DemandSet Controller Instruction Manual

VARIABLE SPEED PRESSURE BOOSTER APPLICATION

For eMVP/MVP Booster DemandSet Version 6
Control Panel using HMI STM Display

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DOCUMENT:MFG/HYF-IOM-6-26

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Pump Safety Instructions

READ THE FOLLOWING BEFORE INSTALLATION OF THE eMVP/MVP PRESSURE BOOSTER SYSTEM.

All installation and operation instructions of this manual must be read, understood, and followed by the installation and operation personnel. Ensure that this is the latest version of the manual by visiting www.hyfabco.com/hyfabco/pressure-boosters.

HYFAB accepts no liability for damages or operating disorders resulting from non-compliance with the operating instructions. Adhere to local codes and ordinances when installing, operating, and maintaining this equipment.

THIS MANUAL DOES NOT COVER THE SELECTION OR PLUMBING DESIGN PROCEDURES. THIS MANUAL IS INTENDED TO ASSIST WITH THE CONFIGURATION AND OPERATIONAL SETUP OF THE STANDARD eMVP / MVP PRESSURE BOOSTER SYSTEM. FAILURE TO FOLLOW DESIGN GUIDELINES MAY RESULT IN EQUIPMENT DAMAGE, SYSTEM MALFUCTION, OR PERSONAL INJURY.

General Safety Symbols

IMPORTANT!: **Read all safety information prior to installation. Thoroughly review all instructions and warnings prior to performing any work on pumping systems such as start-up or maintenance.**

TO AVOID SERIOUS OR FATAL PERSONAL INJURY AND/OR MAJOR PROPERTY DAMAGE, READ AND FOLLOW ALL SAFETY INSTRUCTIONS IN THE MANUAL AND ON THE EQUIPMENT(S).

Symbol	Description
	This is a SAFETY ALERT SYMBOL. When you see this symbol on the pump or in the manual, look for one of the following signal words and be alert to the potential for personal injury or property damage.
⚠ DANGER	Warns of hazards that **WILL** cause serious personal injury, death, or major property damage.
⚠ WARNING	Warns of hazards that **CAN** cause serious personal injury, death, or major property damage.
⚠ CAUTION	Warns of hazards that **CAN** cause personal injury or property damage.
NOTICE!	Indicates important instructions which must be followed.

Pressure Booster Safety Messages

⚠ WARNING	**HIGH VOLTAGE**
All electrical work must be performed by a qualified technician. Always follow the National Electrical Code (NEC), or the Canadian Electrical Code (CEC) as well as all local, state, and provincial codes. Code questions should be directed to the local electrical inspector. Failure to follow electrical codes and OSHA safety guidelines may result in personal injury or equipment damage.	

⚠ CAUTION	**EQUIPMENT HAZARD**
Failure to follow manufacturer's installation instructions may result in electrical shock, fire hazard, personal injury, death, damage to equipment, and unsatisfactory performance, and may void the manufacturer's warranty.	

⚠ WARNING	**UNINTENDED START**
When the pressure booster is energized, the motor may start at any time, causing risk of death, serious injury, and equipment and/or property damage. Carefully review all possible start conditions on startup.	

⚠ CAUTION	**EQUIPMENT HAZARD**
UNIT NOT DESIGNED FOR USE WITH HAZARDOUS LIQUIDS OR FLAMMABLE GASES.	

Certification

UL 508A INDUSTRIAL CONTROL PANEL FABRICATOR

User Safety

NOTICE! **User Manual Limitation**

The instructions in this manual apply exclusively to the DemandSet Control panel for the eMVP/MVP pressure booster station. For detailed information on specific system components or equipment, please refer to the manufacturer's documentation. All users must carefully review, understand, and adhere to each component or equipment's safety instruction, warnings, and operational guidelines before installation, operation, or maintenance.

Personal Safety

To ensure safe and effective installation and operation of the DemandSet control panel, this instruction manual assumes you are already familiar with pumping equipment and components. Users are expected to understand standard industry practices, applicable safety procedures, and the operational principles of a booster station. This document does NOT replace formal training or site-specific operational guidelines.

In any situation consider the following:

- Keep the work area clean and free from any potential hazards.
- Be aware of the potential risks for injuries related to burns, electric shocks, toxic fluids, and hazardous pressure.
- Be mindful of hazardous voltage and avoid all electrical hazards.
- Stay aware of the risks associated with gas and vapors in the workplace.

Safety Equipment

Personal safety equipment must be worn and used to all applicable standards/regulations.

Description and Specifications

This manual does not include system sizing, equipment selection, or plumbing design procedures. It is intended to assist in the installation, programming, and operation of the Demandset controller for standard eMVP/MVP pressure booster. This instruction guide applies to systems with version 6.00 pump controller using the 7" STM-series operator displays. Operators must consult and follow all safety instructions, operating guidelines, and technical documentation provided by the individual component and equipment manufacturers. These documents contain critical information necessary for the safe and proper installation, operation, and maintenance of each system component found in the eMVP/MVP booster station.

The eMVP/ MVP are modular variable speed pressure booster pumping systems. The MVP employs modified Goulds 3656 series single stage, end-suction, centrifugal pumps and offers sensorless-flow monitoring. The eMVP uses Goulds eSV series multistage pumps. Both booster stations are operated and interfaced with the DemandSet controller. This manual also covers operational and integration instructions for a standalone DemandSet control panel when used for a pressure boosting application.

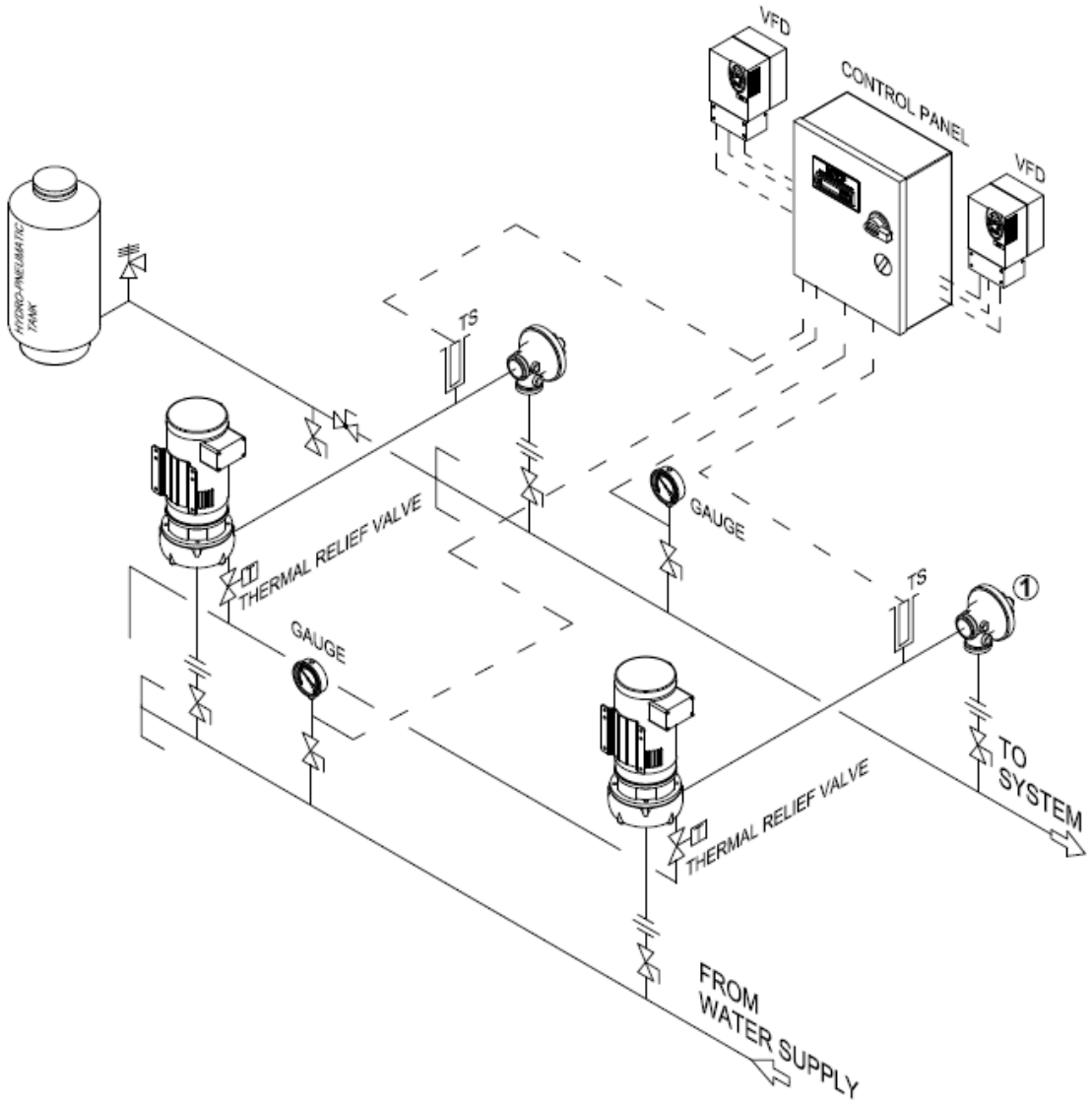
Booster Controller

The DemandSet controller is a multi-pump control system designed for efficient constant water pressure management. It is used for both the eMVP and MVP series of booster stations. It consists of a UL 508A-listed industrial control panel with dedicated variable frequency drives (VFD) for each pump motor. This ensures precise speed control, energy savings, and comprehensive motor and pump protection.

Pump operation is managed by the controller using discrete hardwire termination for reliable and simple integration. A DemandSet controller can operate up to four (4) pumps in parallel, handling run time, speed, multi-pump sequencing, and run status. Factory selected VFD equipment enables advanced features such as sensorless flow approximation for the MVP booster.

The controller supports Modbus or BACnet communication as standard. It can be integrated into existing ethernet capable networks or serial RS-485 systems.

eMVP / MVP Pressure Booster Application



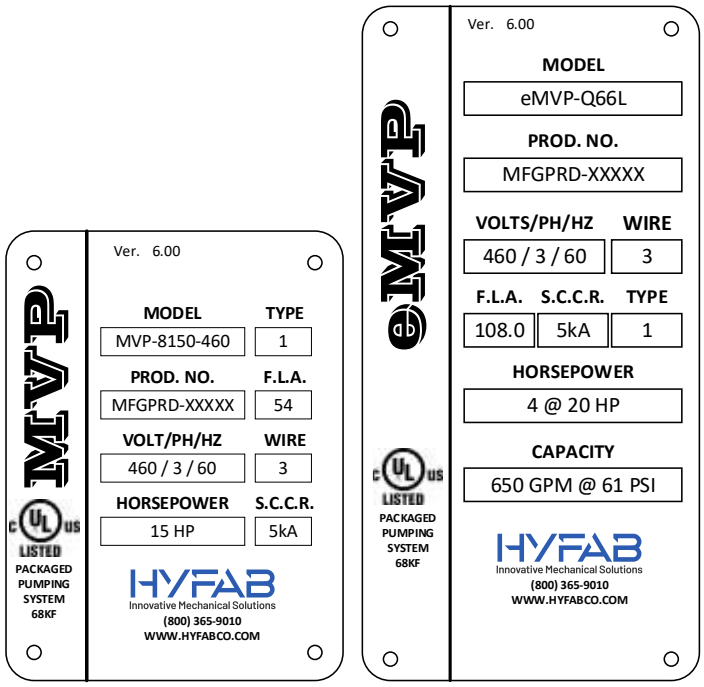
Typical DemandSet application for duplex system

Booster Mode

	eMVP/MVP Booster	
System Process	• Constant Pressure • DemandSet (Variable Pressure) ▪ Sensorless Head (Flow approximation) ▪ Variable Head (Flow actual measurement)	
Pump Control	• Up to four pumps using hardwire.	
BAS Support (Field Configured)	*Serial* • BACnet MS/TP • Modbus RTU	*Ethernet* • BACnet IP • Modbus TCP
Optional Field I/O	*Input* • System Enable • Low Level Cut Off • Remote Pressure • Flow	*Output* • Alarm

Nameplate

The eMVP/MVP pressure booster systems are identified with a pump station nameplate located on the frame and/or controller enclosure, displaying the manufacturer's model and pumping capacity details. Inside the controller enclosure is an additional nameplate which consists of a unique UL 508A tag and identification of the booster's controller version.



Booster nameplate example MVP (left) and eMVP (right)

Identification	Details
Model / Production Number	Booster series and pumping station unique identifiers.
Electrical Ratings	Voltage, frequency, and current ratings.
Pumping System Design	The pumping system capacity, such as maximum pressure or flow rate and HP rating for the largest pump in the system.
Manufacturer Information	The name and contact information for the manufacturer.

When contacting your sales rep., please specify:

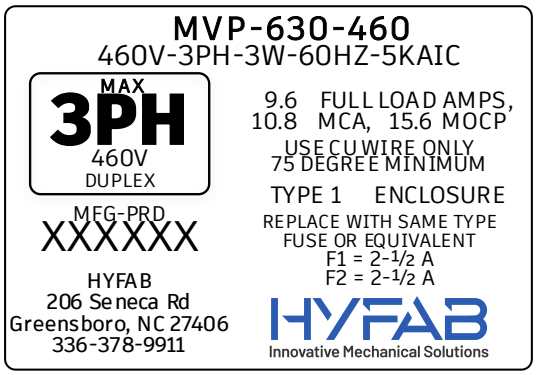
Pressure Booster	
Model:	
Serial (Production) Number:	
Item numbers for applicable parts:	

eMVP series	*MVP series*
eMVP – X NN(N) Y	**MVP – X NN Y**
X *– Pump quantity* D - for Duplex, T -Triplex, Q – Quadplex	
NN *– e-SV variant* 01, 03, 05, 10, 15, 22, 33, 46, 66, 92, 125SV types	***NN*** *– M&L variant* 3656S or 3656 max impeller size, 06, 07, 08-16
Y *– Horsepower* Letters reference HP in a schedule, G- 5HP, H-7.5HP,etc.	

eMVP series	*MVP series*
eMVP – N – XX 0 YY – ZZZ	**MVP* – X YY – ZZZ**
N *– Pump quantity* 2, 3, or 4 pumps	**** Additional Options:*** a. 6", 7", or 8" Headers b. D - for Duplex, T -Triplex, Q – Quadplex
XX *– e-SV variant* 10, 15, 22, or 33SV	***X*** *– Pump Size* 6, 7 or 8
O *- place holder*	
YY *– Number of pump stages* (10 is 1, 20 is 2, 30 is 3, etc). e.g. 21 would be two full stages with one reduced size stage)	***YY*** *– Horsepower* (3 to 25 HP): 30, 50, 75, 100 or 150, 200, 250
ZZZ – Voltage: 208V, 460V, SP (Single Phase 240V)	

Panel Identifier Tag

The control panel nameplate is also associated with a unique UL 508A serialization.

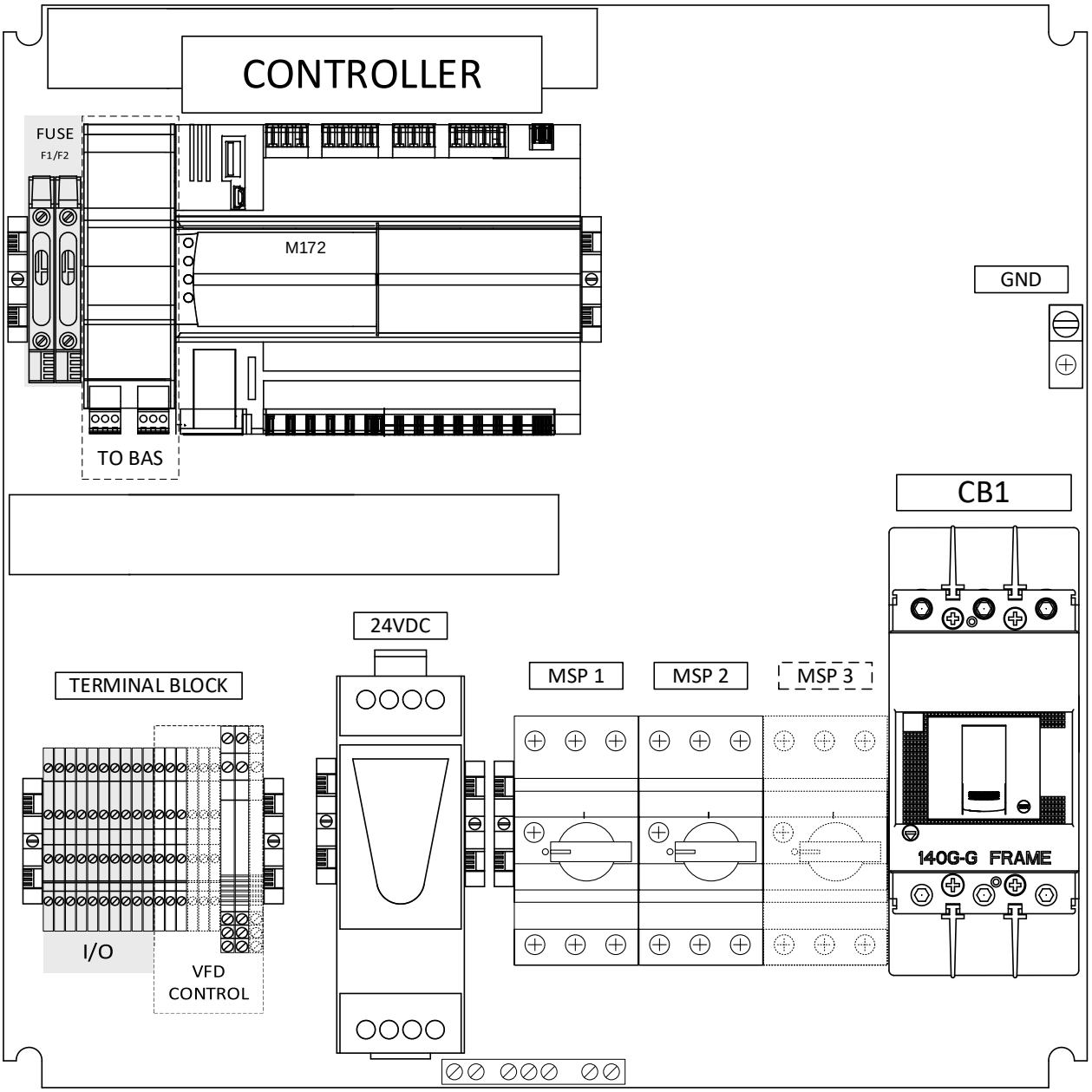


Control panel nameplate

Identification	Details
Model	Identifier for DemandSet control panel wiring diagram.
Short-Circuit Current Rating (SSCR)	Indicates the maximum fault current the panel can safely withstand. See NEC Article 409 by ABB for details.
Manufacturer Serial Number	Unique identifier for DemandSet Control Panel.
Enclosure Type Rating	Specifies NEMA or UL type for dust, water, and corrosion protection.
Electrical Rating	Voltage, frequency, current, and SCCR rating for DemandSet control panel.

Electrical

Panel Layout



DemandSet control panel configured for triplex (3 pumps)

Identifying the following system components will ease setup and operation.

Panel Component	Details
Main Circuit Breaker (CB1)	• The primary disconnect for incoming power source to the DemandSet control panel.
Motor Starter Protection (MSP)	• A motor-specific circuit breaker with short-circuit and overload protection.
Grounding Termination (GND)	• The main bonding point for the DemandSet control panel and incoming power source power grounding.
24VDC Power Supply	• Provides a regulated low voltage 24VDC source for the controller, sensors, and other low-power equipment.
Controller (SE TM172.. 28 I/O)	• Manages pump operations, monitors system status, and provides external integration.
Terminal Block	• Organized connection points for field wired devices, sensors, and switches.

Power Connection

⚠ WARNING	**HIGH VOLTAGE**
ELECTRICAL CONNECTIONS MUST BE COMPLETED BY A COMPETENT AND LICENSED ELECTRICIAN IN COMPLIANCE WITH NEC AND LOCAL CODE REQUIREMENTS. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH AND/OR PROPERTY DAMAGE.	

⚠ WARNING	**HIGH VOLTAGE**
Incorrect voltage levels can cause equipment damage, electrical hazards, or personal injury. Always use appropriate testing equipment and follow standard safety protocols.	

Wire Type and Ratings

Booster panel electrical specification on name plate

When wiring the AC line power connection, ensure that the electrical ratings meet the equipment requirements. See Table 1 - Standard Configuration for eMVP/MVP page 50 for electrical data of standard eMVP/MVP boosters.

- Electrical Supply: Voltage, phase, and frequency ratings.
- Current Raings: Full Load Amps (FLA), Minimum Circuit Ampacity (MCA), and Maximum Overcurrent Protection (MOCP).
- Short Circuit Current Rating (SCCR): The SCCR value.
- Environmental Ratings: Any applicable NEMA or IP ratings.

NOTICE!	**Wire Rating**
	AC line wire type
Minimum:	167°F (75°C) Rated Copper Conductors
Recommended:	600V, 194°F (90°C) Rated Copper Conductors

The ground wire MUST be at least as large as the wire to the motor. Wires should be color coded for ease of identification and maintenance.

⚠ CAUTION	**EQUIPMENT HAZARD**
Any exposed metal in the system piping, including transducer case, must be grounded to the service entrance per NFPA 70: National Electrical Code, Article 250.	

Electrical Check

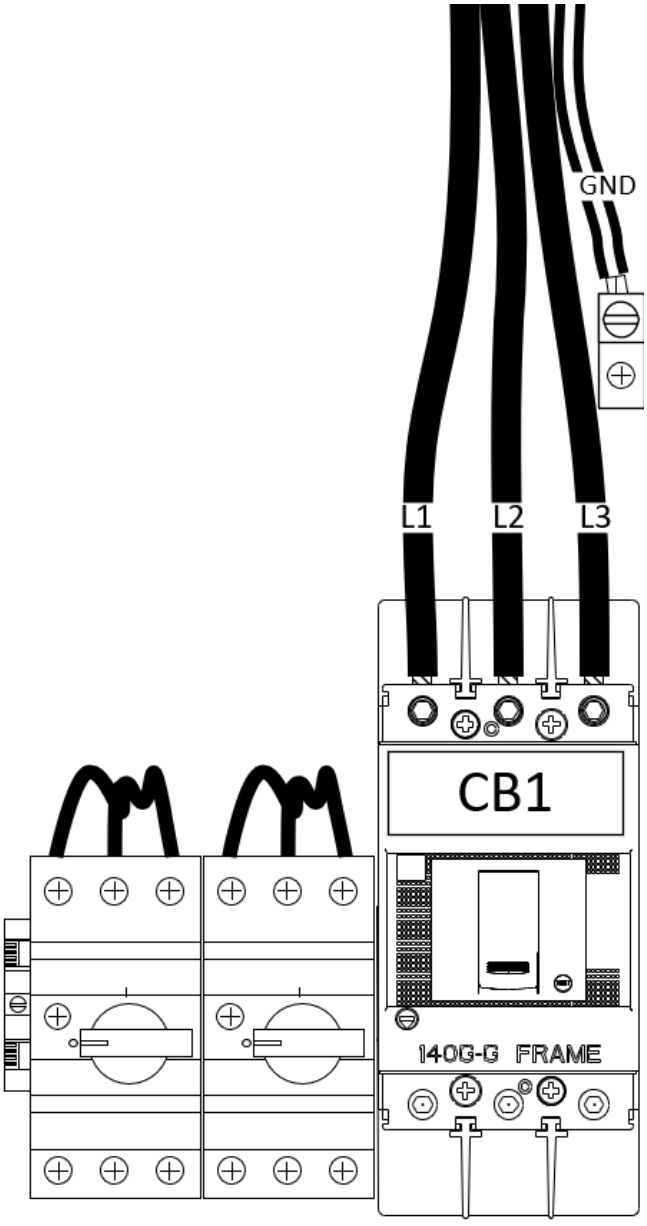
	2	Electrical
☐	2.1	Power available matches power required.
☐	2.2	Panel components are properly seated and factory wiring terminations are secure.
☐	2.3	Record incoming voltage before wiring and energizing control panel. Phase A - B _____ Volts Phase B - C _____ Volts Phase B - C _____ Volts
☐	2.4	Properly sized ground conductor is terminated.
☐	2.5	Motor circuit protective devices are set at motor nameplate ampacities.

Excerpt from HYFAB eMVP/MVP Booster System startup checklist

Wiring

⚠ WARNING	**EQUIPMENT HAZARD**
Power Isolation: Before starting any wiring work, ensure the power supply is completely de-energized and isolated to prevent accidental electric shock.	

Connect power according to the wiring diagram supplied with the unit. Branch circuit protection is required. For all electrical connections, the use of metal conduit with a liquid-tight connector is recommended.



Duplex pressure booster main circuit breaker

NOTICE! **Environmental Rating**

Check that all power wire terminations are completed in accordance with the specified NEMA or IP environmental rating. Proper sealing and protection are essential to maintain the integrity and safety of the system in its operating environment.

Wiring Procedure

Plan to land the conduit entry directly above the main circuit breaker on the enclosure. Provide sufficient clearance above the main breaker to avoid obstruction of control panel low-voltage components.

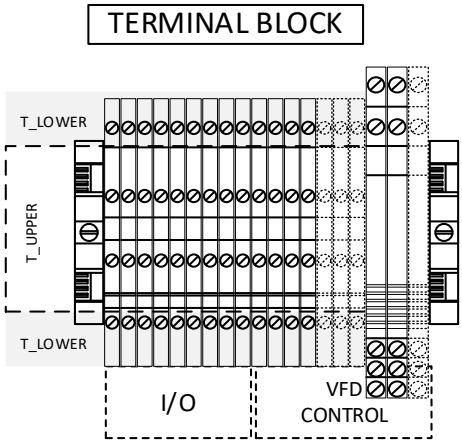
1. Wiring the AC Line Power Connection:
   - Route the power connection wire through appropriate conduits and fittings.
   - Strip the insulation from the wire ends carefully to avoid damaging the conductors.
   - Connect grounding to ground bonding terminal, fasten until it makes a tight and secure connection.
   - Connect the AC line wires to the pressure booster main circuit breaker, ensuring tight and secure connections.
   - Torque connections to terminal specifications.

2. Installation Check:
   - Double-check all connections are securely fastened to device manufacturer's recommended torque specifications.
   - Ensure that all protective covers and/or safety devices are re-installed if they were removed.
   - Remove any loose conductive material and debris from the enclosure.
   - Close the enclosure and use appropriate PPE before applying power to the control panel.

⚠ WARNING	**GROUND CONNECTION**
A separate grounding conductor must be bonded to the grounding connection point located in the control panel enclosure. Failure to permanently ground the pump, motor, and controls before connecting to electrical power can cause shock, burns, or death.	

Field Wiring

Your eMVP/MVP model may include various hardware components. For detailed information on the specific hardware options configured in your system, please refer to the wiring diagram provided with the unit.



Input / output terminal block

Sensors

The eMVP/MVP system uses 4-20 mA pressure transducers and 24 VDC powered devices. Pressure transducers with digital LED readouts are installed at the suction and discharge headers. Temperature sensors are installed at each pump outlet.

Available Sensor(s)

Pre-Installed	• Discharge Pressure Sensor (required) • Suction Pressure Sensor • Thermistor 10K ohm NTC
Field Installed	• Flow Meter (optional) • Remote Pressure Sensor (optional)

NOTICE! **Process Operation**

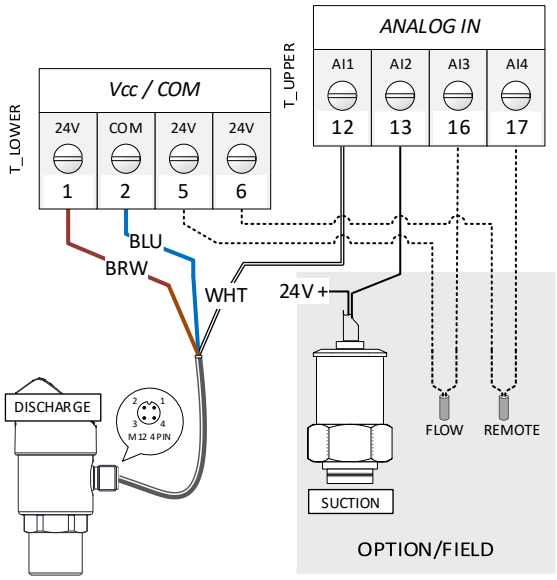
The DISCHARGE pressure signal must be continuously present during system operation. In the event of a discharge sensor failure, the system will switch to Emergency Operating Mode.

