

Civacon 8130 Optic Rack Monitor System and Associated Equipment

Installation and Wiring Instructions Manual

Manual Part Number: H52496PA



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API = American Petroleum Institute
IS = Intrinsically Safe

1. Product Description

This manual describes the installation, operation, and troubleshooting of the Civacon 8130 OPTIC Loading Rack Monitoring System. It is intended to help operators, maintainers, and specifiers understand the operation and features of the OPTIC system. This manual should be read before installation of any equipment.

The OPTIC monitor detects and communicates an overfill condition to the loading rack control automation equipment. The OPTIC monitor optionally can communicate this "NON-PERMISSIVE" condition to the loading operator by way of status lights. The OPTIC monitor can also be used in fixed storage overfill monitoring situations.

An overall loading rack system contains a loading rack control monitor (OPTIC Model 8130), junction box (Model 7560 Series), and an API optic cord set and plug (Model 7100). A Plug Hanger is also available. Please consult the factory for the current availability of all optional products. The Optic signal is compatible with the API 1004 signaling conventions used throughout the industry. The CIVACON OPTIC loading rack control monitor is designed to provide many years of trouble free service.

The 8130 has a RED non-permissive and a GREEN permissive indicator. The 8130 system has BYPASS capability when used with the optional BCU-2 bypass unit. The purpose of the Civacon OPTIC liquid level sensing system is to detect a liquid point level signal from a sensor mounted in compartments of a tank truck, or storage tanks. The system provides an automatic signal to the rack automation equipment to shut-off the flow of liquid, and warn of an impending overflow condition of a tank truck or storage tank.

The OPTIC system uses self-checking principles to provide a continuous check on all system components. This is accomplished by the exchange of digital pulses between sensor and rack monitor. These digital pulses must pass through all active components in the sensor, sensor wiring, and back to the control monitor to test all the components in the circuit. If at any time the circuit detects a failure in any of the components, it reverts to a failsafe condition, NON-PERMISSIVE. The unit must then be repaired before it can return to an operational condition. Sensors cannot be "jumpered" out of the circuit and have it work.

The monitor will work with any API 5 wire OPTIC sensor. The monitor only uses 4 of the 5 wires, because the fifth wire is used for onboard monitor diagnostics ONLY. Up to twelve (12) standard optic sensors may be connected to the monitor.

The monitor is also designed to work with any On Board Monitor's API OPTIC signal format outputs. The 8130 also incorporates truck-to-load rack Ground Verification. The Ground Verification circuit detects the presence of a ground on the trailer frame from four possible sources. The primary source of a ground is through the overfill monitoring systems plugs' sensor ground, which is normally on Pin 10 of the API socket. The other possible sources of a ground are through the loading couplers, the vapor recovery vent line, or any static grounding ball or clamp connection(s).

1.1 Products

All CIVACON Loading Rack Monitors are suitable for Class I, Division 1, Groups C & D hazardous locations with intrinsically safe outputs, and housed in an Explosion Proof Enclosure. All monitors are FM approved. Please consult the factory for the availability of special models.

08130-120 Basic Optic Rack Monitor – 120 VAC

08130-240 Basic Optic Rack Monitor – 240 VAC

OPTIONAL ACCESSORIES

BCU-2 Bypass Unit for 8X30 Monitors

7560-7560 Junction Box for 8130

1.2 Voltage Selection

Depending on the model used, two different input voltages are available for installation. The standard model is rated at 120 VAC, 50/60 Hz., but a 240 VAC, 50/60 Hz., model is available. Both voltage models provide a relay output with a SPDT set of contacts, rated at 240 VAC, 5 Amps. Determine which voltage model was purchased by the voltage rating on the nameplate; and wire according to the proper line voltage.

Voltage selection is made at the factory by jumpers on the PCB. Please do not attempt to alter these settings.

SAFETY FIRST!

POWER MUST BE OFF WHEN INSTALLING OR REMOVING THE PRODUCT FROM SERVICE. THE WIRES FOR THE POWER TERMINALS FROM THE POWER PANEL MUST BE KEPT TURNED OFF DURING WIRING, CHECKOUT AND THE BOARD REPLACEMENT! This is important to maintain safe repair practices.

2. Mounting Diagram

Maximum diameter bolt holes for mounting the enclosure are 7/16" diameter.

