# Installation and Operation Manual

## Elite Circulating





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# Safety Instructions

Read this manual carefully to learn how to safely install and operate your pump. Throughout this manual there are a number of SAFETY HAZARDS that must be read and adhered to in order to prevent possible personal injury and/or damage to the equipment.

Three keywords, “DANGER” ,“WARNING”, and “CAUTION”, are used to indicate the potential severity of the hazard, and are preceded by a SAFETY ALERT SYMBOL. Failure to follow the safety-related instructions may result in a safety hazard.

**DANGER** Indicates an imminently hazardous situation which, if not avoided, WILL result in serious injury or death.

**WARNING** Indicates a potentially hazardous situation which, if not avoided,

Could result in serious injury or death.

**CAUTION** Indicates a potentially hazardous situation which, if not avoided,

May result in minor or moderate injury.

THOROUGHLY REVIEW ALL INSTRUCTIONS AND WARNINGS PRIOR TO PERFORMING ANY WORK ON THIS PUMP.

## *Introduction:*

Because panel installations are seldom identical, this manual cannot possibly provide detailed instructions and precautions for each specific application. Therefore, it is the responsibility and the duty of all personnel involved in the installation, operation and maintenance of the equipment to ensure that applications not addressed in this manual are performed only after establishing that neither operator safety nor panel integrity are compromised by the installation.

## *Pre-Installation Check:*

Open all cartons and inspect for shipping damage. Report any damage to your supplier or shipping carrier immediately. Always verify that the panel nameplate Voltage, Phase, and HP ratings as well as Amps rating on panel match your pumps and power supply. Warranty does not cover damage caused by connecting panels to an incorrect power source (i.e., voltage and phase).

## *Installation:*

Electrical connections are to be made by a qualified electrician in accordance with the National Electrical Code (NEC) or the Canadian Electrical Code, as well all national, state and local codes. Code questions should be directed to your local electrical inspector. Failure to follow electrical codes and OSHA safety standards may result in personal injury or equipment damage. Failure to follow manufacturer’s installation instructions may result in electrical shock, fire hazard, personal injury or death, damaged equipment, provide unsatisfactory performance, and may void the manufacturer’s warranty.

Motor must have a properly sized starter with a properly sized heater to provide overload and under voltage protection unless motor meets following two conditions: single phase and motor horsepower is 1HP or less. Motors that satisfy these two conditions have built-in thermal overload protection.

**Operating personnel should be trained in the operation of the pump and any associated system.**





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# Sequence of Operation

***General***

The controller will operate two circulating pumps to maintain a designated differential pressure. The controller provides adjustable set points for High/Low D/P Alarm, Lead Pump Selection and Lead Pump Alternation Intervals.

***Pump H-O-A Switches***

**AUTO** The pump is enabled by the PLC
**OFF** The pump will be disabled
**HAND** The pump is enabled continuously

***Lead Pump Alternation***

The lead pump is alternated when the **Lead Pump Select** is set to **AUTO.** Alternation interval is adjustable on the **OPERATION** screen. Setting the Lead Pump Select to **PUMP 1** sets Pump 1 as the lead and Pump 2 as the lag. Setting the Lead Pump Select to **PUMP 2** sets Pump 2 as the lead and Pump 1 as the lag.

***Pump Fail Alarm***

When the Lead Pump is enabled to operate, the VFD provides an input to the PLC to indicate it is running. If the Drive Run input is not detected by the PLC the **Standby Pump** will be enabled.
A **PUMP FAIL ALARM** will be indicated on the display along with an audible and visible alarm. The audible alarm is silenced when the **ALARM SILENCE** button is pressed on the display. The visual alarm will stay illuminateduntil the alarm state is cleared. A **PUMP FAIL ALARM** requires a manual reset to clear. The **PUMP FAIL RESET** button is pressed to reset the pump.

***Pump Run Operation***
***High System Alarm***

If the system differential pressure rises above the High System Alarm On set point. A **HIGH SYSTEM ALARM** will be indicated on the display along with an audible and visible alarm. The audible alarm is silenced when the **ALARM SILENCE** button is pressed on the display. The visual alarm will stay illuminated until the alarm state is cleared. The alarm will clear when the pressure falls below the High System Alarm Off set point.

