypass	Pump 2 VFD Bypass Relay Output
Master Alarm	Master Alarm Relay Output
Chiller Enable	Pump Run Proof Output
Pump Running	Pump Run Proof Output
Pump Trip	Pump Trip Signal Output
Pump Trip Alarm	Pump Trip Alarm Output

 ©2024 Copeland LP.

The Pump Skid controller supports the following analog outputs:

Table 4-6 - Pump Skid Controller Analog Outputs

Analog Output	Description
Pump 1 AO	Pump 1 Modulating Analog Output
Pump 2 AO	Pump 1 Modulating Analog Output

For both relay and analog outputs, the Pump Skid controller will drive physical points as well as send the current output value over MODBUS to E2.

4.1.1 Wiring Relay Outputs on the Pump Skid Controller

The output relays are located across the top side of the Pump Skid controller.

Figure 4-8 - Digital Load Connectors

The normally- open relay outputs on each connector have different commons for each group of relay outputs (see **Figure 4-5**), which are not fused. Make sure to use the same voltage for all loads connected to the relays.

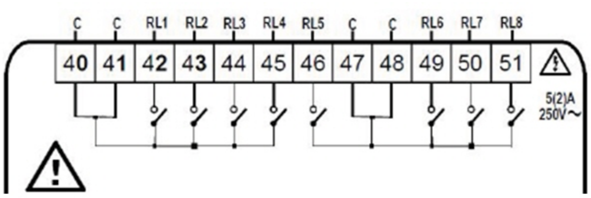


Figure 4-5 - Relay Output Wiring

Table 4-7 - Digital Relay Output Connector Terminal Numbers

Terminal Number on Connector	Name
40	Common for Relays 1-4
41	Common for Relays 1-4
42	Relay 1
43	Relay 2
44	Relay 3
45	Relay 4
46	Relay 5
47	Common for Relays 5-8
48	Common for Relays 5-8
49	Relay 6
50	Relay 7
51	Relay 8

 ©2024 Copeland LP.

4.1.2 Wiring Analog Outputs on the Pump Skid Controller

The analog outputs are located on a separate 16- pin connector.

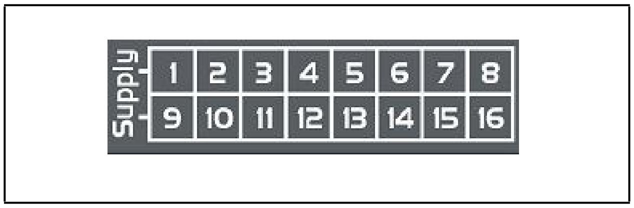


Figure 4-10 - Analog Output Connectors

The Pump Skid controller provides two analog outputs, fixed to terminals 7 and 8 on the controller hardware.

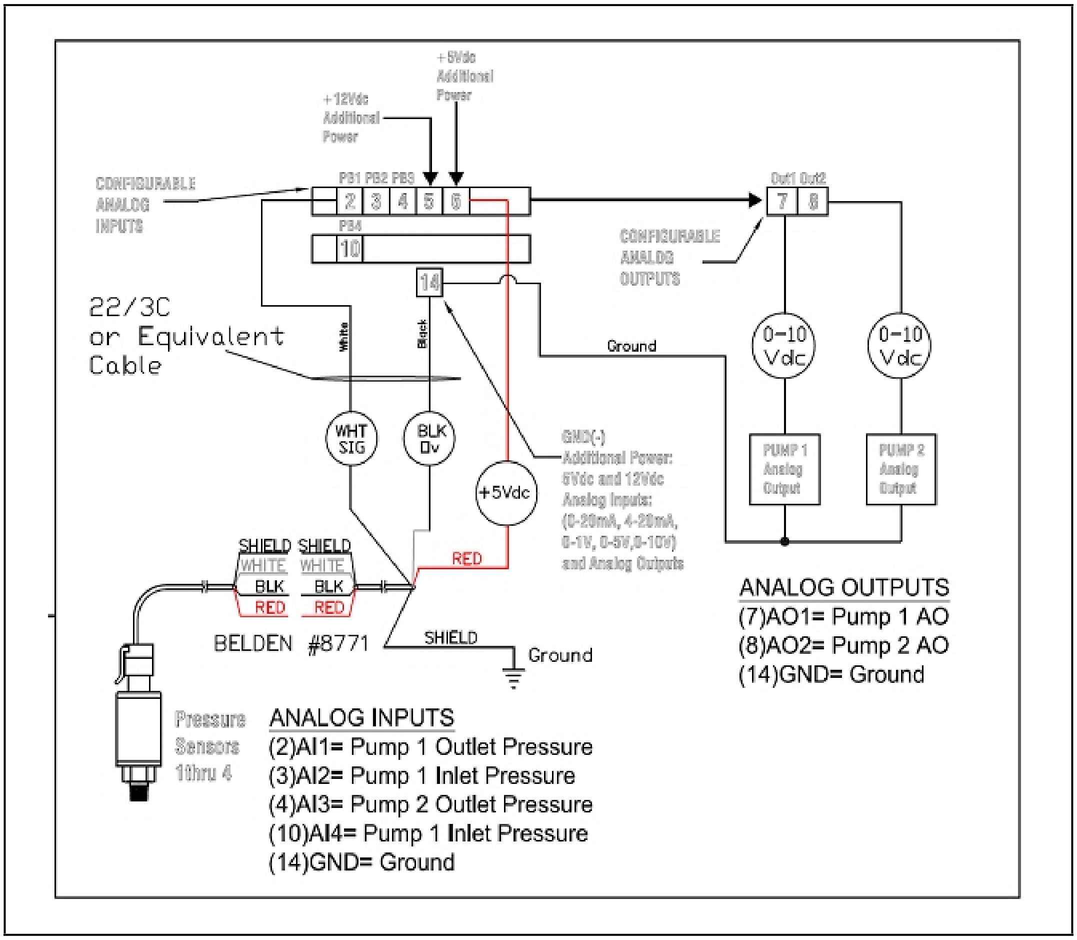


Figure 4-6 - Analog Output Wiring

Table 4-8 - Digital Relay Output Connector Terminal Numbers

Terminal Number on Connector	Name
7	Analog Output 1 (Pump 1 AO)
8	Analog Output 2 (Pump 2 AO)
14	Voltage Common (-)

©2024 Copeland LP.

5 *Pump Skid Controller Status LEDs*

When an Pump Skid controller board is powered up, you will be able to determine the operating status of the board by observing its status LEDs.

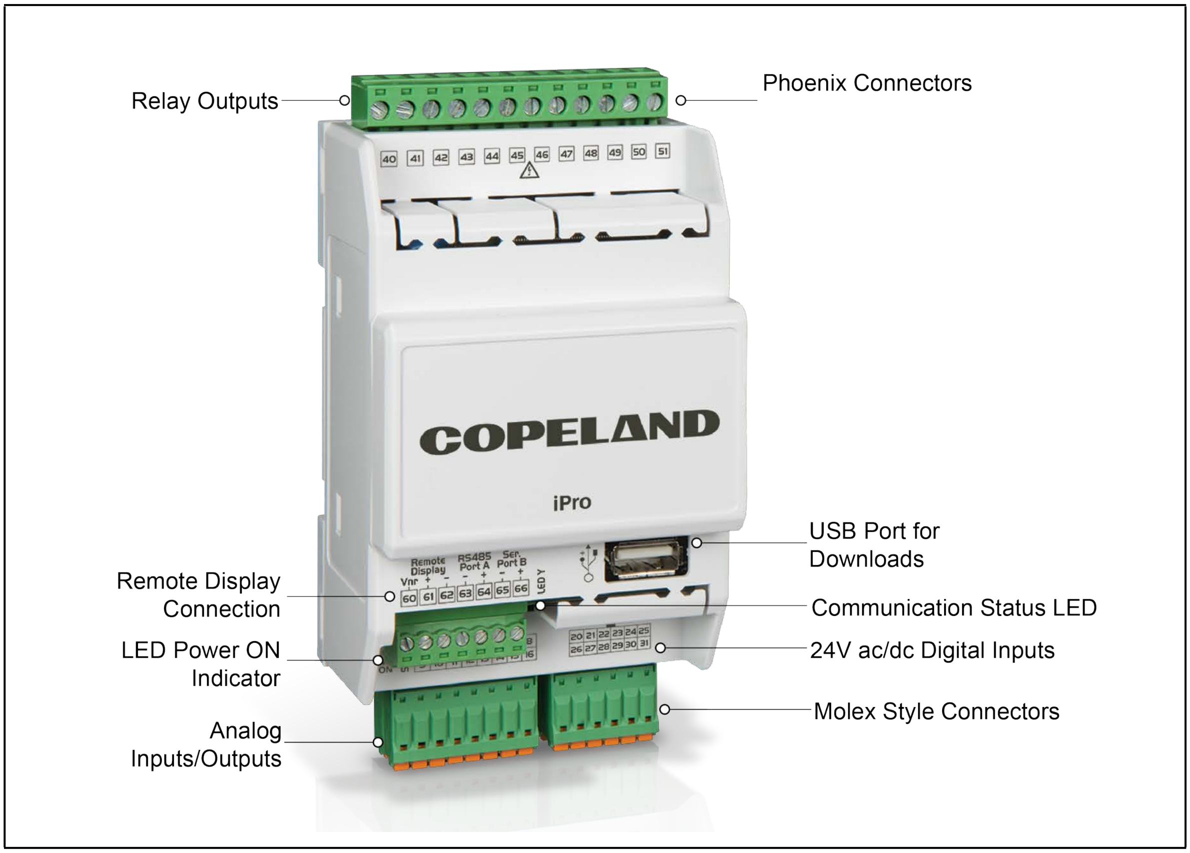


Figure 5-1 - Pump Skid Controller Status LED Locations

5.1 PWR ON LED

The PWR ON LED stays on continuously to show that the board is powered and operational. If this light is not illuminated, the board has likely lost power.