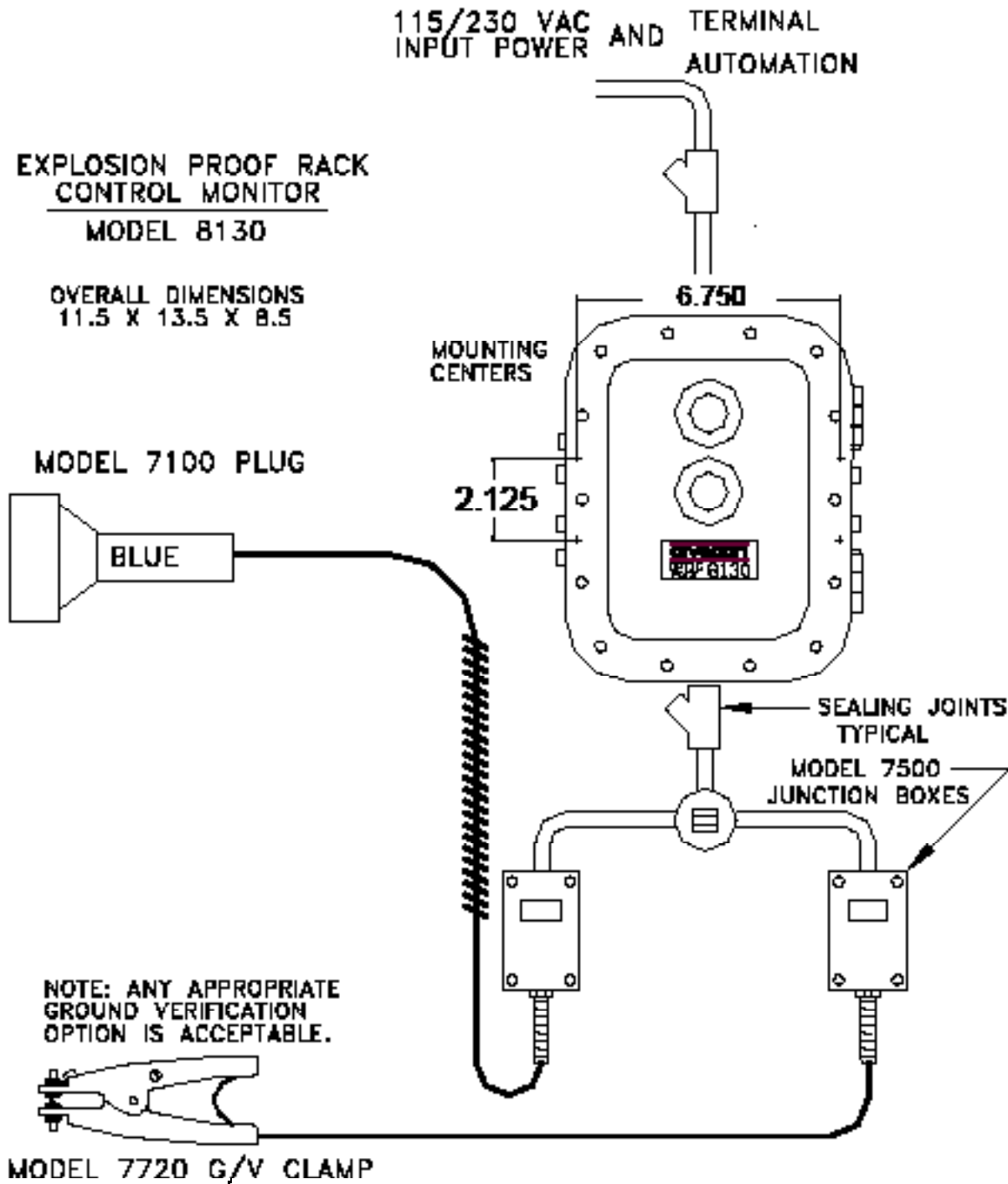


FIGURE 1 - Mechanical Installation

3. Wiring Instructions - Power

All wiring entering the rack monitor enclosure must enter through the NPT conduit openings provided by the factory. Use weather tight conduit fittings and thread sealant on pipe threads to keep out external moisture. Ensure that the proper sealing fittings are installed, and potted (sealed) appropriately.