***Low System Alarm***

If the system pressure falls below the Low System Alarm On set point. A **LOW SYSTEM ALARM** will be indicated on the display along with an audible and visible alarm. The audible alarm is silenced when the **ALARM SILENCE** button is pressed on the display. The visual alarm will stay illuminated until the alarm state is cleared.
The alarm will clear when the pressure rises above the Low SYSTEM Alarm set point.





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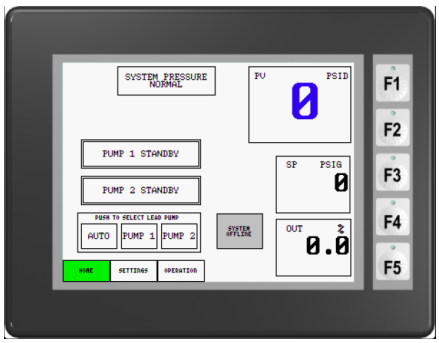
# System Set-up Instructions

### *Main Screen*

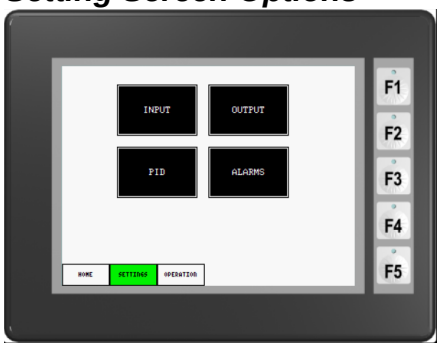



The controller Main Screen provides the loop operating pressure, Pump Run Status and Lead Pump Selection. The lead pump selection is made by pressing the button on the display.

**AUTO** Pumps will be alternated automatically by the controller at the selected Interval time.
**PUMP 1** Pump 1 will operate as the lead with no alternation.
**PUMP 2** Pump 2 will operate as the lead with no alternation.

The "Settings" and "Operating" options are viewable by pressing the button on the bottom of the screen.

### *Setting Screen Options*




Press a button to make the necessary setting adjustments.

**Alarms** System Alarm Setpoints
**Input** Operating Range of Pressure Input Sensor
**Output** Pump Min & Max Speed Setpoints
**PID** PID Loop Tuning Settings

Press the **MAIN** button to return to Main Screen





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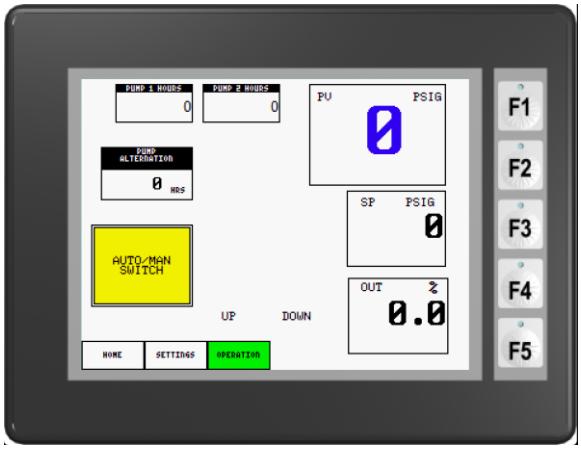
## *Operation Screen*



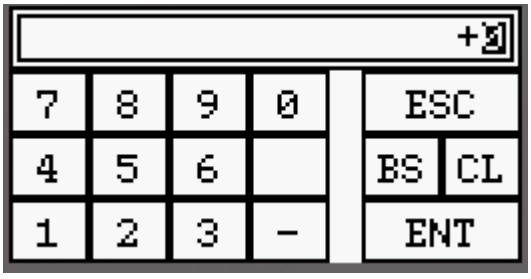

The Operation screen display is used to set the controller for Auto or Manual Operation and System Setpoints. Pressing the "AUTO/MANUAL SWITCH" button provides a bump less transfer between automatic & Manual system operation

### AUTO/MANUAL SWITCH

**AUTO** The Setpoint Up/Down arrows are used to adjust the system setpoint. The controller modulates the output to match the system setpoint.

**MANUAL** The OUTPUT Up/Down arrows are used to manually adjust the pump speed output.

To adjust settings press the sensor button to access a data entry box.




