ROM II™
RETAIN OVERFILL MONITORING SYSTEM

INSTALLATION AND WIRING INSTRUCTIONS

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CIVACON / A DOVER RESOURCES CO.
4304 MATTOX RD.
KANSAS CITY, MO 64150

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1 PRODUCT DESCRIPTION

This manual describes the operation, installation, and troubleshooting of the CIVACON ROM II™ (Retain Overfill Monitor) System, with Auxiliary Inputs. It is intended to help operators, maintenance men, and specifiers understand the operation and features of the ROM II™ system. Some of the information in this manual has come from the field experience of our sales representatives and customers. It is recommended reading this manual completely before installation of any equipment.

The ROM II™ is a tank truck / trailer mounted On Board Monitoring (OBM) system with sensors mounted in the top and bottom of each tank compartment. The ROM II™ monitor detects and communicates a pending overfill condition to a loading rack control monitor, and signals which tank compartment is overfilled. The ROM II™ monitor also detects and communicates a retain condition to a loading rack control monitor, and signals which tank compartment has retained product. This control system will enable a tank trailer truck to load at API optic, thermistor or float petroleum loading rack monitors while using only two wire optic sensors. If all of the optic sensors do not detect any liquids, the monitor provides the necessary signal information to the appropriate API sockets to enable loading of the tank trailer truck.

The overall system contains an onboard control monitor (ROM II™ Model 3202 [or 3212] Series), a top 2 wire optic sensor (Model 1050 or 1020), a bottom 2 wire optic sensor (Model 1000 or 1001), termination units for top and bottom (Model 1910), seven (7) conductor cable (Model 2300), strain relief fittings (Model 2530), and optional sockets for loading rack connections. The onboard control monitor can be configured for use with top and bottom sensors, or top only sensors by way of a jumper. Float, Thermistor and Optic socket outputs from the onboard control monitor allow compatibility with different types of rack control monitors commonly used. The ROM II™ onboard control monitor and sensors are designed to provide many years of trouble free service, although should a problem occur, an advanced patented internal diagnostic feature can pin point the problem with minimal testing or troubleshooting.

CAUTION!: *DO NOT apply power to this monitor without thoroughly reading this manual and checking all connections. DO NOT connect a battery charger or other pulsed power supply to this monitor as this may permanently damage the monitor.*

SAFETY NOTE: Since power for the monitor comes from the truck battery, and it must be fused externally from the monitor's enclosure. The monitor's mounting location is classified for use in a Class I, Division 2, Group D or safer location.

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2 THE ROM II™ SYSTEM OPERATION

The ROM II™ 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 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.

2.1 THE OPTIC SENSORS

The optic sensors require only two wires for connection to the ROM II™ monitor. Each sensor has an internal electrical pulse generator. This pulse is converted to a pulse of light (infrared) and reflects through a prism, and is detected on the other side of the prism. If the prism is dry the light pulse is reflected through; if the prism is wetted by a liquid, the light pulse is diverted into the liquid and does not pass through the prism. In the case of a dry sensor, the light pulse is detected by a photo diode and converted back into a digital pulse. This pulse is sent back to the control monitor over 100 times a second on the same two wires. See Figure 1 for signal reference. Both top and bottom sensors operate the same, and are approved for Class I, Div.1 Grp.D from Factory Mutual and CSA.