Pinout provided for typical M12 sensor connectors.

Sensor Wire Type			
PIN	1	2	3
Connection Type	24 VDC V+ REF	SIGNAL I OUT	0 VDC COM
2-Wire[1]	BROWN	BLUE (SIG)	
3-Wire[2]	BROWN	WHITE	BLUE

[1] Varies with sensor manufacturer

[2] For sensor with 4-Pin M12 connector



Flow metering and remote discharge sensor termination

Contact Switching

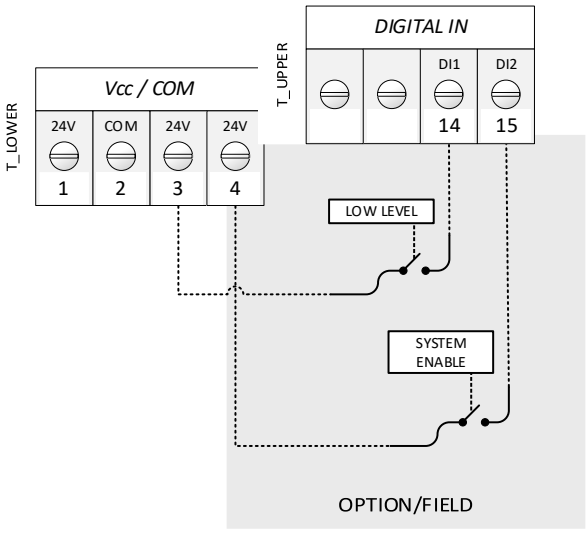
The eMVP/MVP system utilizes 24 VDC active high discrete inputs and outputs. The following sections outline the available discrete connections for field wiring.

Available I/O

Inputs	• Low Level Switch (N.O.) • System Enable Switch (N.O. / N.C., Configurable)
Outputs	• Alarm Indicator (Dry contact, 240 Vac max.)

NOTICE! **System Enable**

System Enable is configurable for BAS integration **OR** discrete contact at terminal 4 - 15.



Low Level and System Enable wiring

Sequence of Operation

Pre-operation Message

Before operating the eMVP/MVP pressure booster system, Review the following safety measures to prevent accidents and ensure personnel safety.

1. Operation and maintenance MUST be performed by properly trained and qualified personnel.
2. Review all instructions and warnings prior to performing any work on the system.
3.

⚠ DANGER	**HAZARDOUS VOLTAGE**
The system MUST be disconnected from the main power supply before attempting any pre-operation or maintenance on the electrical or mechanical part of the system. Failure to disconnect electrical power before attempting any pre-operation or maintenance can result in electrical shock, burns or death.	

4.

⚠ WARNING	**EQUIPMENT HAZARD**
Anytime power is applied to unit, the motor and pump could start unexpectedly and cause serious injury.	

5.

⚠ CAUTION	**STORED ENERGY**
Do not operate at pressure above max. fixture/component pressure ratings.	

6. Always follow local, state, or provincial codes for plumbing and electrical safety.

⚠ CAUTION	**EQUIPMENT DAMAGE**
DO NOT RUN PUMP DRY OR SEAL WILL BE DAMAGED.	

OPERATION AT OR NEAR-ZERO FLOW CAN CAUSE EXTREME HEAT, PERSONAL INJURY OR PROPERTY DAMAGE.

⚠ WARNING	**EQUIPMENT DAMAGE**
DO NOT power the unit or run the pump until all electrical and plumbing connections, especially the pressure transmitter connection, are completed. Do not run the pump dry.	

⚠ WARNING	**EQUIPMENT DAMAGE**
DO NOT use the ball valve to throttle pump. This may cause loss of prime, excessive temperatures, and damage to pumps, voiding warranty.	

Booster Starting & Running

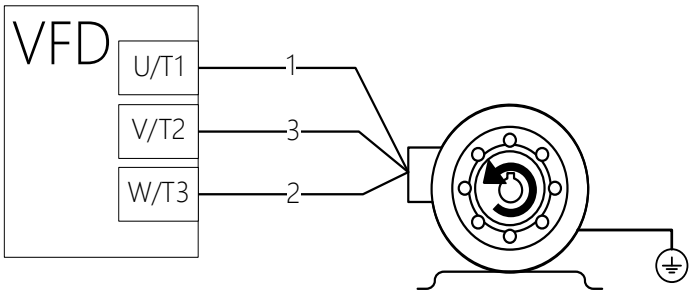
1. **System Enable:** The eMVP/MVP Pressure Booster is enabled to start via BAS or local operation (configurable).
2. **Start Conditions**: The control sequence initiates when the system supply pressure is below the system setpoint threshold, provided no shutdown conditions are present.
3. **Minimum Run Time**: Once started, the booster runs for a minimum of 5 minutes (configurable).
4. **Extended Operation**: The pump continues to run if there is ongoing water usage in the system.
5. **No Flow Stand By (NFSB)**: After water usage ceases, the unit will continue to run until the NFSB condition is met.
6. **Automatic Restart**: The sequence automatically restarts if pressure falls below start threshold (configurable).

Rotation

NOTICE!	**Inoperable Equipment**
Incorrect rotation may damage the pump and void the warranty.	

Check motor rotation prior to operation.

- Rotation can be monitored using the VFD.
- For close-coupled units, remove motor end plug or cover to visually confirm correct rotation.
- To reverse three-phase motor rotation, switch any two phases in the motor input.



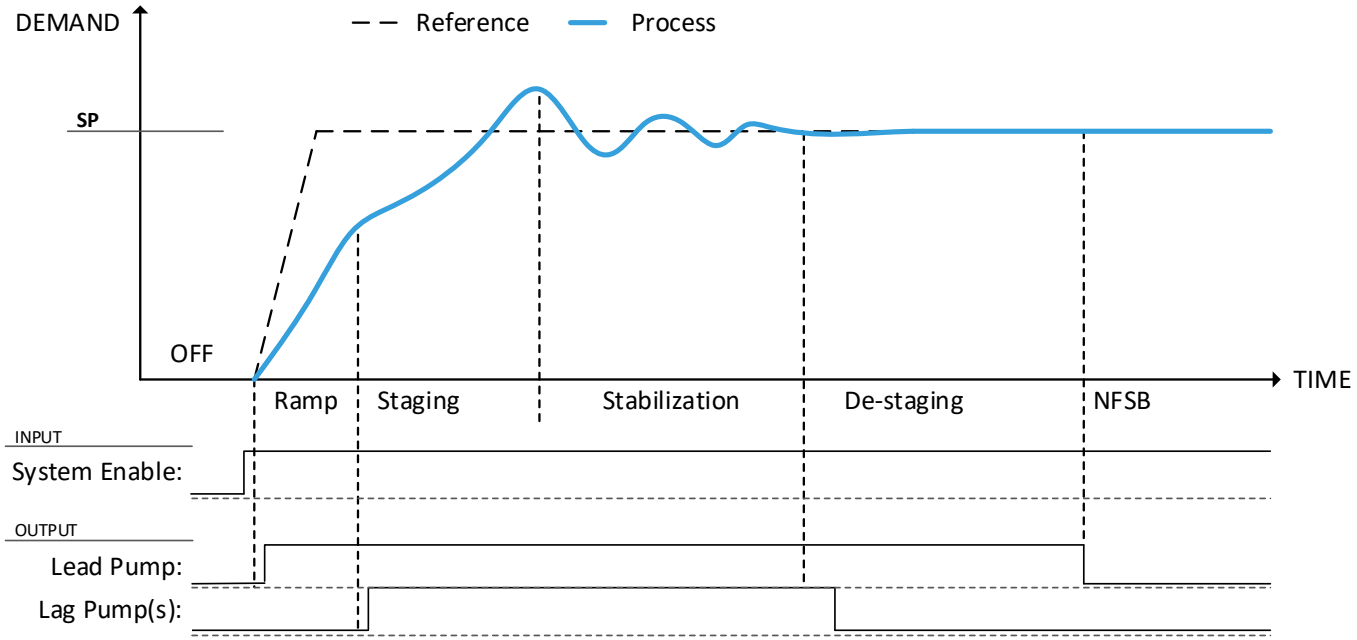
Motor rotation with swapped motor leads

Start-Up Checklist

	6	Starting the System
☐	6.1	Verify adequate water supply pressure is available _____ PSI.
☐	6.2	Close main disconnect. **Warning: Pump(s) may start after controller initializes.**
☐	6.3	Set time and date on controller.
☐	6.4	Verify each VFD is in auto.
☐	6.5	Vent each pump while it is operating until air noise has subsided.
☐	6.6	Disable pumps sequentially, so that each pump will operate.
☐	6.7	Verify pump discharge temperatures are in expected range.
☐	6.8	Verify rotation is correct for each pump.
☐	6.9	Verify all pumps are enabled.
☐	6.10	Site required discharge pressure _____ PSI.
☐	6.11	Adjust High System Shutdown Pressure (HPSD) sufficiently above the operating setpoint so that transient pressure fluctuations do not result in High Pressure Shutdown.
☐	6.12	Adjust High System Shutdown Pressure (HPSD) delay to an interval sufficient to prevent shutdown due to transient pressure fluctuations.
☐	6.13	Adjust the System Setpoint to the site pressure requirement.
☐	6.14	Record minimum observed operating suction pressure _____ PSI.
☐	6.15	If operating suction pressure is less than 20 PSI, contact HYFAB to evaluate low suction pressure transducer option.

Excerpt from HYFAB eMVP/MVP Booster System startup checklist

Pressure Booster Sequence



Pressure booster operation on initial start-up

System Enable

When configured for **Remote Start/Stop (RSS),** the pressure booster may be enabled using:

a. Network: BMS / BAS enabled via Modbus or BACnet
b. Local: N.O. / N.C. dry contact input
c. None: Auto Start

Pump Start

The lead pump will start when the system pressure falls below the **System Start** value (adjustable % of **System Setpoin**t), provided no standby conditions exist. The pump will run to satisfy **Minimum Run Time** and **Setpoint**. The booster will maintain pressure until a **No Flow Standby (NFSB)** condition occurs.

See (Page 14) and Booster Starting & Running (Page 11).

Staging Control

The **lead pump's speed** is modulated to maintain the system pressure setpoint using **Proportional, Integral, Derivative (PID)** control. If the lead pump cannot maintain the required pressure, **lag pump(s)** are activated to assist.

In multi-pump systems, **standby pumps** are not included during staging control.

De-staging Control

When system demand is sufficiently low and the lead pump alone can meet the pressure requirement, the lag pump will shut down after its **Minimum Run Timer** has been satisfied.

Pump Standby

The pump will initiate a **No Flow Standby** test when pressure reaches a steady state, and demand can be met with just the lead pump alone.

Other standby states

Hardwire interlock activated by switches and/or system protection thresholds can also stop the pumps from running.

Notice	**System standby conditions**
Hardwire Interlock:	E-stop, motor fault, dry run/low level, and main disconnect switches can halt system run.
Alarm and Shutdown:	System and equipment protection thresholds such as low suction pressure and/or high temperature can halt system run.

System Operation States

No Flow Standby (NFSB)

When the pump logic controller detects a no-flow condition lasting for **120 seconds** (adjustable), a **Flow-Check Test** is initiated.

In the event of a **NFSB** Condition, the following will occur:

- The **lead pump** will shut down.
- The lead pump will remain off until there is sufficient water demand.

High Temperature Shutdown (HTSD)

HTSD Condition occurs if:

- The discharge temperature exceeds **120°F** (adjustable) for **60 seconds** (adjustable).

In the event of a HTSD:

- The pump(s) will shut down.
- A **HTSD Alarm** will be generated.
- Reset will occur when the temperature falls **10°F** (adjustable) below the shutdown setpoint.
- HTSD will occur regardless of the Minimum Run Timer condition.
- HTSD will activate the Remote Alarm Relay.
- HTSD will trigger the Remote Alarm Contact.

To disable the HTSD feature:

- Set the **HTSD Setpoint** to **`0`**. This will eliminate all references to pump temperature, including the display of temperature and HTSD alarms.

High Suction Pressure Shutdown (HSSD)

HSSD Condition occurs if:

- The suction pressure exceeds the **HSSD Setpoint** of **0 PSI** (adjustable) for **60 seconds** (adjustable).

In the event of a HSSD:

- The pump(s) will shut down.
- A **HSSD Alarm** will be generated.
- Reset and restart will occur when suction pressure drops below the HSSD setpoint.
- The booster system will restart once the alarm is manually cleared.
- HSSD will activate the Remote Alarm Relay.
- HSSD will trigger the Remote Alarm Contact.

To disable the HSSD feature:

- Set the **HSSD Setpoint** to **`0`** (default).

Low Suction Pressure Shutdown (LSSD)

LSSD Condition occurs if:

- The suction pressure falls below the **LSSD Setpoint** of **10 PSI** (adjustable) for **15 seconds** (adjustable).

In the event of a LSSD:

- The pump(s) will shut down.
- A **LSSD Alarm** will be generated.
- Reset and restart will occur when suction pressure exceeds the LSSD setpoint by **5 PSI** (adjustable).
- LSSD is independent of the **Minimum Run Timer** condition.
- LSSD will activate the Remote Alarm Relay.
- LSSD will trigger the Remote Alarm Contact.

To disable the LSSD feature:

- Set the **Suction Pressure Transmitter Span** to **`0`.** This will remove all references to suction pressure from the booster system control sequence.

High Discharge Pressure Shutdown (HPSD)

HPSD Condition occurs if:

- The discharge pressure exceeds the **HPSD Setpoint** of **110 PSI** (adjustable) for **60 seconds** (adjustable).

In the event of a HSSD:

- The pump(s) will shut down.
- A **HPSD Alarm** will be generated.
- Reset and restart is permitted when discharge pressure drops below the HSPD setpoint.
- The booster system will restart once the alarm is manually cleared.
- HPSD will activate the Remote Alarm Relay.
- HPSD will trigger the Remote Alarm Contact.

Low Supply Pressure Shutdown (LSPS)

LSPS Condition occurs if:

- **Discharge Pressure** falls below the **LSPS Setpoint** of **0 PSI** (adjustable) for **30 seconds** (adjustable).

In the event of a LSPS:

- The pump(s) will shut down.
- A **LSPS Alarm** will be generated.
- Reset and restart is permitted when supply pressure exceeds the LSPS setpoint.
- The booster system will restart once the alarm is manually cleared.
- LSPS will activate the Remote Alarm Relay.
- LSPS will trigger the Remote Alarm Contact.

To disable the LPSP feature:

- Set the **LSPS Setpoint** to **`0`** (default). This locks out the LSPS function.

Pump Failure Alarm (VFD/PUMP)

Pump/VFD Failure Alarm is activated under the following conditions if:

- A pump is commanded to start but fails to start within the **Pump Alarm Delay** of **10 seconds** (adjustable), as detected by the **VFD Run Contact**.

In the event of a Pump/VFD Failure:

- A **Pump/VFD Alarm** will be generated.
- If the Lead Pump fails to start, the Lag Pump will automatically start.
- A Pump/VFD Alarm Condition will trigger the Remote Alarm Contact.
- The booster system will restart once the alarm is manually cleared.

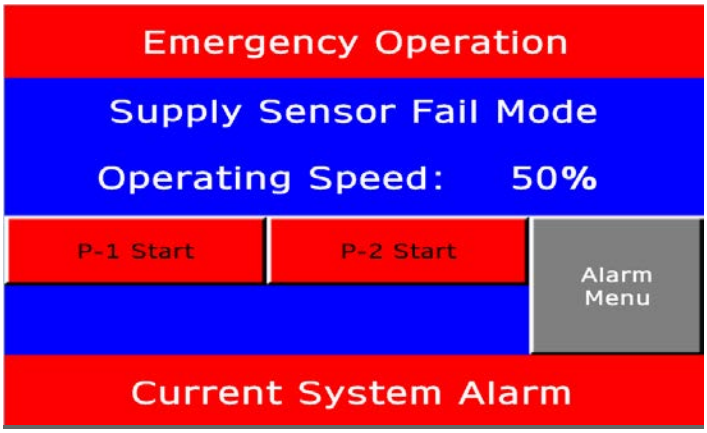
The **VFD in Manual Alarm** Condition occurs if:

- A pump is not commanded to start but is sensed running for **30 seconds** (adjustable).

In the event of a Manual VFD Alarm:

- A **VFD in Manual Alarm** will trigger the Remote Alarm Contact.
- A **VFD in Manual Alarm** will be generated.
- The booster system will restart once the alarm is cleared.

Emergency Operation



Supply sensor failure; Emergency Pump Start

Condition occurs if:

- **Discharge Pressure** sensor has failed.
- Sensor reading falls outside the **sensor operational span** of 0-300 PSI (adjustable).

In the event of a supply sensor failure:

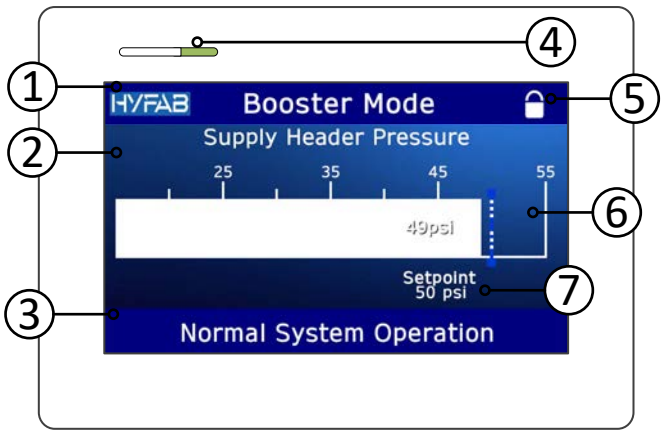
- The pump(s) will shut down.
- A **Sensor Alarm** will be generated.
- Reset and restart is permitted when supply pressure within the **sensor operational span** values.
- The booster system will restart once the alarm is manually cleared.
- Will activate the Remote Alarm Relay.
- Will trigger the Remote Alarm Contact.

IMPORTANT!	**Manual Pump Operation**
Operating Speed:	Sets ALL pump speeds as a percentage of 60Hz.
Pump Start:	Pressing **P-#** Start will run pump(s) at the fixed speed.

Touch Display Operator Interface

General Screen Description

The Touch Display is used to view and configure Pressure Booster system operating parameters.



Default screen on Touch Display HMI

1.	Title Band	• Displays system menu screen title.
2.	Content	• Lists various system menu parameters and status.
3.	Status Band	• Indicates pressure booster operating state.
4.	Display Status LED	• Indicates HMI Display Operation. LED indicates. - GREEN – Normal Operation. - ORANGE – Booting / Transferring image. - RED – Power is On. - RED – Flashing, Module Connection Error. - OFF – Power is OFF.
5.	Operator Lock / Unlock	• Shows Operator access lock icon. • On Press. - Navigate to Login prompt.
6.	Default Screen	• Default screen displays pressure process value. • Activates after a period of inactivity. • On press. - Navigate to Main Menu.
7.	System Setpoint	• Displays the current system setpoint.

IMPORTANT!	**Default Screen**
Inactivity Timeout:	After 5 minutes of screen inactivity, the Default Screen is displayed.
Inactivity Sleep:	The display will turn off after an extended period of inactivity when displaying the default screen.

Operator Lock Out / Password

To prevent unauthorized changes, most configuration parameters require password level access. To begin modifying system parameters, select the lock icon (🔓) when it appears on the screen Title Header. This will open the login prompt. Verify that you have the required access level, enter your password, and press Login to proceed.

Operator login prompt

1.	Operator Icon	• Shows current User credential level. • On Press - Change access level.
2.	Password Prompt	• Enter User password. ▪ OPERATOR – Level 1 Access *Username:* User1 *Default password provided on sheet that ships in the control enclosure.* ▪ TECHNICIAN – Level 2 Access *Username:* User567 *Default password provided on sheet that ships in the control enclosure.* ▪ ADMIN – Factory Level Access *Contact your Representative or HYFAB for login credentials.*
3.	Log in	• Log in with current user access credential.

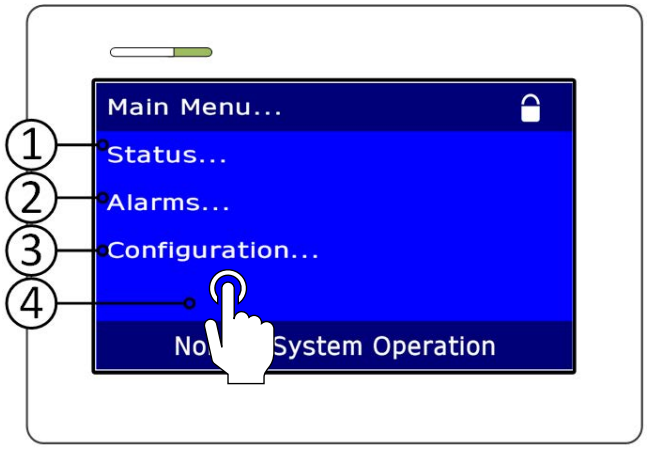
IMPORTANT!	**Lock Inactivity**
Inactivity Timeout:	Operator credentials will time out after 10 minutes of inactivity.
Re-authentication Required:	Operator credentials must be re-entered to make changes to the controller's configuration after a timeout.

Navigating Menu / Sub-Menu

The touch display operator interface uses interactive elements called Screen Objects. By selecting a Screen Object with a firm finger press or tap action, you can navigate through system menus and adjust operating parameters.

Main Menu

The Main Menu provides an overview of the booster system parameters. It serves as the central point for all system adjustments and monitoring.



Main Menu Screen

1.	Status	• Navigate to view System Status sub-menu.
2.	Alarm	• Navigate to System Alarm sub-menu. Reset current alarm.
3.	Configuration	• Navigate to view / modify System Configuration sub-menu.
4.	Press to Interact	• Press on a screen object to make selection.

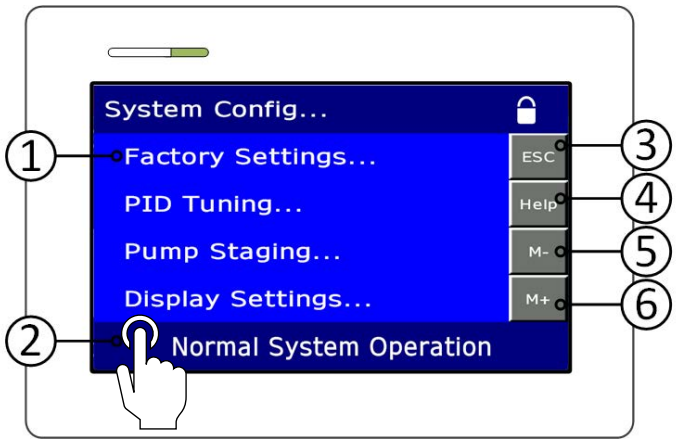
Help Info Screen

Pressing the Help button displays the System Assistance screen. The System Assistance screen contains:

- Q*R Code:* Scannable URL link to support documentation.
- *Service Contact Information:* Displays representative contact info. Editable via the password-protected **Edit Data** button.
- *Version Information:* Access current versions of the Touchscreen, Controller, Firmware, and Time/Date settings via the Version Information button.

Sub-Menu

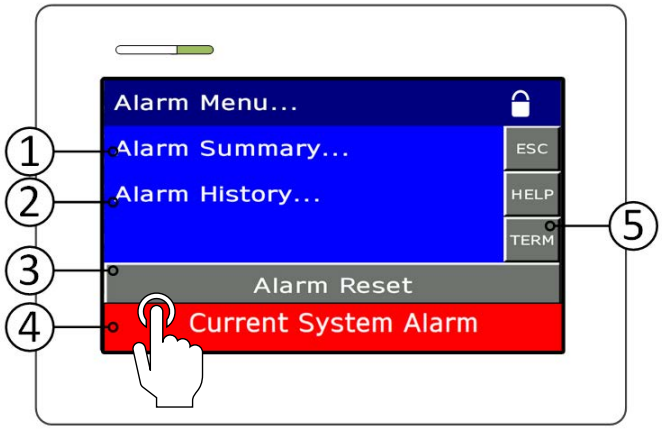
The Sub-Menu displays additional options for viewing system process status and operating parameters.



Configuration sub-menu

1.	Sub-menu List	• Displays additional selection list.
2.	Status Band	• Displays various system messages. ▪ *Normal System Operation.* ▪ *Remote Enable Off* – Remote Start/Stop request. ▪ *Alert* – Pump Rotation in progress. ▪ *Alert* – Bladder Tank Charging. ▪ *Current System Alarm* – Active system alarm. • On Press. ▪ *Normal* – Navigate to Main Menu or Default screen. ▪ *Alert* – Dismiss notification. ▪ *Alarm* – Navigate to Alarm Summary. ▪ *Sensor Failure* – Navigate to Emergency Operation.
3.	ESC	• Navigate to the previous Menu level.
4.	HELP	• Navigate to Help Info Screen. • Rep. Contact Information.
5.	M+	• Menu Next (**M+**) Indicates that another screen is available. • Pressing the M+ button advances the display to the next screen.
6.	M-	• Menu Previous (**M-**) Indicates the ability to return to the previous screen. • Pressing the M- button returns the display to the previously viewed screen.

System Alarm Menu



Alarm menu

1.	Alarm Summary	• Navigate to Alarm Summary screen.
2.	Alarm History	• Navigate to Alarm History Screen.
3.	ALARM RESET	• Press and hold to RESET current alarm.
4.	Status Band (ALARM)	• Shows Alarm message. • On Press. ▪ Navigate to Alarm Summary.
5.	TERMINAL	• Shows Alarm terminal wiring.

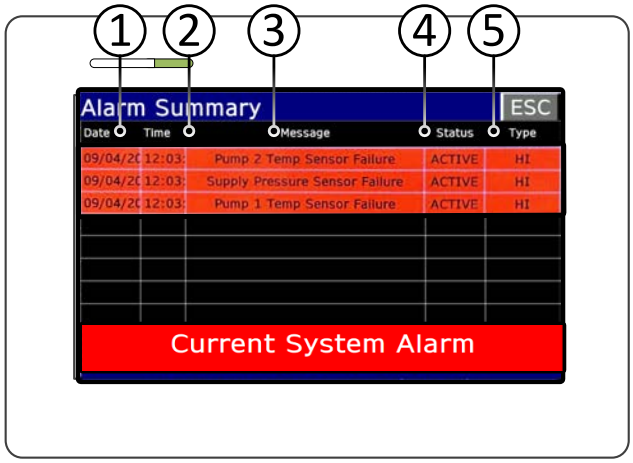
Alarm Notification

Current System Alarm is the only alert which requires attention. A blinking [RED] message indicates that an alarm condition exists. If an Alarm condition exists:

- The blinking Current System Alarm message functions as a menu button.

Alarm Summary

Displays all current and active alarms.

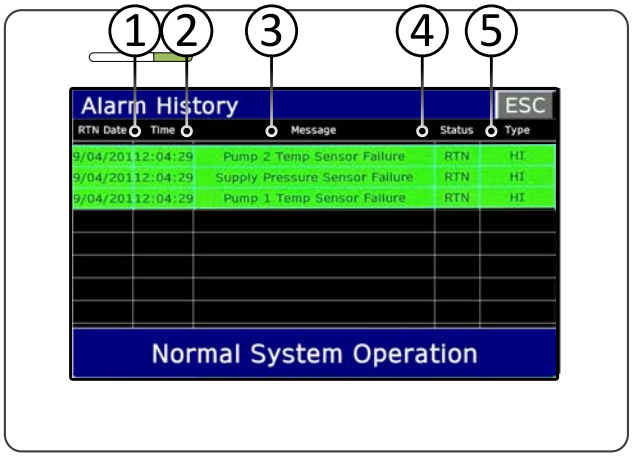


Alarm menu screen

Procedure for Resetting an Alarm

1. Safety Precaution:
   - Before proceeding, identify, and evaluate the alarm message.
2. Access Alarm Summary:
   - Touch the alarm message to go directly to the Alarm Summary screen.
   - All active system alarms will be displayed here.
3. Evaluate Alarms:
   - Carefully review and evaluate the alarm message before resetting Current System Alarm.
4. Return to Alarm Menu:
   - Once the alarms have been evaluated, press the **ESC** button to return to the Alarm Menu.
5. Reset Alarms or Access Alarm History:
   - From the Alarm Menu, you can:
     - Reset the alarms.
     - Access the Alarm History.