CAUTION:

The control monitor's wiring and terminal strips on one side are intrinsically safe, and are separated from the AC power wiring by barriers. This separation of wires must be maintained. All sensor wires must enter the bottom (intrinsically safe side) of the monitor enclosure, and not mix with the AC power wiring or any other wiring at the top. AC power and control circuit wiring must enter through the conduit openings in the top of the enclosure. Wires should be cut to length with no excessive wire coiled inside the enclosure.

The power supply circuit should contain a disconnect switch and an appropriate fuse or circuit breaker with a minimum current rating of 1 Amp. for proper monitor operation. We strongly suggest the use of a high quality stranded and tinned copper wire with a minimum thickness of 18 gauge for all electrical connections. It is recommended that the power be switched off when servicing the electrical system. See Section 6 for proper monitor fuse replacement values.

SAFETY FIRST!

POWER MUST BE OFF WHEN INSTALLING OR REMOVING POWER LEADS TO THE MONITOR.
THE WIRES FOR THE POWER FROM THE POWER PANEL MUST BE KEPT SEPARATE FROM THE PLUG
(SENSOR) WIRING! THEY CANNOT BE RUN TOGETHER IN THE SAME CONDUIT!

50 mm (approx. 2 inches) of separation must be maintained between this wiring. This is important to maintain safe current levels in the Intrinsically Safe wiring.

Do not apply power to the monitor without reading this manual and thoroughly checking all connections. If the power wires pass through a Class I, Division 1, Groups C & D area, the conduit and wire type must be suitable for this use.

ATTENTION:

Be sure to check the local electrical and fire codes for proper installation. Many localities require an inspection to be performed before circuits are energized.

Three terminals are provided on the power input terminal strip on the monitor. These are L1 (LINE), L2 (NEUTRAL), and GROUND. The proper power source must be wired to these terminals, including a GREEN ground wire. In all cases, the appropriate NEC or CEC code should be followed.

Three terminals are provided for the control channel output on the monitor. These are C1 (COMMON 1), NC1 (Normally Closed 1), and NO1 (Normally Open 1), Form C type contacts. The proper control signal source must be wired to these terminals. It is suggested that the control signal source be wired into the C1 (COMMON 1) terminal, as it is the fused control terminal. The wire going to the controlled device should then be connected to the NO1 (or NC1 if applicable) contact of the terminal strip. See notes for Figure 3 concerning contacts C1, NC1, & NO1.

IMPORTANT:

The control monitor's enclosure has a grounding terminal. Connect a 12 AWG (minimum conductor size) solid copper wire from the terminal to an earth ground. The ground connection must be within one (1) ohm of true ground. There must be only one earth ground for the system to maintain an intrinsically safe circuit.

3.1 Power Wiring

The monitor must be wired according to Figure 3.