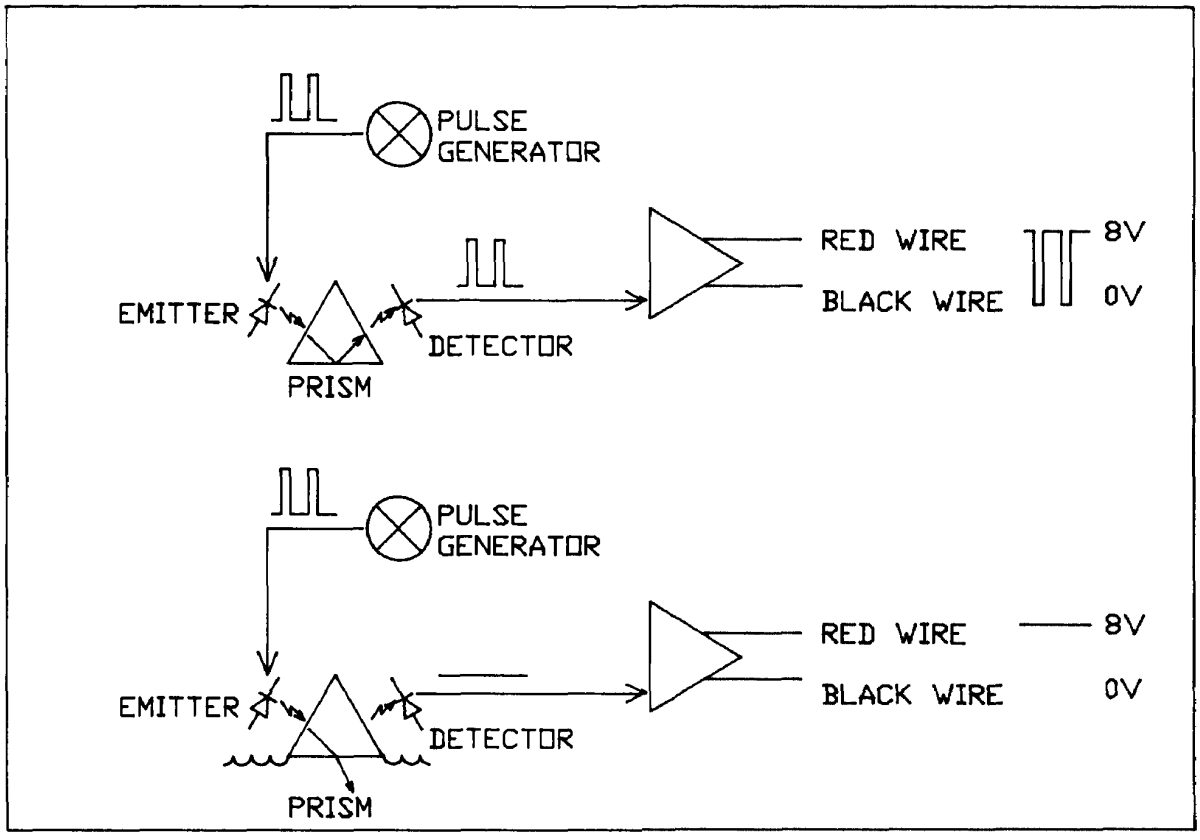

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FIGURE 1 - SIGNAL GENERATION

2.2 THE ROM II™ ONBOARD MONITOR (OBM)

The ROM II™ Onboard Monitor contains connections for 6 overfill (top) channels, 6 retain (bottom) channels, a red diagnostic LED for each channel (compartment), a green permit LED, a yellow power LED, a retain reset switch (which may be a push button, keyswitch, or no switch, if function not used) for the built-in timer, the 12VDC power connection, and compatible API Float, Thermistor, and Optic rack control monitor outputs. In addition, the ROM II™ OBM contains input connections for three auxiliary inputs, and one auxiliary output. These auxiliary inputs are NOT fail-safe since they connect to simple switches for activation. The unit also contains additional LEDs to indicate auxiliary input status, timer status, and socket power status.

The ROM II™ monitor contains patented advance diagnostics that can distinguish between sensor failures and wiring problems. Each sensor channel is wired to only one sensor, and the status of that channel is indicated by a corresponding LED. The LED will signal the type of failure with a flashing light for an open or shorted wire connection, and a solid light for a wetted sensor. The ROM II™ parallel wiring and advanced diagnostics does not require a special tester to troubleshoot a sensor problem. These diagnostics also apply to the terminator unit (Model 1910) if present in the system.

If at any time an overfill (top) sensor becomes wetted, the ROM II™ monitor will switch the API Float, Thermistor and Optic outputs non-permissive. When a returning tank truck contains retained product, it will light the corresponding retain (bottom) red LED solid using the same advanced diagnostics. The tank must be drained before the ROM II™ monitor will switch permissive. If loading over retained product is desired, then activating the reset switch will switch the ROM II™ monitor permissive for approximately forty (40) minutes allowing the load to proceed. At NO time are the overfill (top) sensors effected by the reset switch. After the forty minute cycle is complete and product remains in the tank compartments, the ROM II™ monitor will again switch non-permissive. This feature is beneficial when multiple loads are taken for intank blending but extra attention must be given to prevent an overfilled tank. The ROM II™ onboard monitor is available with a keyed reset switch option should this procedure require supervision (Model 3212 Series). Please note that the reset switch may be activated again to start or re-start another 40 minute timing cycle.