Alarm History

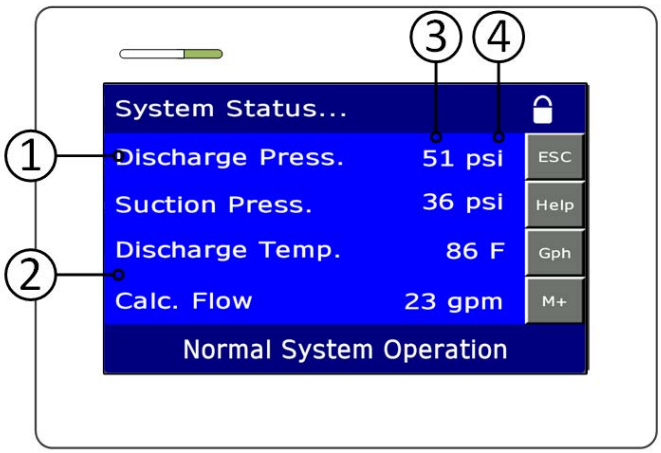


Alarm menu screen

1.	Date	• *Alarm Summary:* The time is displayed when the alarm becomes active. • *Alarm History:* Displays the date when the alarm is recovered (referred to as "RTN").
2.	Time	• *Alarm Summary:* Time of Active Alarm. • *Alarm History:* Time of Alarm Recovered (referred to as "RTN").
3.	Message	• Shows alarm description.
4.	Status	• The status of the alarm is displayed: ▪ Active, Return, ACK, and UNACK.
5.	Type	• The alarm type is displayed: ▪ LoLo, Lo ,Hi, and HiHi.

System Status

System operating status such as system pressure, flow rate, temperature, setpoints, and pump operating state can be viewed.



Operator login prompt

1.	**System Status**	• Shows system process variable status.
2.	**Optional Metrics**	• Shows optional process dependent status.
3.	**Current Value**	• Shows current value.
4.	**Unit**	• Shows status value unit.

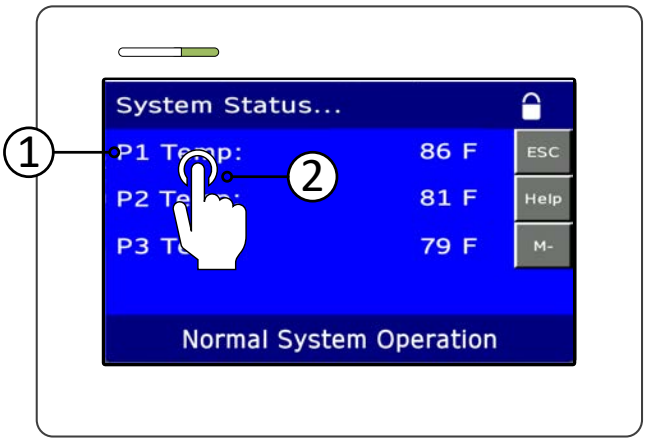
Viewing Status Trends

From the first System Status screen, press on the following text screen objects to display their associated graph.

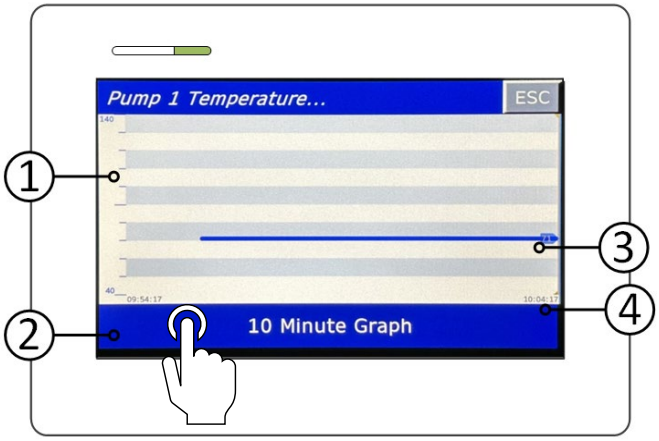
- Discharge Pressure
- Suction Pressure
- Discharge Temperature
- Remote Pressure (optional)
- System Flow (optional)

To view a status trend.

1. Identify the system status you want to view.
2. Press and release to navigate to the trend screen.



System status pump temperature



Pump 1 Temperature Trend

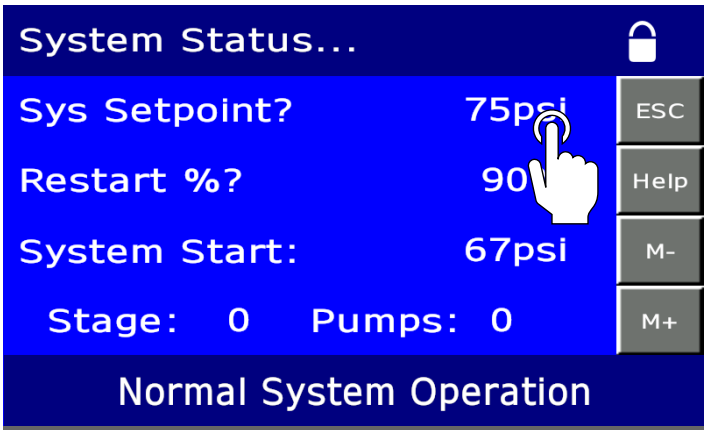
1.	**Range Scale**	• Status value range on vertical axis.
2.	**Time Scale**	• Time span division along horizontal axis. • On press adjust time scale. ▪ 2 Minutes ▪ 10 Minutes ▪ 30 Minutes
3.	**Trend Line**	• Indicates past and current value.
4.	**Time**	• Time label on horizontal axis.

Adjusting System Setpoint

⚠ CAUTION	**UNINTENDED START**
The eMVP / MVP booster may start automically under certain conditions. When adjusting operating parameters, such as changing "System Setpoint", operators must remain alert and exercise proper lock-out tag-out procedures.	

Changing additional parameters:

- `?` Indicates that the parameter is adjustable.
- Press the **ESC** button to access the controller's Main Menu.
- From the Main Menu, you can make further adjustments in *System Config.* as needed.



System status screen page 2 (M+)

NOTICE! **System Setpoint**

The System Setpoint is configured in '**System Status'.**

BMS Priority: When integrated into BMS via BACnet or Modbus, the remote process setpoint is used.

How to change system setpoint?

1. From the '**Main Menu'**. Press on `**Status…**` to open the 'System Status…" submenu screen.
2. Once the **'System Status…'** screen is displayed, press the **M+** button once to advance to next screen.
3. Identify `**Sys Setpoint?**` on the display, Press the `**### PSI**` to adjust the setpoint.
4. A numeric entry **keypad** will open on the display. Using the keypad, type in the new setpoint and **press the enter** button in the lower right corner.
5. Pressing Enter or Close will return to previous screen. If the setpoint has been changed, the new value will be displayed.
6. DemandSet control will now operate at the newly updated **System Start** value.

TIP!

Adjusting Restart Percentage:

Modifying the restart percentage alters the system start pressure.

Navigating Status Screens:

Use the **M+** or **M-** Button to cycle through the status screen series.

NOTICE! **Bladder Tank Charge**

Prevent Short Cycling w/ Pressure Tank:

Pre-charge tank to use system start value.

Tank Charge = (Cut-in Pressure) – (2..3 PSI)

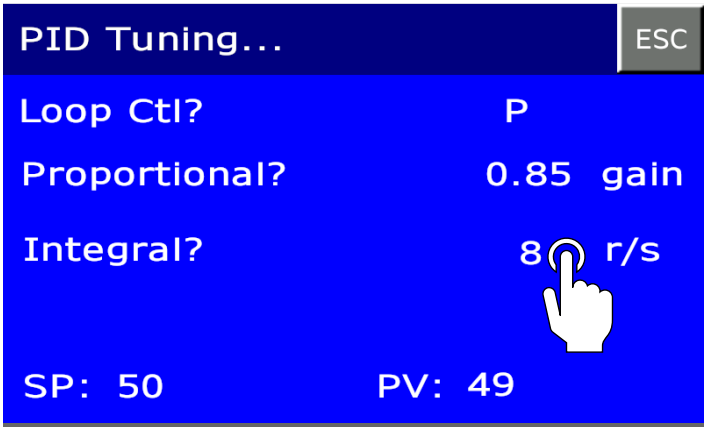
Cut-In Pressure = "System Start"

Refer to 'No Flow Standby' for additional parameter options for expansion tank configurations.

⚠ CAUTION	**EQUIPMENT DAMAGE**
Do not exceed the tank manufacturer's operating specifications.	

Adjusting PID controller

The DemandSet controller uses a PID-style error correction to maintain process setpoint by varying the pump speed. In booster pump applications, proportional and integral error calculation terms (**PI Control**) are sufficient to provide smooth and accurate pressure regulation.



PID Tuning

1.	Control Mode	•	Select process control method.
2.	PID Values	•	Adjust PID term values.
3.	Setpoint (SP)	•	Indicates current setpoint.
4.	Process Value (PV)	•	Indicates actual pressure.

The **proportional term (P)** affects how the booster reacts to instantaneous pressure error. It provides strong direct corrective action. For example, when system pressure drops below the setpoint, the P term causes the pump to immediately increase speed to restore pressure.

The **integral term (I)** corrects long-term or steady-state errors. It accumulates small difference between actual pressure and setpoint over time and adjusts the pump speed until the error is minimal. It ensures long-term accuracy and prevents drift. For example, if the pressure remains slightly off from setpoint (e.g. drift > 5-8 psi difference), the integration value will gradually increase or decrease the pump speed until the actual pressure is near setpoint. A small integral value results in fast influence on the pump speed. A large integral value produces a slow influence on the pump speed resulting in a smoother response.

Why is the Derivative term (D) not used?

The derivative term is used for damping against fast, rapid rate-of-change in the process. Booster pumps operate in a relatively slow and stable process where the water pressure changes and water demand occurs over a longer time interval. Introducing the derivative term may cause oscillation and instability.

PID tuning

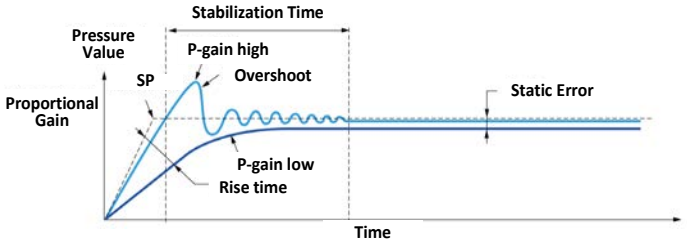
A well-tuned booster station should ramp up smoothly and consistently toward setpoint. Any initial overshoot should subside as pressure stabilizes near setpoint. An unstable system caught in a positive feedback loop will oscillate and "hunt" for the setpoint.

- Make small and observable changes.
- Find a compromise between good response time and stable pressure.

	Value	Result
P	Too Small	Slow response may not have enough influence on pump speed.
	Too Large	Fast response can create too much pressure and can result in overshooting and instability.
I	Too Small	Fast integral action can cause over correcting and instability.
	Too Large	Slow response prevents accurate pressure when stable.

Adjust Proportional Gain (P-Gain)

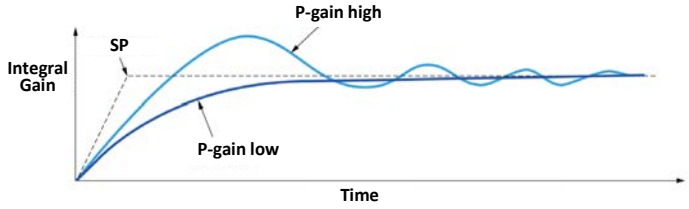
Set the P Gain to an intermediate value that allows the booster to respond quickly to demand changes without overshooting the setpoint.



Source: Schneider Electric Manual NVE41295.06

Adjust Integral Time (I-Time)

Set the I-Time to a value that allows the booster recover from a steady-state without over correcting.



Source: Schneider Electric Manual NVE41295.06

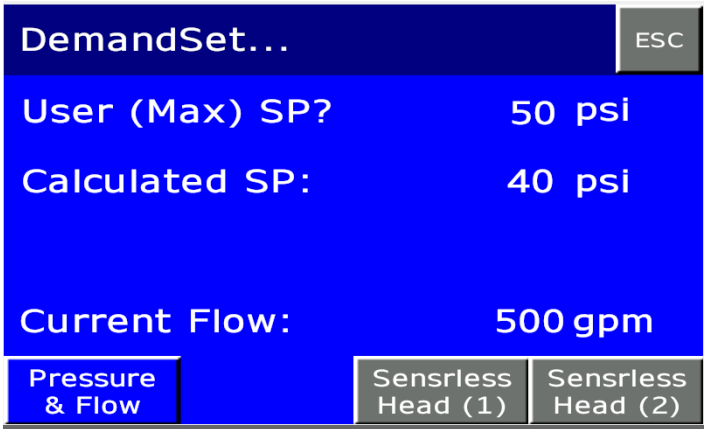
Why is an expansion tank highly recommended?

Adding a hydropneumatic tank greatly improves pressure stability, equipment longevity, and overall performance. It can reduce pump short-cycling during low-demand periods by providing stored pressurized water. This ensures the pressure booster operates consistently and reliably.

DemandSet Control

DemandSet is an application control method that automatically adjusts the **system pressure setpoint** based on real-time demand. By optimizing the operational setpoint the booster station can run with greater efficiency when demand is low. To enable the DemandSet control, system flow reference must be configured to one of the following:

1) Sensorless
   a) MVP - Using predefined pump performance characteristics, flow is calculated from the pump operating speed and VFD performance.
   b) eMVP – User configured system design
      i) The maximum and minimum operating pressures and the minimum speed that the system achieves minimum pressure at no flow must be entered
2) Flow meter
   a) A hardwired flow meter provides direct measured flow.



DemandSet Configuration; Sensorless

1.	Pressure / Flow	• Displays user and active setpoint.
2.	Variable Head	• For flow meter. • User defined configurations for Max system flow, system head or variable loss.
3.	Sensorless Head	• For flow approximation. • User defined configurations for pump and flow requirements.
4.	Sensorless Head	• For flow approximation. • User defines calculation mode and update interval.

DemandSet will continuously recalculate the required pressure to maintain system demand. The **Calculated Setpoint** is updated according to design flow (**Max System Flow**) and system restriction (**Variable Head Configuration**).

NOTICE!	**Configuration Required**
Calculated Setpoint	The Demandset active setpoint must be configured according to the system flow reference options to achieve optimal efficiency.

Sensorless Head

Option 1 – Sensorless Head (Available when no flow meter is configured).

Sensorless Head DemandSet is configured by setting the maximum flow operating conditions:

Max. (n) Pump(s) @ %

(n) = the number of pumps required
% = output speed

The maximum and minimum operating pressures and the minimum speed that the system achieves minimum pressure at no flow must be entered.

Variable Head

Option 2 – Variable Head (Available when a flow meter has been configured).

For Variable Head DemandSet to be operational, flow indication must be set via one of the following:

a. Hardwired flow meter
b. Calculated flow

Once flow indication has been established, Variable Head DemandSet can be configured. Variable Head DemandSet requires two user configured values:

1) Maximum system flow.
2) Variable system head via building height, or variable head loss.

DemandSet Configuration

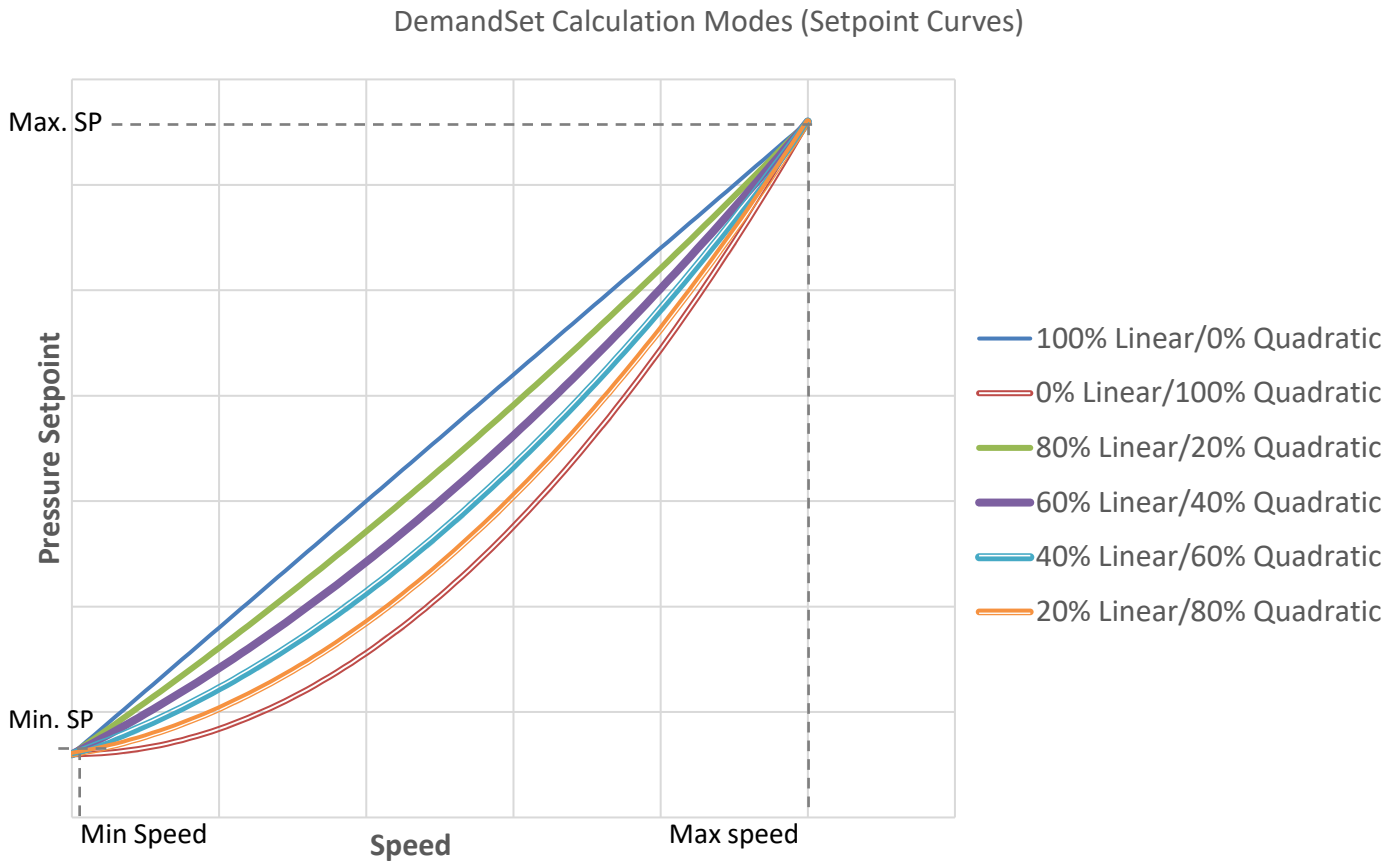
The setpoint reset feature of the DemandSet system controller must be configured in one of two ways, depending on the hardware available for the application. The necessary parameters for setup can be found below and only one of these two methods needs to be completed.

Application with a flow meter

1. Enter the user (max.) setpoint (0-999 PSI): _____ PSI
2. Enter the max. system flow (0-9999 GPM): _____ GPM
3. Enter the variable head loss (0-999 PSI): _____ PSI

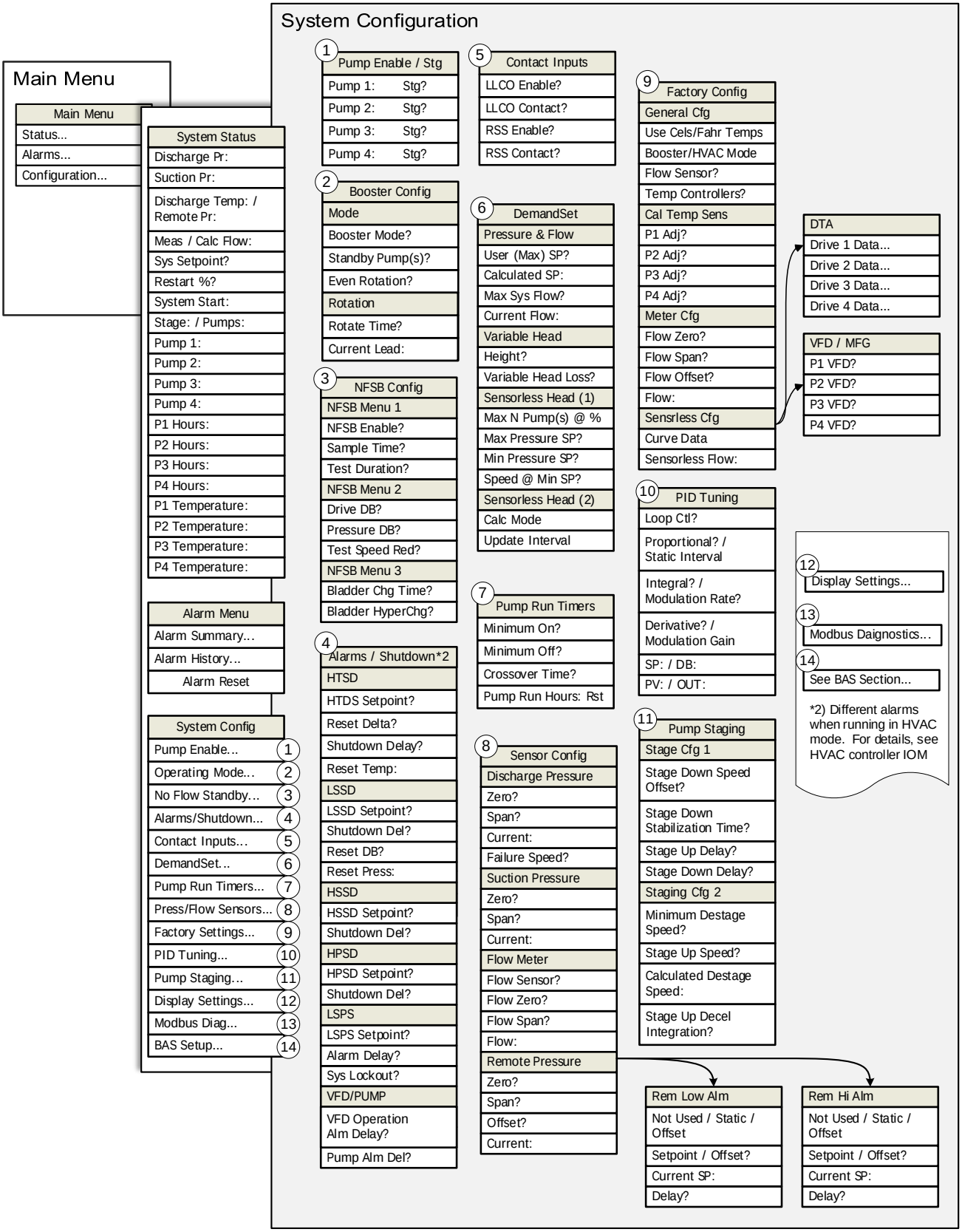
Application with no flow meter

1. Enter the number of pumps (1-4): _____
2. Enter the max. speed (20%-100%): _____ %
3. Enter the variable head loss (0-999 PSI): _____ PSI
4. Enter the max. differential pressure setpoint (0-999 PSI): _____ PSI
5. Enter the speed at min. setpoint (0-100%): _____ %
Automatic Speed at Min. Setpoint : Hold your finger down on the "Speed @ min. SP" menu item and it will change to "Shutoff Detection" with a 60-second timer. During this 60-second period you can throttle a valve on the discharge side of the pumps until it is almost closed (**allow minimal flow and do not shut completely**). Leave the valve in this position until the 60-second timer expires and it will automatically detect the speed at min. setpoint.
6. Select the desired setpoint reset curve calculation method
(100% Linear/0% Quadratic – 0% Linear/100% Quadratic):



Operating Parameters

Operator Menu Map



Programming Navigation Table

Main Menu

Menu Item	Variable	Default	Range	Field Value
Status:	• Opens the System Status.			
Alarms:	• Opens the Alarm menu. • Displays current Alarms Summary and Alarm History. • Resets current alarms.			
Configuration:	• Opens the system Configuration. • Adjust system operating parameters.			
Reserved…/	• Displays additional menu items configured by manufacturer.			

Status

Menu Item	Variable	Default	Range	Field Value
Discharge Pr:	• Displays current system Discharge Pressure. • Action: On press shows current trends.		0 to 999	
Suction Pr:	• Displays current system Suction Pressure, if configured • Action: On press shows current trends.		0 to 999	
Discharge Temp:/ Remote Pr:	• Displays highest temperature reading of installed temperature sensors, or remote system pressure, if used.			
Meas/Calc Flow:	• Total flow. • Displays 'Meas Flow' when hardwired flow meter is configured. • Displays 'Calc Flow' when sensorless flow is configured.		0 to 9999	
Next Page (M+)				
Sys Setpoint:	• System target Discharge Pressure Setpoint. • Action: On press adjust value. • Unit: PSI	50	0 to 999	
Restart %:	• Minimum percentage of system pressure setpoint required for system restart. • Action: On press adjust value. • Unit: %	90	0 to 99	
System Start:	• Displays Calculated System Start Pressure. • Based on System Setpoint and Restart %. • Unit: PSI		0 to 999	
Stage: Pumps:	• Displays the number of stages called for and the number of pumps running.			
Next Page (M+)				
Pump 1:	• Displays pump status and % of full speed.			
Pump 2:	• Visible only in Dplx, Tplx, or Qplx modes. • Displays pump status and % of full speed.			
Pump 3:	• Visible only in Tplx or Qplx modes. • Displays pump status and % of full speed.			
Pump 4:	• Visible only in Qplx mode. • Displays pump status and % of full speed.			
Next Page (M+)				
P1 Hours:	• Total pump run hours.			
P2 Hours:	• Visible only in Dplx, Tplx, or Qplx modes. • Total pump run hours.			
P3 Hours:	• Visible only in Tplx or Qplx modes. • Total pump run hours.			
P4 Hours:	• Visible only in Qplx mode. • Total pump run hours.			
Next Page (M+)				
P1 Temperature:	• Pump discharge temperature.			
P2 Temperature:	• Visible only in Dplx, Tplx, or Qplx modes. • Pump discharge temperature.			
P3 Temperature:	• Visible only in Tplx or Qplx modes. • Pump discharge temperature.			
P4 Temperature:	• Visible only in Qplx mode. • Pump discharge temperature.			

Alarms

Menu Item	Variable	Default	Range	Field Value
Alarm Summary:	• Opens the Alarm Summary screen. • Contains a summary of all active alarms.			
Alarm History:	• Opens the Alarm History screen. • Contains the last 100 alarm events.			
Alarm Reset:	• Resets current alarms. • Action; Press and hold one second, then release.			

Configuration

Menu Item	Variable	Default	Range	Field Value
Pump Enable:	• Opens the Pump Enable/Stg configuration. • Enables or disables individual pumps. • Assign pump staging position. • Sets the fixed rotation sequence number of the pumps, if fixed rotation has been selected.			
Operating Mode:	• Opens the Booster Config screen series. • Selects the number of booster pumps (1-4) by setting to Splx, Dplx, Tplx, or Qplx. • Defines the standby and rotation sequences.			
No Flow Standby: (NFSB)	• Opens the NFSB Config screen series. • NFSB Puts the booster in standby mode when there is no system demand.			
Alarms/Shutdown:	• Opens the Alarms/System Shutdown screens. • Configures HTSD, LSSD, HSSD, HPSD, LSPS, VFD/PUMP shutdown/alarms.			
Next Page (M+)				
Contact Inputs:	• Opens the Contact Inputs screen. • Enables and configures LLCO and RSS inputs.			
DemandSet:	• Opens the DemandSet Configuration screens. • Adjusts the booster supply setpoint based on measured or calculated flow.			
Pump Run Timers:	• Opens the Pump Run Timers screen. • Sets the minimum on, minimum off, and crossover times. • Resets the pump run hours.			
Pressure/Flow Sensors:	• Opens the Sensor Config screen series. • Configures the Discharge Pressure, Suction Pressure, Flow Meter, & Remote Pressure sensors.			