Enter the desired set point and press **ENT** to save the setting. The new setting will be displayed on the button.





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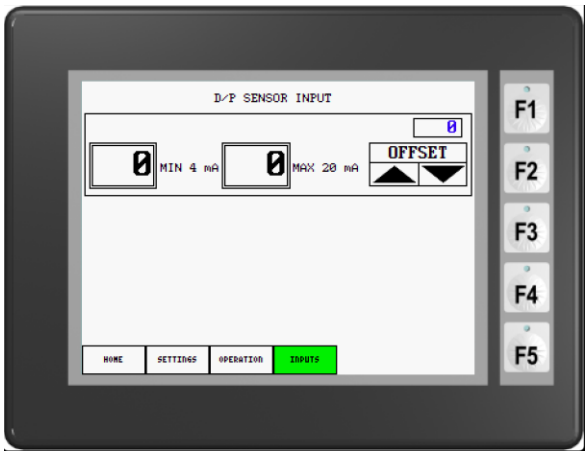
### *Input Screen*



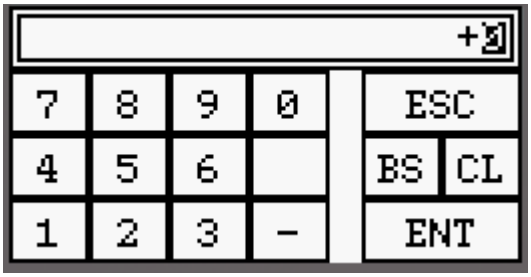

The Input Screen is used to set the pressure sensor Min/Max range.

**SENSOR MIN** This is the level that the pressure sensor will send 4mA to the controller. This value is typically zero on most sensors.

**SENSOR MAX** This is the level that the pressure sensor will send 20 mA to the controller. This value is 100% of the sensor scale.

**OFFSET** The Up/Down arrows are used to adjust the display as necessary to match the actual system pressure gauges.

To adjust settings press the sensor button to access a data entry box.




Enter the desired set point and press **ENT** to save the setting. The new setting will be displayed on the button.





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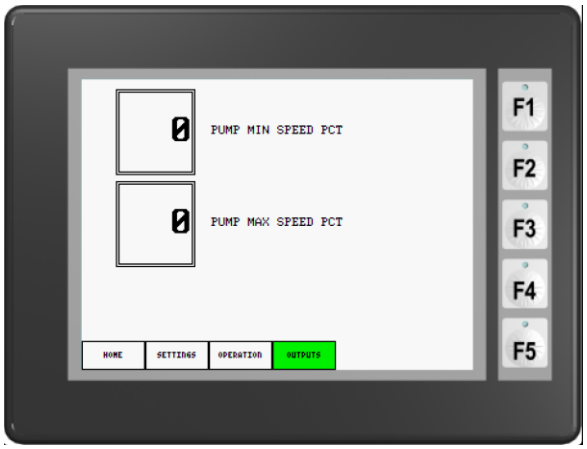
### *Output Screen*

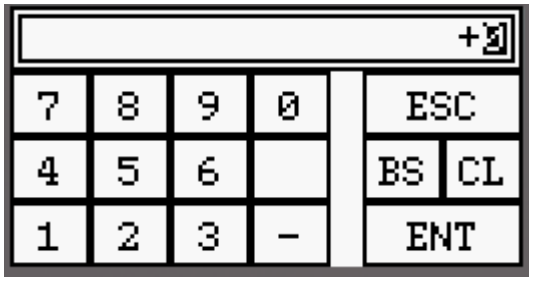



The Output display screen is used to set the maximum and minimum speed the pump(s) will run.

**MIN OUTPUT %** This setting is set to the pump dead head speed when the system pressure is equal to the set point. This speed that the drive ramps to before the PID control takes over the pump speed.

**MAX OUTPUT %** This setting is the maximum speed at which the pump will be running. The normal setting is 100%.

To adjust settings press the sensor button to access a data entry box.




Enter the desired set point and press **ENT** to save the setting. The new setting will be displayed on the button.