2.3 THE "TOP ONLY" ROM II™ ONBOARD MONITOR

The ROM II™ monitor can be configured for top only (overfill) operation. A terminal block connection is provided to disable the retain (bottom) circuitry. Top only ROM II™ configuration will provide the advantages of 2 wire sensors and advanced diagnostics with the ability to install retain sensors at a later date. This terminal block is located at the top of the unit, and is labeled **TB4A**. A jumper wire is installed between the terminals to **DISABLE** the retain (bottom) circuitry. It is pre-wired at the factory if the proper system is ordered. DO NOT connect anything to the retain (bottom) sensor terminals.

2.4 THE RESET SWITCH

The **RESET** Switch is pre-wired at the factory to **TB4B**. Do not disturb this connection.

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3 OBM MOUNTING INSTRUCTIONS

The CIVACON Onboard Monitor has four (4) flanges with holes, at the base of its cast aluminum housing, used for mounting the enclosure. These are provided so that it may be securely bolted to a grounded metal portion of the trailer that will provide an excellent physical support to the monitor. Locate the monitor in an area that is visible to the operator near the sockets and bottom loading adapters. The holes on the enclosure are 5/16 inch diameter. Refer to Figure 2 for dimensional mounting information. Mounting dimensions are given in inches.

To protect the electronics in the housing, keep the monitor lid on the enclosure until you are ready to wire the monitor. The housing provides seven (7) ½" NPT conduit holes (refer to Figure 2). These holes provide for easy wiring access to the desired locations of the monitor. The three (3) holes on the right side of the monitor are used for wiring to the sockets and auxiliary inputs. The two (2) located on the left side of the monitor are used for wiring the 12 volt power and comes installed with the reset switch. The holes along the bottom are used for the overfill (top) and retain (bottom) sensors. Any holes that are not used should be properly sealed with pipe plugs, provided with the enclosure. Once the housing is installed, you are ready to remove the cover frame, gasket, and window; and begin the wiring procedure.

WARNING: There is only one NPT hole provided to bring the NON-intrinsically safe power wiring into the enclosure. The remaining six (6) NPT holes are used for intrinsically safe signals and wiring. This convention MUST be complied with !

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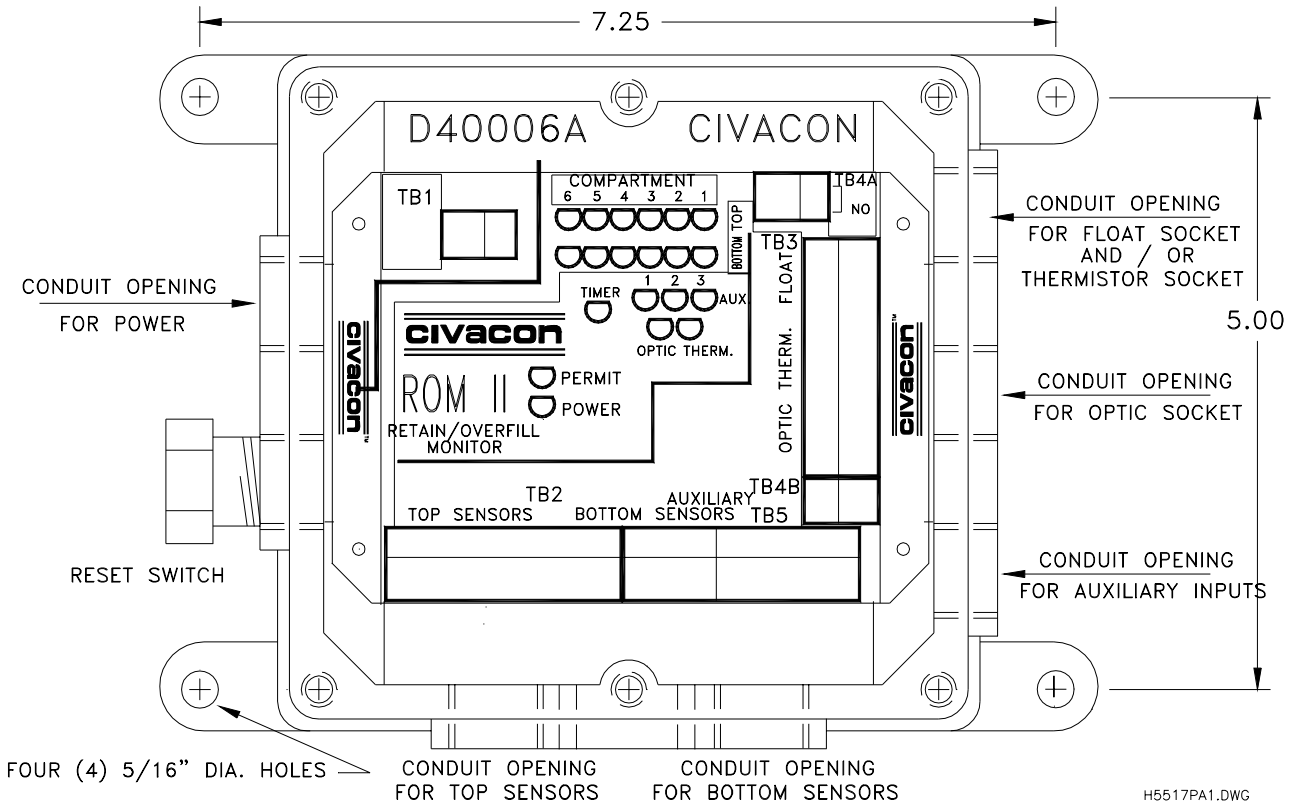

