

SENTRY Protect SIMPLEX PANEL Installation and Operation Manual

**Environment One Corporation
240 VAC Two Leg Power**



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Overview

The Sentry Protect panel is an Environment One Alarm/Monitor panel. The Sentry Protect panel monitors the following:

- Pump Run Dry Condition (Pump running out of water)
- Pump Overpressure Condition (Pump consuming more than 2000 watts of power)
- Brownout Condition (Mains voltage under 12% of nameplate rating)
- High Liquid Level

The Sentry Protect Panel displays pump status by means of the following indicators:

- Normal LED (Green)
- Pump Running LED (Green)
- High Level Alarm LED (Red)
- Run Dry LED (Red)
- Overpressure LED (Red)
- Brownout LED (Red)

The following are the hardware features:

- IP65 Rating
- Enclosure made from Thermoplastic Polyester
- Separate Circuit Breakers for Alarm and Pump
- Audible & Visual Alarm indicators
- Silence for Audible Alarm
- Alarm Dry Contacts that operate with or without power to the panel (for DC power driven alarm devices only). Intended for use with Environment One Remote Sentry, sold separately.
- Dry and Powered Alarm Contacts (will only operate when the power is on to the alarm board).
- Manual Pump Run Button.

Wiring Instructions

Due to the different optional features and voltages, the Sentry Protect panel wiring can change from model to model. Wire the Sentry Protect panel per the wiring decal inside the door.

The typical wiring diagrams can be found in the Appendix Section of this document.

Normal Operation

When mains power is applied to the Sentry Protect panel:

1. Power is applied to the pump and all LEDs will light.
2. The system automatically retrieves all operating parameters from non-volatile memory.
3. The Normal LED will remain lighted, all other LEDs will turn off, and the system will advance into normal operation.
4. The Pump Running LED will light any time the pump is operating and drawing current.

Note that the Brownout LED will light (and latch on) if the Alarm breaker is turned on but the Pump breakers are off (this is because the panel will detect an abnormally low mains voltage). This situation may arise during pump commissioning/testing when filling the tank with water. The Brownout LED may subsequently be extinguished (once the Pump breakers are turned back on) by turning the Alarm breaker off, then on (see **Trouble Operation**, below).

Manually Running Pump

The pump can be run manually (providing there are no detected trouble conditions which would prevent its running) by pressing and holding the **RUN** button. Note that a delay of approximately 8 seconds may occur before the Pump Running LED lights in response to the keypress. This delay results from the processing time needed to filter out possible run dry and overpressure conditions from the pump start and stop power transients. Release the button to stop the pump.

High Level Alarm

Should the system go into a high level alarm, it will light the red “High Level Alarm” LED, light the panel lamp, and turn on the buzzer. The buzzer may be silenced at any time by pressing the Silence button.

DIP Switch

A three position miniature switch (DIP switch), labeled S1, programs Sentry Protect for the mains voltage and other parameters to be applied. In the following voltage selection table “U” represents a switch in the Up (ON) position and “D” represents a switch in the Down (OFF) position. The DIP switch must be programmed with mains power off (Alarm Breaker off). ***It is essential that the DIP switch is properly set for the mains voltage applied.***

240 VAC, 60 Hz	UUU
240 VAC, 50 Hz	UUD
220 VAC, 50 Hz	UDU
120 VAC, 60 Hz	UDD
120 VAC, 60 Hz	DUU
220 VAC, 50 Hz	DUD
240 VAC, 50 Hz	DDU
Calibration Mode	DDD

Calibration

Calibration is a factory only item that cannot be performed properly in the field.

Trouble Operation

The Sentry Protect panel continuously monitors for several trouble conditions:

1. Brownout. Power to the pump is conveyed through a high power contactor. Should the mains voltage drop below a preset Turn-off Level – about 12% less than the nameplate rating, selected by the DIP switch, above – the contactor will open and the Brownout LED will light. This condition will self-clear, permitting the contactor to close, only if the mains voltage rises above a preset Turn-on Level (about 8% less than the nameplate rating, also selected by the DIP switch).