5.2 LED1 Network Status

The amber colored LED1 indicates whether the Pump Skid controller is online or offline with the E2. When the Pump Skid controller is online, the LED1 will turn on for one second and off for one second. However, if the Pump Skid controller is offline, the LED1 will turn on for half a second and off for half a second (blinking twice as fast). When the Pump Skid controller is offline, it reverts to standalone control, using only the locally connected inputs to control the pump(s).

 ©2024 Copeland LP.

6 Software Overview

The Pump Skid controller is capable of controlling a pump(s) to maintain a desired pressure or temperature by activating a pump relay and modulating a corresponding analog output. For this reason, pressure or temperature sensors must be connected to the controller. The desired pressure or temperature is primarily determined by a setpoint and PID settings. Extended logging and alarm control capabilities require connection to an E2 controller.

6.1 Application Mode

The Pump Skid controller supports the control of a pump(s) by choosing either Temperature or Pressure as the control strategy. The user defined engineering unit choices for Temperature are DF or DC. The user-defined engineering unit choices for Pressure are PSI or BAR. The Pump Skid controller can interact with a VFD.

6.2 Operational Modes and Setpoints

The Pump Skid controller will be in one of five possible modes of operation at any given time:

1. Relay Only
2. User Def AO%
3. Differential
4. Outlet
5. Inlet

Table 6-1 - Pump Skid Controller Operational Modes

Operating Mode	Description	Outputs Active
Relay Only	Pump relay activates to control pump; no analog output	Pump Relay
User Def AO%	User defines analog output percentage; Default=100%	Pump Relay; Analog Output
Differential	Controls pumps to maintain differential setpoint between High and Low cutout setpoints (operating range) Control input - Calculated difference between Outlet and Inlet temperature/pressure	Pump Relay; Analog Output
Outlet	Controls pumps to maintain Outlet temperature or pressure setpoint Control input - Outlet temperature/pressure sensor	Pump Relay; Analog Output
Inlet	Controls pumps to maintain Inlet temperature or pressure setpoint Control input - Inlet temperature/pressure sensor	Pump Relay; Analog Output

6.2.1 Direct Acting

The Direct Acting configuration applies to all Operating Modes that use an analog output for control. If Direct Acting is set to YES, the PID will increase as the control input increases, and vice versa.

If Direct Acting is set to NO, the PID will decrease as the control input increases, and vice versa. This is known as "reverse acting."

6.2.2 PID Settings

The PID settings are user defined and can be used to either speed up or slow down the analog output. The adjustable settings that are available are:

- TR or P Gain
- I Gain
- D Gain

6.2.3 Control Setpoint

The Control Setpoint is a user-defined temperature or pressure setpoint. The Pump Skid controller will modulate the analog output accordingly to maintain this setpoint.

NOTE	When the Control Method is configured as Relay Only (NU), these setpoints are ignored.

6.2.4 Setpoint Offset

The Setpoint Offset is a user-defined value that will add or subtract from the control input. The Setpoint Offset is often used to correct a sensor input value when a sensor is not reading correctly.

6.2.5 Differential HI/LO Cutout Setpoints

The Differential HI/LO Cutout setpoints are user-defined temperature or pressure setpoints. The pump is allowed to run within this "operating range" (pump will run within these user-defined HI/LO Cutout setpoints). If the temperature or pressure falls outside of these setpoints, after a user-defined delay time the Pump Skid controller will alarm and switch to backup pump. The Differential HI/LO Cutout setpoints are used for pump/system safety.

NOTE	When the Control Method is configured as Relay Only (NU), these setpoints are ignored.

6.2.6 Outlet HI Cutout/Outlet Cutin Setpoints

The Outlet HI Cutout setpoint is a user-defined temperature or pressure setpoint. The pump is allowed to run below this setpoint. If the outlet temperature or pressure exceeds this setpoint, after a user-defined delay time the Pump Skid controller will alarm and deactivate the pump. The pump will be allowed to run once the outlet temperature or pressure reaches the user defined Outlet Cutin setpoint. The Outlet HI Cutout setpoint is used for pump/system safety.

NOTE	When the Control Method is configured as Relay Only (NU), these setpoints are ignored.

6.3 Pump Run Proof

The Pump Skid controller uses a user defined digital input to detect a Pump Run Proof.

When a pump is called to run, the Pump Skid controller should detect a digital "Pump Run Proof good" signal within a user defined delay time. If a "Pump Run Proof good" signal is not detected within a user-defined delay time, the Pump Skid controller will alarm and switch to the backup pump.

6.4 VFD Interaction

The Pump Skid controller can interact with a Variable Frequency Drive(s) (VFD).

6.4.1 0-10 Volt Analog Output

The Pump Skid controller sends a 0-10V analog signal to the VFD as the speed reference. This 0-10V analog output is accepted by the VFD and then converted to a scaled frequency range (usually 0-60Hz).

6.4.2 VFD Fault

The Pump Skid controller uses a user-defined digital input to detect if a VFD Fault has occurred. The digital input used to detect a VFD Fault, as well as the polarity of the digital input, is user defined.

When a VFD Fault occurs, the Pump Skid controller can attempt a VFD Fault Reset via the relay output.

6.4.3 VFD Fault Reset

When a VFD Fault has been detected, the Pump Skid controller can attempt to reset the VFD via a user-defined relay output.

The VFD Fault Reset relay has a user-defined output ON time (seconds). Once the relay is activated ON, it will stay ON for a user-defined time before deactivating ("pulse").

There is also a user-defined "Time Between Reset Attempts" (seconds) that allows time between the VFD Fault Reset attempts.

The number of VFD Fault Reset attempts is user-defined. If the VFD Fault has not cleared in the user defined number of reset attempts, the Pump Skid controller will alarm and switch to the backup pump.

6.4.4 VFD Bypass

The Pump Skid controller uses a user-defined digital input to detect if a VFD Bypass has been initiated. A VFD Bypass acts as a manual override ON. If VFD Bypass is initiated, the pump relay will activate and the corresponding analog output will modulate according to the PID parameters for that pump.

 ©2024 Copeland LP.

6.5 Pump Skid Controller Alarms

The Pump Skid controller can activate a relay when an alarm occurs. A user defined "Alarm Clear" delay is available to delay the clearing of an alarm(s) if a failure occurs causing a switch to the backup pump.

Alarms:

- VFD Fault
- Pump Run Proof Fail
- HI Outlet
- Differential

NOTE	**If the configured amount of switches is attempted within the configured limit (Section 6.6.3), no further switching attempts are made, and the Pump Trip/ Pump Trip Alarm relay outputs (if either or both are configured) will become active.**

The Pump Skid controller can also receive digital inputs that will immediately shut off the pumps (without attempting to switch) and activate the main Alarm relay output.

- Chiller Alarm
- Emergency Stop
- Remote Trip

6.6 Pump Switch Setup

6.6.1 Automatic Pump Switch (To Exercise Pumps)

The Pump Skid controller has the option to switch pumps in order to equalize runtime. This option is recommended because it helps to protect the pumps from locking up due to possible sediment and rust in the system and also proves to be beneficial for lubrication.

This option requires a user-defined number of hours between pumps switching. An entry of **24** will switch the pumps 24 hours from current time.

If this option is enabled, there is an "Elapsed Time" counter to allow user to see proximity of the next pump switch.

6.6.2 Manual Pump Switch

The Pump Skid controller also has the option to switch pumps manually. A user-defined digital input is used to detect a manual pump switch. The polarity of the manual pump switch input is user-defined as well.

6.6.3 Pump Switching Attempts Limit

The Pump Skid controller can be configured to a specified amount of switching attempts under any of the Alarm conditions (pump proof failure, HI/LO Differential Cutout, HI/LO Outlet Cutout, VFD Fault, etc.). When the configured number of switching attempts is reached within the Pump Trip Time Period, no further switching attempts are made and the **Pump Trip Alarm** will become active. A manual reset is required in order to re-start the pumps (**Pump Trip Reset** parameter).

NOTE	**The Manual Pump Switch DI also counts towards this switching counter, and the controller will require a manual reset if the attempted manual switches reach the counter limit within the specified time period.**

6.6.4 Pump Switch Overlap

The Pump Skid controller can be configured to a timed pump run overlap at every switching attempt. This is useful on systems where the backup pump may be slow to ramp up and any momentary interruption in flow or momentary pressure drop may cause issues elsewhere in the system. At every switching attempt between pumps, whenever an overlap time greater than zero is configured, the pump that is about to shut off will continue running for the specified amount of time after the next pump is given the command to start. After this overlap time expires, the previous pump will shut off, and the next pump will continue running as normal. This applies for the timed automatic pump switching, manual switching, as well as pump switching attempts under any of the alarm conditions mentioned previously.

©2024 Copeland LP.

7 E2 Setup

The Pump Skid controller is capable of communicating with an E2 version 3.0 or above.

Using the Pump Skid controller with a central E2 offers several benefits over simple standalone control, including:

- Reporting of Pump Skid controller-related alarms in the Alarm Advisory Log.
- The ability to log Pump Skid controller inputs in an E2 logging group.
- The ability to share temperature or pressure values, proof, or fault statuses by sharing between the Pump Skid and the E2.
- Remote access to Pump Skid controller status and programming from the E2 front panel.
- The ability to remotely access the Pump Skid controller from UltraSite32 or Site Manager, and to back up, restore, and offline-program Pump Skid controller configuration along with E2 site configuration.

Communication between E2 and an Pump Skid controller takes place over the RS485 MODBUS. Follow the instructions in **Section 3, The MODBUS Network**, to connect an Pump Skid controller to the E2 MODBUS network.

Then, follow the instructions in this chapter (**Section 7**) to set up the Pump Skid controller.