FIGURE 2 - MONITOR MOUNTING

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4 WIRING INSTRUCTIONS - THE WIRE

All wiring entering the monitor must enter through the appropriate conduit openings shown in Figure 2. Use weathertight strain reliefs or liquid-tite conduit fittings to keep out external moisture. The use of weathertight strain reliefs with the sensor and socket housings are also imperative for a moisture resistant system. We require the use of a high quality stranded and tinned copper wire with a minimum thickness of 20 gage for all electrical connections to the monitor. Trim about ¼" of the insulation off the end of each wire that will be connected to the terminal strips of the monitor. Insert the trimmed wire into its appropriate slot on the terminal strip and tighten the screw on top of that slot. Ensure that NO strands of wire have separated from the connection that could cause a potential short with an adjacent terminal. Due to the vibrations that can occur on a trailer, it is extremely important to double check all wiring connections for good mechanical integrity. The proper color code of the wires will save time and money on the installation and on any troubleshooting which may be required in the future. CIVACON Model 2300 cable (Ident code 97701) is a seven (7) conductor color coded cable which is highly recommended for use with the installation of CIVACON ROM II™ overfill prevention equipment. CIVACON also makes a Model 2100 cable (Ident code 97750) that is a five (5) conductor color coded cable which may be used with the socket installations.

5 WIRING INSTRUCTIONS - POWER

SAFETY FIRST!! ***POWER MUST BE OFF WHEN INSTALLING OR REMOVING POWER LEADS TO THE MONITOR. THE WIRES FOR THE POWER FROM THE BATTERY MUST BE KEPT SEPARATE FROM THE SENSOR AND SOCKET WIRING! THEY CANNOT BE RUN TOGETHER IN THE SAME CONDUIT!*** This is important to maintain safe current levels in the intrinsically safe sensors, auxiliary switches, and socket wiring.

Do not apply power to the monitor without reading this manual and thoroughly checking all connections. Measure the truck / trailer system voltage. The monitor is designed to operate from 11 to 16 Volts DC, negative ground systems, supplied by a battery. If your voltage measurement is not within this range, contact CIVACON before installing the monitor. Power from battery chargers or other pulsed power supplies may permanently damage the monitor. If the power wires pass through a Class I, Division 2, Group D area, the conduit and wire type must be suitable for this use. The monitor's power supply circuit should contain a switch and an inline fuse with a maximum current rating of ¼ Amp. It could be located in the nose box, and an inline switch located in the truck cab so that the overfill system can be turn off when the truck is out of service. This may also be accomplished with an appropriate safety switch and fuse in an equipment cabinet on the trailer. It is recommended that the power be switched off when not in use (i.e.- When servicing the electrical system or when driving the vehicle). The wires from the power source should only enter the OBM enclosure via the proper conduit opening, which is the upper left hand opening (refer to Figure 2).

An external junction box, fuse holder, and fuse may be purchased from CIVACON as a kit product if one is not available locally. Please contact the factory for further information on this product. This product comes with its' own instruction sheet.

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6 TOP SENSORS INSTALLATION

Install the TOP (Overfill) Sensors in the appropriate locations in the top of the tank or trailer using the following information. Then install lengths of 7 conductor cable (CIVACON Model 2300) between each sensor housing leaving sufficient lengths for making the connections inside the sensor housings, and to tie the cable neatly to the rollover rail. A longer length of wire is required from the sensor in the rear most compartment to run to the ROM II™ onboard monitor located near the bottom loading adapters. If this is a front wired trailer, then the longer length is used on the sensor in the front of the trailer. It is recommended that you use the CIVACON cable because the color coding will help wiring and troubleshooting in later steps.