2. Run Dry. Should the panel detect a sustained, abnormally low pump power level (below a pre-determined threshold) it will open the contactor and light the Run Dry LED. Typically, a very low power level is associated with the liquid level in the pump dropping below the pressure bell housing. Shutting off the pump for this condition prevents possible damage to the grinding mechanism. After a 20 minute delay the panel will close the contactor and permit the pump to run. The contactor will remain closed for no more than approximately 8 seconds should the panel continue to detect low pump power, at which point, it will, again, open the contactor. This run dry cycle may continue indefinitely; however, at the third run dry cycle the panel will light the alarm lamp and turn on the buzzer. The alarm condition will self-clear if, during the time that the pump is permitted to run, the power level returns to normal and the pump automatically shuts off. The only condition which overrides the cyclic run dry operation is the occurrence of a high level alarm. For this state the contactor is closed, the pump is forced on, the Run Dry LED will remain lit, the "High Level Alarm" LED and panel lamp will light, and the buzzer will turn on. The buzzer may be silenced at any time by pressing the Silence button.

3. Overpressure. Should the panel detect a sustained, abnormally high pump power level (above a pre-determined threshold) it will open the contactor and light the Overpressure LED. Typically, a very high power level is associated with a blocked discharge line. After a 20 minute delay the panel will, again, close the contactor and permit the pump to run. The contactor will remain closed for no more than approximately 8 seconds should the panel continue to detect high pump power, at which point, it will open the contactor. This overpressure cycle may continue indefinitely; however, unlike the run dry cycle, above, the panel will not light the alarm lamp and turn on the buzzer. Additionally, the occurrence of a high level alarm, while it will light the "High Level Alarm" LED and panel lamp and turn on the buzzer, will not close the contactor. The overpressure condition will self-clear if, during the time that the pump is permitted to run, the power level returns to normal and the pump will automatically shut off.

Note that for the Trouble operation, above, the LED associated with the last occurring trouble condition will latch on. The LEDs will clear only after either the mains power turns off, then on, or else the Alarm circuit breaker is turned off, then on.

Trouble Shooting

Testing Instructions and Charts

Troubleshooting Chart

Condition	Possible Causes	Troubleshooting Steps
Pump Running NOT Pumping	Leak in pump discharge assembly, underground wire damage, inoperable controls	1. Verify Voltage (216V-264V) (108V-132V) 2. Wiring - see p. 4 3. Continuity Test 4. Amperage Test
Pump NOT Operating	Brownout, plugged breather, low fluid level, wet or corroded controls, inoperative controls, faulty panel breaker	
Alarm Activates Frequently	High flow, plugged vent or breather, sensing line leak, line blockage or worn stator, underground wire damage	

Condition	Possible Causes	Troubleshooting Steps
Noisy Pump	Normal operation, low voltage, blocked discharge, damaged stator, worn motor bearing	

Continuity Test

1. Verify power is off by checking the voltage (voltmeter/multimeter).
2. Use an ohm meter (multimeter) and set to 2000K (or 2Meg) scale for continuity test.
3. Place one probe on the lead under Color 1, and the other lead on Color 2 (allow 5 sec to stabilize).
4. Verify the readings are "Normal."
5. If one is not "Normal," repeat the entire procedure in the panel with the EQD disconnected, and again on the pump EQD (see terminal connection chart).

Continuity Test (set meter to 2000k, or 2 meg scale)				
Color 1	Color 2	Operation	Normal Reading	
			in liquid	out of liquid
Red (2)	Brown (1)	On-Off Switch	0, short or closed = ON	OL, 1, open = OFF
Yellow (5)	Blue (6)	Alarm Switch	0, short or closed = ON	OL, 1, open = OFF
GRN/YEL (4)	Red (2), Brown (1), Black (3)	Short to Ground	OL, 1, open = no short	OL, 1, open = no short
GRN/YEL (4)	Blue (6)	Short to Ground	0, short = closed	0, short = closed
GRN/YEL (4)	Yellow (5)	Short to Ground	0, short = closed	OL, 1 = open
Brown (1)	Blue (6), Yellow (5), GRN/YEL (4)	Short in Push-to-run circuit	OL, 1, open = no short	OL, 1, open = no short
Brown (1)	Black (3)	contactor coil	.001 to .003	.001 to .003