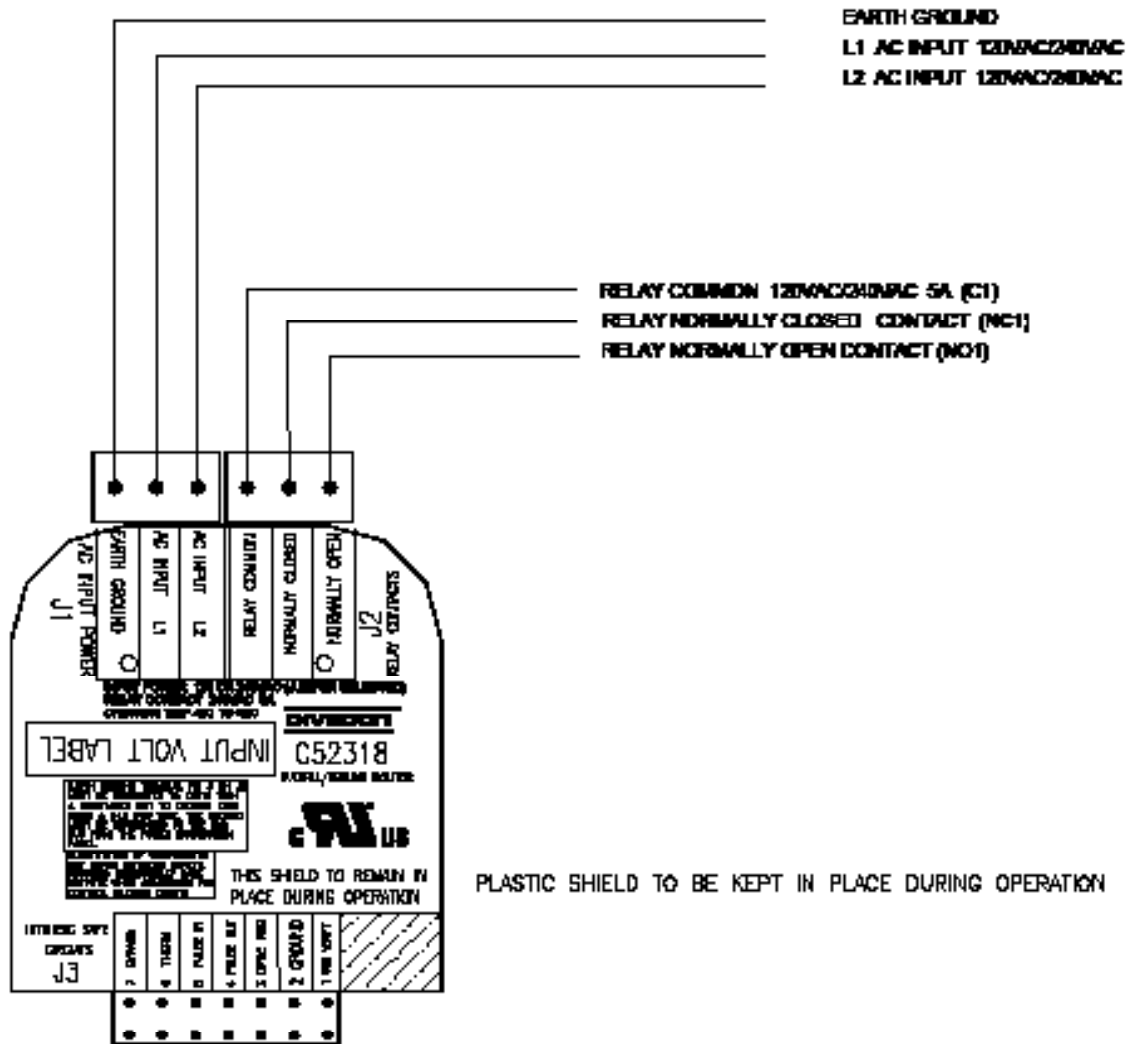


FIGURE 3 - Power Wiring

Additional Notes:

- Installation should be in accordance with NEC ANSI/NFPA 70 and ANSI/ISA RP12.6. In Canada, the system must be installed in accordance with the Canadian Electrical Code, CEC Part I.

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4. Wiring Instructions - Intrinsic Safety (IS) Signals

We strongly suggest the use of a high quality stranded and tinned copper wire with a minimum thickness of 18 gauge for all electrical connections to the intrinsically safe area connections. For wire lengths greater than 1000 feet (300 m.), please consult the factory.

WARNING:

These recommendations must be followed to limit the inductance and capacitance of the IS field wiring. Failure to do so will impair the intrinsic safety and approvals of the system.

CAUTION:

Hazardous conditions exist in fixed tank or large open rack installations. For lightning protection, above ground wiring runs must be in metal conduit, which must be weather-proof and have grounding rods to earth at each end. Underground wiring runs can be in non-metal liquid-tight conduit, however, such runs must terminate in a metal weather-proof junction box upon surface transition. It is suggested that underground wiring runs be run in metal conduit. This junction box must have a ground rod to earth. Lightning suppression equipment can be added at each sensor and control monitor. If additional protection is desirable, consult the factory.

Additional installation information can be obtained from Civacon for the other products used in the IS wiring portion of this installation. This information is usually shipped with the other products when they are purchased. If you misplace or lose this information, use the following information for obtaining replacements.

Use CIVACON Instruction Sheet or Manual H50457PA for additional information on installing Model 7500 series Junction Boxes.

Use CIVACON Instruction Sheet or Manual H50204PA for additional information on installing Model 7100 or 7300 series Rack Connector Plugs.