Menu Item	Variable	Default	Range	Field Value
Next Page (M+)				
Factory Settings:	• Opens the Factory Config screen series. • Sets the temperature sensor calibration and units. • Selects flow devices and factory parameters.			
PID Tuning:	• Opens the PID Tuning screen. • Sets the pump speed response to system pressure.			
Pump Staging:	• Opens the Pump Staging screen series. • Sets the system parameters that control when the system starts and stops additional pumps. ***NOTICE!*** These parameters can be viewed, but require a Technician level password to modify.			
Display Settings:	• TIME AND DATE are SET HERE. • Opens the Controller Display screens. • Offline/System/Diagnostics menus.			
Next Page (M+)				
Modbus Diagnostics	• Provides communication diagnostics for the VFD communication bus. • The VFD communication bus is only used when sensorless flow data is required.			
BAS Setup (Only visible if BMS communication module installed)	Opens BAS setup screens. The BAS Setup menu option will only be available if BAS connectivity was purchased. If BAS connectivity is required, and this menu option is not visible, contact your booster provider. BAS modules can be purchased and added to the controller in the field. For more details see • Building Automation System Integration (Page 43).			

Pump Enable

Menu Item		Variable	Default	Range	Field Value
Pump 1:	Stg:	• Enabled / Disabled – Stg #.	Ena - 1	Ena/Dis – 1-4	
Pump 2:	Stg:	• Visible only in Dplx, Tplx, or Qplx modes. • Enabled / Disabled – Stg #.	Ena - 2	Ena/Dis – 1-4	
Pump 3:	Stg:	• Visible only in Tplx or Qplx modes. Enabled / Disabled – Stg #.	Ena - 3	Ena/Dis – 1-4	
Pump 4:	Stg:	• Visible only in Qplx mode. • Enabled / Disabled – Stg #.	Ena - 4	Ena/Dis – 1-4	

Operating Mode

Menu Item	Variable	Default	Range	Field Value
Booster Mode:	• The mode for the package: 1) Splx=1 pump (Simplex). 2) Dplx=2 pumps (Duplex). 3) Tplx=3 pumps (Triplex). • Qplx=4 pumps (Quadplex).	Splx	Splx to Qplx	
Standby Pump(s):	• Not visible/applicable in Simplex mode. • Assigns standby pump(s) in multiple pump systems.	0	0 – No. of System Pumps	
Even Rotation:	• Not visible/applicable in Simplex mode. • Enables the rotation of pump(s) based on run hours. Enabled prior to shipping.	No	No/Yes	
Rotate Time:	• Not visible/applicable if Even Rotation set to No. • Details the amount of time in hours the system will run before a pump rotation can be made automatically.	60	1 to 999	

No Flow Standby

Menu Item	Variable	Default	Range	Field Value
NFSB Enable? (NFSB Menu 1)	• Enables or Disables No Flow Standby. • None of the following No Flow Standby variables are visible if NFSB is disabled.	Yes	Yes/No	
Sample Time? (NFSB Menu 1)	• The amount of time in seconds the drive speed will be steady prior to the unit entering a NFSB sequence.	120	1 to 999	
Test Duration? (NFSB Menu 1)	The amount of time in seconds the controller tests the NFSB sequence variables for verification.	5	2 to 30	
NFSB Enable? (NFSB Menu 1)	• Enables or Disables No Flow Standby. • None of the following No Flow Standby variables are visible if NFSB is disabled.	Yes	Yes/No	
NSFB Menu 2				
Drive DB? (NFSB Menu 2)	• Dead Band speed range the drive must operate within to initiate a No Flow Shutdown Test.	0.5	00.0 to 99.9	
Pressure DB? (NFSB Menu 2)	• Dead Band pressure range the system must operate within during No Flow Shutdown test to enter No Flow Shutdown Mode.	3	1 to 20	
Test Speed Reduction? (NFSB Menu 2)	• Amount the pump speed is reduced during the No Flow Shutdown test.	5.0	-99.9 to 99.9	
NFSB Menu 3				
Bladder Tank Charge Time? (NFSB Menu 3)	• The amount of time that the booster runs (in seconds) with the HyperCharge setpoint prior to shutting down under No Flow StandBy.	10	0 to 999	
Bladder Tank Charge? (NFSB Menu 3)	• Adjust the cut-out pressure. • Affects the booster operations prior to shutting down under No Flow StandBy. • The extra pressure acts a buffer, giving the tank more stored water and reducing pump starts during small demand changes.	0	0 to 20	

Alarms/Shutdown

Menu Item	Variable	Default	Range	Field Value
High Temperature Shutdown Temperature				
Setpoint? (HTSD)	• High Temperature Shutdown Temperature. • The maximum discharge temperature that the system may reach prior to shutdown. • System will start again once this value falls below the HTSD setting by the amount of the High Temp Shutdown Reset Delta.	120° F	0 to 200° F	
Reset Delta? (HTSD)	• High Temperature Reset Delta. • The amount of discharge temperature decrease the controller must realize prior to restarting the unit.	10° F	5 to 100° F	
Shutdown Del? (HTSD)	• Number of seconds the High Temperature Setpoint must be realized before the unit shuts down.	15	2 to 30	
Reset Temp: (HTSD)	• Calculated temperature the system will reach prior to restart.			
Low Suction Shutdown				
LSSD Setpoint? (LSSD)	• Low Suction Shutdown Pressure limit. • Suction pressure below this setting will cause the unit to shut down.	10	-15 to 999	
Shutdown Del? (LSSD)	• The time in seconds that low suction pressure is allowed before alarm occurs.	15	0 to 60	
Reset DB? (LSSD)	• The Low Suction Pressure Reset Pressure differential in PSI. • LSSD setpoint must be exceeded by this amount for the unit to restart.	5	1 to 99	
Reset Pressure: (LSSD)	• The calculated suction pressure required for system to restart.			
High Suction Shutdown				
HSSD Setpoint? (HSSD)	• High Suction Shutdown Setpoint. • Suction pressure above this setting will cause the unit to shut down. • A HSSD setpoint of zero disables this feature.	0	0 to 999	
Shutdown Del? (HSSD)	• The time in seconds that high suction pressure is allowed before alarm occurs.	60	0 to 999	
HPSD Setpoint? (HPSD)	• High System Shutdown Pressure. • Sets the maximum discharge pressure the system may reach prior to shutdown. • System requires a manual reset for this condition.	110	0 to 999	
Shutdown Del? (HPSD)	• Time delay in seconds that the high system shutdown pressure is realized and sustained until the system shuts down.	60	0 to 999	

Menu Item	Variable	Default	Range	Field Value
Low Supply Pressure Shutdown				
LSPS Setpoint? (LSPS)	• Low Supply Pressure Shutdown. • Sets the minimum discharge pressure the system may discharge prior to triggering an alarm event. • A LSPS setpoint of zero disables this feature.	0	0 to 999	
Delay? (LSPS)	• The time in seconds that low supply pressure is allowed before alarm occurs.	30	0 to 999	
Sys Lockout? (LSPS)	• If enabled, this will stop the booster on a LSPS event and prevent the booster from restarting until the LSPS alarm is manually reset.	Disabled	Disabled / Enabled	
VFD / Pump				
VFD Operation Alm Delay? (VFD/PUMP)	• Time in seconds that a VFD can run while not commanded to before a VFD in Manual Operation Alarm is generated.	30	0 to 999	
Pump Alm Del? (VFD/PUMP)	• Time in seconds that a VFD can be commanded to operate and not return an ON status before a Pump Failure Alarm is generated.	5	0 to 999	

Contact Inputs

Menu Item	Variable	Default	Range	Field Value
LLCO Enable?	• Enables the Low Level Cutout function if enabled. • Utilized for low water cutoff when pumping water from a vessel.	No	No/Yes	
LLCO Contact?	• Low Level Cutout Operation.	N.O.	N.O./N.C.	
RSS Enable?	• Enables Remote Start/Stop Function if enabled.	No	No/Yes	
RSS Contact?	• Remote Enable Operation.	N.O.	N.O./N.C.	

DemandSet

Menu Item	Variable	Default	Range	Field Value
Pressure & Flow				
User SP: (Pressure & Flow)	• The User Setpoint. • Here for reference purposes only, but can be adjusted. • The user setpoint can be adjusted via the Status menu.	50	0 to 999	
Calculated SP: (Pressure & Flow)	• The DemandSet Setpoint. • Displays the working setpoint of the booster. • The DemandSet setpoint is calculated using Max. Sys Flow and Variable Head Cfg. • When actual system flow is at or above Max. Sys Flow, the DemandSet SP will equal the User SP. • As actual system flow falls below Max. Sys Flow, the system variable head is used to calculate a lower DemandSet SP.		0 to 999	
Max. Sys Flow? (Pressure & Flow)	• Only available when system flow is available via hardwired flow meter or sensorless calculation. • The highest anticipated flow the system is expected to deliver (usually design flow).	0	0 to 9999	
Current Flow: (Pressure & Flow)	• Only available when system flow is available via hardwired flow meter or sensorless calculation. • Current system flow from hardwired flow meter or sensorless flow calculation.		0 to 9999	
Variable Head				
Height? (Variable Head)	• Only available when system flow is available via hardwired flow meter or sensorless calculation. • Height of building in feet, or longest pipe run.	0	0 to 9999	
Variable Head Loss? (Variable Head)	• Only available when system flow is available via hardwired flow meter or sensorless calculation. • Actual System Variable Head Loss. • If this variable is set to a value other than zero, it will be used to calculate the DemandSet SP regardless of the Height setting.	0	0 to 999	
Sensorless Head - 1/2				
Max. N Pump(s) @ % (Sensorless Head (1))	• Only available when system flow is NOT available. • Set max. number of pumps and system speed required to meet design conditions.	1 & 80%	1 to 4 & 20% to 100%	
Max. Pressure SP? (Sensorless Head (1))	• Only available when system flow is NOT available. • Set maximum pressure required to meet design flow.	50	0 to 999	
Min Pressure SP? (Sensorless Head (1))	• Only available when system flow is NOT available. • Set minimum pressure required – control head at zero flow.	0	0 to 999	
Sensorless Head - 2/2				
Calc Mode (Sensorless Head (2))	• Set control curve from 100% Quadratic to 100% Linear in 20% increments.	100% Linear	0% to 100%	
Update Interval (Sensorless Head (2))	• Set the setpoint update interval.	2.0	0.1 – 999.9	

Pump Run Timers

Menu Item	Variable	Default	Range	Field Value
Minimum On?	• Establishes pump minimum on time in seconds.	5	0 to 999	
Minimum Off?	• Establishes pump minimum off time in seconds.	5	0 to 999	
Crossover Time?	• Establishes the length of time in seconds that a pump selected to shut down stays online so other pump(s) can stabilize. • For example, during lead swap.	10	0 to 999	
Reset Pump Run Hours	• Resets pump hours to zero.			

Pressure & Flow Sensors

Menu Item	Variable	Default	Range	Field Value
Discharge Pressure				
Zero? (Discharge Pressure)	• System Pressure Sensor Zero. • Sets the minimum pressure of the discharge pressure transducer in PSIG.	0	-30 to 30	
Span? (Discharge Pressure)	• System Pressure Sensor Span. • The span of the discharge pressure transducer in PSIG.	300	0 to 999	
Current: (Discharge Pressure)	• Displays the current discharge pressure reading.			
Failure Speed? (Discharge Pressure)	• Speed the system will operate the pumps in the event of a discharge pressure transducer failure.	50%	20 to 100%	
Suction Pressure				
Zero? (Suction Pressure)	• Suction Pressure Sensor Zero. • Sets the minimum pressure of the suction pressure transducer in PSIG.	0	-30 to 30	
Span? (Suction Pressure)	• Suction Pressure Sensor Span. • The span of the suction pressure transducer in PSIG. • Setting span to zero removes suction pressure from alarm routines and display.	300	0 to 999	
Current: (Suction Pressure)	• Displays the current suction pressure reading.			
Flow Meter				
Flow Sensor? (Flow Meter)	• Enables booster flow feature. • Selection of Meter enables hardwired meter interaction with booster system. • Once the Meter selection has been made, the 4-20mA input, hardware alarm is enabled for the flow meter input. • If Meter has been selected, absence of flowmeter will cause a hardware failure alarm. • Selection of sensorless enables sensorless flow calculation interaction with booster system – this option only available on standard MVP boosters, and typically enabled during factory setup. • Selection of Meter will override sensorless calculations.	No	No / Meter / Sensorless	
Flow Zero? (Flow Meter)	• Hardwired flow meter zero.	0	0 to 999	
Flow Span? (Flow Meter)	• Hardwired flow meter span.	0	0 to 9999	
Flow: (Flow Meter)	• Displays the current hardwired flow meter reading.			

Menu Item	Variable	Default	Range	Field Value
Flow Meter				
Zero? (Remote Pressure)	• Remote pressure transmitter zero.	0	-30 to 30	
Span? (Remote Pressure)	• Remote pressure transmitter span. • Setting span to anything other than zero enables the remote pressure transmitter feature. • Once the remote pressure transmitter feature has been enabled, the 4-20mA input hardware alarm is enabled for the remote pressure transmitter input. • Absence of a remote pressure transmitter will cause a hardware failure alarm and automatically return the booster system to local header pressure control. • When the remote pressure feature is active, the HPSD and LSPS alarms continue to monitor the booster's local header pressure.	0	0 to 999	
Offset +/-? (Remote Pressure)	• Added to, or subtracted from, final remote pressure reading.	0	-99 to 99	
Current: (Remote Pressure)	• Displays the current remote pressure reading.			
Remote Pressure High Alarm				
Alarm Type (Remote Pressure) (Rem Hi Alm)	• Sets remote pressure high alarm type. • Only available if remote pressure sensor has been configured. • Not Used – Remote pressure high alarm not functional. • Static SP – Results in a fixed high-pressure alarm setpoint. • Offset SP – Results in a dynamic high-pressure alarm setpoint that is the result of adding the offset setpoint to the working setpoint.	Not Used	Not Used / Static SP / Offset SP	
Setpoint/Offset? (Remote Pressure) (Rem Hi Alm)	• Value to be used as either the Static SP, or the Offset SP to be added to the working setpoint.	0	0 to 999	
Current SP: (Remote Pressure) (Rem Hi Alm)	• Displays the current high-pressure alarm setpoint.			
Delay? (Remote Pressure) (Rem Hi Alm)	• Time delay in seconds that the high remote system pressure is realized and sustained until the high alarm is generated.	0	0 to 999	

Menu Item	Variable	Default	Range	Field Value
Remote Pressure Low Alarm				
Alarm Type (Remote Pressure) (Rem Low Alm)	• Sets remote pressure low alarm type. • Only available if remote pressure sensor has been configured. • Not Used – Remote pressure low alarm not functional. • Static SP – Results in a fixed low-pressure alarm setpoint. • Offset SP – Results in a dynamic low-pressure alarm setpoint that is the result of subtracting the offset setpoint from the working setpoint.	Not Used	Not Used / Static SP / Offset SP	
Setpoint/Offset? (Remote Pressure) (Rem Low Alm)	• Value to be used as either the Static SP, or the Offset SP to be subtracted from the working setpoint.	0	0 to 999	
Current SP: (Remote Pressure) (Rem Low Alm)	• Displays the current low-pressure alarm setpoint.			
Delay? (Remote Pressure) (Rem Low Alm)	• Time delay in seconds that the low remote system pressure is realized and sustained until the low alarm is generated.	0	0 to 999	

Factory Settings

Menu Item	Variable	Default	Range	Field Value
Configurable Settings				
Use Celsius Temps/Use Fahrenheit Temps (General Cfg)	• Selects whether the temperatures are displayed as Fahrenheit, or Celsius.	F	F/C	
Booster/HVAC Mode	• Used to set operating mode of controller. • HVAC Mode covered in detail by HVAC Mode addendum to this manual.	Booster	Booster – HVAC Mode	
Flow Sensor? (General Cfg)	• Enables the flow sensor functions of Meter, Sensorless, or No.	No	No/Meter/ Sensorless	
P1 VFD? (VFD/MFG)	• Available only if sensorless flow has been selected. • Sets model of VFD for Modbus communications.	Altivar 212	Altivar 212 / AB PF 523 / ABB ACH550 / Danfs FC102 / Future VFD3 / … Future VFD8 /	
P2 VFD? (VFD/MFG)	• Available only if sensorless flow has been selected. • Sets model of VFD for Modbus communications. • Visible only in Dplx, Tplx, or Qplx modes.	Altivar 212	Altivar 212 / AB PF 523 / ABB ACH550 / Danfs FC102 / Future VFD3 / … Future VFD8 /	
P3 VFD? (VFD/MFG)	• Available only if sensorless flow has been selected. • Sets model of VFD for Modbus communications. • Visible only in Tplx, or Qplx modes.	Altivar 212	Altivar 212 / AB PF 523 / ABB ACH550 / Danfs FC102 / Future VFD3 / … Future VFD8 /	
P4 VFD? (VFD/MFG)	• Available only if sensorless flow has been selected. • Sets model of VFD for Modbus communications. • Visible only in Qplx mode.	Altivar 212	Altivar 212 / AB PF 523 / ABB ACH550 / Danfs FC102 / Future VFD3 / … Future VFD8 /	
RPM (VFD/MFG) (DTA) Drive 1 Data…	• Displays current RPM of pump 1 reading from VFD via Modbus communications. • Available only if sensorless flow has been selected.			
KW (VFD/MFG) (DTA) Drive 1 Data…	• Displays current kW of pump 1 reading from VFD via Modbus communications. • Available only if sensorless flow has been selected.			
Delay KW (VFD/MFG) (DTA) Drive 1 Data…	• Displays rolling average of the last 10 readings of kW of pump 1 reading from VFD via Modbus communications. • Available only if sensorless flow has been selected.			
RPM (VFD/MFG) (DTA)	• Displays current RPM of pump 2 reading from VFD via Modbus communications. • Available only if sensorless flow has been selected			

Menu Item	Variable	Default	Range	Field Value
Drive 2 Data…	• Visible only in Dplx, Tplx, or Qplx modes.			
KW (VFD/MFG) (DTA) Drive 2 Data…	• Displays current kW of pump 2 reading from VFD via Modbus communications. • Available only if sensorless flow has been selected. • Visible only in Dplx, Tplx, or Qplx modes.			
Delay KW (VFD/MFG) (DTA) Drive 2 Data…	• Displays rolling average of the last 10 readings of kW of pump 2 reading from VFD via Modbus communications. • Available only if sensorless flow has been selected. • Visible only in Dplx, Tplx, or Qplx modes.			
RPM (VFD/MFG) (DTA) Drive 3 Data…	• Displays current RPM of pump 3 reading from VFD via Modbus communications. • Available only if sensorless flow has been selected. • Visible only in Tplx, or Qplx modes.			
KW (VFD/MFG) (DTA) Drive 3 Data…	• Displays current kW of pump 3 reading from VFD via Modbus communications. • Available only if sensorless flow has been selected. • Visible only in Tplx, or Qplx modes.			
Delay KW (VFD/MFG) (DTA) Drive 3 Data…	• Displays rolling average of the last 10 readings of kW of pump 3 reading from VFD via Modbus communications. • Available only if sensorless flow has been selected. • Visible only in Tplx, or Qplx modes.			
RPM (VFD/MFG) (DTA) Drive 4 Data…	• Displays current RPM of pump 4 reading from VFD via Modbus communications. • Available only if sensorless flow has been selected. • Visible only in Qplx mode.			
KW (VFD/MFG) (DTA) Drive 4 Data…	• Displays current kW of pump 4 reading from VFD via Modbus communications. • Available only if sensorless flow has been selected. • Visible only in Qplx mode.			
Delay KW (VFD/MFG) (DTA) Drive 4 Data…	• Displays rolling average of the last 10 readings of kW of pump 4 reading from VFD via Modbus communications. • Available only if sensorless flow has been selected. • Visible only in Qplx mode.			
P1 Adj? (Cal Temp Sens)	• Used to calibrate Pump 1 Temperature. • Calibrated temperature displayed to right of calibration value.	0	-99.9 to 99.9	
P2 Adj? (Cal Temp Sens)	• Used to calibrate Pump 2 Temperature. • Calibrated temperature displayed to right of calibration value. • Visible only in Dplx, Tplx, or Qplx modes.	0	-99.9 to 99.9	
P3 Adj? (Cal Temp Sens)	• Used to calibrate Pump 3 Temperature. • Calibrated temperature displayed to right of calibration value. • Visible only in Tplx, or Qplx modes.	0	-99.9 to 99.9	
P4 Adj? (Cal Temp Sens)	• Used to calibrate Pump 4 Temperature. • Calibrated temperature displayed to right of calibration value. • Visible only in Qplx mode.	0	-99.9 to 99.9	
Flow Zero? (Meter Cfg)	• Hardwired flow meter zero. • Not visible if Flow Sensor is set to No.	0	0 to 999	

Menu Item	Variable	Default	Range	Field Value
Flow Span? (Meter Cfg)	• Hardwired flow meter span. • Not visible if Flow Sensor is set to No.	0	0 to 9999	
Flow Offset? (Meter Cfg)	• Sets Flow Sensor offset for calibration purposes. • Not visible if Flow Sensor is set to No.	0	-999 to 999	
Flow: (Meter Cfg)	• Displays Current Calculated Flow.			
Curve Data (Sensorless Cfg)	• Selects pump performance data by MVP model for sensorless flow calculation.	MVP-630-208	MVP-630-208 / MVP-630-460 / MVP-850-208 / MVP-850-460 / MVP-875-208 / MVP-875-460 / MVP-8100-208 / MVP-8100-460 / MVP-8150-208 / MVP-8150-460 / Custom 1 / Custom 2 / Custom 3 / Custom 4 / Custom 5 /	
Sensorless Flow (Sensorless Cfg)	• Displays current sensorless flow calculation.			

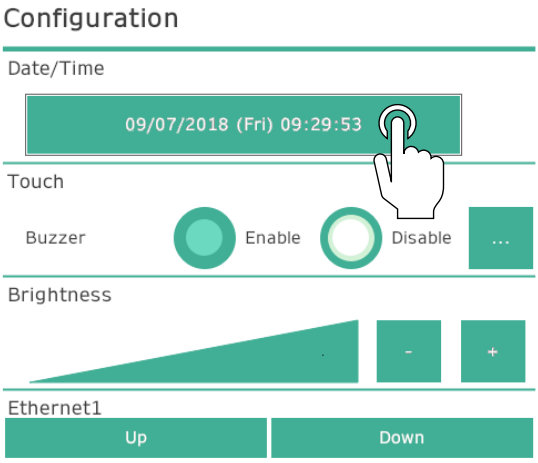
PID Tuning

Menu Item	Variable	Default	Range	Field Value
Loop Ctl:	• Sets type of control. • P = Proportional only. • PI = Proportional with Integral. • PID = Proportional with Integral and Derivative. • DC = Demand Control – **This option is NOT applicable to booster systems and should NOT be selected.**	PI	P, PI, PID, DC	
Proportional:	• Controls the initial reaction of the PID loop. • ***P*** gain is a dimensional unit for error correction. • The larger the number, the greater the initial response. • Visible only on P, PI, PID menus.	00.85	00.00 to 30.00	
Integral:	• ***I*** Time is the rate which a steady-state is corrected. • Controls the amount that is continuously added or subtracted to the output, based on the process variable in relation to the setpoint. • Trims the initial control response up, or down. • The larger the number, the slower integral is added to the output signal. • Minimum Value; 1 – Fastest integration time e.g. 10 is ten times the fastest integration time. • Visible only on PI & PID menus.	8	0 to 6000	
Derivative:	• Takes the rate of process variable change into account and varies the control output accordingly. • Visible only on PID menu.	0	0 to 6000	
Static Interval?	• Used only in DC configuration. • Time in seconds, no change between DC cycles.	30	0 to 999	
Modulation Rate?	• Used only in DC configuration. • Time between gain adjustments during DC modulation.	5	0 to 99	
Modulation Gain?	• Used only in DC configuration. • Amount of control output change in counts made each time the Modulation Gain is applied.	5	0 to 99	
SP:	• Visible only in P, PI & PID configuration. • Current process setpoint.			
PV:	• Current process variable.			
DB:	• Used only in DC configuration.	10	0 to 99	
OUT:	• Used only in DC configuration. • Current control output.			

Pump Staging

Menu Item	Variable	Default	Range	Field Value
Stage Down Speed Offset? (Stage Cfg 1)	• Sets the percentage speed offset for the system destage point. • When the system stages up, once the Stage Dn Stab Time has elapsed, the system stores the pump speed minus the Stage Dn Speed Offset. • Example: Stabilized speed of 78 – offset speed of 25= destage speed of 53.	25	0 to 99	
Stage Down Stabilization Time? (Stage Cfg 1)	• Sets the amount of time in seconds the system waits after staging up to record the stabilized speed.	10	0 to 999	
Stage Up Delay? (Stage Cfg 1)	• The amount of time in seconds that the system must operate above the Stage Up Speed for a stage to be added.	15	0 to 999	
Stage Down Delay? (Stage Cfg 1)	• The amount of time in seconds that the system has to operate below whichever is greater to shed a stage: o Calc Destage Speed o Min. Destage Speed	15	0 to 999	
Minimum Destage Speed? (Stage Cfg 2)	• The Minimum Destage Speed. • Takes precedent over calculated destage speed.	30	0 to 99	
Stage Up Speed? (Stage Cfg 2)	• Speed the system achieves before staging up.	95	0 to 100	
Calculated Destage Speed: (Stage Cfg 2)	• Displays the calculated destage speed.			
Stage Up Decel Integration?	• Used to mitigate pressure overshoot during stage up by forcing the VFD speed reference output low as added stage reaches operating speed. • For this feature to work correctly, VFD ramp time must be 10 seconds (set at VFD). • A value of 20% will cause the VFDs to match speeds at 90% output where the drive(s) already running slow to 90% as the drive coming online increases to 90%. • The effects of this feature happen very quickly and are time-based. A 20% setting will cause an output decrease of 2 seconds. • A setting of 0% will result in no change to output speed.	20%	0% to 80%	

Display Hardware Configuration



Display setting / Update time

The following settings and operations are available on the Hardware Configuration screen.

- Adjusting the Clock
- Deactivating the Touch Sound
- Adjusting Brightness
- Configuring driver settings
- Configuring Scan Rates
- Downloading booster HMI application

The booster HMI application may also be upgraded through the “Display Settings” using a USB stick.

Real-time Clock

The controller automatically synchronizes its time with the display's time.

- During power outages, the controller maintains the correct time and date via an onboard real-time clock with battery backup.
- Upon power-up, the display’s clock is updated with the correct time from the controller’s real-time clock.

Setting Date and Time via HMI Panel Display

To configure the date and time on your device, follow these steps:

1. Navigate to System Configuration.
   - Select 'System Config…' from Main Menu and enter the system configuration settings.
2. Navigate to Display Settings:
   - Within the 'System Config' menu, select 'Display Settings'.
3. Set Date and Time:
   - In the 'Display Settings' menu, locate the 'Date/Time' option.
   - Adjust the date and time as needed using the provided interface.

IMPORTANT!

To ensure accurate event time recordings, set the date and time on the controller during the start-up. This will maintain an accurate activity log for the display and booster system.