7.1 Network Connection to E2

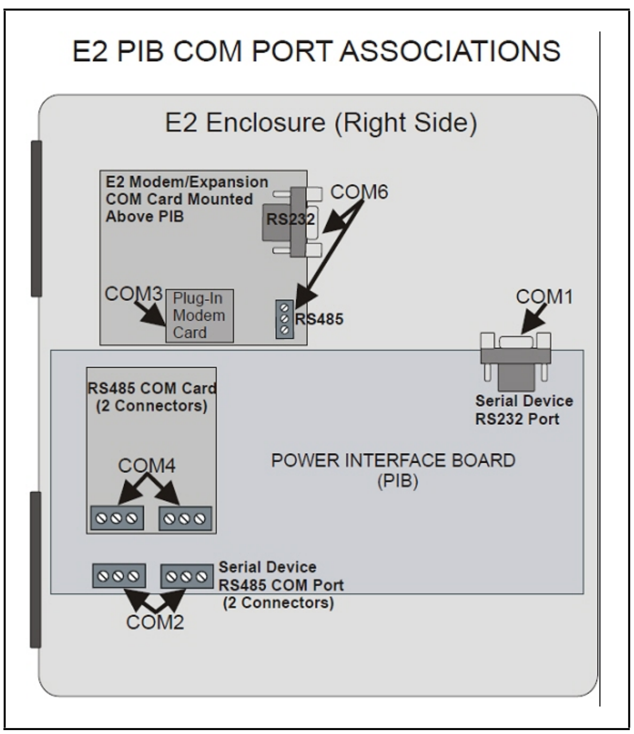


Figure 7-1 - Location of E2 COM Ports (E2 Versions 3.xx and Below)

Connecting an Pump Skid controller to an E2 unit requires the E2 to be version 3.0 or above. Contact Copeland for upgrade information if the controller is a version prior to 3.0.

An E2 has up to three COM ports that can be assigned for MODBUS communication (COM2, an RS485 port on the E2 power interface board, and COM4 and COM6, which are optional ports requiring expansion cards). COM ports can only be used for one function; in other words, if COM2 is set up as the MODBUS, you can only connect other devices that are MODBUS to COM2. Ensure your E2 is equipped with an RS485COM Card *(P/N 637-4890)* and configured in E2 General Services (Menu 7 3 1, **Serial** tab) to enable COM4 or an E2 Expansion COM Card *(P/N 637-4871)* to enable COM6.

Connect the MODBUS network cable to the three- terminal connector on the COM port you wish to assign as MODBUS. Like other Pump Skid connections, wire RS485+ to RS485+, RS485- to RS485-, and the shield cable to the middle terminal. If the E2 will be the first device in the daisy-chain, set the port's termination jumpers to the TERMINATED & BIASED position (all three jumpers UP); otherwise, set all jumpers DOWN if not the first device.

7.1.1 Setup Network Ports

Before setting up a Pump Skid controller, the port on the E2 that has the MODBUS cable connected must be set up as a MODBUS port.

1. Log in to the E2 with Level 4 access.
2. Press Menu followed by 7 3 1 - **General Controller Info**.
3. Press Ctrl + 3 to open the **Serial** tab of the General Controller Info setup screens:

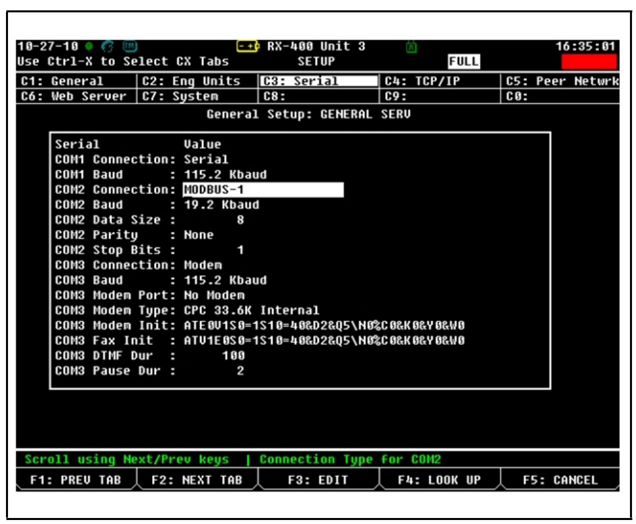


Figure 7-2 - Serial Communications Manager Screen

©2024 Copeland LP.

4. This screen will have a "**Connection**" field for all COM ports on the E2. Highlight the COM port connection field that will be used for Pump Skid controller, and press F4 - **LOOK UP**. From the list of network types, select **MODBUS**.

5. Four fields will become visible underneath the COM port connection field, which pertain to the way the device communicates:

- **Baud** - Default setting is **19,200**. *<u>This must be changed to</u>* **<u>9600</u>**. (All devices connected to the same COM port should be set to the same baud rate.)
- **Data Size** - Leave this field at the default value (**8**).
- **Parity** - Leave this field at the default value (**None**).
- **Stop Bits** - Leave this field at the default value (**1**).

6. Press [back key] to save changes and exit.

7.2 Add and Connect Pump Skid Controllers

To enable communications between E2 and the Pump Skid controller, the devices must be added and addressed in E2.

1. Log in to the E2 with Level 4 access.
2. Press Menu 7 7 2 - **Connected I/O Boards and Controllers**.

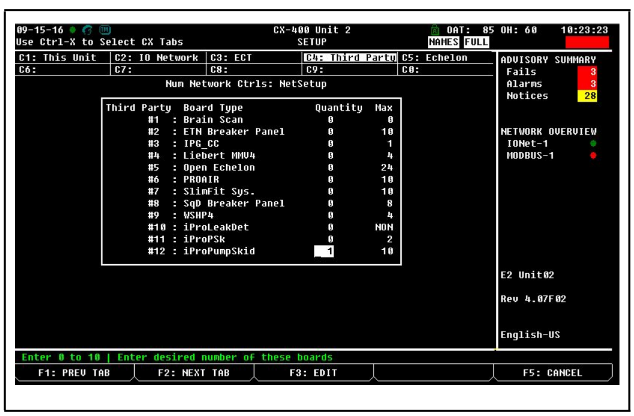


Figure 7-3 - Connected I/O Screen

3. In the Connected I/O screen, under the **Third Party** tab, Enter the number of Pump Skid controller devices in the **iProPumpSkid** number field.

4. Press [back key] to return to the Network Setup menu, then select 1 - **Network Summary**.

5. Locate the Pump Skid controller you added to the network list (press Page Up and Page Down to scroll through the list). The default name for a Pump Skid controller increments up starting with **iProPumpSkid001**.

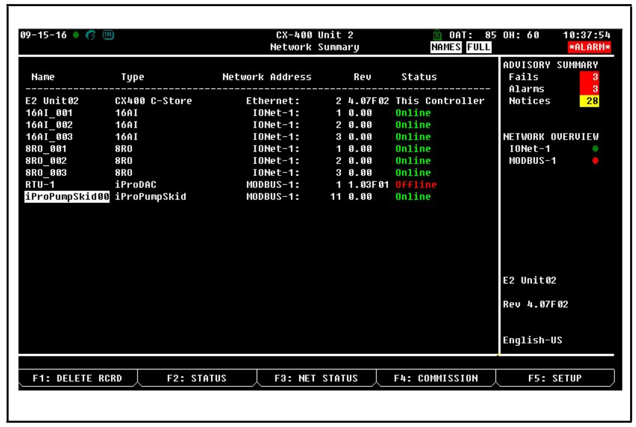


Figure 7-2 - Network List

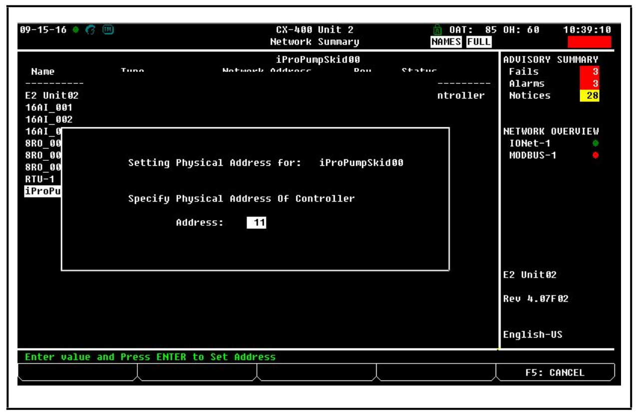


Figure 7-3 - Network Summary Screen

6. By default, each Pump Skid controller's board number in the network list is indicated by a - (dash). To set the address and begin communication, press F4 to Commission. (If you have more than one MODBUS network, specify which network you want the device to belong to).

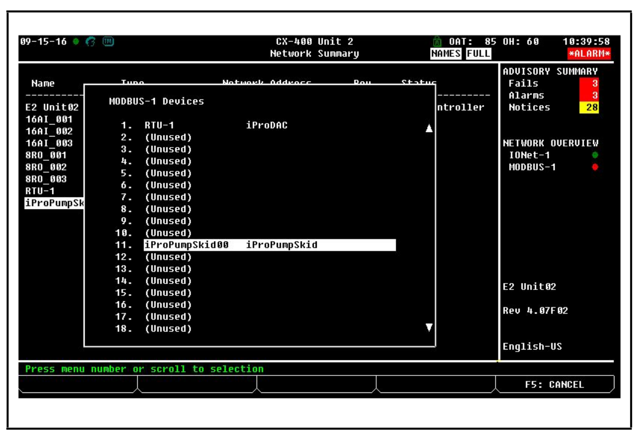


Figure 7-4 - Specify MODBUS Address

©2024 Copeland LP.

7. choosing the MODBUS network (if applicable), press Enter and a screen will open that allows you set the address:

Figure 7-5 - Set the Address of the Pump Skid controller

8. When finished, press to return to the Network Setup menu, then press 1 - Network Summary. Locate the Pump Skid controllers you set up, and look at each device's status in the Status field. You will see one of the following messages:

- **Online** - The Pump Skid controller is communicating normally.
- **Offline** - The Pump Skid controller is not communicating, has not been commissioned, is not functional, or is not powered up. Verify the Pump Skid is powered up, wired correctly, and has the proper network address, baud rate, and parity.
- **Unknown** - The Pump Skid controller is not communicating or has not been commissioned. Verify the Pump Skid is powered up, wired correctly, and has the proper network address, baud rate, and parity.
- **No Port** - No port is set up in the E2 Serial Configuration Manager to be a MODBUS port.
- **Wrong FW Rev** - This message is likely caused by the Pump Skid controller having a firmware version older than the minimum revision required by E2 for communication. Replace the Pump Skid controller with a new controller that has the latest version of firmware on it.