See Figure 3 for additional technical information on these sensors.

6.1 THE MODEL 1050 INSTALLATION

The Model 1050 sensor is equipped with a 2 inch NPT housing with two ½ inch NPT conduit openings. This sensor can be mounted two ways. First, the sensor can be mounted though a 2_ inch hole in the manway cover, and secured using the gasket and lock nut provided. The gasket should be installed between the skin of the tank and base of the sensor housing. Second, the sensor can be mounted into a 2 inch NPT half coupling welded into the top skin of the tank, or the manway. In this case the locknut and gasket are not used.

6.2 THE MODEL 1020 INSTALLATION

The Model 1020 sensor is equipped with flanged housing with two ½ inch NPT conduit openings. The flanged sensor is designed to be mounted against a 5¼ inch flange coupling welded into the skin of the trailer, or the manway. Use a 5¼ inch O.D. flange with four (4), 9/32 inch bolt holes equally spaced around a 4½ inch bolt circle. Install the sensor with the gasket between sensor base and flange.

6.3 SENSING POINT ADJUSTMENT

The actual sensing point can be adjusted by loosening the set screw on the side of the sensor housing. Generally the sensor is adjusted with its sensing point above the high level point with sufficient ullage space to allow for sufficient response time to shut off the loading process and prevent an overflow condition. The ROM II™ system and rack monitor will have a maximum response time of about a half (½) second. Keep in mind that the loading terminal pumping shut off valve will also have a longer response time. Once the sensor is adjusted to proper height, tighten the set screw. Even if the sensor is not adjusted, insure that the set screw is tight.

The standard sensors supplied with the system provide for a typical adjustment range between 5 inches minimum to a maximum of 7 inches. If a longer sensor is required, please contact the factory for additional information. Special sensors can be made up to 144 inches long.

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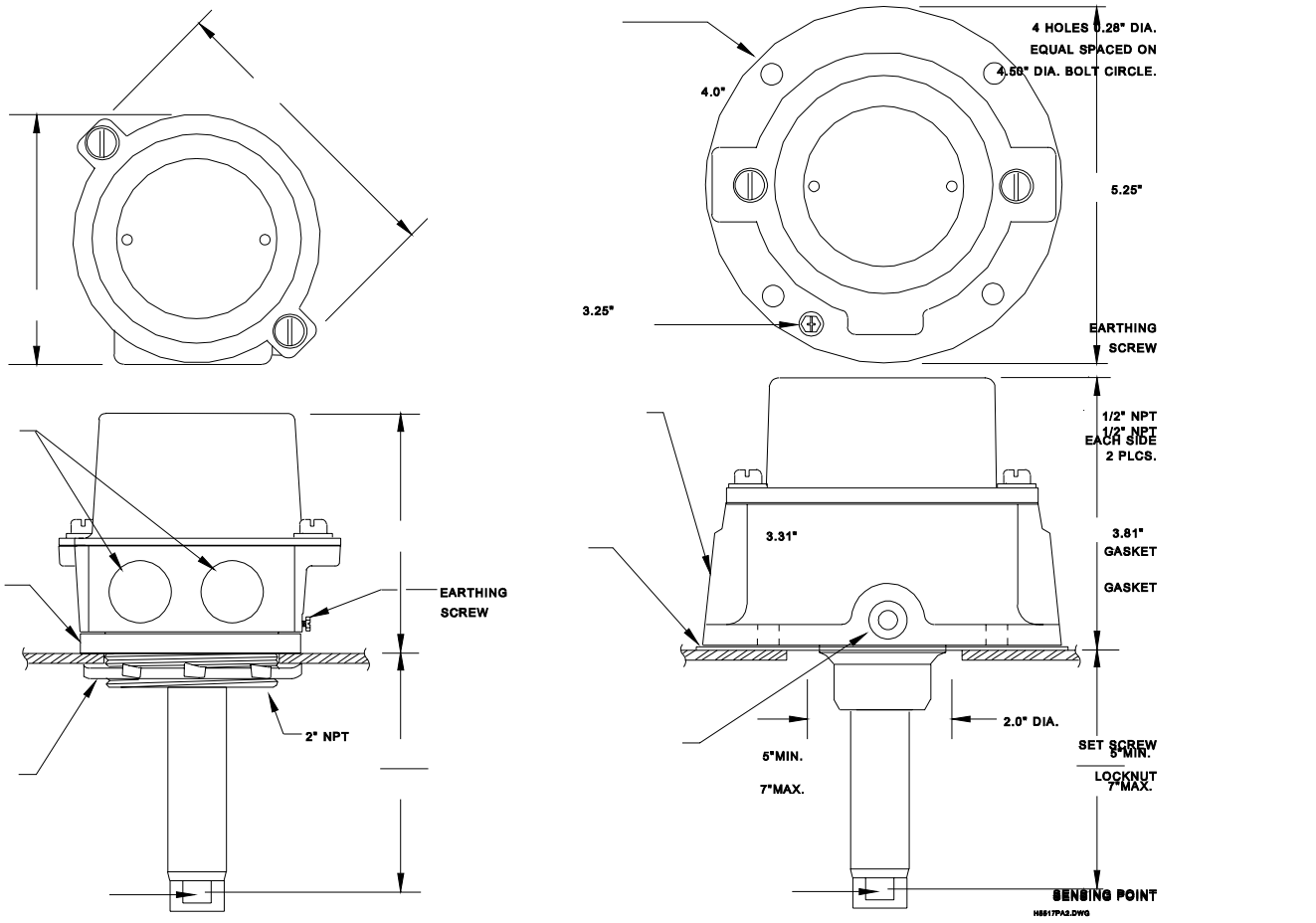