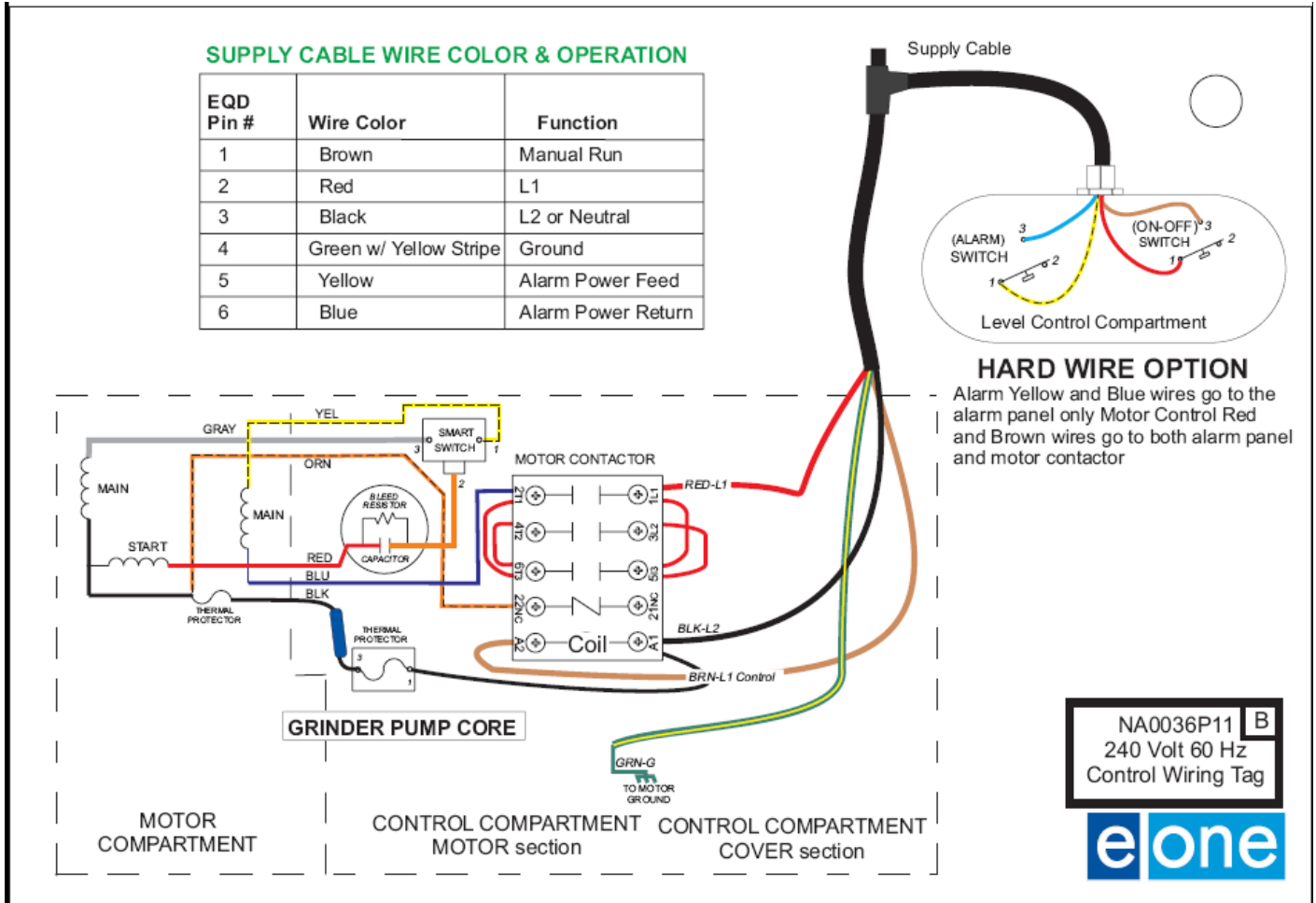
Amperage Test

1. Hook an amp meter around the BLACK wire from the pump
2. Press the Push-to-run button (if necessary)
3. NOTE: Amperages may vary from this chart by as much as 1 amp.
4. Verify the zero-head amperage to calibrate.