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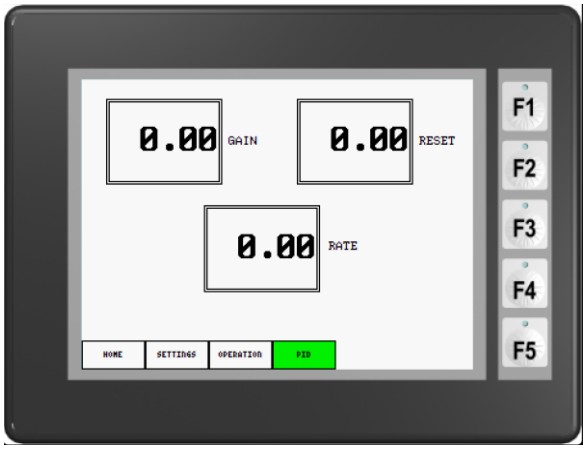
### *PID Screen*

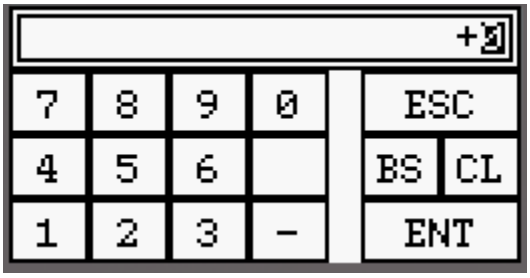



**GAIN** This setting adjusts the amount of change in output percentage based on a deveation of the system pressure above or below the System Pressure Setpoint. The scale is 0-100 on this setting. The typical swetting for this application is 2-5.

**RESET** This setting adjusts the amount of time pulse to drive the system pressure back to the setpoint. The setting is in seconds. The typical setting for this application .5 sec – 3 sec.

**RATE** This setting is not used for pressure control and should be set to 0.00

To adjust settings press the sensor button to access a data entry box.




Enter the desired set point and press **ENT** to save the setting. The new setting will be displayed on the button.





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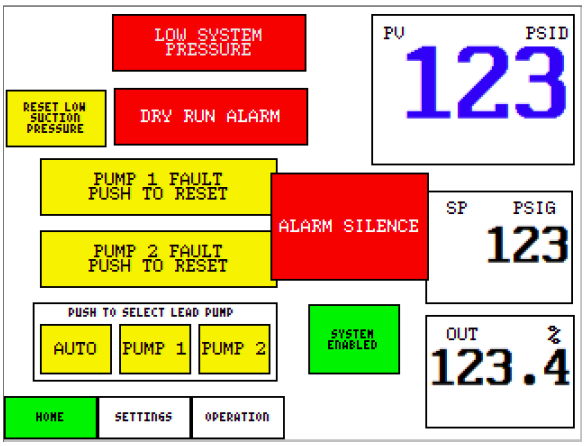
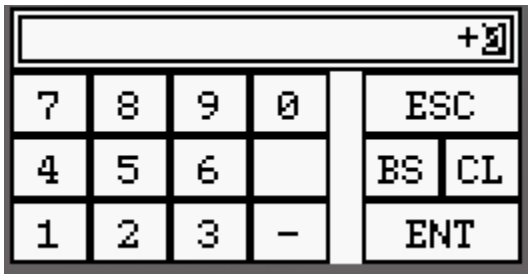
## Alarm Settings


The Alarm screen, on the left, will allow you to select individual alarms and set at desired set point. The Alarms include, High System Alarm, Low System Alarm, and Low System Alarm Delay. To activate the desired alarms, press the desired alarm box and the display will pop up. *See figure below.*

The Figure to the right shows what the alarms would look like if they are activated on the display screen. The alarms include, Low System Pressure, Dry Run alarm, Alarm Silence button will allow you to silence the buzzer but will not reset any alarm. Should a pump fault occur, the affected pump can be reset buy pressing the affected Pump Fault Reset button.

To adjust settings press the sensor button to access a data entry box.

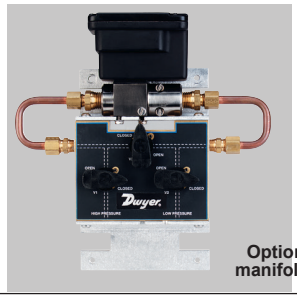



Enter the desired set point and press **ENT** to save the setting. The new setting will be displayed on the button.