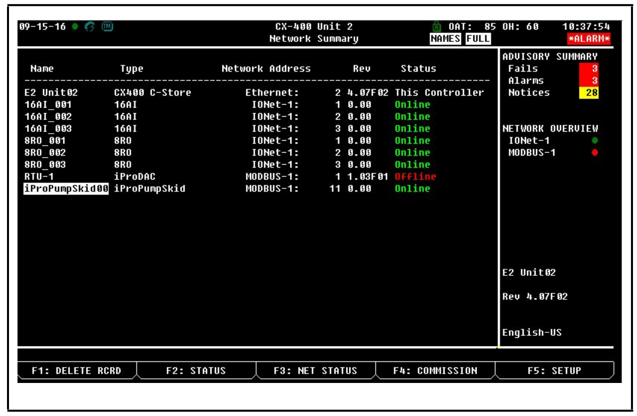


Figure 7-6 - Network Summary Screen

7.3 Viewing the Pump Skid Controller Status Screen

Once you have added an Pump Skid controller to the E2, you will be able to see the status of the Pump Skid controller board(s) from the front panel.

1. From the Main Status Screen, press Menu key and select 5 - **Configured Applications**.

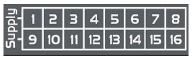
2. Select **iProPumpSkid** from the menu. If multiple Pump Skid controllers are associated with this E2, the Pump Skid controller Summary Screen will be shown. To see a single Pump Skid controller status screen, use the arrow keys to highlight the Pump Skid you wish to view, and press Enter.

 ©2024 Copeland LP.

8 Connections

8.1 Pump Skid Controller Descriptions

Table 8-1 - Descriptions of the Connections

Operating Mode	Outputs Active
	Connector for 24VAC/DC power supply analog inputs (Pb1 - Pb6, PbC) Additional power (+5VDC, +12VDC, Voltage Common -)
	24VAC/DC digital inputs (DI1-DI11, Digital Common -)
	Connector for remote terminal (VISOGRAPH), maximum 1 terminal per Pump Skid. RS485 Slave connector Serial port connector (LAN or RS485)
	USB port for downloads (BIOS, ISaGRAF® application, maps of parameters, remote display applications, network configuration, website) and uploads (log files). Connection with the computer via a USB-ETH converter
	Digital relay outputs 4 NO relays, 2 common
	Digital relay outputs 4 NO relays, 2 common

8.2 Terminal Number Descriptions

Table 8-2 - Terminal Number Descriptions

Terminal Number	Type of Input	Description
1	Supply	Power 24VACor 24VDC(-)
2	Pb1	Configurable analog input 1 (NTC, PTC, 0 - 20mA, 4 - 20mA, 0 - 10V, 0 - 1V, 0 - 5V, DI)
3	Pb2	Configurable analog input 2 (NTC, PTC, 0 - 20mA, 4 - 20mA, 0 - 10V, 0 - 1V, 0 - 5V, DI)
4	Pb3	Configurable analog input 3 (NTC, PTC, 0 - 20mA, 4 - 20mA, 0 - 10V, 0 - 1V, 0 - 5V, DI)
5	+12V	Additional power +12VDC
6	+5V	Additional power +5VDC
7	Out1	Analog output 1, 0 -10V
8	Out2	Analog output 2, 0 -10V
9	Supply	Power 24VACor 24VDC(+)
10	Pb4	Configurable analog input 4 (NTC, PTC, 0 - 20mA, 4 - 20mA, 0 - 10V, 0 - 1V, 0 - 5V, DI)
11	Pb5	Configurable analog input 5 (NTC, PTC, 0 - 20mA, 4 - 20mA, 0 - 10V, 0 - 1V, 0 - 5V, DI)
12	Pb6	Configurable analog input 6 (NTC, PTC, 0 - 20mA, 4 - 20mA, 0 - 10V, 0 - 1V, 0 - 5V, DI)
13	PbC	Common analog inputs (NTC, PTC, DI)
14	Voltage Common (-)	Additional power reference 5VDCand 12VDC, analog inputs (0 - 20mA, 4 - 20mA, 0 - 10V, 0- 1V, 0 - 5V), analog outputs

 ©2024 Copeland LP.

Table 8-2 - Terminal Number Descriptions

15	Out3	Analog output 3, 0 -10V
16	Out4	Analog output 4, 0 -10V
20	DI1	Digital input 1 24VAC/DC
21	DI2	Digital input 2 24VAC/DC
22	DI3	Digital input 3 24VAC/DC
23	DI4	Digital input 4 24VAC/DC
24	DI5	Digital input 5 24VAC/DC
25	DI6	Digital input 6 24VAC/DC
26	DI7	Digital input 7 24VAC/DC
27	DI8	Digital input 8 24VAC/DC
28	DI9	Digital input 9 24VAC/DC
29	DI10	Digital input 10 24VAC/DC
30	DI11	Digital input 11 24VAC/DC
31	Digital Common (-)	Common digital inputs 1 to 11
40	C	Common relays 1, 2, 3 and 4
41	C	Common relays 1, 2, 3 and 4
42	RL1	Relay 1 normally open contact
43	RL2	Relay 2 normally open contact
44	RL3	Relay 3 normally open contact
45	RL4	Relay 4 normally open contact
46	RL5	Relay 5 normally open contact
47	C	Common relays 5, 6, 7 and 8
48	C	Common relays 5, 6, 7 and 8
49	RL6	Relay 6 normally open contact
50	RL7	Relay 7 normally open contact
51	RL8	Relay 8 normally open contact
60	Remote Display	Connection for VISOGRAPH remote terminal (Vnr)
61	Remote Display	Connection for VISOGRAPH remote terminal (+)
62	Remote Display	Connection for VISOGRAPH remote terminal (-)
63	RS485 Slave	RS485 Slave connection (-)
64	RS485 Slave	RS485 Slave connection (+)
65	LAN	LAN Connection (-)
66	LAN	LAN Connection (+)

 ©2024 Copeland LP.

8.3 Technical Specifications

8.3.1 Analog Inputs

Table 8-3 - Analog Input Specifications

Analog conversion type:	10-bit A/D converter
Number of inputs:	6
Type of analog input: (configurable via software parameter)	NTC Dixell (-50T110°C; 10KΩ±1% at 25°C) PTC Dixell (-55T115°C; 990Ω±1% at 25°C) Digital input (potential free contact) Voltage: 0 - V, 0 - 5V, 0 - 10V (input resistance 3.7KΩ) Current: 0 - 20mA, 4 - 20mA (input resistance 100Ω)
Digital input status variation detection time:	100ms (in any case it depends on the cycle time set by the user in the given application)
Accuracy:	NTC, PTC: ±1% 0-1V: ±20mV 0-5V: ±100mV 0-10V:±200mV 2-20mA, 4-20mA: ±0.30mA
Additional power:	+12V: 200mA in total +5V: 100mA

⚠ **CAUTION**	**Any inputs that are powered with a voltage that differs from that supplied by the device (+12V or +5V) must be powered separately with another transformer (do not use the same secondary of the controller's power) in order to prevent the inputs from malfunctioning or being damaged.**

8.3.2 Digital Inputs

Table 8-4 - Digital Inputs Specifications

Type: (configurable via software parameter)	Opto-insulated live contact (24VAC/DC) External power 24VAC/DC ±20%
Number of inputs:	11
Digital input status variation detection time:	100ms (in any case it depends on the cycle time set by the user in the given application)

⚠ **CAUTION**	**If the digital inputs are used with voltage, use another transformer (<u>do not use the same secondary of the controller's power</u>) in order to prevent the inputs from malfunctioning or being damaged.**

©2024 Copeland LP.

8.3.3 Analog Outputs

Table 8-5 - Analog Outputs Specification

Type:	Non opto-insulated internal power
Number of outputs:	4
Type of analog output:	4 configurable outputs 0-10VDC (Out1 - Out4)
Maximum load:	40mA (Out1 - Out4) max with configured outputs 0-10VDC 22? per live analog output
Accuracy:	Out1 - Out4: ±2% full scale
Resolution:	8bit

CAUTION **The electrical devices controlled by these analog outputs must be powered separately with another transformer (<u>do not use the same secondary of the controller's power</u>) in order to prevent the outputs from malfunctioning or being damaged.**

8.3.4 Digital Outputs

Table 8-6 - Digital Outputs Specifications

Type:	Relays with NO contacts
Number of outputs:	8
Type of output: (configurable via software parameter)	Relays with normally open contact
Maximum load:	5A(250VAC) SPST 5(2)A

CAUTION **Verify the capacity of the output used. There is double insulation between the digital outputs and the low voltage of the rest of the circuit. <u>Do not use different voltages for the various groups of relays nor within each group.</u>**

 ©2024 Copeland LP.