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FIGURE 3 - TOP SENSOR DIMENSIONS

6.4 THE MODEL 1910 TERMINATOR

Tanks with less than six compartments (or one less than the maximum number per specific model) require the Model 1910 termination unit. The Model 1910 signals to the ROM II™ monitor the number of sensors NOT connected to the monitor. Thread the 1910 termination unit into the unused ½ inch NPT conduit opening in the sensor housing located in compartment number 1 (front of the tank trailer); or the last compartment, if wired from the front to the rear of the trailer.

6.5 WIRING CONNECTIONS

Make all wiring connections, as shown in Figure 5 with Diagrams A1 through A6, that show the 1 through 6 compartment configurations. Be sure to double check that your wiring connections are correct. Also, we have found that a small amount of non-corrosive sealant in each crimp connection will prevent corrosion and provide very reliable wire connections. See the SEALED WIRE CONNECTIONS addendum at the rear of the manual.

7 BOTTOM SENSORS INSTALLATION [If so equipped]

Install the BOTTOM (Retain) Sensors, if so equipped, in the appropriate locations in the bottom of the tank or trailer using the following information. Then install lengths of 7 conductor cable (CIVACON Model 2300) between each sensor housing leaving sufficient lengths for making the connections inside the sensor housings, and to tie the cable neatly to any conduit run from the rear to the front of the trailer. Do not let this cable sag beneath the bottom of the trailer, as it may snag on something. A longer length of wire is required from the sensor in rear most compartment to run to the ROM II™ onboard monitor located near the bottom loading adapters. If this is a front wired trailer, then the longer length is used on the sensor in the front of the trailer. It is recommended that you use the CIVACON cable because the color coding will help wiring and troubleshooting in later steps.

7.1 THE MODEL 1000 & 1001 INSTALLATION

The Model 1000 and 1001 retain sensors are designed to fit into a ½ inch NPT half coupling collar welded into the bottom of each compartment at the lowest point. See Figure 4 for additional technical information on these sensors and collar. The collar should not protrude more than ¾ inch beyond the outside shell of the tank, and flush with the inside of the tank when possible. CIVACON supplies a special half coupling collar with each retain sensor purchased. This half coupling requires an opening of 1-_ inch diameter be cut into the bottom of the compartments. Weld it appropriately so the mechanical strength of this coupling is maintained with the compartment wall. Thread the sensor into the half coupling using pipe sealant or Teflon® tape to lubricate and seal the threads. Use the hex fitting to tighten the unit. Do **NOT** use the body of the sensor to tighten it.

> **NOTE:** Check to see that the sensor housing will not interfere with the emergency valves. It is also a good idea to check for compartment leaks **BEFORE** wiring the retain sensors.

7.2 THE MODEL 1910 TERMINATOR

Tanks with less than six compartments (or one less than the maximum number per specific model) require the Model 1910 termination unit. The Model 1910 signals to the ROM II™ monitor the number of sensors NOT connected to the monitor. Thread the 1910 termination unit into the unused ½ inch NPT conduit opening in the sensor housing located in compartment number 1 (front of the tank trailer); or the last compartment, if wired from the front to the rear of the trailer.