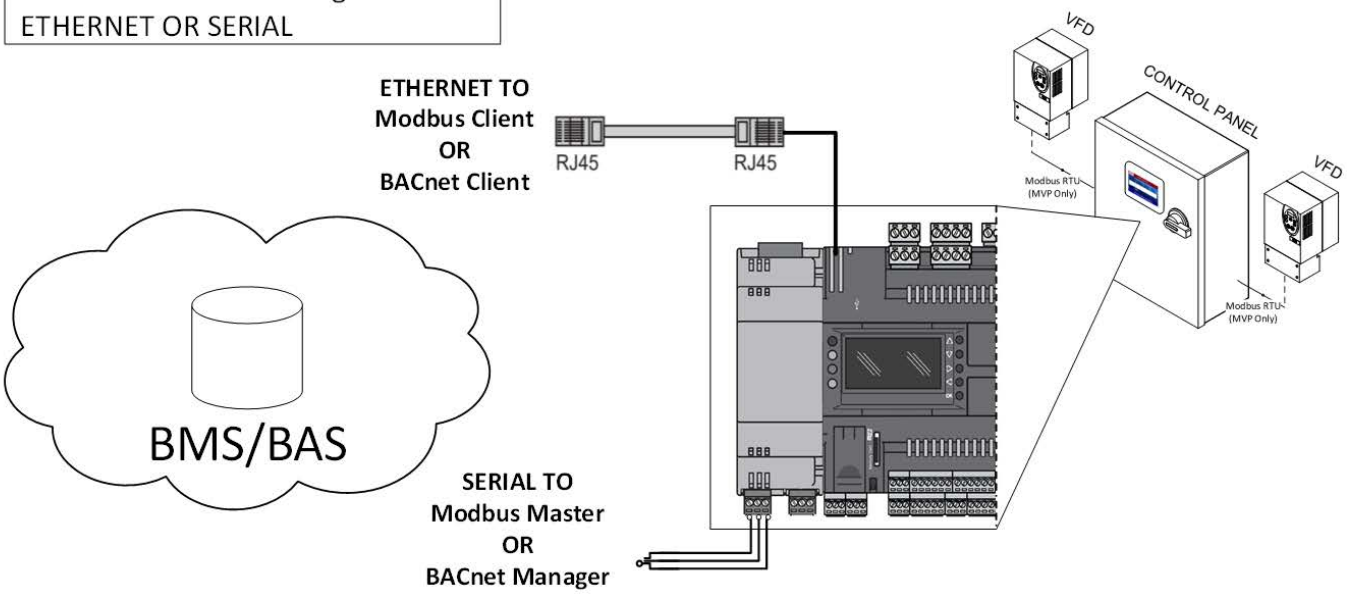
Settings

Menu Item	Variable	Default	Range	Field Value
Date/Time	• Adjust display time and date.			
Buzzer	• Configure the display’s internal buzzer during press action.			
Brightness	• Adjust display brightness.			
Configuring Ethernet Settings	• Configure display’s network.			
Drivers	• Configure serial communication.			
Scan Rates	• Adjust communication update time.			
Download From	• Select source to upload application to HMI display.			
Download To	• Select target to download HMI display information.			
Reboot	• Restart HMI display. • Recommended after making system changes.			
System Log	• View HMI display system log.			

Building Automation System Integration

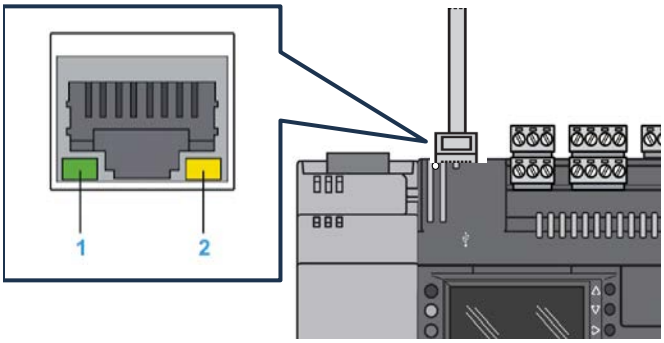
Communication Connectivity

NOTICE!
Controller must be configured for ETHERNET OR SERIAL



Typical network to BAS

RJ-45 Ethernet port is located on the top left of the controller.



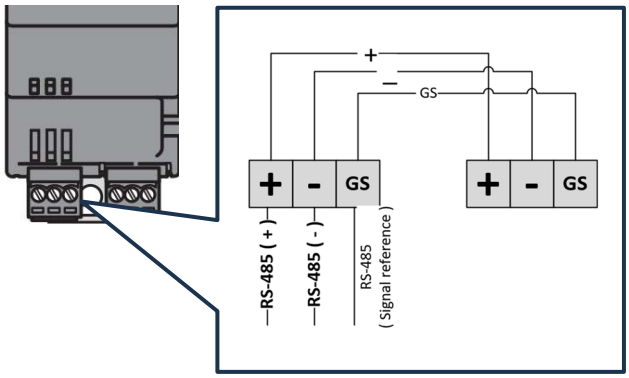
Ethernet RJ-45 port
Source: Schneider Electric Hardware Guide EIO0000002015 09/2018

	Signal	LED color	Status	Description
1.	Ethernet Link	Green/Yellow	Off	No Link
			Yellow On	Link at 10Mb
			Green On	Link at 100Mb
2.	Ethernet Activity	Green	OFF	No Activity
			Flashing	activity

NOTICE!
Ethernet RS-45 port is available but NOT enabled for BAS/BMS without Communication Module expansion plug-in.

Serial RS-485 port(s) are located on the bottom of the communication module.

- The two ports on the RS-485 module are connected internally.
- Either port can be used to connect to the controller, or both, if the controller is installed in the middle of a trunk (one for IN and one for OUT).
- Maximum speed of 115200 baud.

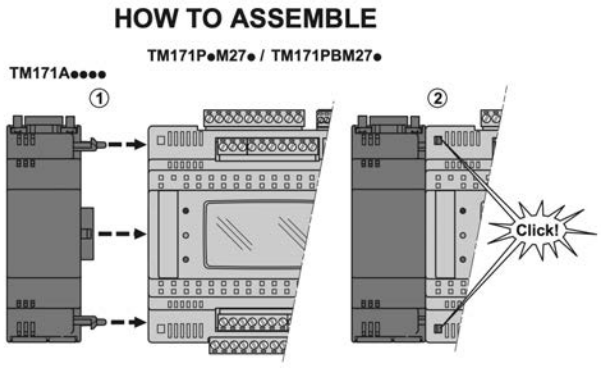


RS-485 input
Source: Schneider Electric Hardware Guide EIO0000002030.05 05/2024

BAS/BMS Communication Module

NOTICE!	RS-485 Communication Module
BAS Communication Module Required:	The BAS module must be installed as an expansion plug-in to enable BAS/BMS connectivity.
Part Available:	If a communication module is factory installed, one may be requested and added in the field.
Part:	**RS-485 Schneider TM171ARS485**

Communication Module Installation Procedure



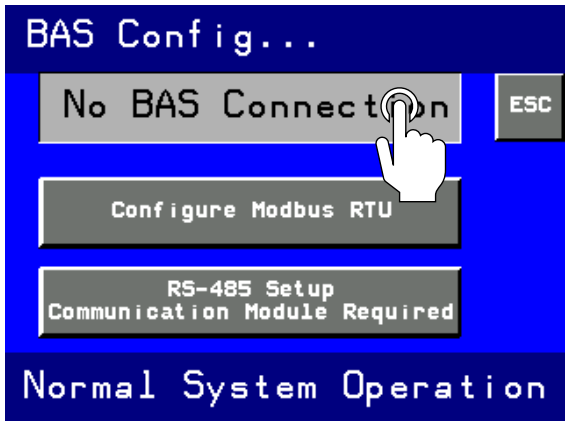
Removing controller from din rail mount
Source: Schneider Electric Product QuickStart *EIO0000002030.05 05/2024*

1. Turn OFF power to the Panel.
    - Completely power down the control panel and wait for all electrical components to de-energize.
2. Install the Communication Module.
    - Disconnect the controller and unmount from its DIN rail.
    - Carefully line the guide tabs and install the communication module in the expansion slot to the left of the controller.
3. Power Up the Panel.
    - Re-install any components that were removed.
    - Turn the power back on.
4. Verify Installation.
    - The controller will automatically detect the newly installed communication module.
    - Navigate to the Configuration screen and verify the module is detected.

NOTICE!

If the `BAS Setup…` menu option is not available (visible), the communication module is NOT detected or installed.

BAS Configuration



BAS configuration

1.	BAS connection	• Shows current BAS connection. • Press to change and establish BAS protocol.

NOTICE! **Power Cycle**

Once BAS protocol is configured, return the screen all the way out to the main menu and cycle power to the controller to save configuration.

Protocol

The eMVP/MVP supports connections to:

- A supervision system using Modbus TCP/IP protocol.
- A BACnet/IP network, B-AAC profile.

Protocol	Physical Layer	Topology
Modbus RTU	Serial (RS-485)	Bus
Modbus TCP	Ethernet (RJ-45)	Star
BACnet MS/TP	Serial (RS-485)	Bus
BACnet/IP (UDP)	Ethernet/IP (RJ-45)	Star, Mesh

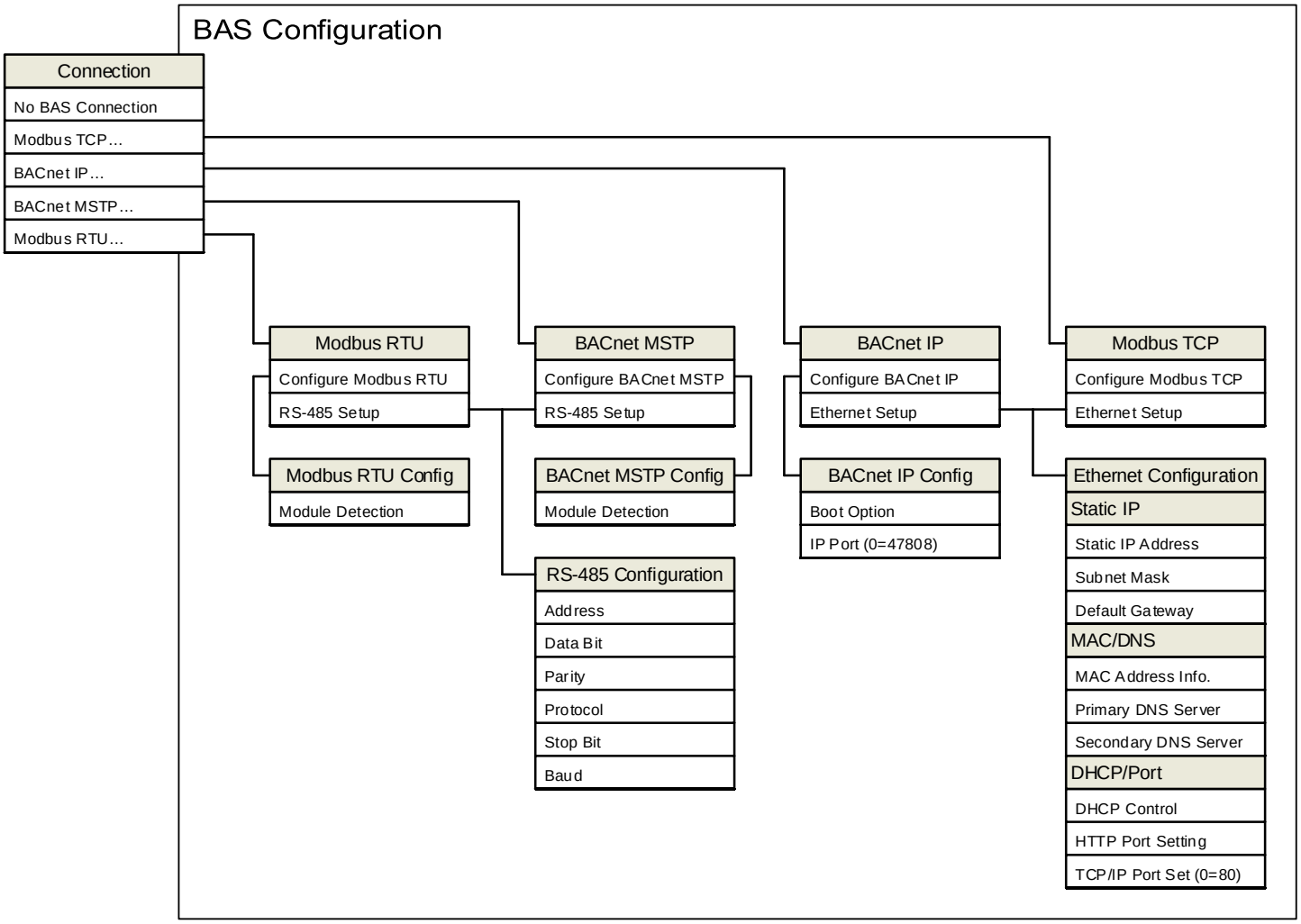
New Connections to Communication Trunks:

- Ensure new connections to a BAS/BMS communication trunk are designed for high-capacity, scalable, and reliable connections between multiple systems or network segments.
- Consult your BAS/BMS supervisory software/manager for the optimal method.

NOTICE! **INOPERABLE EQUIPMENT**

Concurrent communication of different protocols on the same serial port is not allowed.

BAS Configuration Menu Structure



Menu Item	Variable	Default	Range	Field Value
BAS Config				
Connection	• No BAS Connection. • Modbus TCP… • BACnet IP… • BACnet MSTP… • Modbus RTU…	NO BAS		

Menu Item	Variable	Default	Range	Field Value
Modbus TCP				
Configure Modbus TCP	• Opens the Modbus TCP configuration. • Uses ethernet protocol.			
Ethernet Setup	• Opens the Ethernet Configuration Menu.			
BACnet IP				
Configure BACnet IP	• BACnet IP Configuration.			
Boot Option (Configure BACnet IP)	• No Action. • Load BACnet E2 Defaults (loaded at next system boot) .	No Action		
IP Port (Configure BACnet IP)	• Allows setting of specific BACnet IP port. • A setting of 0 = 47808. • A setting of 65535 = BACnet stack running only on PLC side.	0	0 to 65535	
Ethernet Setup	• Opens the Ethernet Configuration Menu.			
BACnet MSTP				
Configure BACnet MSTP	• RS-485 module detection screen. • Visible when RS-485 communication module is installed.			
RS-485 Configuration	• Menu Item.			
Modbus RTU				
Configure Modbus RTU	• RS-485 module detection screen. • Visible when RS-485 communication module is installed.			
RS-485 Configuration	• Opens the RS-485 Configuration Menu.			

Ethernet Configuration

Menu Item	Variable	Default	Range	Field Value
Static IP Address (Static IP)	• Static IP address set here.	10.0.0.100	0.0.0.0 To 255.255.255.255	
Subnet Mask (Static IP)	• Subnet Mask address set here.	255.255. 255.0	0.0.0.0 To 255.255.255.255	
Default Gateway (Static IP)	• Default Gateway address set here.	10.0.0.1	0.0.0.0 To 255.255.255.255	
MAC Address Info (MAC/DNS)	• Controller MAC address viewed here.	Varies	00:00:00:00:00:00 To FF:FF:FF:FF:FF:FF	
Primary DNS Server (MAC/DNS)	• Primary DNS Server address set here.	8.8.8.8	0.0.0.0 To 255.255.255.255	
Secondary DNS Server (MAC/DNS)	• Secondary DNS Server address set here.	8.8.4.4	0.0.0.0 To 255.255.255.255	
DHCP Control (DHCP/Port)	• DHCP addressing control enabled here.	DHCP Disabled	DHCP Disabled To DHCP Enabled	
HTTP Port Setting (DHCP/Port)	• HTTP Port set here. • Setting of 0 = default port 80.	0	0 to 65535	
TCP/IP Port Setting (DHCP/Port)	• TCP/IP Port set here.	502	0 to 65535	

RS-485 Configuration

Menu Item	Variable	Default	Range	Field Value
Address	• RS-485 address set here.	1	0 To 255	
Data Bit	• Data Bit displayed here.	8	8 to 8	
Parity	• RS-485 Parity set here.	Even	None Odd Even	
Protocol	• RS-485 communication protocol set here. • If BACnet IP is the desired communication protocol, this setting CANNOT be BACnet MSTP – The controller will only serve BACnet through one hardware port at a time.	Modbus RTU	uNET Modbus RTU BACnet MSTP	
Stop Bit	• RS-485 Stop Bit set here.	1	1 to 2	
Baud	• RS-485 Baud rate set here.	38,400	9,600 19,200 38,400 57,600 76,800 115,200	

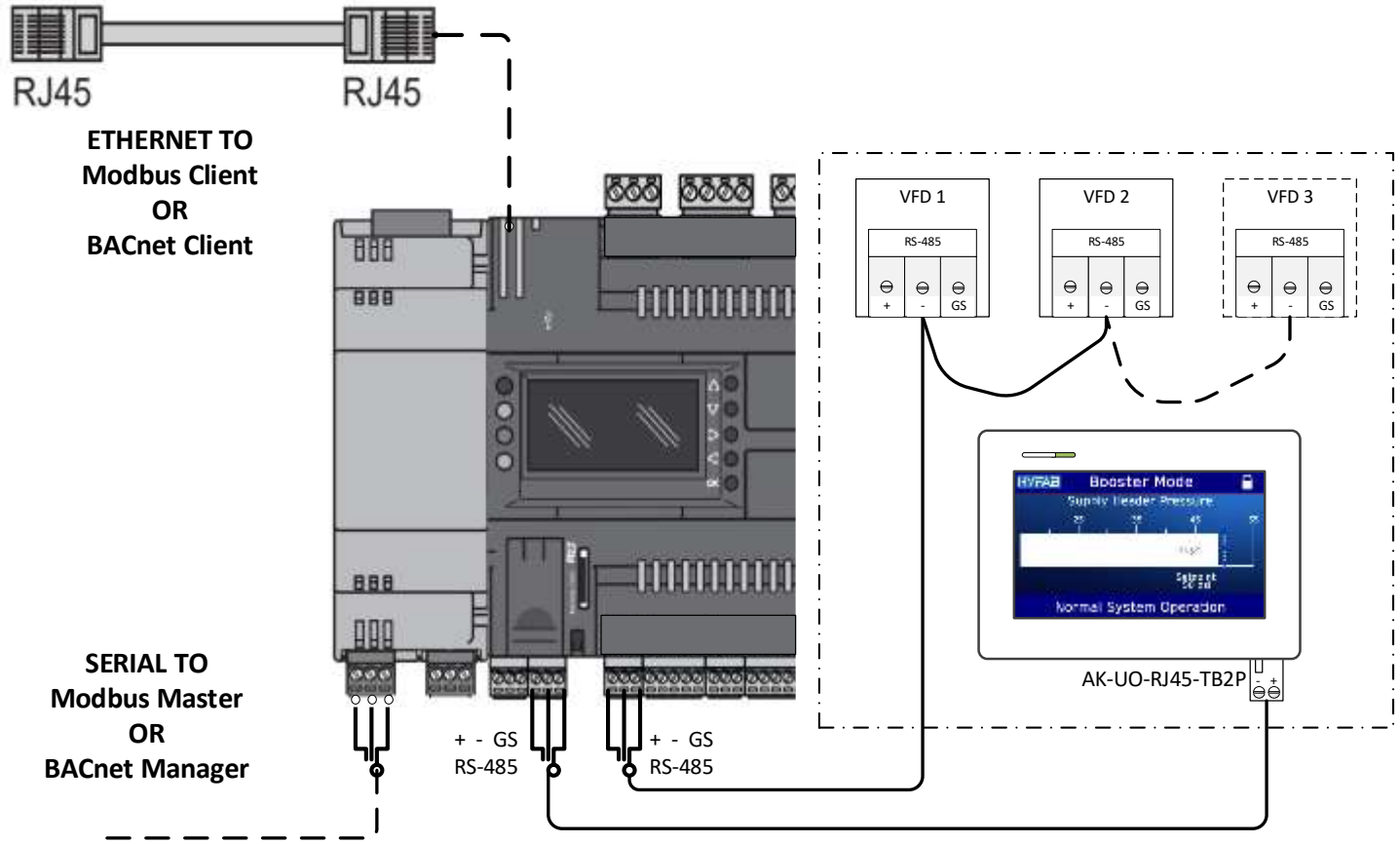
BAS Point Export Table

			BACnet Point Data		Modbus Point Data		Controller
Point Description	Read /Write	Point Type	Units /Inactive	Active	Type	Decimal ADR	Booster MODE
Supply Header Pressure	R	AV	PSI		16-bit Int	9164	Yes
Suction Header Pressure	R	AV	PSI		16-bit Int	9165	Yes
Flow Rate	R	AV	GPM		16-bit Int	9166	Yes
Remote system Pressure	R	AV	PSI		16-bit Int	9167	Yes
Pump 1 Speed	R	AV	%		16-bit Int	9168	Yes
Pump 2 Speed	R	AV	%		16-bit Int	9169	Yes
Pump 3 Speed	R	AV	%		16-bit Int	9170	Yes
Pump 4 Speed	R	AV	%		16-bit Int	9171	Yes
Current Lead Pump	R	AV			16-bit Int	9172	Yes
High System Shutdown Pressure	R	AV	PSI		16-bit Int	9173	Yes
System Setpoint	R/W	AV	PSI		16-bit Int	8996	Yes
Pump 1 / System Supply Temperature	R	AV	DegF		16-bit Int	9175	Yes
Pump 2 / System Return Temperature	R	AV	DegF		16-bit Int	9176	Yes
Pump 3 / Process 1 Temperature	R	AV	DegF		16-bit Int	9177	Yes
Pump 4 / Process 2 Temperature	R	AV	DegF		16-bit Int	9178	Yes
Pump 1 Run Hours	R	AV	Hours		32-bit Uint	9179	Yes
Pump 2 Run Hours	R	AV	Hours		32-bit Uint	9181	Yes
Pump 3 Run Hours	R	AV	Hours		32-bit Uint	9183	Yes
Pump 4 Run Hours	R	AV	Hours		32-bit Uint	9185	Yes
Process 1 Setpoint	R/W	AV	DegF		16-bit Uint	8997	No
Process 2 Setpoint	R/W	AV	DegF		16-bit Uint	8998	No
Process 1 Output	R	AV	%		16-bit Uint	8995	No
Process 2 Output	R	AV	%		16-bit Uint	9003	No
Pump 1 Status	R	BV	Off	Running	16-bit Int	9187	Yes
Pump 2 Status	R	BV	Off	Running	16-bit Int	9188	Yes
Pump 3 Status	R	BV	Off	Running	16-bit Int	9189	Yes
Pump 4 Status	R	BV	Off	Running	16-bit Int	9190	Yes
No Flow Standby Status	R	BV	Running	Standby	16-bit Int	9191	Yes
Low Level Cutout Enable	R	BV	Disabled	Enabled	16-bit Int	9192	Yes
Low Level Cutout Alarm	R	BV	Normal	Alarm	16-bit Int	9193	Yes
System Enable Status	R	BV	Disabled	Enabled	16-bit Int	9194	Yes
Pump 1 Alarm	R	BV	Normal	Alarm	16-bit Int	9195	Yes
Pump 2 Alarm	R	BV	Normal	Alarm	16-bit Int	9196	Yes
Pump 3 Alarm	R	BV	Normal	Alarm	16-bit Int	9197	Yes
Pump 4 Alarm	R	BV	Normal	Alarm	16-bit Int	9198	Yes
High System Pressure Alarm	R	BV	Normal	Alarm	16-bit Int	9199	Yes
Low Suction Shutdown Alarm	R	BV	Normal	Alarm	16-bit Int	9200	Yes
Pump 1 High Temperature Shutdown Alarm	R	BV	Normal	Alarm	16-bit Int	9201	Yes
Pump 2 High Temperature Shutdown Alarm	R	BV	Normal	Alarm	16-bit Int	9202	Yes
Pump 3 High Temperature Shutdown Alarm	R	BV	Normal	Alarm	16-bit Int	9203	Yes
Pump 4 High Temperature Shutdown Alarm	R	BV	Normal	Alarm	16-bit Int	9204	Yes
Low System Pressure Alarm	R	BV	Normal	Alarm	16-bit Int	9205	Yes
Low System Pressure Shutdown Alarm	R	BV	Normal	Alarm	16-bit Int	9206	Yes
Remote High-Pressure Alarm	R	BV	Normal	Alarm	16-bit Int	9207	Yes
Remote Low-Pressure Alarm	R	BV	Normal	Alarm	16-bit Int	9208	Yes
Supply Pressure Transmitter Failure	R	BV	Normal	Alarm	16-bit Int	9209	Yes
Suction Pressure Transmitter Failure	R	BV	Normal	Alarm	16-bit Int	9210	Yes
Pump 1 Temperature Sensor Failure	R	BV	Normal	Alarm	16-bit Int	9211	Yes
Pump 2 Temperature Sensor Failure	R	BV	Normal	Alarm	16-bit Int	9212	Yes
Pump 3 Temperature Sensor Failure	R	BV	Normal	Alarm	16-bit Int	9213	Yes
Pump 4 Temperature Sensor Failure	R	BV	Normal	Alarm	16-bit Int	9214	Yes
Remote Pressure Transmitter Failure	R	BV	Normal	Alarm	16-bit Int	9215	Yes
Flow Transmitter Failure	R	BV	Normal	Alarm	16-bit Int	9216	Yes
VFD In Manual Alarm	R	BV	Normal	Alarm	16-bit Int	9217	Yes
High Suction Shutdown Alarm	R	BV	Normal	Alarm	16-bit Int	9218	Yes
System Enable (Must be Configured Locally)	R/W	BV	Disabled	Enabled	16-bit Int	8994	Yes
Process 1 Blocking/Enable	R/W	BV	Open/Enable	Close/Disable	16-bit Int	9002	No
Process 2 Blocking/Enable	R/W	BV	Open/Enable	Close/Disable	16-bit Int	9004	No
Supply Temperature Alarm	R	BV	Normal	Alarm	16-bit Int	9259	No
Return Temperature Alarm	R	BV	Normal	Alarm	16-bit Int	9260	No
Process 1 Temperature Alarm	R	BV	Normal	Alarm	16-bit Int	9261	No
Process 2 Temperature Alarm	R	BV	Normal	Alarm	16-bit Int	9262	No

Wiring Diagrams

Network

Shown in the diagram below is a typical DemandSet controller for an MVP booster with sensorless flow. The controller may only be configured to communicate over Modbus OR BACnet for building integration.



DemandSet controller for MVP booster with connection to building supervisory software

	RS-485 Serial Port 1		RS-485 Serial Port 2	
Parameters -/- Device	**HMI COM1 (Controller)**	**PLC CN19 (Device)**	**PLC CN1 (Controller)**	**VFD Serial Fieldbus (Device)[1]**
Serial Interface	2 Wire	2 Wire	2 Wire	2 Wire
Protocol Mode	Modbus RTU	Modbus RTU	Modbus RTU	Modbus RTU
Address	/	1	1	1,2,3,4
Baud Rate	19200[2]	19200[2]	19200	19200
Data Bits	8	8	8	8
Parity Bit	Even	Even	Even	Even
Stop Bits	1	1	1	1

[1] Modbus RTU device connection varies by drive manufacturer.

[2] HMI STU series operates at 19200.