8.4 Wiring

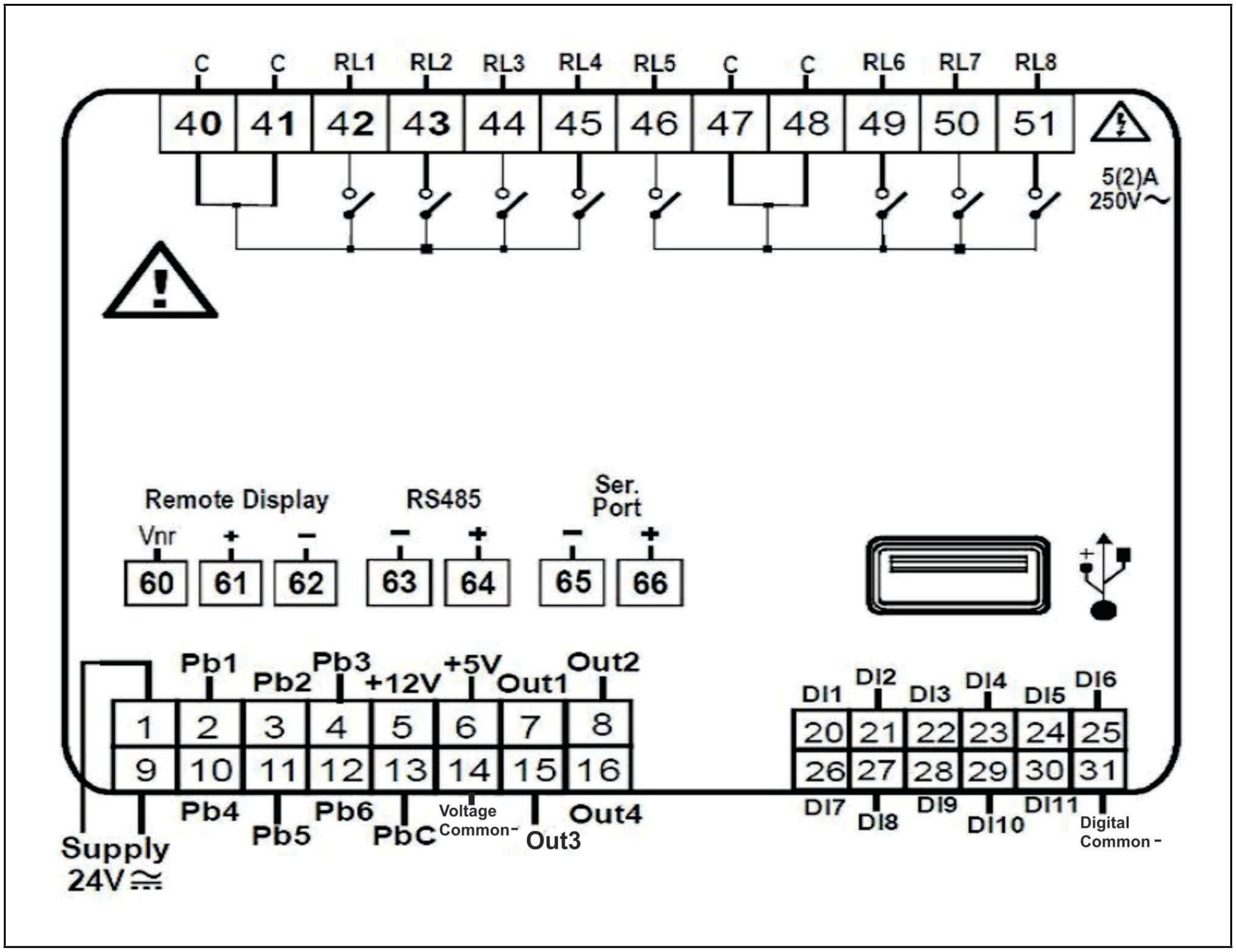


Figure 8-1 - Pump Skid Controller Detail

9 Using the Visograph

9.1 Viewing Status

For visograph button functionality, see **Section 3.1.2.2, Visograph Navigation** section.

9.1.1 Main Menu

1. **Pump(s) Status** - shows status of pumps 1 and 2
2. **Pump(s) Configure** - for pump 1 and 2 setup
3. **Set Modbus Address** - to set Modbus address and update Visograph screens
4. **P1 Alarm(s) Status** - shows active alarms for pump 1
5. **P2 Alarm(s) Status** - shows active alarms for pump 2
6. **System Status** - shows system alarms status
7. **System Config** - configure system digital inputs

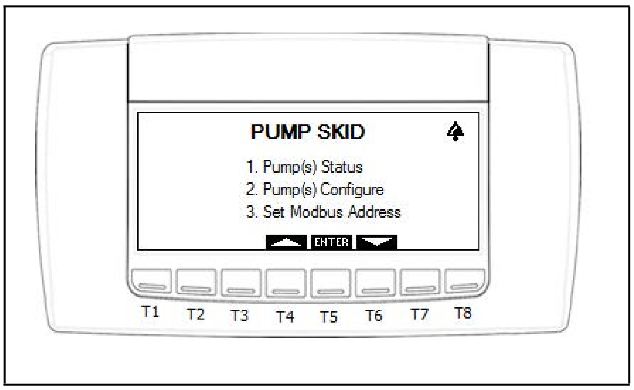


Figure 9-1 - Main Menu Page 1

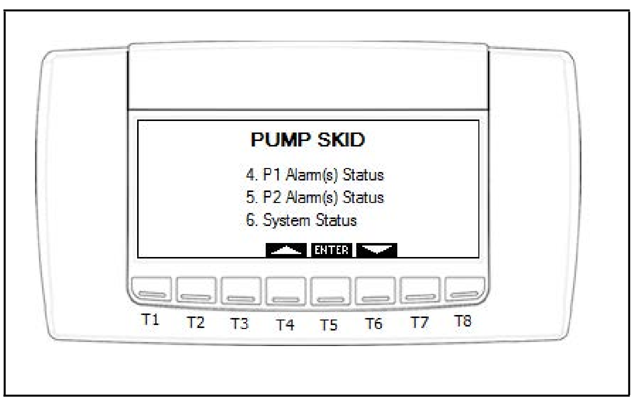


Figure 9-2 - Main Menu Page 2

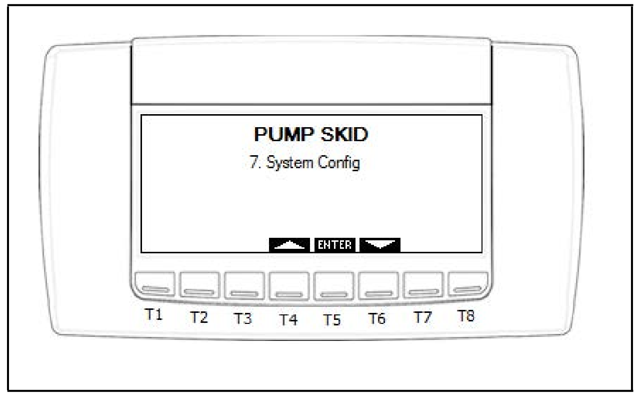


Figure 9-2 - Main Menu Page 3

9.2 Pump(s) Status

Press **1** to navigate to the Pump(s) Status screen. The status of pumps 1 and 2 that are shown on this screen are:

- Outlet Temperature/Pressure
- Inlet Temperature/Pressure
- Analog Output %
- Lead Pump Differential Temperature/Pressure
- Animation for running pump

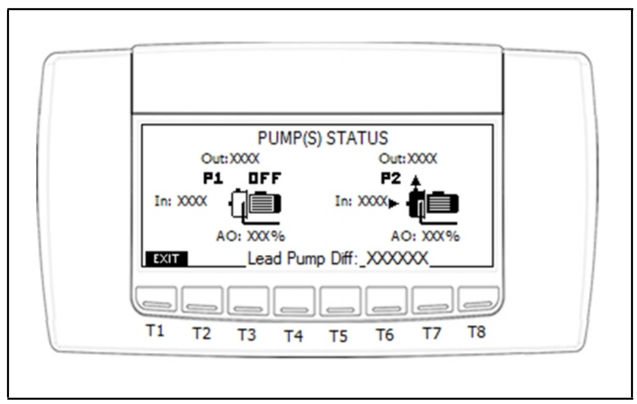


Figure 9-2 - Pump(s) Status

9.3 Pump(s) Configure

From PUMP SKID main menu, use the arrows to navigate to the PUMP(s) CONFIGURE screen. From this screen the user can select the control strategy - either temperature (TEMP) or pressure (PRES).

1. **CNTRL STRATGY**: To select control strategy, TEMP or PRES, use the up and down arrows until TEMP or PRES is highlighted. Press **SET** (the highlighted selection should begin flashing). Use the up and down arrows to scroll through choices. To select, press the **SET** button again (the highlighted selection should stop flashing).

2. **ENG UNITS**: To select the engineering units, DC/BAR or DF/PSI, use the up and down arrows until DC/BAR or DF/PSI is highlighted. Press the **SET** button (should see highlighted selection begin flashing). Use the up and down arrows to scroll through choices. To select, press the **SET** button again (should see highlighted selection stop flashing).2

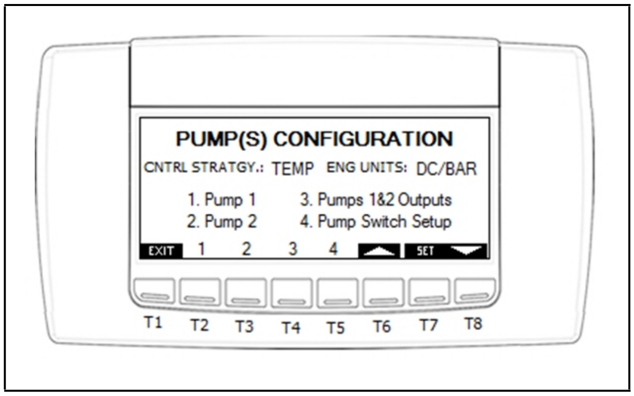


Figure 9-3 - Pump(s) Configuration

9.3.1 Pump 1 Configuration

From the PUMP(S) CONFIGURATION screen, press **1** (**T2** button) to enter PUMP 1 CONFIGURATION screen.

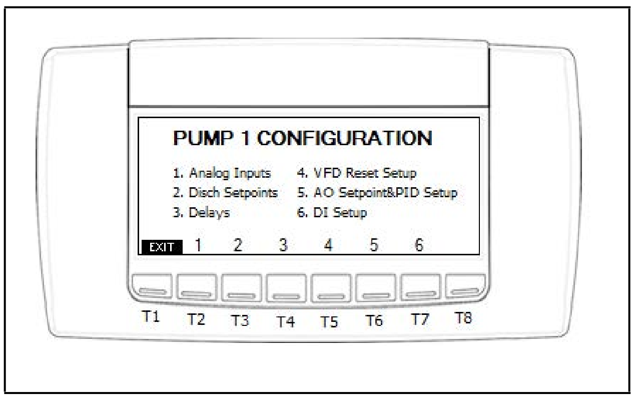


Figure 9-4 - Pump 1 Configuration

9.3.1.1 Pump 1 Analog Inputs

From the PUMP 1 CONFIGURATION screen press **1** to navigate to the PUMP 1 ANALOG INPUTS screen. From this screen the user can select an analog input (AI1 - AI6) for "P1 Inlet" and "P1 Outlet."