7.3 WIRING CONNECTIONS

Make all wiring connections, as shown in Figure 5 with Diagrams A1 through A6, that show the 1 through 6 compartment configurations. Be sure to double check that your wiring connections are correct. Also, we have found that a small amount of non-corrosive sealant in each crimp connection will prevent corrosion and provide very reliable wire connections. See the SEALED WIRE CONNECTIONS addendum at the rear of the manual.

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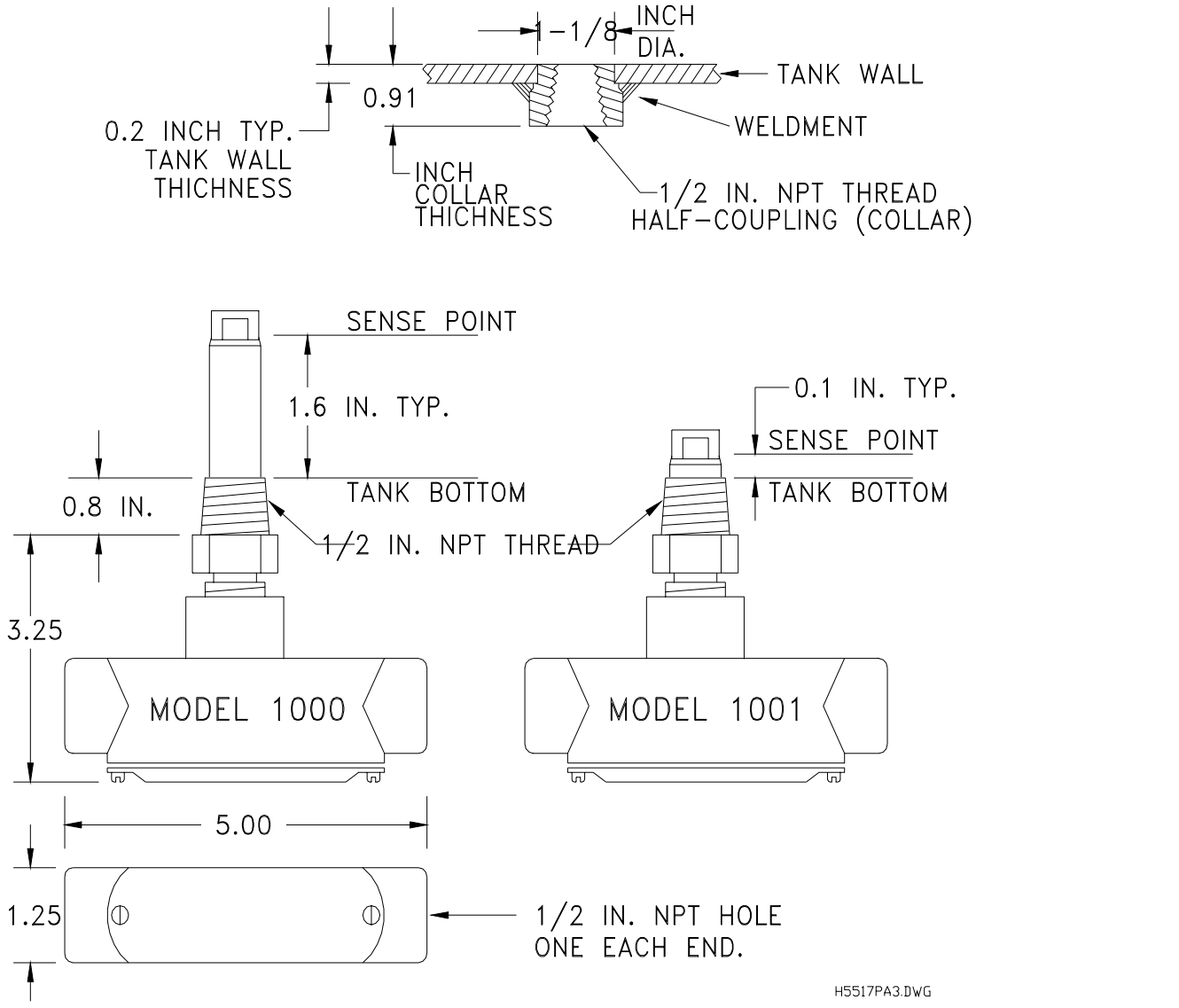


FIGURE 4 - RETAIN SENSOR DIMENSIONS

8 WIRING INSTRUCTIONS - SENSORS & OBM

The sensors must be wired according to Figure 5, as mentioned previously. The wires from the sensors should enter the OBM enclosure via the proper conduit opening (refer to Figure 2). Only CIVACON ROM sensors, which follows the two wire ROM signal format, may be used with the system. See the Figure 5 diagrams for a complete sensor system wiring diagram.