Power Connection

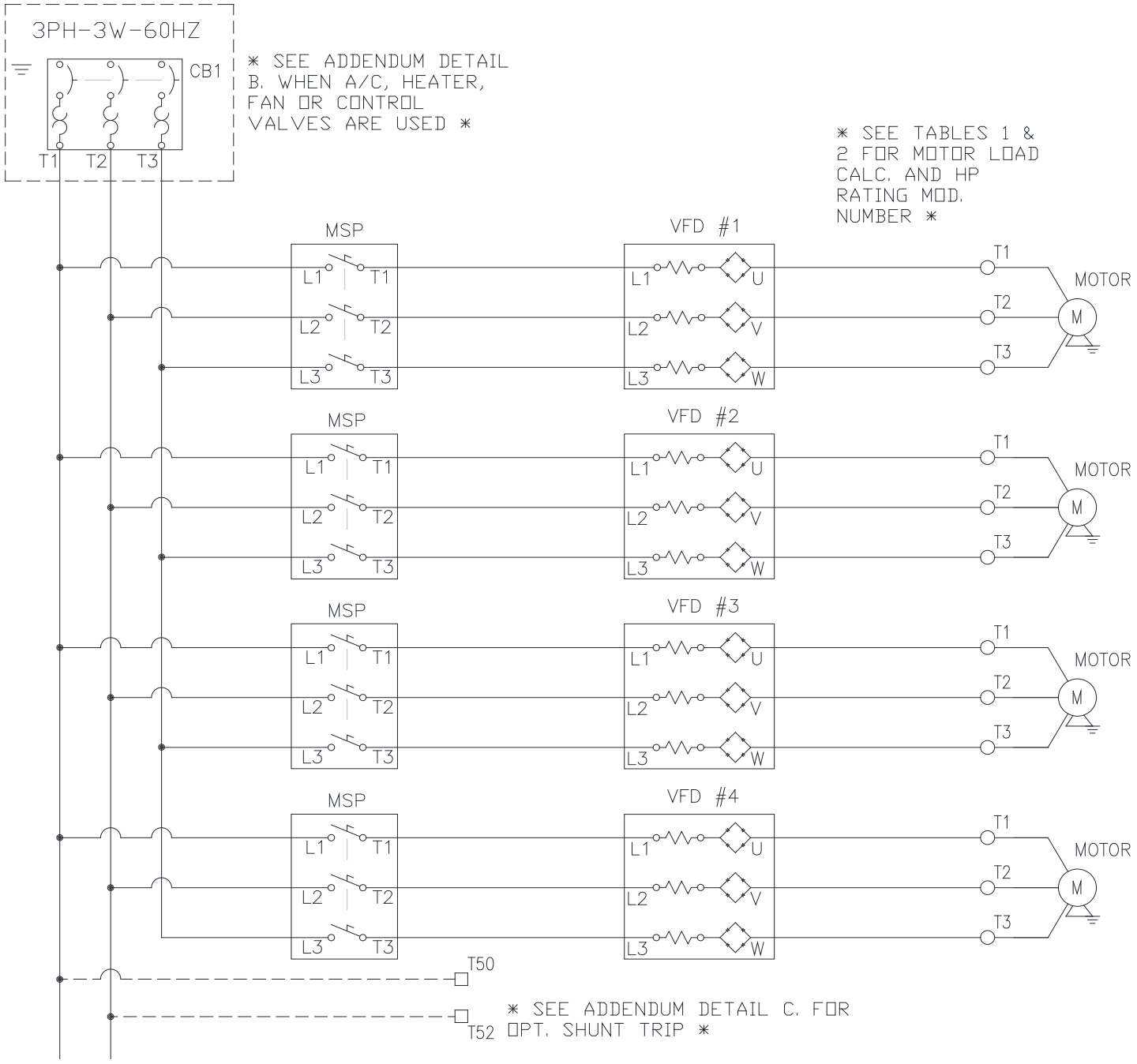


Table 1 - Standard Configuration for eMVP/MVP

The table below provides full-load ampacity (FLA) with calculations for minimum circuit ampacity (MCA) and maximum over-current protection (MOCP) for a single pump up to four pump booster stations. Nameplate electrical specifications should be used for selecting devices for motor overload protection.

For three (3) phase standard induction-type squirrel cage alternating current motors. Motor full-load current may vary considerably depending on design.

SIMPLEX - One (1) AC Motor

	FLA		Circuit Breaker (CB) Amps		MFG	IC	MSP - MODEL	
HP/V	208V	460V	208V	460V	208/460V		208V	460V
3	10.6	4.8	14.5...20	14.5...20	AB	5kA	140MT-C3E-C20	140MT-C3E-C20
5	16.7	7.6	14.5...20	14.5...20	AB	5kA	140MT-C3E-C20	140MT-C3E-C20
7.5	24.2	11	27...32	14.5...20	AB	5kA	140MT-C3E-C32	140MT-C3E-C20
10	30.8	14	27...32	14.5...20	AB	5kA	140MT-C3E-C32	140MT-C3E-C20
15	46.2	21	32...45	27...32	AB	5kA	140MT-F9E-C45	140MT-C3E-C32
20	59.4	27	63	27...32	AB	5kA	140G-G2C3-C63	140MT-C3E-C32
25	74.8	34	90	27...32	AB	5kA	140G-G2C3-C90	140MT-C3E-C32
30	88	40	90	32...45	AB	5kA	140G-G2C3-C90	140MT-F9E-C45
40	114	52	160	63	AB	5kA	140G-G2E3-D16	140G-G2C3-C63

DUPLEX - Two (2) AC Motors

	FLA		MCA		MOCP		CB-AMPS		MFG	IC	CB - MODEL		
HP/V	208V	460V	208V	460V	208V	460V	208V	460V	208/460V			208V	460V
3	21.2	9.6	23.9	10.8	34.5	15.6	30	25	AB	5kA	140G-...	...G2C3-C30	...G2C3-C25
5	33.4	15.2	37.6	17.1	54.3	24.7	30	25	AB	5kA	140G-...	...G2C3-C30	...G2C3-C25
7.5	48.4	22.0	54.5	24.8	78.7	35.8	50	30	AB	5kA	140G-...	...G2C3-C50	...G2C3-C30
10	61.6	28.0	69.3	31.5	100.0	45.5	70	30	AB	5kA	140G-...	...G2C3-C70	...G2C3-C30
15	92.4	42.0	104.0	47.3	150.2	68.3	110	50	AB	5kA	140G-...	...G2C3-D11	...G2C3-C50
20	118.8	54.0	133.7	60.8	193.1	87.8	150	70	AB	5kA	140G-...	...I2C3-D15	...G2C3-C70
25	149.6	68.0	168.3	76.5	243.1	110.5	200	70	AB	5kA	140G-...	...I2C3-D20	...G2C3-C70
30	176.0	80.0	198.0	90.0	286.0	130.0	225	110	AB	5kA	140G-...	...I2C3-D22	...G2C3-D11
40	228.0	104.0	257.0	117.0	371.0	169.0	300	150	AB	5kA	140G-...	...K3F3-D30	...I2C3-D15

TRIPLEX - Three (3) AC Motors

HP/V	208V	460V	208V	460V	208V	460V	208V	460V	208/460V			208V	460V
3	31.8	14.4	34.4	15.6	34.5	20.4	35	25	AB	5kA	140G-...	...G2C3-C35	...G2C3-C25
5	50.1	22.8	54.3	24.7	54.3	32.3	80	25	AB	5kA	140G-...	...G2C3-C80	...G2C3-C25
7.5	72.6	33	78.6	35.7	78.7	46.7	80	35	AB	5kA	140G-...	...G2C3-C80	...G2C3-C35
10	92.4	42	100.1	45.5	100.0	59.5	125	80	AB	5kA	140G-...	...G2C3-D12	...G2C3-C80
15	138.6	63	150.1	68.2	150.2	89.2	150	80	AB	5kA	140G-...	...I2C3-D15	...G2C3-C80
20	178.2	81	193.1	87.7	193.1	114.7	225	125	AB	5kA	140G-...	...I2C3-D22	...G2C3-D12
25	224.4	102	243.1	110.5	243.1	144.5	300	125	AB	5kA	140G-...	...K3F3-D30	...G2C3-D12
30	264	120	286	130	286.0	170	350	150	AB	5kA	140G-...	...K3F3-D40	...I2C3-D15
40	342	156	371	169	371.0	221	450	225	AB	5kA	140G-...	...M5F3-D60	...I2C3-D22

QUADPLEX - Four (4) AC Motors

HP/V	208V	460V	208V	460V	208V	460V	208V	460V	208/460V			208V	460V
3	42.4	19.2	45.1	20.4	55.7	25.2	50	25	AB	5kA	140G-...	...G2C3-C50	...G2C3-C25
5	66.8	30.4	71	32.3	87.7	39.9	80	35	AB	5kA	140G-...	...G2C3-C80	...G2C3-C35
7.5	96.8	44	102.9	46.8	127.1	57.8	110	50	AB	5kA	140G-...	...G2C3-D11	...G2C3-C50
10	123.2	56	130.9	59.5	161.7	73.5	160	70	AB	5kA	140G-...	...G2E3-D16	...G2C3-C70
15	184.8	84	196.4	89.3	242.6	110.3	200	110	AB	5kA	140G-...	...I2C3-D20	...G2C3-D11
20	237.6	108	252.5	114.8	311.9	141.8	300	125	AB	5kA	140G-...	...K3F3-D30	...G2C3-D12
25	299.2	136	317.9	144.5	392.7	178.5	380	160	AB	5kA	140G-...	...K3F3-D40	...G2E3-D16
30	352	160	374	170	462	210	450	200	AB	5kA	140G-...	...M5F3-D60	...I2C3-D20
40	456	208	485	221	599	273	600	225	AB	5kA	140G-...	...M5F3-D60	...I2C3-D22

VFD Control I/O Wiring Block Diagram

Typical drive terminals for hardwire control with the eMVP/MVP booster system. Refer to the drive manufacturer's documentation for the terminal function configurations.

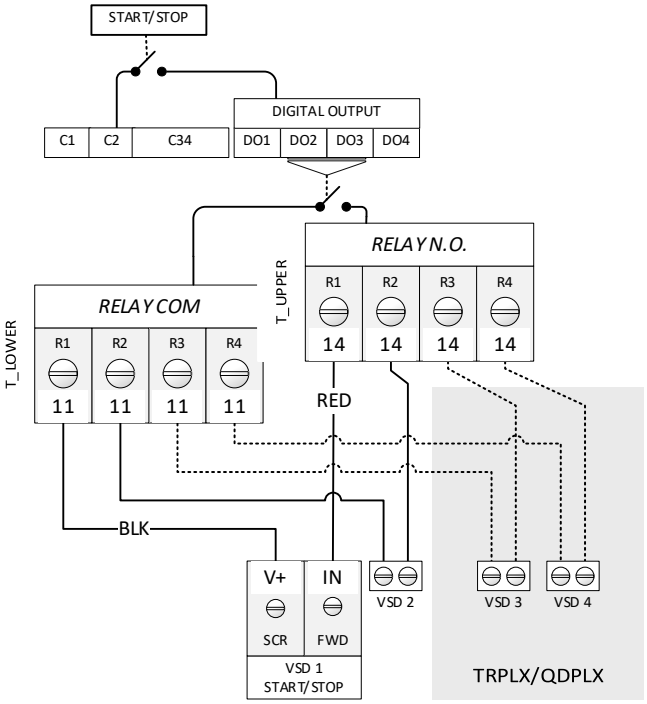
VFD hardwire control function

Start / Stop	Contact Input (Source / Sink)
Speed Command	0 – 10VDC, load impedance >700 Ω
Run Status	+0…38 VDC

Function	Signal	AB PF523	SE ATV320	ATV 212
Start / Stop	V+	11	+24	P24
	FWD	12	DI1	F
Speed Command	COM	14	COM	CC
	0-10V IN	13	AI1	VIA
Run Status	COM	R2	R1C (1)	RYC(1)
	N.O.	R1	R1A (1)	RYA

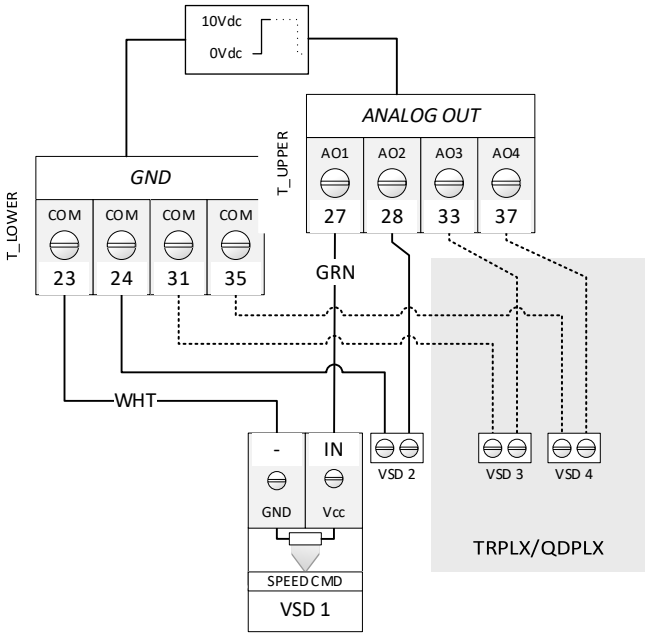
(1) Configured to indicate Running status

Start / Stop



START / STOP command contact input 0…38VDC

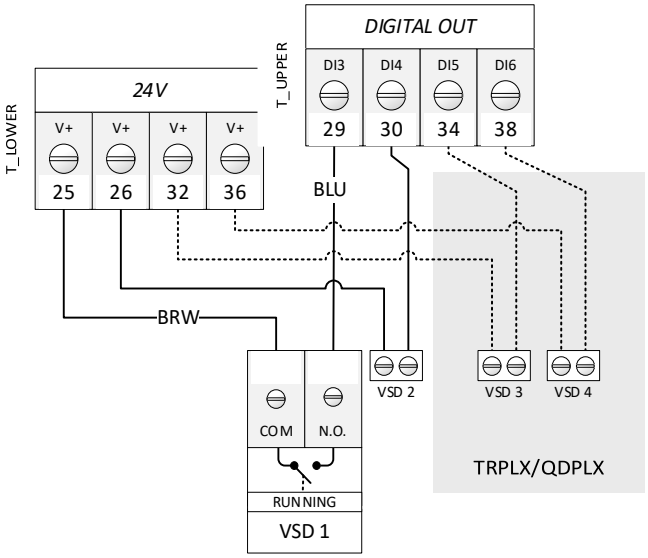
Speed Command



Speed command 0-10 VDC

Run Status

If relay assignment for running status is not available, this input should be wired as a Start / Stop interlock, such as flow proven switch.



Run Status +0…38VDC

Operator Enable

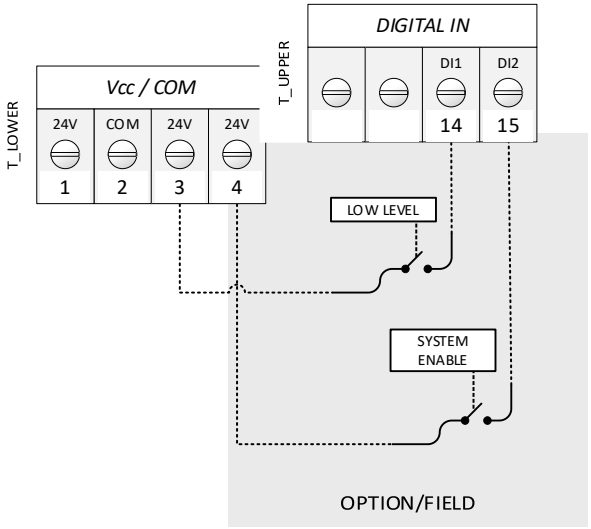
The eMVP/MVP pressure booster can be configured for Low Level Cutoff or Remote System Enable.

Remote System Enable is selectable for discrete contacts or over BMS communications.

Remote Start / Stop (RSS)	
Discrete Contact	N.O. Normally Close Contact. N.C. Normally Open Contact.
BMS	System Enable – automation integration.

(1) Max. 1 A if ambient temperature exceeds 55 °C (131 °F)
(2) Max. operating temperature 60 °C (140 °F)

For N.O./N.C. contact or configured to use building supervisory manager over serial network.



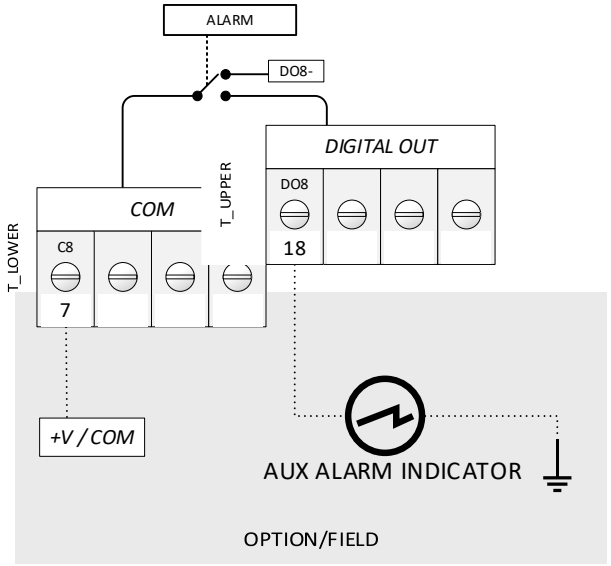
Low level cutoff and system enable contact

General Alarm

A N.O. contact may be used to monitor booster alarm status using an auxiliary alarm indicator.

Alarm Relay	
Max. Current:	3 A(1)(2)
Max. Voltage:	240 Vac

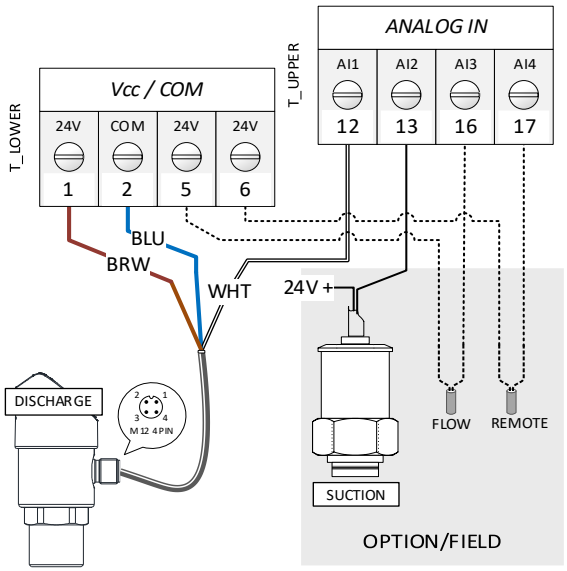
(1) Max. 1 A if ambient temperature exceeds 55 °C (131 °F)
(2) Max. operating temperature 60 °C (140 °F)



Alarm contact

Sensors

Pressure Transducer



Duplex unit shown wired for 3-sensor and suction 2-wire sensor

> **WARNING** **Equipment Damage**
>
> Incorrectly connecting the SUCTION sensor to DISCHARGE TERMINAL will result in a positive-feedback loop, potentially causing severe overpressure in the system. This can lead to equipment damage and/or personal injury.

Pressure Transducer			
	Signal Type	Span	Power Supply
Suction Header	4 – 20mA	0 – 300 PSI[1,2]	24 VDC
Discharge Header			
Remote Discharge			

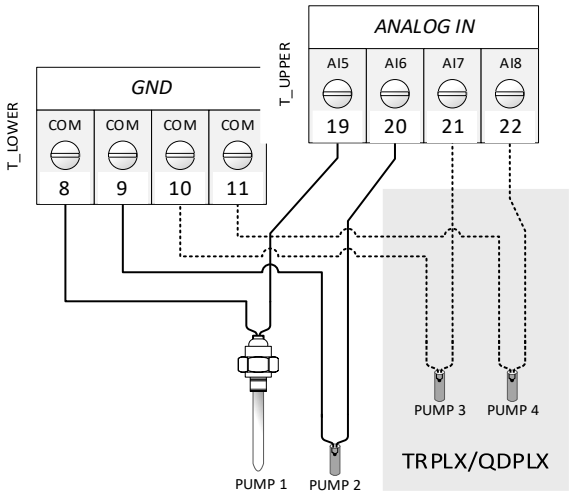
[1] Varies with sensor manufacturer
[2] Configurable through HMI

Temperature Probe

eMVP/MVP booster pump(s) include 10K ohm type II NTC thermistors. They are installed near the outlet of each pump and used to monitor high temperature. The process is isolated from the sensor probe using a thermowell.

Notice

Troubleshooting;	Isolate the thermistor before measuring its resistances.
Replacement;	Use adequate thermal paste if replacing the sensor probe on thermowell-equipped booster.



Pump temperature sensor wired for duplex booster

Thermistors are thermally sensitive resistors. Their change in resistance should measure ± 0.02 °C throughout its normal operating range.

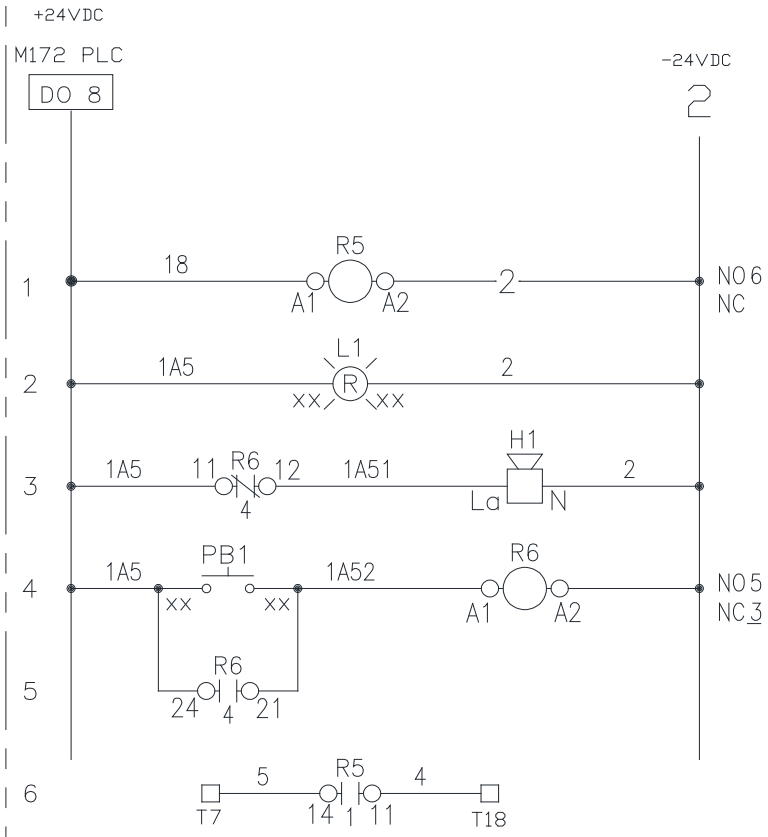
NTC 10K-2 Thermistor Output		
°F	**°C**	**Ω**
15	-9.44	53647
27	-2.78	37676
39	3.89	26834
53	11.67	18378
67	19.44	12814
77	25	10000
95	35	6530
109	42.78	4766
125	51.67	3380
167	75	1480

Optional

Check that optional hardwares are enabled and configured. Verify the features or sensors are configured and the booster system is adjusted to meet device manufacturer's specifications.

Detail A - Door Mounted Alarm Indicator

NOTE: THIS OPTION REPLACES TERMINALS 7 & 18 ON PG. 1 STANDARD GEN. ALARM.



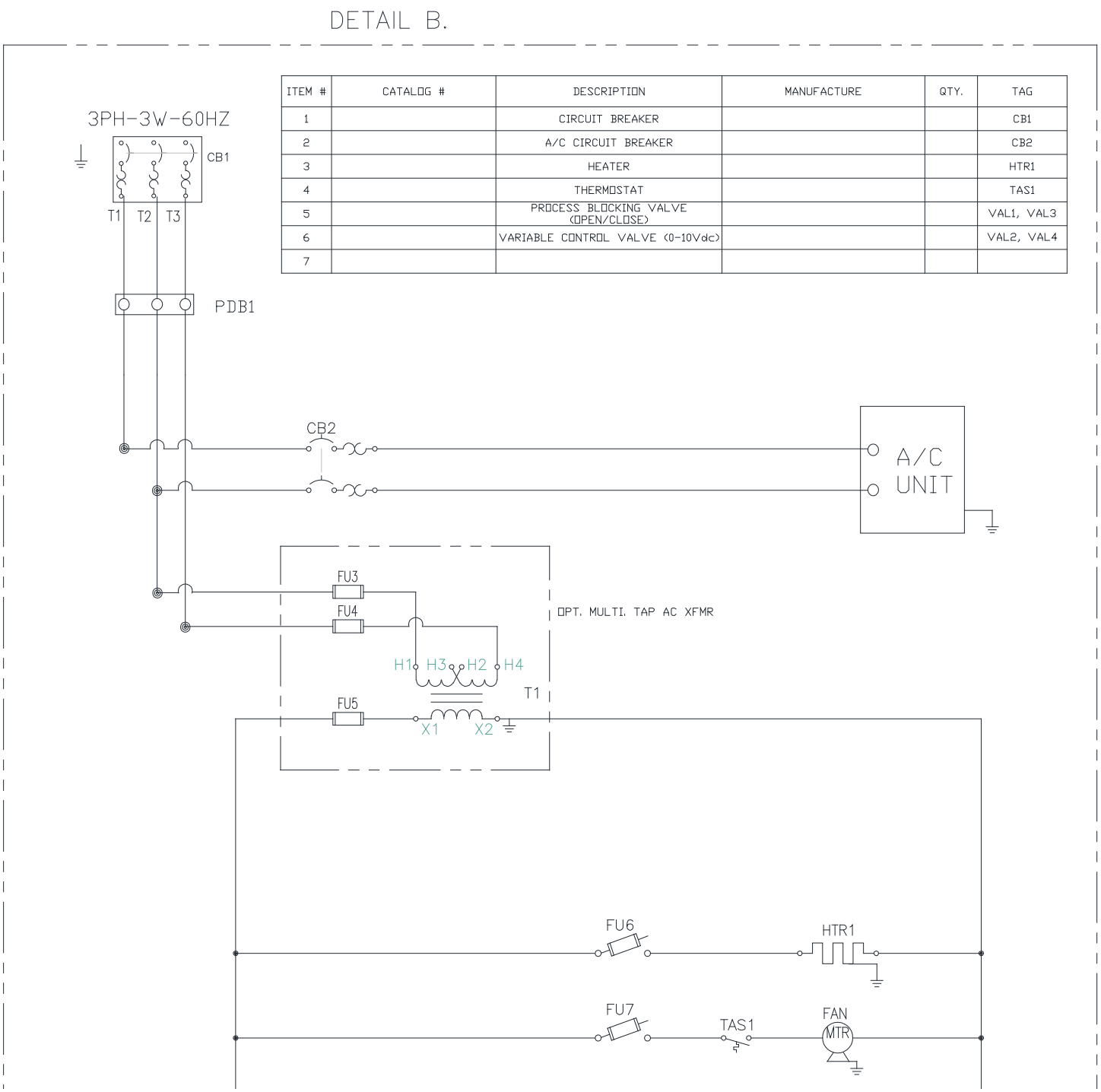
OPTIONAL DOOR MOUNTED ALARM WITH SILENCE BUTTON

TAG	MFG	MODEL	DESCRIPTION
R5	AB	700-HLT1U24	SPDT RELAY
R6	AB	700-HLT12U24	DPDT RELAY
L1	AB	800FM-P4	PILOT LAMP
L1	AB	800F-ALP	LATCH
L1	AB	800F-N3R	24V LED
PB1	AB	800FM-F5	PUSH BUTTON
PB1	AB	800F-ALP	LATCH
PB1	AB	800F-X10/ 800F-X10V	NO CONTACT
H1	AB	855P-B30SH22	HORN

ALTERNATE 22mm OPERATOR COMPONENTS

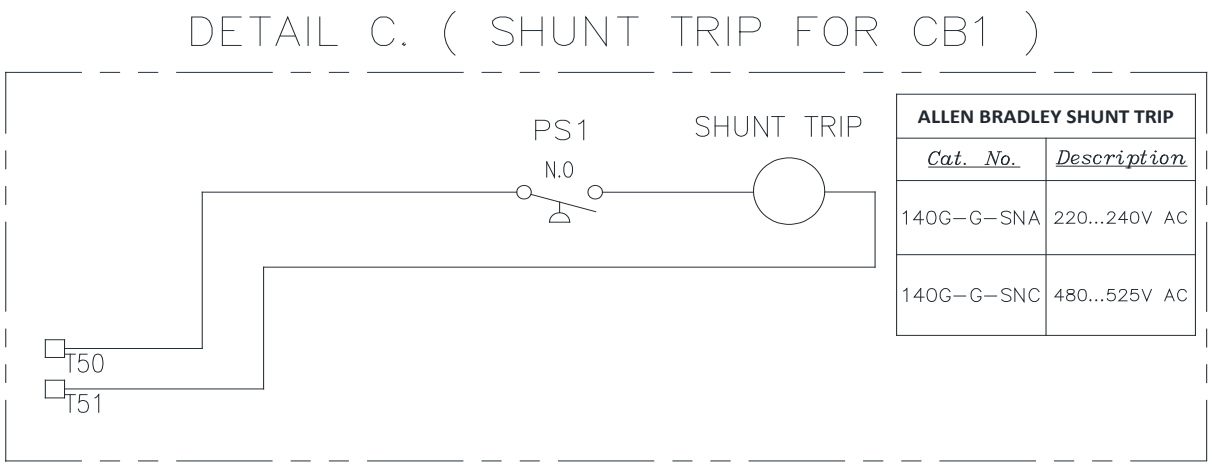
TAG	MFG	MODEL	DESCRIPTION
L1	S.E	ZB4BV043	PILOT LAMP
L1	S.E	ZB4BZ009	LATCH
L1	S.E	ZBVB1	24V LED
PB1	S.E	ZB4BA5	PUSH BUTTON
PB1	S.E	ZB4BZ009	LATCH
PB1	S.E	ZBE101	NO CONTACT