To select an analog input, press the **SET** button (should see highlighted selection flashing). Use the up and down arrows to scroll through choices. To select, press the **SET** button again (should see highlighted selection stop flashing).

Arrow down to the next field. Repeat above until all analog inputs have been set up.

Press right arrow (**T8** button) to enter CONFIGURE AI's (TEMP) screen.

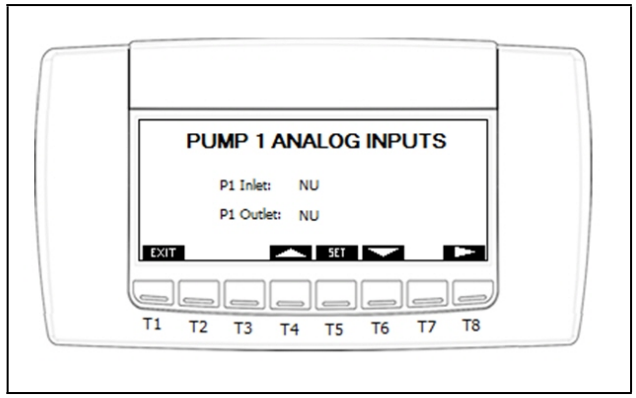


Figure 9-5 - Pump 1 Analog Inputs

9.3.1.2 Configure Analog Input's Temperature

If the selected control strategy is temperature (TEMP), use this screen to select what type of analog sensor is being used (NTC, PTC, 0-20mA, 4-20mA, 0-10V, 0-1V, 0-5V, or CPC).

To select an analog input type, press the **SET** button (should see highlighted selection flashing). Use the up and down arrows to scroll through choices. To select, press the **SET** button again (should see highlighted selection stop flashing).

Arrow down to the next field. Repeat above until all analog input sensor types have been set up.

Press the right arrow (**T8** button) to enter CONFIGURE AI's (TRANSD.SIZE) screen.

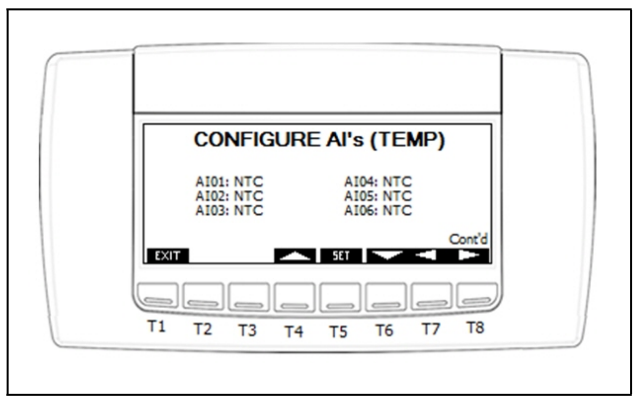


Figure 9-6 - Configure Analog Input's Temperature

 ©2024 Copeland LP.

9.3.1.3 Configure Analog Input’s Transducer Size

If the selected control strategy is pressure (PRES), use this screen to select what type of pressure transducer is being used (100lb, 200lb, 500lb, 650lb).

To select the pressure transducer type, press the **SET** button (should see highlighted selection flashing). Use the up and down arrows to scroll through the choices. To select, press the **SET** button again (should see highlighted selection stop flashing).

Arrow down to the next field. Repeat above until all pressure transducer types have been set up.

Press the right arrow (**T8** button) to enter CONFIGURE AI’s (OFFSET) screen.

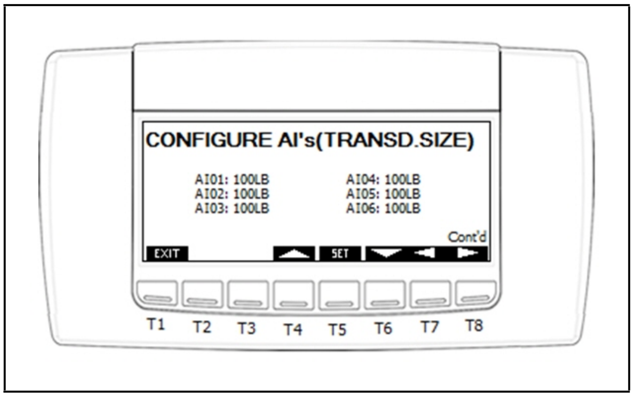


Figure 9-7 - Configure Analog Input’s Transducer Size

9.3.1.4 Configure Analog Input’s Offset

To enter an analog input offset (temperature or pressure), press the **SET** button (should see highlighted selection flashing). Use the up and down arrows to scroll increment/ decrement value. To select, press the **SET** button again (should see highlighted selection stop flashing).

Arrow down to the next field. Repeat the above until all analog input offsets have been set up.

Press **EXIT** (**T1** button) to return to PUMP 1 CONFIGURATION screen.

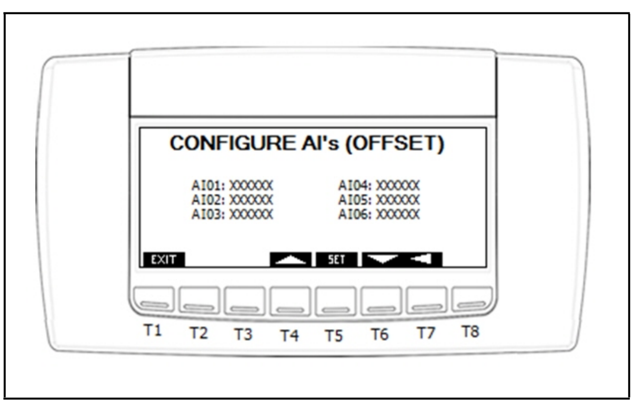


Figure 9-8 - Configure Analog Input’s Offset

9.3.1.5 Pump 1 Digital Inputs

From the PUMP 1 CONFIGURATION screen press **6** to navigate to the PUMP 1 DIGITAL INPUTS screen. From this screen the user can select a digital input (DI1 - DI11) for **P1 Proof**, **P1 VFD** Fault, and **P1 VFD Bypass**.

To select a digital input, press the **SET** button (should see highlighted selection flashing). Use the up and down arrows to scroll through choices. To select, press the **SET** button again (the highlighted selection should stop flashing).

Arrow down to the next field. Repeat the above steps until all digital inputs have been set up.

Press the right arrow (**T8** button) to enter CONFIGURE DI’s (POLARITY) screen.

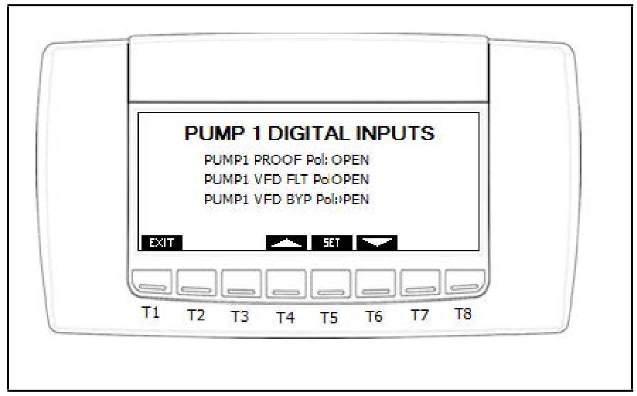


Figure 9-9 - Pump 1 Digital Inputs

9.3.1.6 Configure Digital Input’s Polarity

To select digital input polarity, press the **SET** button (should see highlighted selection flashing). Use the up and down arrows to scroll through choices. To select, press the **SET** button again (the highlighted selection should stop flashing).

Arrow down to the next field. Repeat the above steps until all digital input polarities have been set up.

Press **EXIT** (**T1** button) to return to PUMP 1 CONFIGURATION screen.

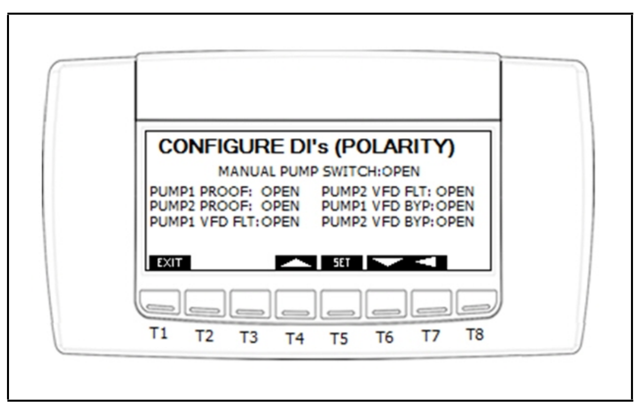


Figure 9-10 - Configure Digital Input’s Polarity

©2024 Copeland LP.

9.3.1.7 Pump 1 Setpoints

From the PUMP 1 CONFIGURATION screen press **2** to navigate to the PUMP 1 SETPOINTS screen. From this screen the user can enter pump safety Cut-in and Cut-out setpoints.

To enter setpoints, press the **SET** button (the flashing highlighted selection). Use the up and down arrows to scroll through the choices. To select, press the **SET** button again (the highlighted selection should stop flashing).

Arrow down to the next field. Repeat above until all setpoints have been set up.

Press **EXIT** (**T1** button) to return to PUMP 1 CONFIGURATION screen.

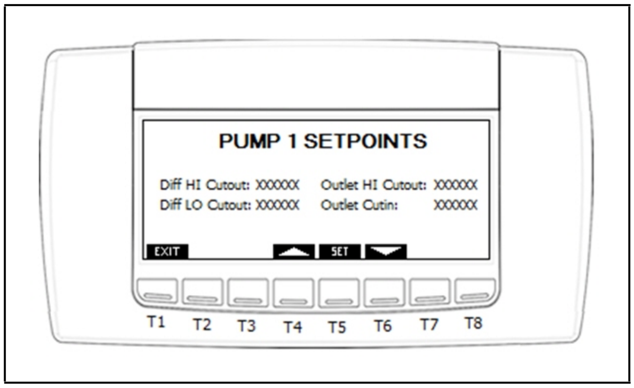


Figure 9-11 - Pump 1 Setpoints

9.3.1.8 Pump 1 Delays

From the PUMP 1 CONFIGURATION screen press **3** to navigate to the PUMP 1 DELAYS screen. From this screen the user can enter alarm delays for a differential pressure "out-of-range" alarm and a pump run proof failure alarm. The user can also enter a delay for when the alarm(s) clear.