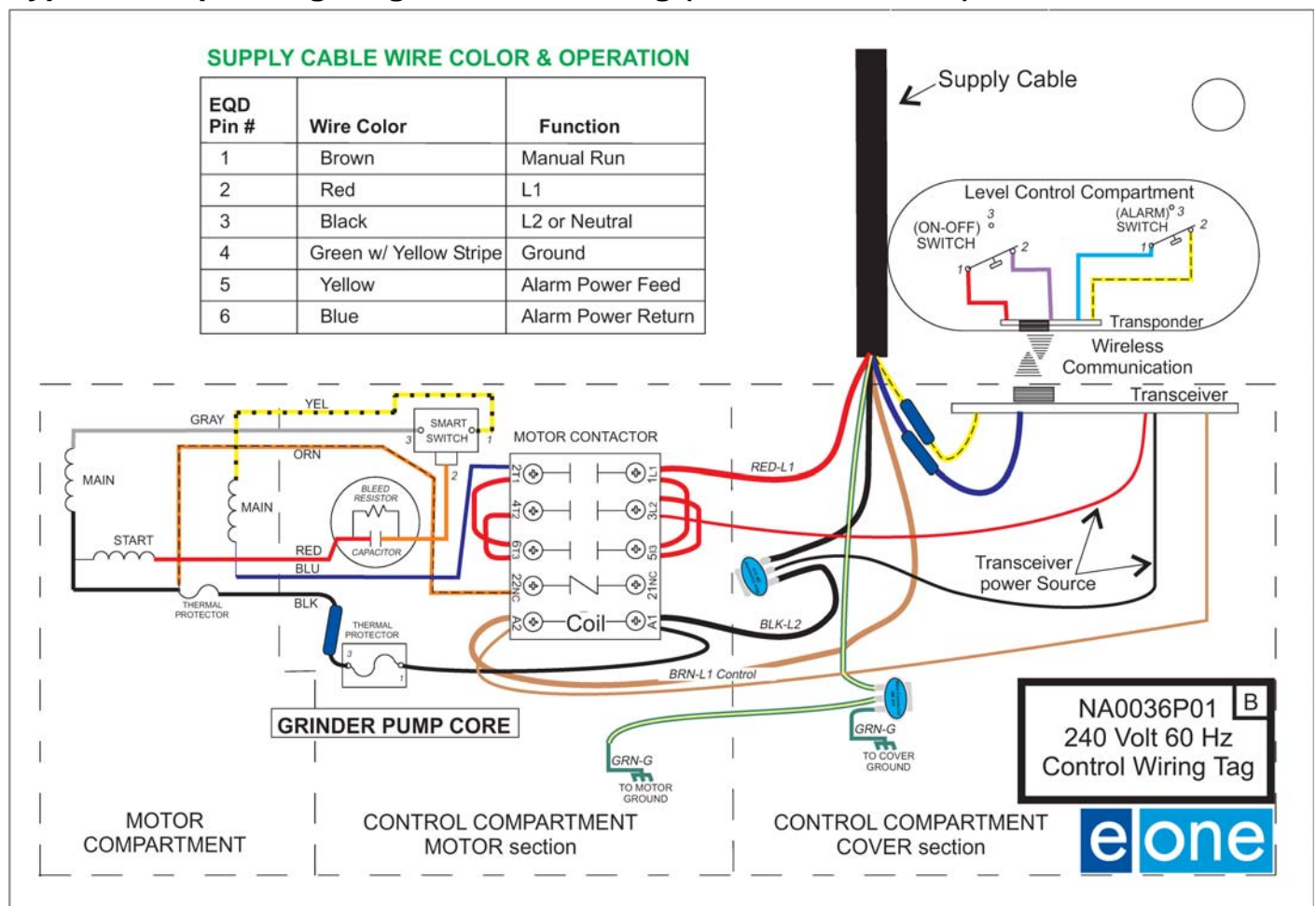
Approximate Amp Draw Readings				
Amps @ 240V (@ 120V)	PSI	Head (ft)	GPM	Comments
4.9 or less (9.8)	0	0	0	Worn stator
5.6 (11.2)	10	24	14	Normal
5.8 (11.6)	20	46	13	Normal
6 (12)	30	70	12	Normal
6.2 (12.4)	40	92	11	Normal