Detail B – AC Low Voltage – Climate Enclosure



ITEM #	CATALOG #	DESCRIPTION	MANUFACTURE	QTY.	TAG
1		CIRCUIT BREAKER			CB1
2		A/C CIRCUIT BREAKER			CB2
3		HEATER			HTR1
4		THERMOSTAT			TAS1
5		PROCESS BLOCKING VALVE (OPEN/CLOSE)			VAL1, VAL3
6		VARIABLE CONTROL VALVE (0-10Vdc)			VAL2, VAL4
7					

Detail C - Shunt Trip



ALLEN BRADLEY SHUNT TRIP	
Cat. No.	*Description*
140G–G–SNA	220...240V AC
140G–G–SNC	480...525V AC

Parts Tables

Table 2

AC – DC Power supply

CATALOG #	DESCRIPTION	MANUFACTURE	TAG
ABL8RPS24030	Universal Power Supply 24VDC 3A	SCHNEIDER ELEC.	PWS1
ABL8RPS24050	Universal Power Supply 24VDC 5A	SCHNEIDER ELEC.	PWS1
ABL8RPS24100	Universal Power Supply 24VDC 10A	SCHNEIDER ELEC.	PWS1

Table 4

AC – Transformer options

CATALOG #	DESCRIPTION	MANUFACTURE	TAG
1497A-A1-M18-3-N	CCT, 50VA, 208/230/480V - 120/24V (50/60HZ), 2 Primary- 1 Secondary Fuse Block	ALLEN-BRADLEY	T1
1497A-A2-M18-3-N	CCT, 75VA, 208/230/480V - 120/24V (50/60HZ), 2 Primary- 1 Secondary Fuse Block	ALLEN-BRADLEY	T1
1497A-A3-M18-3-N	CCT, 100VA, 208/230/480V - 120/24V (50/60HZ), 2 Primary- 1 Secondary Fuse Block	ALLEN-BRADLEY	T1
1497A-A4-M18-3-N	CCT, 150VA, 208/230/480V - 120/24V (50/60HZ), 2 Primary- 1 Secondary Fuse Block	ALLEN-BRADLEY	T1
1497A-A5-M18-3-N	CCT, 200VA, 208/230/480V - 120/24V (50/60HZ), 2 Primary- 1 Secondary Fuse Block	ALLEN-BRADLEY	T1
1497A-A6-M18-3-N	CCT, 250VA, 208/230/480V - 120/24V (50/60HZ), 2 Primary- 1 Secondary Fuse Block	ALLEN-BRADLEY	T1
1497A-A7-M18-3-N	CCT, 300VA, 208/230/480V - 120/24V (50/60HZ), 2 Primary- 1 Secondary Fuse Block	ALLEN-BRADLEY	T1
1497A-A8-M18-3-N	CCT, 350VA, 208/230/480V - 120/24V (50/60HZ), 2 Primary- 1 Secondary Fuse Block	ALLEN-BRADLEY	T1

Table 5

Optional AC Fuse Options

CATALOG #	DESCRIPTION	MANUFACTURE	TAG
1492-H6	H6 Fuse Block 15A Max Current for ¼”x 1 ¼” fuse	ALLEN-BRADLEY	
1492-N37	End Barrier for H6 Fuse Block	ALLEN-BRADLEY	
MDL-2-1/2-R	2-1/2A, 250V, ¼”x 1 ¼” Time Delay Fuse	BUSSMMAN	
MDL-3-R	3A, 250V, ¼”x 1 ¼” Time Delay Fuse	BUSSMMAN	
MDL-3-1/2-R	3-1/2A, 250V, ¼”x 1 ¼” Time Delay Fuse	BUSSMMAN	
MDL-4-R	4A, 250V, ¼”x 1 ¼” Time Delay Fuse	BUSSMMAN	
MDL-5-R	5A, 250V, ¼”x 1 ¼” Time Delay Fuse	BUSSMMAN	
MDL-6-R	6A, 250V, ¼”x 1 ¼” " Time Delay Fuse	BUSSMMAN	
MDL-6-1/4-R	6-1/4A, 250V, ¼”x 1 ¼” Time Delay Fuse	BUSSMMAN	

VFD Parameters

Allen Bradley PowerFlex 523

Programming Manual

WARNING **EQUIPEMENT DAMAGE**

This table lists parameters which differ from the drive manufacturer's settings. Altering these parameters or installing a drive with parameters not set to these values can cause hazardous conditions and may result in serious personal injury, death, and/or property damage.

Allen-Bradley PowerFlex 520-Series progamming manual 520-QS001B-EN-E

Modified Parameter List

Modified Parameter Table for **460 & 208** VAC MVP Models Using **Allen Bradley PowerFlex 523**

	FUNCTION	LOWER LIMIT	UPPER LIMIT	UNITS	HYFAB SETTING		MVP				
							630-XXX	850-XXX	875-XXX	8100-XXX	8150-XXX
P030	Language	1	15	1	1		Same for all models				
P031	Motor Rated Voltage	20	460	1	460	460V					
		10	208		208	208V					
P032	Motor Nameplate Hertz	15	500	1	60						
P033	Motor OL Current (SFA) NP X 1.0	0	DR x 2	0.1	Model	460V	3.80	5.90	8.70	12.00	17.70
						208V	8.00	12.40	18.40	26.00	37.40
P034	Motor Nameplate Full Load Amps	0	DR x 2	0.1	Model	460V	3.80	5.90	8.70	12.00	17.70
						208V	8.00	12.40	18.40	26.00	37.40
P035	Motor Nameplate Poles NP RPM	2	40	1	2	3600RPM	Same for all models				
					4	1800RPM					
P036	Motor Nameplate RPM (Varies by motor)	0	24000	1	3450	3600RPM					
					1725	1800RPM					
P039	Torque Perf Mode	0	4	1	1						
P040	Autotune	0	2	1	1						
P041	Acceleration Time	0.00	600.00	0.01sec	10.00						
P042	Deceleration Time	0.00	600.00	0.01sec	10.00						
P043	Minimum Frequency	0.00	500.00	0.01Hz	12.00						
P044	Maximum Frequency	0.00	500.00	0.01Hz	60.00						
P045	Stop Mode	0	11	1	0						
P046	Start Source (Must be set to 2 for auto operation)	1	5	1	2						
P047	Speed Reference	1	16	1	5						
T076	Relay Output 1 Select	0	31	1	2						
C123	RS485 Data Rate	0	5	1	4						
C124	RS485 Node Address	1	247	1	1,2,3,4						
C126	Communication Loss Time	0.1	60.0	0.1sec	5.0						
C127	RS485 Format	0	5	1	1						
A484	Current Limit 1 (Motor Nameplate Full Load Amps)	0	DR x 1.5	0.1	Varies by model	460V	3.80	5.90	8.70	12.00	17.70
						208V	8.00	12.40	18.40	26.00	37.40
A492	Stall Fault Time	0	5	1	5		Same for all models				
A541	Auto Restart Tries	0	9	1	3						
A542	Auto Restart Delay	0.00	120.00	0.1sec	1						
A543	Start at Power Up	0	1	1	1						
A553	Program Lock Mod	0	3	1	1						
A552	Program Lock	0000	9999	1	0001						

Schneider Electric Altivar 212

Programming Manual

⚠ WARNING **EQUIPEMENT DAMAGE**

This table lists parameters which differ from the drive manufacturer's settings. Altering these parameters or installing a drive with parameters not set to these values can cause hazardous conditions and may result in serious personal injury, death, and/or property damage.

Schneider Electric Altivar Machine ATV212 programming manual S1A53838

Modified Parameter List

Modified Parameter Table for 460 & 208 VAC MVP Models Using Schneider Electric ATV212

TITLE	FUNCTION	LOWER LIMIT	UPPER LIMIT	UNITS	HYFAB SETTING		630-XXX	850-XXX	875-XXX	8100-XXX	8150-XXX
tyP	Default setting (3)	0	9	1	2		Same for all models				
CN0D	(CMOd) Command mode selection	0	2	1	0						
FN0D	(FMOd) Frequency setting mode selection	0	5	1	1						
OLN	Electronic-thermal protection characteristic selection	0	7	1	1						
FH	Maximum frequency	30	200	0.01Hz	60						
AU1	Automatic acceleration/deceleration	0	2	1	0						
ACC	Acceleration time 1	0	3200	0.1sec	10						
DEC	Deceleration time 1	0	3200	0.1sec	10						
LL	Lower limit frequency	0	60	0.01Hz	12						
UL	Upper limit frequency	0.5	60	0.01Hz	60						
tHr	Motor rated current overload setting (Nameplate)	10	100	Amps	Varies by model	460V	3.8	5.9	8.7	12.0	17.7
						208V	8.0	12.4	18.4	26.0	37.4
Pt	V/F control mode selection	0	6	1	3		Same for all models				
uL	Motor Rated Frequency	25	200	0.01Hz	60						
uLu	Motor Rated Voltage	50	330	0.1V	460	460V					
					208	208V					
F415	Motor rated current NP X 1.0	0.1	200	0.1A	Varies by model	460V	3.8	5.9	8.7	12.0	17.7
						208V	8.0	12.4	18.4	26.0	37.4
F417	Motor rated speed (Varies by motor)	100	15000	rpm	Nameplate		3450	3465	3480	3500	3485
F601	Motor Current Limit NP X 1.0	10	110	Amps	Varies by model	460V	3.8	5.9	8.7	12.0	17.5
						208V	8.0	12.4	18.4	26.0	37.4
F400	Auto-tuning enable	0	2	1	2		Set to 1 to initiate auto-tune. Changes automatically to 2 after successful tuning. Autotune is completed by HYFAB during setup and testing.				
F203	VIA input point 2 setting	0	100	1%	99		Same for all models				
F416	Motor no-load current as percent of FLA	10	100	1%	Varies by model	460V	40	40	31	29	28
						208V	30	30	24	22	20
F602	Drive Fault Memory	0	1	1	1		Same for all models				
F603	Emergency stop selection	0	2	1	1						
F721	Local mode motor stop type	0	1	1	1						
F730	Disabling of keypad speed reference change keys	0	1	1	0						
F735	Disabling of keypad fault reset operation	0	1	1	0						
F802	Modbus address	0	247	1	1,2,3,4						
F803	Modbus time-out	0	100	1 Sec	1						
F856	Number of motor poles for communication (1-3600 RPM : 2-1800 RPM)	1	8	1	1						
tyP	Default setting	0	9	1	7						
F700	Parameter Lock	0	1	1	1						

Schneider Electric ATV320

Programming Manual

⚠ WARNING **EQUIPEMENT DAMAGE**

This table lists parameters which differ from the drive manufacturer's settings. Altering these parameters or installing a drive with parameters not set to these values can cause hazardous conditions and may result in serious personal injury, death, and/or property damage.

Schneider Electric Altivar Machine ATV320 programming Manual NVE41295.06

Modified Parameter List

Menu / SubMenu	Title	Function	Lower Limit	Upper Limit	Unit	HYFAB Settings		630-XXX	850-XXX	875-XXX	8100-XXX	8150-XXX
FuLL		Configuration Mode -> Access to All Parameters										
SiN-		Simply Start										
	tCC	2/3 Wire Control	2C	3C		2C		Same for all models				
	bFr	Standard Motor Frequency	50	60	Hz	60						
	nPr	Rated Motor Power				***		***Varies by model				
	unS	Rated Motor Voltage	200	480	V	460	460V	Same for all models				
			100	240		208	208V					
	nCr	Rated Motor Current (Nameplate)	1	100	A	Varies by model	460V	3.8	5.9	8.7	12.0	17.7
							208V	8.0	12.4	18.4	26.0	37.4
	FrS	Rated Motor Frequency	10	800	Hz	60						
	nSP	Rated Motor Speed (Nameplate)	0	9999	RPM	***	3600	***Varies by model				
							1800					
	tFr	Maximum Frequency	10	599	Hz	60		Same for all models				
	ACC	Acceleration	0	6000	sec	10						
	dEC	Deceleration	0	6000	sec	10						
	LSP	Low Speed	0	599	Hz	12						
	HSP	High Speed	0	599	Hz	60						
SEt-		Settings										
	CLi	Current Limitation	1	100	A	Varies by model	460V	3.8	5.9	8.7	12.0	17.7
							208V	8.0	12.4	18.4	26.0	37.4
I_O-		Inputs/Outputs Configuration						Same for all models				
r 1-		Relay One Configuration										
	r 1	Relay One Assignment				run						
dRC-		Motor Control										
ASY-		Asynchronous Motor										
	Ctt	Motor Control Type				Varies by horsepower		Std	Std	Std	VVC	VVC
	Aut	Automatic Autotune				onE		A tune is done at the first run order				

Danfoss FC102

Programming Manual

WARNING **EQUIPEMENT DAMAGE**

This table lists parameters which differ from the drive manufacturer's settings. Altering these parameters or installing a drive with parameters not set to these values can cause hazardous conditions and may result in serious personal injury, death, and/or property damage.

Danfoss FC102 programming Manaul AU430028034214en-US1901.pdf

Modified Parameter List

Title	Menu Selection	Function	Lower Limit	Upper Limit	Units	HYFAB Setting		630-XXX	850-XXX	875-XXX	8100-XXX	8150-XXX
	Quick Menu: Quick Set-up											
1-21		Motor Power (Nameplate)	0.09	3000	Hp	Varies by model		Same for all models				
1-22		Motor Voltage (Nameplate)			Volts	460	460V					
						208	208V					
1-23		Motor Frequency	20	1000	Hertz	60						
1-24		Motor Current (Nameplate)	0.1	10000	Amps	Varies by model	460V	3.80	5.90	8.70	12.00	17.70
							208V	8.00	12.40	18.40	26.00	37.40
1-25		Motor Nominal Speed (Nameplate)	100	60000	RPM	Varies by model	3600					
							1800					
3-41		Ramp 1 Ramp Up Time	1.00	3600	Seconds	10.0s						
3-42		Ramp 1 Ramp Down Time	1.00	3600	Seconds	10.0s						
4-12		Motor Speed Low Limit			Hertz	12.0Hz						
4-14		Motor Speed High Limit			Hertz	60.0Hz						
5-12		Terminal 27 Digital Input				0						
1-29		Automatic Motor Adaptation (AMA) Default [0]				1						
	Check Motor Rotation (Hand)											
	Main Menu:											
3-**	**References/Ramps**											
3-1*	**References**											
3-15		Reference 1 Source Analog Input 53				1						
5-**	**Digital In/Out**											
5-1*	**Digital Inputs**											
5-10		Terminal 18 Digital Input				8						
5-4*	**Relays**											
5-40		Relay 1 Default [160]				[0] No operation						
		Relay 2 Default [5]				[5] Running						
	Boosters with DemandSet (MVP, Standard)							Do not change with Flowmeter				
8-**	**Comm and Options**											
8-3*	**FC Port Settings**											
8-30		Protocol Default [0]				[2] Modbus RTU						
8-31		Address	1	247		1,2,3,4						

Troubleshooting

System Operations

The pressure booster is not operating

Probable Cause:	Solution:
System Enable	• Check for DemandSet hardware interlock such as; ▪ Low water cut off (**LLCO**), Operator enable, Pressure limit switch, or similar. • Check BMS run permission; ▪ BAS integration for **Remote Enable**. • Adjust DemandSet System Enable; ▪ Configure booster's "**Contact Input > Remote Start Stop (RSS)**".
System Setpoint	• Check DemandSet pressure Setpoint; ▪ **System Setpoint** value is too low. ▪ System pressure at or above **System Start** setpoint. ▪ System pressure at or above System Setpoint. ▪ No Flow Standby (**NSFB**).
Available Pumps	• Check DemandSet setting; ▪ Configure available pump(s) "**Pump Enable**". ▪ Configure pump operations "**Operating Mode > Standby Pump(s)**".
Supply Sensor	• Check sensor Configuration; ▪ Adjust sensor operating span **"Press/Flow Sensor > Supply Sensor > Span".**
Fault / System Alarm	• Check for DemandSet active alarms; ▪ Resolve active alarms or system faults. ▪ Adjust Temperature limit threshold. ▪ Adjust Pressure limit threshold for Suction and/or Discharge. ▪ Configure "**Alarms/Shutdown > Reset / Delay Time**". • Check pump drive status; ▪ Resolve **Pump Alarm or Fault**. - Drive External Fault.* - Drive Internal Fault.** • Reset System Alarm. *Motor condition. **Frequency drive fault detection. Check with manufacturer's operating manual.

Pump(s) is not running

Probable Cause:	Solution:
VFD configuration / Electrical	• Check wiring ▪ **Start/Stop** – 24VCD relay NO contact. ▪ **Run Status** – 24VDC active High. ▪ **Speed Reference** – 0-10VDC. • Check drive settings ▪ Adjust **Auto / Manual** selection. ▪ Adjust control type selection. ▪ Resolve active drive status / faults. • Check circuit protection ▪ Energize AC circuit for VFD and Pump. ▪ Resolve AC circuit faults.
Available Pumps	• Check DemandSet setting; ▪ Configure available pump(s) "**Pump Enable**". ▪ Configure pump operations "**Operating Mode > Standby Pump(s)**".

Pump(s) is searching / hunting for pressure setpoint

Probable Cause:	Solution:
PID Controller	• Check DemandSet PID Controller ▪ Use "**PI**" Control – DemandSet uses Proportional and Integral values. • Check Proportional Gain value ▪ Adjusts initial system response. ▪ High "**P gain**" value will cause quick response but introduce overshoot and oscillation. ▪ Low "**P gain**" value will cause slow response but cause under performance and can reduce oscillation. • Check Integral Time value ▪ Adjust system steady-state correction response. ▪ Large Integral value slows steady-state correction. ▪ Small Integral time value increases steady-state correction. - Increases oscillation and overshoot. - Easily affected by sudden load changes. **1.** If the booster is overreacting to system pressure fluctuations, then the Proportional Gain should be reduced. If the booster isn't reacting enough, then the Proportional Gain should be increased. Make small changes. A little change in the Proportional Gain goes a long way. **2.** The Integral may need to be adjusted as well. The Integral is constantly increasing or reducing the speed of the system to meet setpoint. A larger Integral results in slower increases/decreases. **3.** The Proportional and Integral should be adjusted so that the booster reacts to system requirement fluctuations as quickly and as accurately as possible. On a significant fluctuation, the Proportional is responsible for the initial booster reaction and the Integral works to get the booster on setpoint. Small system fluctuations are handled by the Integral, for the most part. **4.** Isolate the tank from the system and check: **a.** PID Tuning **b.** Setpoint **c.** Restart Pressure

Pump(s) run away

Probable Cause	Solution:
Electrical	• Check wiring ▪ **Start/Stop** – 24VCD relay NO contact. ▪ **Run Status** – 24VDC active High. ▪ **Speed Reference** – 0-10VDC. • Check drive settings ▪ Adjust speed reference selection. ▪ Adjust control ramp up type selection. ▪ Resolve active drive status / faults.
Process Sensor	• Check wiring ▪ Discharge Sensor located on Outlet header – 4-20mA Signal **Terminal 12 AI1.** ▪ Suction Sensor located on Inlet header – 4-20mA Signal **Terminal 13 AI2.** • Check DemandSet settings ▪ Adjust sensor operating span **"Press/Flow Sensor > Supply Sensor > Span"**. ▪ Adjust sensor Offset **"Press/Flow Sensor > Supply Sensor > Offset"**.

Pump(s) always RUN

Probable Cause:	Solution:
No Flow Standby (NSFB)	• Check DemandSet settings ▪ Configure NFSB "**No Flow Standby**". ▪ Adjust "**Sample Time**" and "**Test Duration**". ▪ Adjust drive speed deadband threshold "**Drive DB**". ▪ Adjust system pressure deadband threshold "**Pressure DB**".
System Setpoint	• Check DemandSet Settings ▪ Configure Start Setpoint "**Status > M+ > System Setpoint..**". ▪ Adjust System start values "**System Start %**".
Electrical	• Check wiring ▪ **Start/Stop** – 24VDC relay NO contact. ▪ **Run Status** – 24VDC active High. ▪ **Speed Reference** – 0-10VDC. • Check drive settings ▪ Adjust speed reference selection. ▪ Adjust control ramp up type selection. ▪ Resolve active drive status / faults.

DemandSet controller HMI display is off

Probable Cause:	Solution:
Sleep Mode	• Check HMI display LED indicator ▪ Confirm Green LED status. ▪ Touch on screen to wake display.
Electrical	• Check 24VDC supply ▪ Fuse 1 (**FU1**) 2-1/2 A. ▪ Resolve DC circuit supply fault* *The Schneider Electric AC/DC regulated power supply has a self-resetting protection feature for overload, overvoltage, short-circuits, undervoltage, and thermal conditions.

System Integration

DemandSet Controller is not discoverable

Probable Cause:	Solution:
Serial	• Check Wiring ▪ A/B Polarity termination across all devices with common ground reference. ▪ Uses twisted pair communication cable. e.g. Belden 3106A. ▪ Terminate last node with 120 Ohm resistor. • Check Protocol Settings ▪ Unique device ID. ▪ All devices should match. - Baud rate, Data bits, Parity, Stop Bit. • Check DemandSet Controller ▪ Adjust "**BAS Setup..** >" for serial communication.
Ethernet	• Check Wiring ▪ Use CAT4e/6 with good connectors. • Check device Settings ▪ All devices should have: - Subnet Mask. - Default Gate (If device communicates outside its own subnet). ▪ Assign unique **Static IP address**. ▪ Assign unique **device ID**. • Check DemandSet Controller ▪ Adjust "**BAS Setup..** >" for Ethernet communication. ▪ Use Default port assignment; - **Modbus TCP Port 502.** - **BACnet IP UDP Port 47808.** • Check Network connectivity. ▪ Ping target device to check for basic reachability. ▪ Keep network and interconnecting device(s) local and simple. ▪ Authenticate interconnecting device such as BACnet Broadcast Management Device (**BBMD**) with facility's network / security administrative personnel.
Controller	• Check Device ▪ 24VDC Fuse 1 (FU1) 2-1/2 A. ▪ Reboot Device. ▪ Communication Module (TM171ARS85).

System Mechanical Operations

Motor is not running

Probable Cause:	Solution:
Electrical	• Motor Wiring ▪ Connect motor wiring per manufacturer's procedure. ▪ Check equipment ground bonding. • Motor thermal protector tripped ▪ Allow motor to cool, then reset the thermal protector. • Open circuit breaker or blown fuse ▪ Check circuit breaker and fuses. • Defective motor ▪ Repair or replace the motor.
Pump	• Impeller binding ▪ Check for a bound impeller. ▪ Make sure the pump can be turned by hand.

Motor is running at full speed with low pump performance

Probable Cause:	Solution:
Electrical	• Inspect motor rotation ▪ The pump volute will indicate the proper rotation. ▪ Align motor rotation with correct impeller rotation. • Check VFD motor nameplate ▪ Set the correct motor nameplate into the VFD (HP, RPM, Voltage, FLA). • Perform a drive / motor auto-tune ▪ Follow the drive manufacturer's procedure, static or dynamic tuning mode, to adjust the switching frequency during operation.
Pump	• Impeller binding ▪ Make sure the pump can be turned by hand. Check for a bound impeller. • Incorrect impeller diameter ▪ Trim or replace the impeller. • Pump shaft ▪ Check for broken, slipping, or misaligned coupling. ▪ Inspect shaft for excessive signs of play or shearing. ▪ Re-align motor and pump following pump manufacturer's procedure. • Discharge head too low – excessive flow rate ▪ Check the discharge piping and valves. ▪ Make sure that pipes and plugs are not plugged. ▪ Make sure that the isolation valves are open and that there are no clogs. ▪ Resolve excessive high flow events.

Low pump(s) performance during initial start up

Probable Cause:	Solution:
Electrical	• Inspect motor rotation ▪ The pump volute will indicate the proper rotation. ▪ Align motor rotation with correct impeller rotation. • Check VFD motor nameplate ▪ Set the correct motor nameplate into the VFD (HP, RPM, Voltage, FLA). • Perform a drive / motor auto-tune ▪ Follow the drive manufacturer's procedure, static or dynamic tuning mode, to adjust the switching frequency during operation.
Pump and Process lines	• Check for Loss of Prime / Air in the pumps or lines ▪ Re-prime the pump(s) and purge air from the water lines. ▪ Ensure the pump(s) remain completely flooded during operation. • Check for restricted lines ▪ Inspect suction and discharge piping for blockages, debris, or obstructions. ▪ Ensure all isolation valves are fully open. ▪ Clear any clogged and obstructed screens, plugs, or strainers. • Check Impeller condition ▪ Examine the impeller for wear, damage, or material buildup. ▪ Service or replace the impeller as required. • Check if system head is too high ▪ Inspect and confirm that discharge valves or other flow-controlling devices are not inadvertently closed or throttled. • Net Positive Suction Head (NPSH) too low – Excessive Suction lift or losses ▪ Check the NPSH. ▪ Ensure that proper flooded conditions or positive pressure is being delivered to the pump station. ▪ Check for air in the supply lines. ▪ Ensure that supply tanks are correctly filled.

Excessive noise and/or vibration

Probable Cause:	Solution:
Electrical	• Inspect motor rotation ▪ The pump volute will indicate the proper rotation. ▪ Align motor rotation with correct impeller rotation. • Check VFD motor nameplate ▪ Set the correct motor nameplate into the VFD (HP, RPM, Voltage, FLA). • Perform a drive / motor auto-tune ▪ Follow the drive manufacturer's procedure, static or dynamic tuning mode, to adjust the switching frequency during operation.
Pump and Process lines	• Check for Loss of Prime / Air in the pumps or lines ▪ Re-prime the pump(s) and purge air from the water lines. ▪ Confirm that the pump(s) remain completely flooded during operation. • Check for restricted lines ▪ Inspect suction and discharge piping for blockages, debris, or obstructions. ▪ Ensure all isolation valves are fully open. ▪ Clear any clogged and obstructed screens, plugs, or strainers. • Check Impeller condition ▪ Examine the impeller for wear, damage, or material buildup. ▪ Service or replace the impeller as required. • Check if system head is too high ▪ Inspect and confirm that discharge valves or other flow-controlling devices are not inadvertently closed or throttled. • Net Positive Suction Head (NPSH) too low – Excessive Suction lift or losses ▪ Check the NPSH. ▪ Ensure that proper flooded conditions, or positive pressure, is being delivered to the pump station. ▪ Check for air in the supply lines. ▪ Ensure that supply tanks are correctly filled.

What Is DemandSet?

DemandSet is a method of adjusting the pressure setpoint of your system based on system flow. As your system flow requirements increase, friction loss increases in your system piping. Friction loss is the result of the water in your piping system flowing. Since the wall of the pipe is stationary, the speed of the water is slower at the pipe wall than the water in the middle of the pipe. This causes friction in the fluid itself that we call friction loss. The friction loss increases as the volume of the water increases. Since the pipe size does not change the speed of the water must increase to accommodate the volume requirement, this means more friction. The friction loss of the piping system is a varying pressure loss that must be compensated for by the pumping system. Friction loss is compensated for by generating a higher discharge pressure at the pumping system header.

In the Past

In the past friction loss was compensated for by measuring the pressure at or near the end of the water piping system. This method is the very best for cancelling out the impact that piping friction loss has on the system. Since the pressure reading is taken at the END of the piping run, any friction loss generated by the piping system is accounted for in the pressure measurement. The problem with this approach is that the sensor is a long way from the pump package. Usually, once a system is out of warranty there is nobody on site with any idea where the sensor is located. If the sensor needs attention, it can take hours, or days to locate. The search itself is disruptive to the building occupants. Measuring pressure at the end of the run is an excellent choice as long as the sensor doesn't need attention. The DemandSet controller can use a remote mounted pressure sensor, but the DemandSet controller offers some excellent alternatives discussed below.

Why DemandSet Control?