To enter a delay time, press the **SET** button (the flashing highlighted selection). Use the up and down arrows to scroll through choices. To select, press the **SET** button again (the highlighted selection should stop flashing).

Arrow down to the next field. Repeat the above steps until all delays have been set up.

Press **EXIT** (**T1** button) to return to PUMP 1 CONFIGURATION screen.

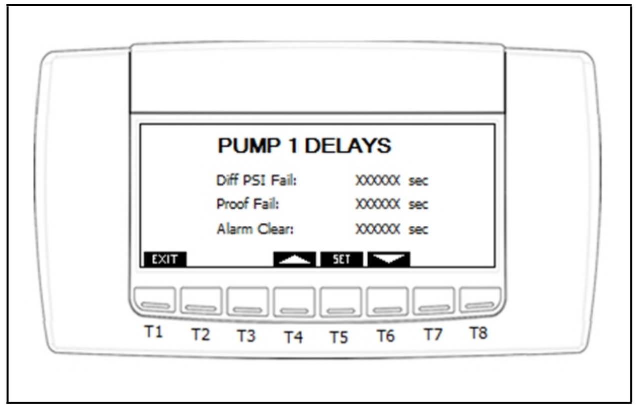


Figure 9-12 - Pump 1 Delays

9.3.1.9 Pump 1 VFD Reset Setup

From the PUMP 1 CONFIGURATION screen press **4** to navigate to the PUMP 1 VFD screen. From this screen the user can enter pump reset setpoints.

To enter setpoints, press the **SET** button (the flashing highlighted selection). Use the up and down arrows to scroll through choices. To select, press the **SET** button again (the highlighted selection should stop flashing).

Arrow down to the next field. Repeat the above steps until all setpoints have been set up.

Press **EXIT** (**T1** button) to return to PUMP 1 CONFIGURATION screen.

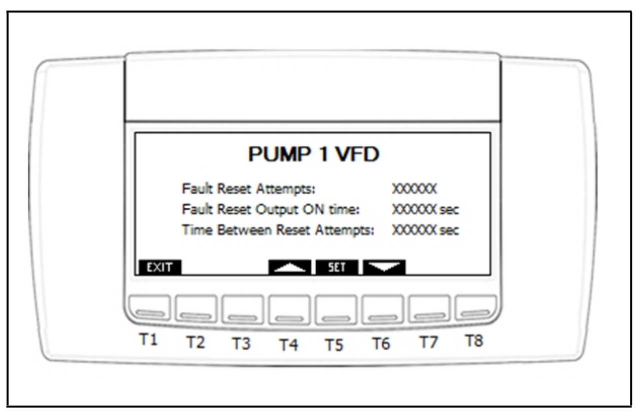


Figure 9-13 - Pump 1 VFD

9.3.1.10 Pump 1 AO and PID Setup

From the PUMP 1 CONFIGURATION screen press **5** to navigate to the PUMP 1 AO & PID screen. PUMP 1 AO & PID screen setup explained below:

DIRECT ACTING: If set to **YES**, PID increases as control input increases, and vice versa. Cooling and refrigeration use this method.

If set to **NO**, PID decreases as control input increases, and vice versa. Also known as "reverse acting." Heating also uses this method.

CONTROL METHOD:

Five Possible Selections:

1. **NU** - Pump relay ON, AO = 0% (to be used if no modulation - pump controlled by relay only).
2. **User Def %** - User defines percentage of analog output - Default = 100%
3. **Differential** - Controls pump to maintain user defined setpoint within user-defined differential temperature or pressure range. (See **Section 9.3.1.7, Pump 1 Setpoints** for range).
4. **Outlet** - Controls pumps to maintain user-defined setpoint within user-defined outlet temperature or pressure range. (See **Section 9.3.1.7, Pump 1 Setpoints** for range).
5. **Inlet** - Controls pumps to maintain user defined inlet temperature or pressure setpoint.

- **Control Setpoint**: User-defined temperature or pressure setpoint value.
- **Setpoint Offset**: User-defined temperature or pressure offset value.
- **TR or P Gain, I Gain, D Gain**: Adjustable PID settings.

For setup, press the **SET** button (the highlighted selection should stop flashing). Use the up and down arrows to scroll through choices. To select, press the **SET** button again (the highlighted selection should stop flashing).

Arrow down to the next field. Repeat the above steps until all setpoints have been set up.

Press **EXIT** (**T1** button) to return to PUMP 1 CONFIGURATION screen.

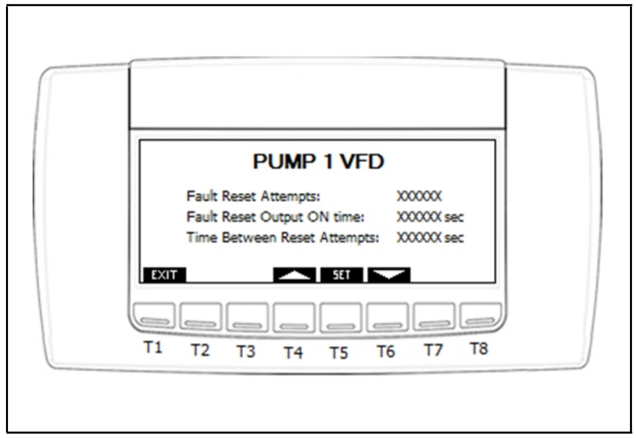


Figure 9-14 - Pump 1 AO and PID

9.3.2 Pump 2 Configuration

From the PUMP(S) CONFIGURATION screen, press **2** (**T3** button) to enter PUMP 2 CONFIGURATION screen.

Repeat the previous steps as Pump 1 setup for Pump 2 setup.

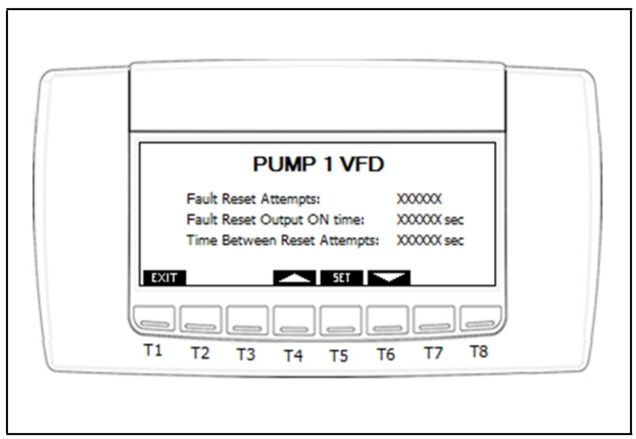


Figure 9-15 - Pump 2 Configuration

9.3.3 System Digital Inputs

From the MAIN MENU, use the arrows to scroll down to the SYSTEM CONFIG screens.

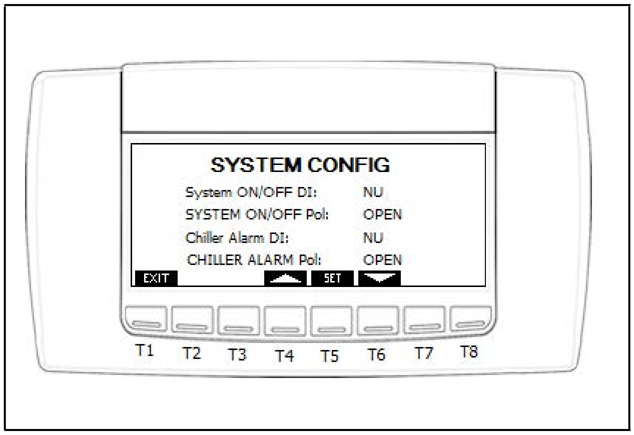


Figure 9-16 - System Configuration Page 1

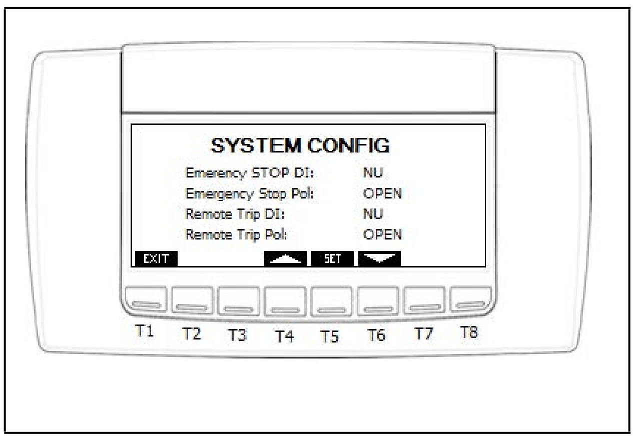


Figure 9-17 - System Configuration Page 2

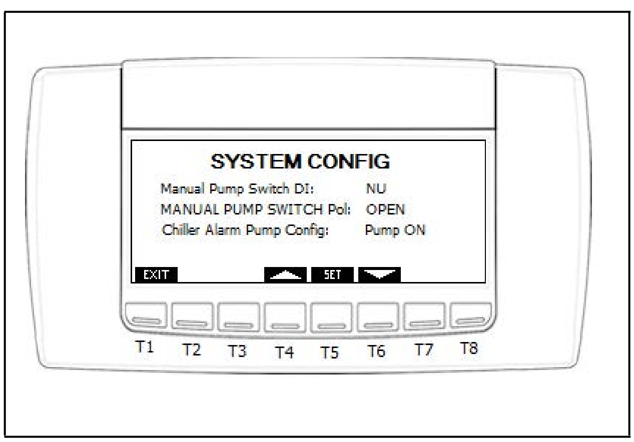


Figure 9-18 - System Configuration Page 3

To configure each digital input and its respective polarity, use the arrows to highlight, press ENTER (highlighted input will start flashing), press UP or DOWN arrows as needed to select the desired input configuration, then press ENTER again to assign.