Approximate Amp Draw Readings				
Amps @ 240V (@ 120V)	PSI	Head (ft)	GPM	Comments
6.5 (13)	50	115	10	Normal
6.8 (13.6)	60	138	9	Normal
8 and higher (16)	90+	207+	varies	Plugged Discharge line or bad bearings
over 15 (30)	0	0	0	Jammed Grinder or Shorted Motor

Typical Pump Wiring Diagram – 240V 2-Leg (Extreme Hardwired)



Typical Pump Wiring Diagram – 240V 2-Leg (Extreme Wireless)



Trouble Shooting Panel Symptoms and Tests

- High Level Alarm will not turn on
 - Check the voltage between Yellow and Blue on the alarm board from the pump.
 - If the voltage is below 25 VAC check;
 - That the alarm board is fed the proper voltage between Service Neutral and Alarm BR L1.
 - Inspect supply cable and pump for problem.
 - If the voltage is above 25 VAC, the alarm pressure switch is open or there is a problem wire the wire connection between the panel and the pump.
- Volt and/or Amps do not read correctly
 - Check using a Volt/Amp meter to compare against the display.
 - To check the voltage, read the voltage directly off the Black and Red pump wires.
 - To check the amperage, check the current on the Black wire going to the pump.
 - If the readings are off more then 5% the Board assembly will need to be returned to the factory to be re-calibrated.
- Contactor in panel will not pull in
 - If voltage is 10% lower then nameplate voltage the contactor will not pull in.

- Make sure all wire connections and terminals are torqued to their proper level.
- Check the voltage coming into the panel.
 - If low repair it
- Check the voltage between terminal TB7-1 (BR L1) and TB3-1 (BR L2/NEUTRAL)
 - If low repair it
- Manual run does not work
 - Check that all pump wires are properly connected and in the correct position.
 - Make sure the Red and Black pump wires are in their proper location.
 - With the manual run button pressed, read the voltage between the Black and Brown pump leads.
 - If the voltage read is within 10% of the pumps nameplate voltage, then there is either a problem in the supply cable or in the pump.
 - If the voltage read is low then remove the Brown wire.
 - Check the voltage between the Black pump wire and the terminal block where the Brown wire was removed. When pressing the manual run button nameplate voltage should be seen, if so the problem is a bad or shorted wire in the supply cable or in the pump.
- Pump running dry
 - Check the pump wires for shorts. Any shorts to the Brown wire (except from the pump Black wire) will need to be repaired.
- Pump will not run
 - Check the voltage between the Red and the Black pump wires.
 - If the voltage is normal, check the supply cable and/or the pump.
 - If there is no voltage, check to see if the Low Voltage Contactor is pulled in. The input voltage must be within 10% of nameplate voltage.

Technical Q&A

1. What do some of the major components on the Protect circuit board do?
 - K3 is the changeover contacts; it supplies a connection to the indoor Remote Sentry from the Alarm Pressure Switch when there is no power or through a set of dry contacts on K4 when power is supplied.
 - K1 is the Redundant Run and the Dry Contact relay.
 - K5 is the Horn Silence relay.
 - K4 is the Remote Sentry Contact when power is supplied to the board.
 - SSR1 is the solid state relay that controls the pump contactor
 - R67 is the bleeding resistor for the K1 coil
 - PTC1 provides protection to the redundant run circuit in the event of any sort of mis-wire. This resistor will help protect the traces from burning out by opening up until the short is cleared.
2. Why are both L1 and L2 going to the circuit board?

The panel needs L2 (which could also be Neutral in single-leg and 120 volt panels) to operate the power measuring circuit when the pump operates.
3. How exactly does the run indicator work?

The Protect panel measures the amperage drawn by the pump. If the draw exceeds a pre-set value, the "Pump Running" indicator will light.

Appendix

Typical Panel Wiring Diagram – 240V 2-Leg