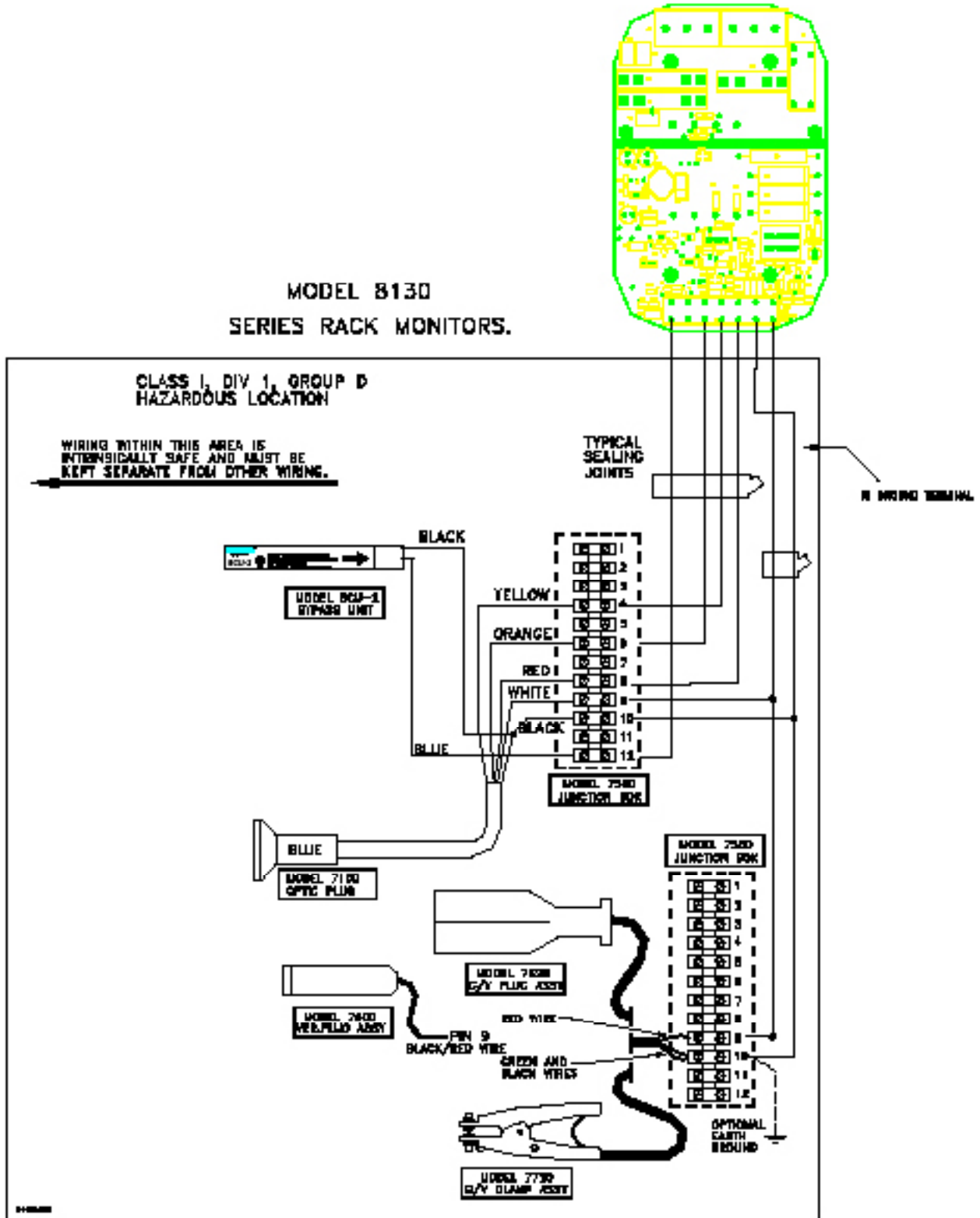




FIGURE 4 - Intrinsic Safety (IS) Wiring

5. Monitor Indicators

RED indicator ON means NON-PERMISSIVE; while a GREEN indicator ON means PERMISSIVE. When the BYPASS is activated, both RED and GREEN will come on indicating this mode. If there is no GROUND VERIFY signal, the RED lamp will flash.

If the cover to the rack monitor is opened, a PERMIT LED may be viewed for operational functions.

Function Table

MODEL	8130				
OPERATORS					
TEST CONDITIONS	NO GROUND	GOOD GROUND NO OPTIC	GOOD GROUND GOOD OPTIC	BYPASSED	
	ON FLASH	ON	OFF	ON	
	OFF	OFF	ON	ON	

CAUTION:

DO NOT apply power to this monitor without thoroughly reading this manual and checking all connections. **DO NOT** connect a power source other than what's marked on the label to this monitor, as this may permanently damage it.