9.3.4 Configure Outputs

9.3.4.1 Pumps 1 & 2 Outputs

From the PUMP(S) CONFIGURATION screen press **3** to navigate to the SYSTEM OUTPUTS screen. From this screen the user can select a control point for each relay.

To assign outputs, press the **SET** button (the flashing highlighted selection). Use the up and down arrows to scroll through choices. To select, press the **SET** button again (the highlighted selection should stop flashing).

Arrow down to the next field. Repeat the above steps until all outputs have been set up.

Press **EXIT**(**T1** button) to return to PUMP(S) CONFIGURATION screen.

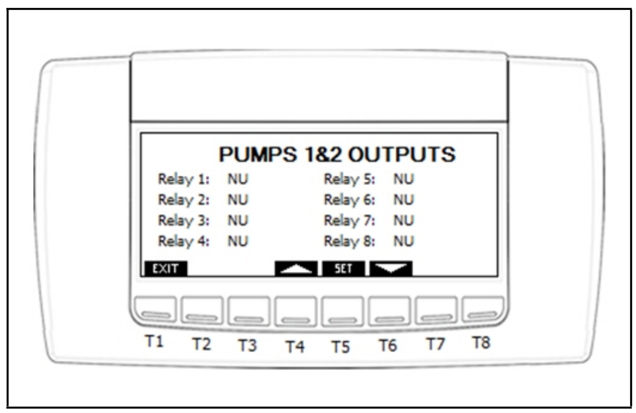


Figure 9-16 - Pump 1 & 2 Outputs

9.3.4.2 Pump Switch Setup

From the PUMP(S) CONFIGURATION screen press **4** to navigate to the PUMP SWITCH SETUP screen. The PUMP SWITCH SETUP screen setup explained below:

- **Manual Pump Switch DI**: User-defined digital input that will be used to switch pumps manually.
- **Enable pumps to switch on timer?**: If set to **NO**, the lead pumps runs continuously under normal conditions. If set to **YES**, pumps can switch in order to equalize runtime.
- **Enter Hrs between pump switch**: User-defined number of hours the lead pump is to run before switching to next pump.
- **Elapsed time**: Displays number of hours elapsed since timed pump switch was enabled.

 ©2024 Copeland LP.

- **Overlap on Pump Switch Over**: User-defined time period (in seconds) where the first pump remains running after the switching attempt to the second pump is made.
- **Count of Switches before Pump Trip Alarm**: User-defined parameter setting the limit of switching attempts to be made under any of the alarm conditions before discontinuing any further attempts and activating the main Alarm, or the Pump Trip Alarm.
- **Pump Trip Time Period**: User-defined period (in seconds) within which the count of switching attempts must reach the limit in order to activate the main Alarm or Pump Trip Alarm and discontinue any further switching attempts.
- **Pump Trip Reset**: Parameter to manually reset the pumps and resume normal operation after the switch counter reaches its limit within the pump trip time period.

To assign/enter value(s), press the **SET** button (the highlighted selection should be flashing). Use the up and down arrows to scroll through choices. To select, press the **SET** button again (should see highlighted selection stop flashing).

Arrow down to the next field. Repeat above until all have been set up.

Press **EXIT** (**T1** button) to return to PUMP(S) CONFIGURATION screen.

Both pumps 1 and 2 should now be configured.

Now press **EXIT** (**T1** button) twice to return to PUMP SKID main menu screen.

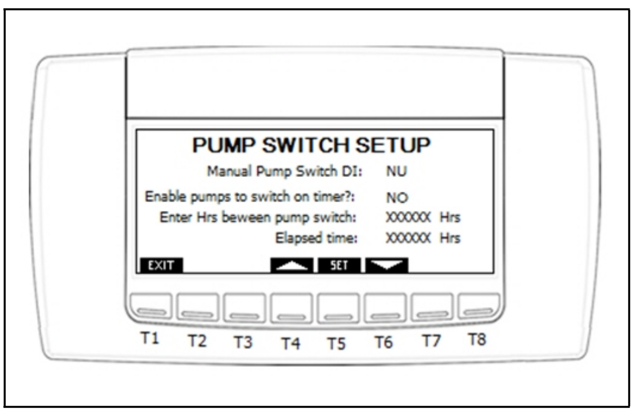


Figure 9-17 - Pump Switch Setup

9.4 Configure MODBUS Address

From the PUMP SKID main menu, press **3** to navigate to the SET MODBUS ADDRESS screen. From this screen the user can select the MODBUS address, as well as upload Visograph screens.

The UPD.↑ button allows the user to upload Visograph screens.

To assign a MODBUS address, press the **SET** button (the flashing highlighted selection). Use the up and down arrows to scroll through choices. To select, press the **SET** button again (the highlighted selection should stop flashing).

Press the **EXIT** (**T1** button) to return to the PUMP SKID main menu screen.

Reboot Pump Skid controller (power down, then power up) to establish the MODBUS address.

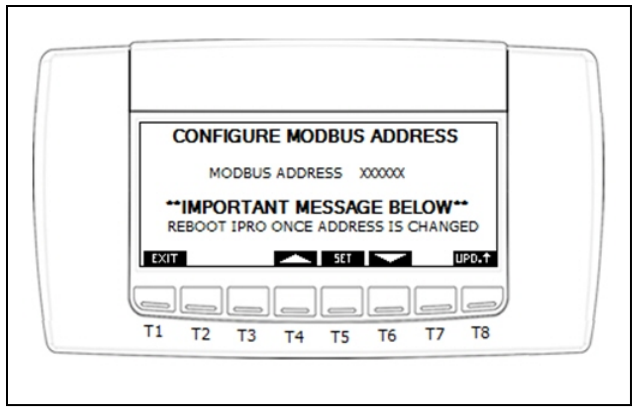


Figure 9-18 - Configure MODBUS Address

9.5 Pump 1 Alarm(s) Status

From PUMP SKID main menu, press **4** to navigate to the PUMP1 ALARMS(S) STATUS screen. From this screen the user can see active alarms for pump 1.

Press **EXIT** (**T1** button) to return to PUMP SKID main menu screen, or press right arrow (**T8** button) to go to PUMP2 ALARMS(S) STATUS screen.

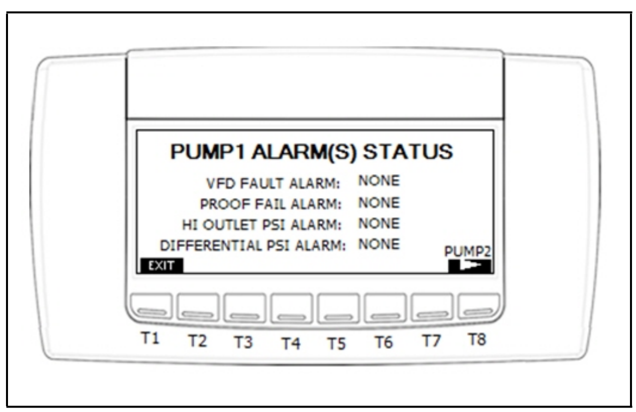


Figure 9-19 - Pump 1 Alarm(s) Status

 ©2024 Copeland LP.

9.6 Pump 2 Alarm(s) Status

From PUMP SKID main menu, press **5** to navigate to the PUMP2 ALARMS(S) STATUS screen. From this screen the user can see active alarms for pump 2.

Press **EXIT** (**T1** button) to return to PUMP SKID main menu screen.

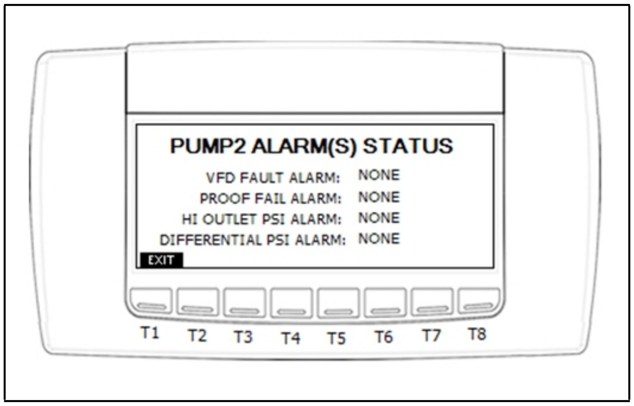


Figure 9-20 - Pump 2 Alarm(s) Status

9.7 System Alarm(s) Status

From the PUMP SKID main menu, press **6** to navigate to the SYSTEM STATUS screen. From this screen, the user can see active system alarms. Press **EXIT** (**T1** button) to return to PUMP SKID main menu screen.

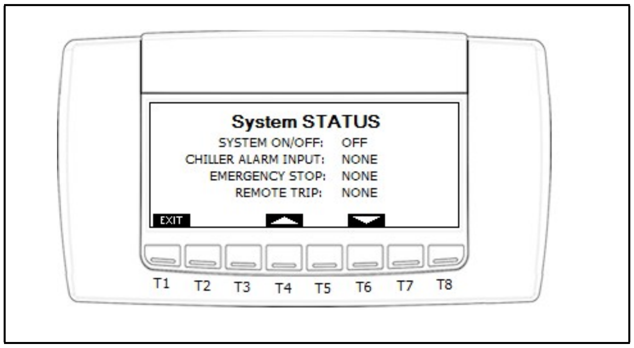


Figure 9-2 - System Status Screen

 ©2024 Copeland LP.

Index

©2024 Copeland LP.

Visit our website at copeland.com/en-us/products/controls-monitoring-systems for the latest technical documentation and updates.
For Technical Support call **833-409-7505** or email **ColdChain.TechnicalServices@Copeland.com**

The contents of this publication are presented for informational purposes only and they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. Copeland reserves the right to modify the designs or specifications of such products at any time without notice. Responsibility for proper selection, use and maintenance of any product remains solely with the purchaser and end-user.
©2024 Copeland is a trademark of Copeland LP.

026-1733 R3