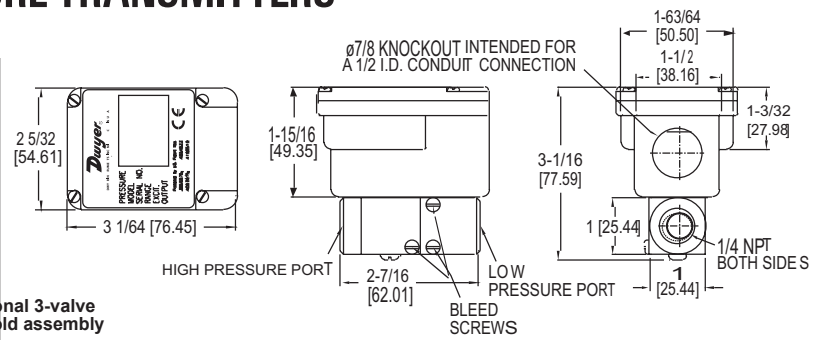
SERIES 645

# WET/WET DIFFERENTIAL PRESSURE TRANSMITTERS

## ±0.25% Accuracy, Quick Response, 2-Wire Design



Optional 3-valve manifold assembly




**Series 645 Wet/Wet Differential Pressure Transmitters** are designed for use with compatible gases and liquids which can be applied to both the pressure and reference ports. Quick response capacitance sensor delivers a 4-20 mA output signal proportional to differential pressure with ±.25% accuracy. The Series 645 transmitters are ideal for process control, filter condition monitoring, refrigeration equipment, pump speed control, HVAC equipment, and liquid level measurement. For ease of installation and maintenance, order optional 3-valve manifold assembly. Bleed ports allow for total elimination of air in the line and pressure cavities.

### FEATURES/BENEFITS

- Versatile, high-accuracy device for liquid or gas supports designs requiring more precise measurements in support of application
- Optional 3-way valve manifold supports simplifying installation or removal of transmitter without interrupting process

### APPLICATIONS

- Process control
- Refrigeration equipment
- HVAC equipment
- Filter monitoring
- Pump speed control
- Liquid level measurement

| MODEL CHART | |
|---|---|
| **Model** | **Range** |
| **645-0** | 0 to 1 psid |
| **645-1** | 0 to 2 psid |
| **645-2** | 0 to 5 psid |
| **645-3** | 0 to 10 psid |
| **645-4** | 0 to 25 psid |
| **645-5** | 0 to 50 psid |
| **645-6** | 0 to 100 psid |

**Note:** For optional 3-valve manifold assembly, add -3V to end of model number.

### SPECIFICATIONS

**Service:** Compatible gases or liquids on both pressure and reference sides.
**Wetted Materials:** 17-4 PH stainless steel, 300 Series stainless steel, fluoroelastomer and silicone O-rings and bleed screw seals.
**Accuracy:** ±0.25% FS (RSS).
**Temperature Limits:** Operating: 0 to 175°F (-22 to 80°C); Storage: -65 to 260°F (-54 to 126°C).
**Pressure Limits:** (High side) 1 to 5 psi: 20 x FS, 10 to 25 psi: 10 x FS, 50 psi: 5 x FS, 100 psi: 2.5 x FS; (low side) 2.5 x FS.
**Thermal Effects:** (includes zero and span) ±0.02% FS/°F, 30 to 150°F (-1 to 65°C).
**Power Requirements:** 11-30 VDC.
**Output Signal:** 4-20 mA, 2-wire.
**Zero and Span Adjustments:** Adjustable, ±1 mA, non-interactive.
**Response Time:** 30 to 50 ms.
**Loop Resistance:** 0 to 1000Ω.
**Electrical Connection:** Barrier strip terminal block with conduit enclosure and .875″ (22 mm) diameter conduit opening.
**Process Connection:** 1/4″-18 female NPT.
**Housing:** Stainless steel/aluminum, NEMA 4X (IP56).
**Weight:** 14.4 oz (0.4 kg).
**Agency Approvals:** CE.