5.1 Checkout Procedure

- Step 1** Before applying AC line power to the 8130 Series Rack Monitor, perform a visual inspection of the power and control wiring according to Figure 3.
- Step 2** Apply the proper AC line power to the 8130 Series Rack Monitor. Ensure the rack monitor's plug(s) is not connected to anything. The RED indicator on the Rack Monitor should light and FLASH.
- Check the rack automation equipment for a NON PERMISSIVE signal.
- NOTE:** Bypass should NOT be connected.
- Step 3** Connect a Ground Verification signal to the IS connector (pins 1 and 2). The RED lamp will change from FLASH to continuous ON.
- Step 4** Connect the Rack Monitor's Optic plug, 7100, to an appropriate Optic test sensor source. The RED lamp will go OFF and the GREEN lamp will be ON.
- Check the rack automation equipment for a "PERMISSIVE" signal.
- NOTE:** Use a known working tank truck with appropriate sensors installed that can connect through the plug and socket to the Rack Monitor for a permit signal source. A Civacon Model 1386 Rackcheck-RTM Test Unit may be used if it is available.
- Step 5** Testing Bypass (is applicable). If you have purchased the BCU-2 Bypass Control Unit, make sure to disconnect the Optic equipment in step 4 but leave the Ground Verification source connected in step 3. Connect the BCU-2 to its connector on the junction box. The GREEN and RED lights will come on and the relay will activate.
- Check the rack automation equipment for a "PERMISSIVE" signal.
- Step 6** Troubleshoot any problems if the monitor's operation is not as stated above.

The J3 Intrinsic Safety terminals may be measured for voltage presence. Using a voltmeter set on a 20 volt DC scale. With the ground (negative) lead of the meter on terminal 2, measure the DC voltage at pin 3 and it should read between 12 and 14 V with no wiring connected.

CAUTION:

Hazardous conditions exist on the printed circuit board. Only a qualified technician should be probing around on the circuitry contained within. Please consult the factory with any questions.

5.2 Replacement Parts

The printed circuit board (PCB) can be replaced in the field.

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Open the cover to the enclosure; and then remove the two (2) screws holding the safety panel and remove the safety panel. Remove the four (4) mounting screws that hold the board to the bottom of the chassis. Separate the two halves of the black connector to disconnect the board from the pilot lamps. The board can now be removed for replacement.

The following is a list of repair PCBs for the monitors. Replace with the correct version.

C52318-120 Basic Optic Rack Monitor PCB: 120VAC

C52318-240 Basic Optic Rack Monitor PCB: 240VAC

CAUTION:

The monitor chassis contains NO components that are field replaceable except for three (3) AC fuses. Any substitution of components may impair the intrinsic safety and approvals of the system.

The three (3) fuses that are field replaceable are F1, F2 & F5. The following list of specifications should be followed.

F1 & F2 = 3AG Type, 250V, 1/2 AMP.

For AC line input, Li and L2 Inputs.

F5 = 3AG Type, 250V, 5 AMP.

For Relay Contacts

6. Warranty

All parts and products are thoroughly inspected and tested from the time raw material is received at our plant, until the product is completed. We guarantee that all products are free from defects in materials and workmanship for a period of one year from the date of shipment. Any product that may prove defective within said one year period will, at our option, be promptly repaired, or replaced, or credit given for future orders.

This warranty shall not apply to any product that has been altered in any way, which has been repaired by any party other than an authorized service representative, or when such a failure is due to misuse or conditions of use. We shall have no liability for labor costs, freight costs, or any other cost or charges in excess of the amount of invoice for the products.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, AND SPECIFICALLY THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

WARNING:

OPW Engineered Systems' products should be used in compliance with applicable federal, state, and local laws and regulations. Product selection should be based on physical specifications and limitations, compatibility with the environment, and the material to be handled. OPW Engineered Systems makes no warranty of fitness for a particular use.

IMPORTANT: OPW products should be used in compliance with applicable federal, state, provincial, and local laws and regulations. Product selection should be based on physical specifications and limitations and compatibility with the environment and materials to be handled. OPW MAKES NO WARRANTY OF FITNESS FOR A PARTICULAR USE. All illustrations and specifications in this literature are based on the latest product information available at the time of publication. OPW reserves the right to make changes at any time in prices, materials, specifications and models and to discontinue models without notice or obligation.