With the use of the DemandSet feature, the remote sensor is no longer necessary. When DemandSet is activated, the flow is measured, or approximated depending on how the system is configured. Once the system flow is known or approximated, the pressure setpoint is adjusted by the DemandSet controller based on the system flow/approximation negating the necessity of a remote mounted pressure transmitter. This allows the system pressure to be measured at the pump rather than out in the building somewhere. All the pumping equipment and instrumentation is located at the package making the system's service requirements easier to execute. This is better for the building operator and easier for the service technician.

DemandSet control strategies

- Flow measurement via flow meter. This is the most accurate means of resetting the pressure setpoint at the DemandSet controlled package. The flow returned from the flowmeter is more accurate than the flow approximation approach used in the other DemandSet option. Equipment first cost is slightly higher so in many cases the second DemandSet option is used.
- Flow estimation based on pump speed. In this DemandSet strategy, the flow is estimated via the system's pump speed. This type of DemandSet setpoint reset is standard on all DemandSet pump packages. The pump's speed changes to meet pressure and flow requirements. Setpoint reset is accomplished via the output speed rather than the measured flow of an installed meter.

These strategies are being used extensively throughout the plumbing industry. Flow approximation setpoint reset is frequently the perfect solution for the plumbing industry.

Warranty

HYFAB Packaged Systems Warranty

HYFAB warrants for a period of eighteen (18) months from date of shipment from its factory or one (1) year from date of installation, whichever occurs first, that all Products furnished by HYFAB are free from defects in materials and workmanship.

HYFAB's liability for any breach of this Warranty shall be limited solely to replacement or repair, at the sole option of HYFAB, of any part or parts found to be defective during the Warranty period provided the Product is properly installed and is being used as originally intended. Buyer must notify HYFAB of any breach of this Warranty within the aforementioned Warranty period: defective parts must be shipped by Buyer to Seller with transportation charges prepaid.

IT IS EXPRESSLY AGREED THAT THIS SHALL BE THE SOLE AND EXCLUSIVE REMEDY OF THE BUYER. UNDER NO CIRCUMSTANCES SHALL HYFAB BE LIABLE FOR ANY COSTS, LOSS EXPENSE DAMAGES, SPECIAL DAMAGES, INCIDENTAL DAMAGES OR CONSEQUENTIAL DAMAGES ARISING DIRECTLY OR INDIRECTLY FROM THE DESIGN, MANUFACTURE, SALE, USE OR REPAIR OF THE PRODUCT WHETHER BASED UPON WARRANTY, CONTRACT, NEGLIGENCE OR STRICT LIABILITY. IN NO EVENT WILL LIABILITY EXCEED THE PURCHASE PRICE OF THE PRODUCT. THE WARRANTY AND LIMITS OF LIABILITY CONTAINED HEREIN ARE IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, EXPRESSED OR IMPLIED. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED BY SELLER AND EXCLUDED FROM THIS WARRANTY.

HYFAB neither assumes nor authorizes any person to assume for it, any other Warranty obligation in connection with the sale of the Product. This Warranty shall not apply to any Product or parts of Products which (a) have been repaired or altered outside of HYFAB's facilities; or (b) have been subject to misuse, negligence or accident; or (c) have been used in a manner contrary to HYFAB's instructions.

In the case of products not manufactured by HYFAB, there is no warranty from HYFAB, but HYFAB will extend to the Buyer any Warranty of Seller's supplier of such products.

HYFAB

Innovative Mechanical Solutions

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3PH-3W-60HZ

CB1

T1 T2 T3

* SEE ADDENDUM DETAIL B. WHEN A/C, HEATER, FAN OR CONTROL VALVES ARE USED *

* SEE TABLE 1 FOR MOTOR LOAD CALC. AND HP RATING MOD. NUMBER *

MSP

VFD #1

MOTOR

MSP

VFD #2

MOTOR

MSP

VFD #3

MOTOR

MSP

VFD #4

MOTOR

T50

T52

* SEE ADDENDUM DETAIL C. FOR OPT. SHUNT TRIP *

PWS1

L1

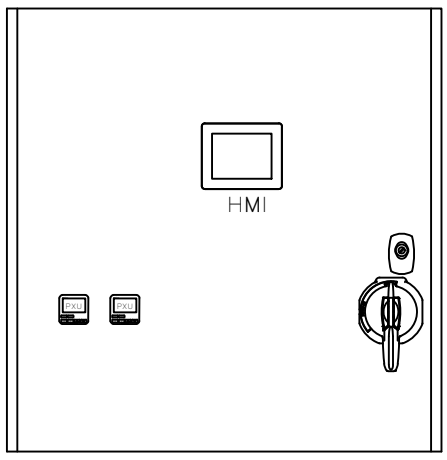
L2/N

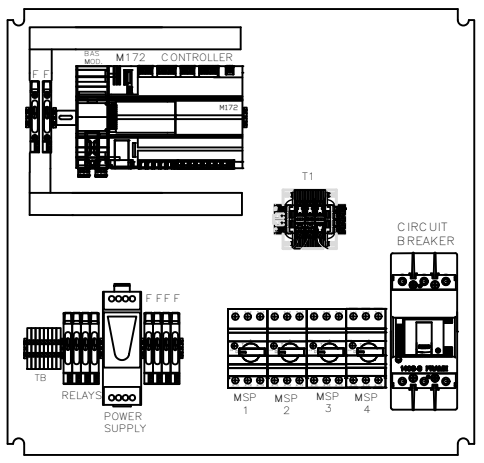
GND

24VDC

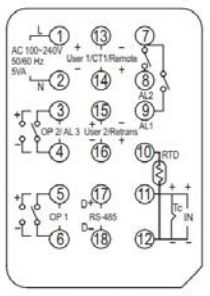
FU1, FU2-(2.5 AMP/ BUSS MDL-2-1/2-R)

* SEE TABLE 2 FOR MODEL / PART # *





PXU TERMINALS



1/16 DIN

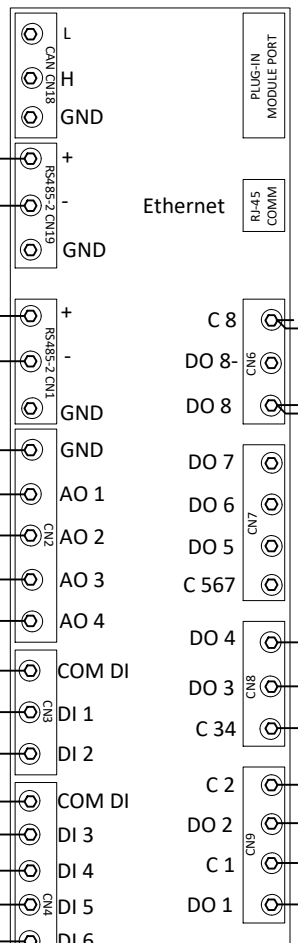
AK-U0-RJ45-TB2P

BLK

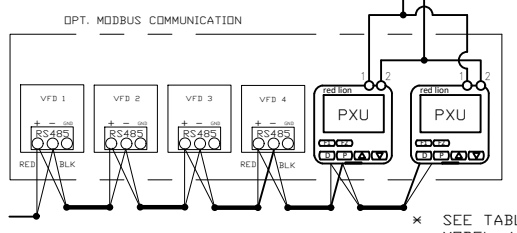
RED

CBL 5

SCHNEIDER ELEC M172, 23 IO CONTROLLER WITH M172 SCREW TERMINAL BLOCKS



OPT. MODBUS COMMUNICATION



* SEE TABLE 3 FOR PXU MODEL / PART #, SEE ABOVE FOR TERMINALS *

* SEE ADDENDUM DETAIL D. FOR OPT. DOOR MOUNTED ALARM W/ SILENCE BUTTON*

T7 STANDARD GEN ALM T18

SEE ADDENDUM DETAIL A. WHEN DRY RUN SENSOR IS USED

HARDWIRED QUADPLEX VFD CONTROL

VFD 4 S/S RELAY

R4

AB-700-HLT1U24

CBL 14

RED

BLK

VFD 4

HARDWIRED TRIPLEX VFD CONTROL

VFD 3 S/S RELAY

R3

AB-700-HLT1U24

CBL 13

RED

BLK

VFD 3

HARDWIRED DUPLEX VFD CONTROL

VFD 2 S/S RELAY

R2

AB-700-HLT1U24

CBL 12

RED

BLK

VFD 2

VFD 1 S/S RELAY

R1

AB-700-HLT1U24

CBL 11

RED

BLK

VFD 1

HDWR DUPLEX VFD CONTROL

VFD 1 SPEED REF

CBL 1

WHT

GRN

T23

T27

VFD 2 SPEED REF

CBL 2

T24

T28

HDWR TRIPLEX VFD CONTROL

VFD 3 SPEED REF

CBL 3

T31

T33

HDWR QUADPLEX VFD CONTROL

VFD 4 SPEED REF

CBL 4

T35

T37

OPT LOW LEVEL CONTROL

LOW LEVEL CONTACT

T3

T14

OPT REMOTE SYSTEM ENABLE

REM S/S CONTACT

T4

T15

HDWR DUPLEX VFD CONTROL

VFD 1 RUN CON.

CBL 7

BRN

BLU

T25

T29

VFD 2 RUN CON.

CBL 8

T26

T30

HDWR TRIPLEX VFD CONTROL

VFD 3 RUN CON.

CBL 9

T32

T34

HDWR QUADPLEX VFD CONTROL

VFD 4 RUN CON.

CBL 10

T36

T38

DISCHARGE/DIFF. PRESSURE X-MITTER

BRN

BLU

WHT

T12

OPTIONAL

SUCTION PRESSURE X-MITTER

T13

SYSTEM FLOW METER

T5

T16

REMOTE PRESSURE X - MITTER

T6

T17

FIELD INSTALLED

PUMP 1/SUPPLY TEMP. SENSOR

T19

T8

PUMP 2/RETURN TEMP. SENSOR

T20

T9

PUMP 3/PROC. 1 TEMP. SENSOR (TRIPLEX)

T21

T10

PUMP 4/PROC. 2 TEMP. SENSOR (QUADPLEX)

T22

T11

X-MITTER WIRE TERMINATION			
X-MITTER	+24V (T1)	-COM (T2)	SIGNAL (T12,T13)
XML-P300PD230 W/ ZMLPA1P2SW	BRN	BLU	WHT
XML-P300PD230	BRN		BLU

MATERIALS NOT IDENTIFIED IN SCHEMATIC FOR STANDARD PANELS

CATALOG#	DESCRIPTION	MFG	QTY
NSYS3DC5420	16x20 TYPE 1, 2, 3, 3R, 4, 4X, 5, 12 AND 13 ENCLOSURE	SCHNEIDER ELEC	1
NSYMM54WH	White Mounting Plate for NSYS3DC5420	SCHNEIDER ELEC	1
140G-G-MTL63	Frame-G, Multi Terminal Lug, Qty 3, 6x14-2(2.5-35)	ALLEN BRADLEY	1
140G-G-TC3H	Frame-G, Terminal Cover, 3p, Qty 2, High	ALLEN BRADLEY	1
140G-G-TLC13	Frame-G, Terminal Lug, Qty 3, FCCu 1x14-1/0(2.5-95)	ALLEN BRADLEY	1
140G-G-RVM12B	Rotary Handle, 12" Black	ALLEN BRADLEY	1
140M-C-W452N	3-Phase Comm. Link Feeder Terminal for 140M-C,-D, 2 Starters	ALLEN BRADLEY	1
140M-C-WTEN	Common Link Feeder Terminal for 140M-C, 140M-D	ALLEN BRADLEY	1
1492-H6	h Block Black- ¼" Fuse Block	ALLEN BRADLEY	2
1492-N37	End Barrier for 1492-H6 Fuse Block	ALLEN BRADLEY	1
1492-JD3	3mm Terminal Block	ALLEN BRADLEY	19
1492-EBJ3	End Barrier for Single J3	ALLEN BRADLEY	1
1492-EAJ35	End Anchor	ALLEN BRADLEY	5
199-DR1	Zinc Plated, Chromate Steel, 35mm x 7.5mm DIN rail	ALLEN BRADLEY	1
DN-SSB25-10	Support Bracket 1 inch	DINNECTOR	2
DN-SSB50-10	Support Bracket 2 inch	DINNECTOR	4
F1X3GLG6	Wire Duct 1 x 3 inch, slotted	PANDUIT	1
C1LG6	1 Duct cover	PANDUIT	1
FL25x25LG-A	Flex Wire Duct 1 x 1.38 inch	PANDUIT	1
XZCPV1141L5	5M Cable with Connector	SCHNEIDER ELEC	2
ZP-MC-CG-11MB	Cable Gland Connector	ZIP PORT	4
TE-703-A8A6/11	Temperature Sensor	MAMAC SYS	4
800-2-2-300-2	Discharge / Suction Pressure X-Mitter Assy.	NOSHOK	2

SHEET: 1 OF 2

HYFAB NO.:

M172
DemandSet Controller
3PH-3W-50/60HZ

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DRAWN BY: MICHAEL T.
DRAWN FOR:
DATE CREATED: 1/5/2021
DWG No: 1

ALL DIMENSIONS APPROXIMATE, CONSULT FACTORY FOR CERTIFIED DIMENSIONS

APPROVED BY:

DATE:

REVISIONS		
5		11/2/2023
6		10/8/2024
7		5/9/2025

TABLE 1 (STANDARD CONFIGURATION FOR MVP, eMVP, e-MHP)

MOTOR DATA		DUPLEX					TRIPLEX					QUADPLEX									
FLA	HP/VOLTS	FLA	MCA	MOCP	CB-AMPS	CB-MOD	FLA	MCA	MOCP	CB-AMPS	CB-MOD	FLA	MCA	MOCP	CB-AMPS	CB-MOD	CB-MFG	IC	MSP_AMPS	MSP_MFG	MSP_MOD
10.6	3HP/208V	21.2	23.9	34.5	30	140G-G2C3-C30	31.8	34.4	45	35	140G-G2C3-C35	42.4	45.1	55.7	50	140G-G2C3-C50	AB	5kA	14.5...20	AB	140MT-C3E-C20
16.7	5HP/208V	33.4	37.6	54.3	30	140G-G2C3-C30	50.1	54.3	71	80	140G-G2C3-C80	66.8	71	87.7	80	140G-G2C3-C80	AB	5kA	14.5...20	AB	140MT-C3E-C20
24.2	7.5HP/208V	48.4	54.5	78.7	50	140G-G2C3-C50	72.6	78.6	102.8	80	140G-G2C3-C80	96.8	102.9	127.1	110	140G-G2C3-D11	AB	5kA	27...32	AB	140MT-C3E-C32
30.8	10HP/208V	61.6	69.3	100	70	140G-G2C3-C70	92.4	100.1	130.9	125	140G-G2C3-D12	123.2	130.9	161.7	160	140G-G2E3-D16	AB	5kA	27...32	AB	140MT-C3E-C32
46.2	15HP/208V	92.4	104	150.2	110	140G-G2C3-D11	138.6	150.1	196.3	150	140G-I2C3-D15	184.8	196.4	242.6	200	140G-I2C3-D20	AB	5kA	32...45	AB	140MT-F9E-C45
59.4	20HP/208V	118.8	133.7	193.05	150	140G-I2C3-D15	178.2	193.1	252.5	225	140G-I2C3-D22	237.6	252.5	311.9	300	140G-K3F3-D30	AB	5kA	63	AB	140G-G2C3-C63
74.8	25HP/208V	149.6	168.3	243.1	200	140G-I2C3-D20	224.4	243.1	317.9	300	140G-K3F3-D30	299.2	317.9	392.7	380	140G-K3F3-D40	AB	5kA	90	AB	140G-G2C3-C90
88	30HP/208V	176	198	286	225	140G-I2C3-D22	264	286	374	350	140G-K3F3-D40	352	374	462	450	140G-M5F3-D60	AB	5kA	90	AB	140G-G2C3-C90
114	40HP/208V	228	257	371	300	140G-K3F3-D30	342	371	485	450	140G-M5F3-D60	456	485	599	600	140G-M5F3-D60	AB	5kA	160	AB	140G-G2E3-D16
4.8	3HP/460V	9.6	10.8	15.6	25	140G-G2C3-C25	14.4	15.6	20.4	25	140G-G2C3-C25	19.2	20.4	25.2	25	140G-G2C3-C25	AB	5kA	14.5...20	AB	140MT-C3E-C20
7.6	5HP/460V	15.2	17.1	24.7	25	140G-G2C3-C25	22.8	24.7	32.3	25	140G-G2C3-C25	30.4	32.3	39.9	35	140G-G2C3-C35	AB	5kA	14.5...20	AB	140MT-C3E-C20
11	7.5HP/460V	22	24.8	35.8	30	140G-G2C3-C30	33	35.7	46.7	35	140G-G2C3-C35	44	46.8	57.8	50	140G-G2C3-C50	AB	5kA	14.5...20	AB	140MT-C3E-C20
14	10HP/460V	28	31.5	45.5	30	140G-G2C3-C30	42	45.5	59.5	80	140G-G2C3-C80	56	59.5	73.5	70	140G-G2C3-C70	AB	5kA	14.5...20	AB	140MT-C3E-C20
21	15HP/460V	42	47.3	68.3	50	140G-G2C3-C50	63	68.2	89.2	80	140G-G2C3-C80	84	89.3	110.3	11O	140G-G2C3-D11	AB	5kA	27...32	AB	140MT-C3E-C32
27	20HP/460V	54	60.8	87.8	70	140G-G2C3-C70	81	87.7	114.7	125	140G-G2C3-D12	108	114.8	141.8	125	140G-G2C3-D12	AB	5kA	27...32	AB	140MT-C3E-C32
34	25HP/460V	68	76.5	110.5	70	140G-G2C3-C70	102	110.5	144.5	125	140G-G2C3-D12	136	144.5	178.5	160	140G-G2E3-D16	AB	5kA	27...32	AB	140MT-C3E-C32
40	30HP/460V	80	90	130	110	140G-G2C3-D11	120	130	170	150	140G-I2C3-D15	160	170	210	200	140G-I2C3-D20	AB	5kA	32...45	AB	140MT-F9E-C45
52	40HP/460V	104	117	169	150	140G-I2C3-D15	156	169	221	225	140G-I2C3-D22	208	221	273	225	140G-I2C3-D22	AB	5kA	63	AB	140G-G2C3-C63

TABLE 2 (3A POWER SUPPLY USED ON STANDARD ENCLOSURES)

	CATALOG #	DESCRIPTION	MANUFACTURE	TAG
	ABL8RPS24030	Universal Power Supply 24VDC 3A	SCHNEIDER ELEC.	PWS1
	ABL8RPS24050	Universal Power Supply 24VDC 5A	SCHNEIDER ELEC.	PWS1
	ABL8RPS24100	Universal Power Supply 24VDC 10A	SCHNEIDER ELEC.	PWS1

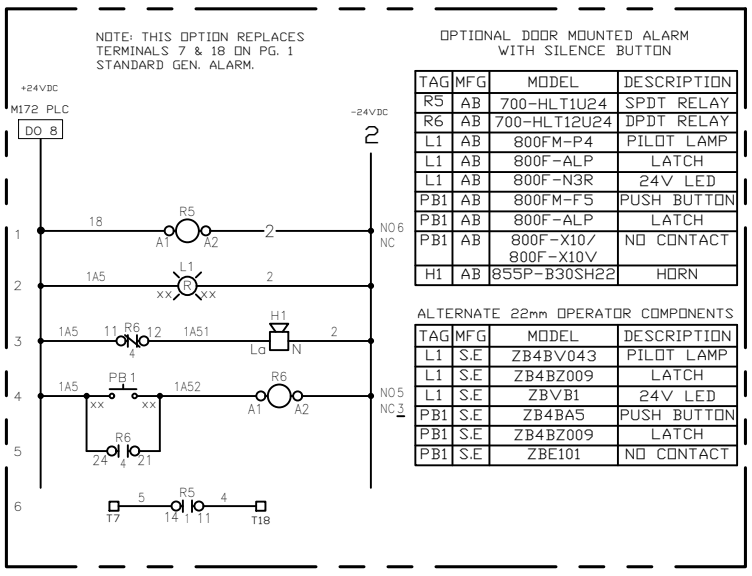
TABLE 3 (PXU RedLion Control Loop Controller Options)

	CATALOG #	DESCRIPTION	MANUFACTURE	TAG
	PXU31AB□	24 VDC, 4-20mA Main Control Output 1, 2 user inputs, RS-485 communication	REDLION	
	PXU41AB□	24 VDC, 0-10VDC Main Control Output 1, 2 user inputs, RS-485 communication	REDLION	

TABLE 4 (Optional AC XFMR Options)

	CATALOG #	DESCRIPTION	MANUFACTURE	TAG
	1497A-A1-M18-3-N	CCT, 50VA, 208/230/480V - 120/24V (50/60HZ), 2 Primary- 1 Secondary Fuse Block	AB	T1
	1497A-A2-M18-3-N	CCT, 75VA, 208/230/480V - 120/24V (50/60HZ), 2 Primary- 1 Secondary Fuse Block	AB	T1
	1497A-A3-M18-3-N	CCT, 100VA, 208/230/480V - 120/24V (50/60HZ), 2 Primary- 1 Secondary Fuse Block	AB	T1
	1497A-A4-M18-3-N	CCT, 150VA, 208/230/480V - 120/24V (50/60HZ), 2 Primary- 1 Secondary Fuse Block	AB	T1
	1497A-A5-M18-3-N	CCT, 200VA, 208/230/480V - 120/24V (50/60HZ), 2 Primary- 1 Secondary Fuse Block	AB	T1
	1497A-A6-M18-3-N	CCT, 250VA, 208/230/480V - 120/24V (50/60HZ), 2 Primary- 1 Secondary Fuse Block	AB	T1
	1497A-A7-M18-3-N	CCT, 300VA, 208/230/480V - 120/24V (50/60HZ), 2 Primary- 1 Secondary Fuse Block	AB	T1
	1497A-A8-M18-3-N	CCT, 350VA, 208/230/480V - 120/24V (50/60HZ), 2 Primary- 1 Secondary Fuse Block	AB	T1
				T1

DETAIL A.



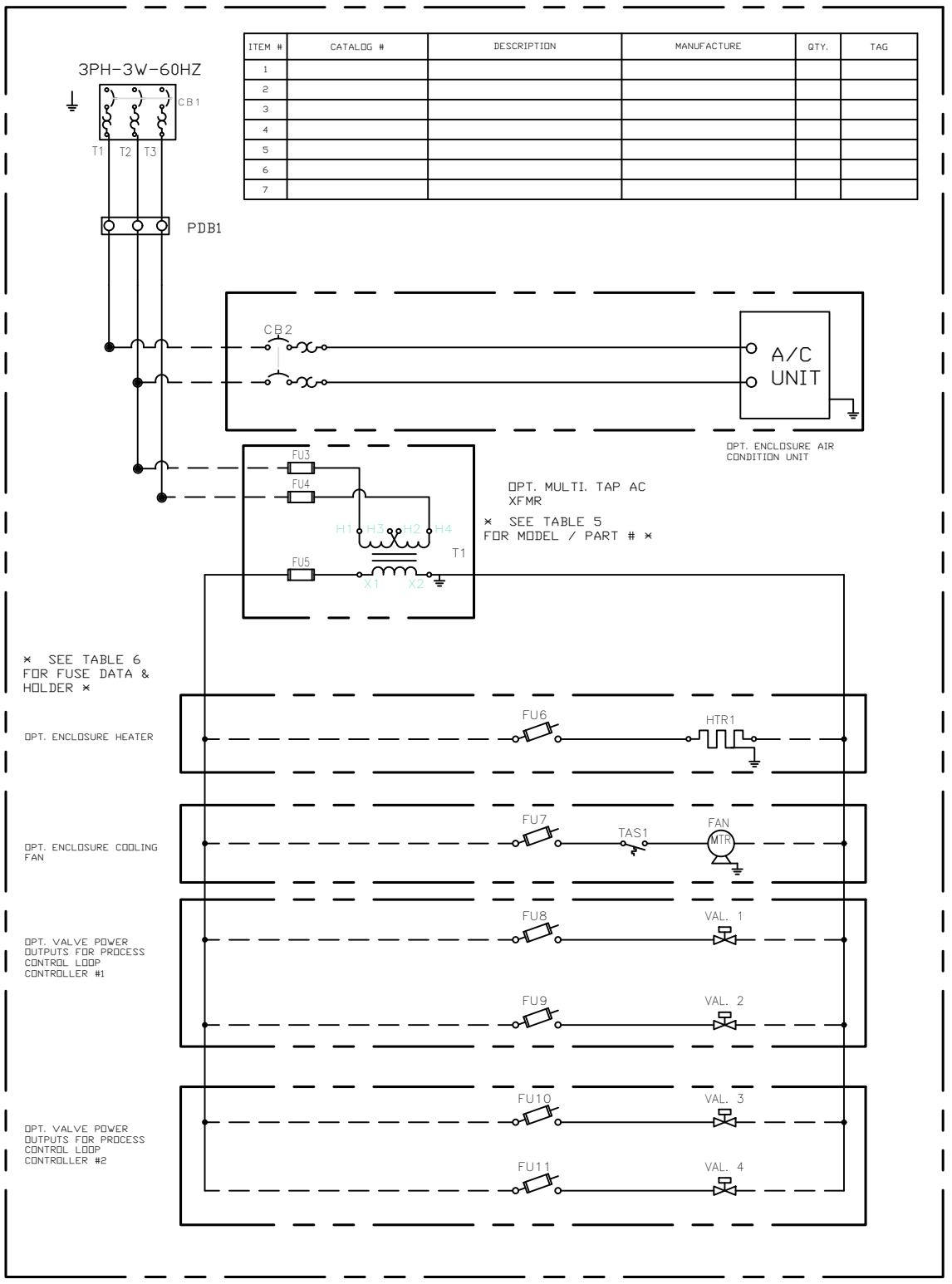
OPTIONAL DOOR MOUNTED ALARM WITH SILENCE BUTTON

TAG	MFG	MODEL	DESCRIPTION
R5	AB	700-HLT1U24	SPDT RELAY
R6	AB	700-HLT12U24	DPDT RELAY
L1	AB	800FM-P4	PILOT LAMP
L1	AB	800F-ALP	LATCH
L1	AB	800F-N3R	24V LED
PB1	AB	800FM-F5	PUSH BUTTON
PB1	AB	800F-ALP	LATCH
PB1	AB	800F-X10/ 800F-X10V	NO CONTACT
H1	AB	855P-B30SH22	HORN

ALTERNATE 22mm OPERATOR COMPONENTS

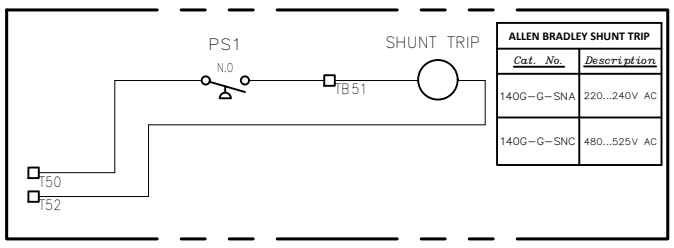
TAG	MFG	MODEL	DESCRIPTION
L1	S.E	ZB4BV043	PILOT LAMP
L1	S.E	ZB4BZ009	LATCH
L1	S.E	ZBVB1	24V LED
PB1	S.E	ZB4BA5	PUSH BUTTON
PB1	S.E	ZB4BZ009	LATCH
PB1	S.E	ZBE101	NO CONTACT

DETAIL B.



ITEM #	CATALOG #	DESCRIPTION	MANUFACTURE	QTY.	TAG
1					
2					
3					
4					
5					
6					
7					

DETAIL C. (SHUNT TRIP FOR CB1)



ALLEN BRADLEY SHUNT TRIP	
Cat. No.	*Description*
140G-G-SNA	220...240V AC
140G-G-SNC	480...525V AC

SHEET: 2 OF 2

HYFAB NO.:

M172
DemandSet Controller
Addendum

HYFAB
Innovative Mechanical Solutions

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DRAWN BY: MICHAEL T.
DRAWN FOR:
DATE CREATED: 1/5/2021
DWG No: 1

ALL DIMENSIONS APPROXIMATE, CONSULT FACTORY FOR CERTIFIED DIMENSIONS

APPROVED BY:

DATE:

REVISIONS