**3-VALVE MANIFOLD ASSEMBLY**
**Manifold:** Brass.
**Valve Type:** 90° on/off.
**Process Connection:** 1/4″-18 female NPT.

| OPTIONS | |
|---|---|
| **Use order code:** | **Description** |
| **NISTCAL-PT1** | NIST traceable calibration certificate |

USA: California Proposition 65
⚠ WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov

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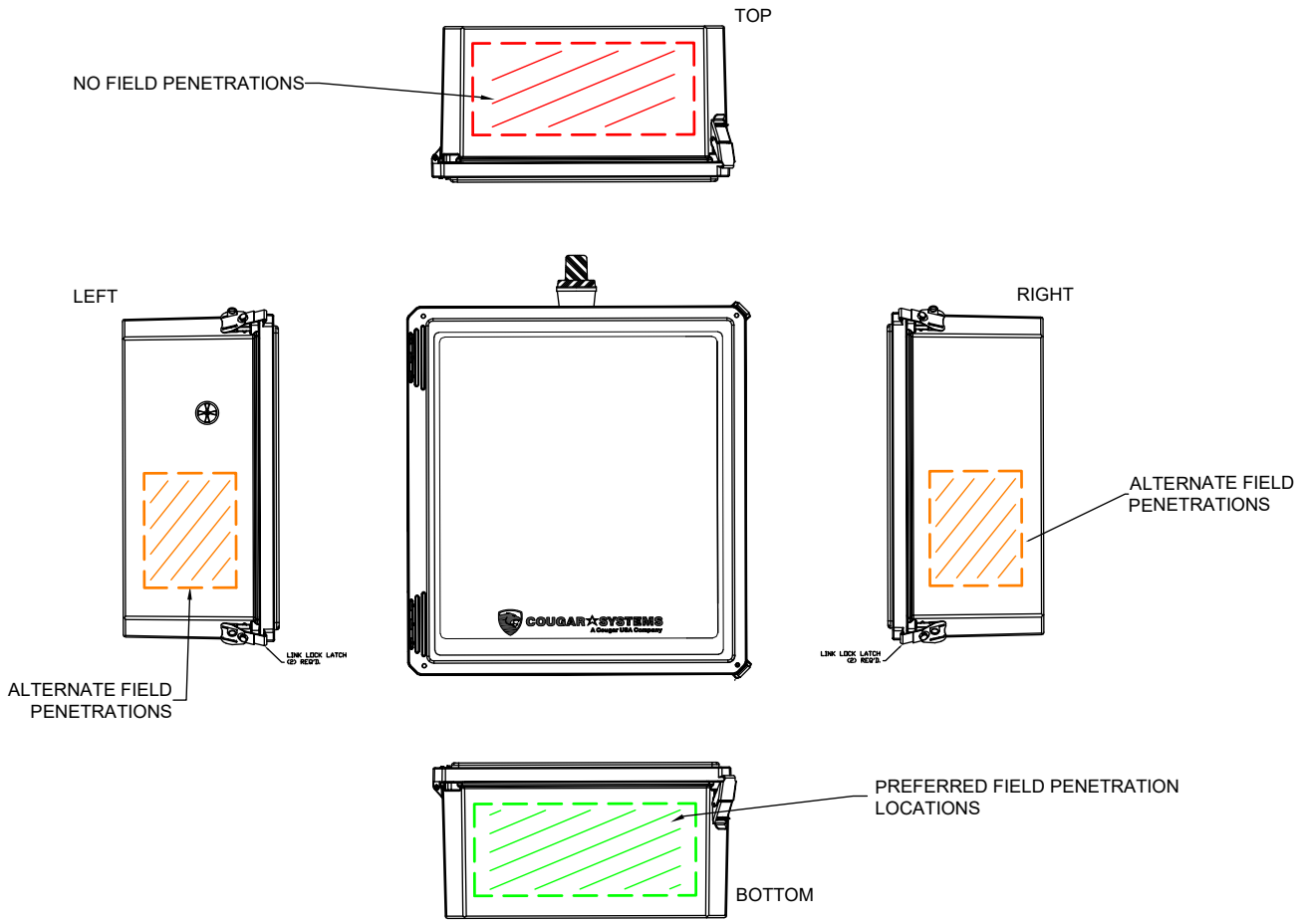
# Field Penetration

*** URGENT ***
ANY FIELD PENETRATIONS IN LOCATIONS OTHER THEN FACTORY AUTHORIZED AREAS WILL ***VOID MANUFACTURERS WARRANTY*** OF ALL INTERNAL COMPONENTS.





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