CIVACON has a full color wall chart that is available for the standard ROM® system. You can use most of the information on the chart for this system also. Please contact the factory for a copy.

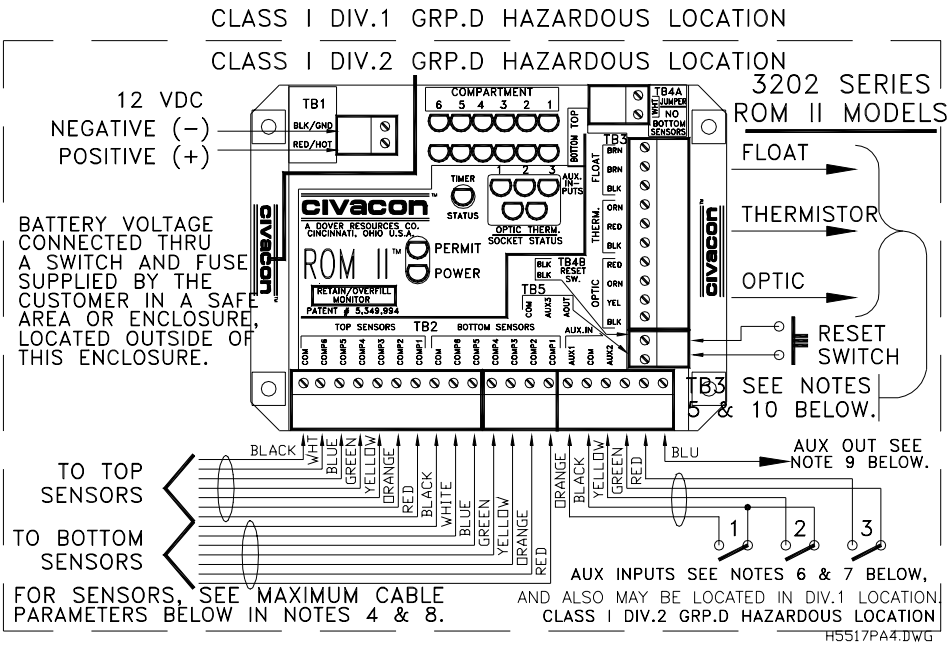


FIGURE 5 - POWER AND INTRINSICALLY SAFE WIRING

CONTROL DIAGRAM

Additional Notes:

1 - Electrical Apparatus connected to the Onboard Monitors should not use or generate more than 250 Volts.

2 - 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.

3 - Maximum ambient temperature is 60° C (140° F) .

4 - Maximum cable capacitance of 10.1 uF and cable inductance of 4.7 mH must not be exceeded. (FMRC Only Parameters)

5 - Model 3202 Intrinsically Safe Field Wiring parameters (FMRC Only) for TB3 Terminals BRN/BRN/BLK, ORN/RED/BLK, and RED/ORN/YEL/BLK are :

Vmax. = 30 V. Vmax. ≥ Voc or Vt; Ci = 0 uF. Ca ≥ Ci + Ccable;

Imax. = 250 mA. Imax. ≥ Isc or It; Li = 0 mH. La ≥ Li + Lcable.

6 - Maximum entity parameters (FMRC Only) for terminals TB5-1, 3, 5 (AUX INPUTS) are:

Vt = 12.8 V. Ca = 8 uF. Also see Note 5 parameters.

It = 8 mA. La = 1 H. Also see Note 5 parameters.

7 - TB4A, TB4B, & TB5-1, 3, 5 inputs are for simple switch mechanisms with NO inductance or capacitance. They provide Intrinsically Safe circuits for passive switches or jumpers with NO energy storing or discharging capability.

8 - CIVACON devices connected to TB2 are sensor Models 1050, 1020, 1000, 1001, and replacement 1350; plus special length versions of the same models with an "S" suffix.

9 - Auxiliary Output terminal (Aux Out of TB5-6) can be connected to Auxiliary Input of secondary OBM module. Do not cross connect.

10 - CIVACON devices connected to TB3 are Intrinsically Safe outputs from rack monitor Models 8100 series, 8300 series, and 8400 series. The connections are less than 50 feet.

11 - Do not modify this control diagram without notifying all approval agencies.

12 - The following diagrams are part of Figure 5. Diagram A1, A2, A3, A4, A5, & A6.

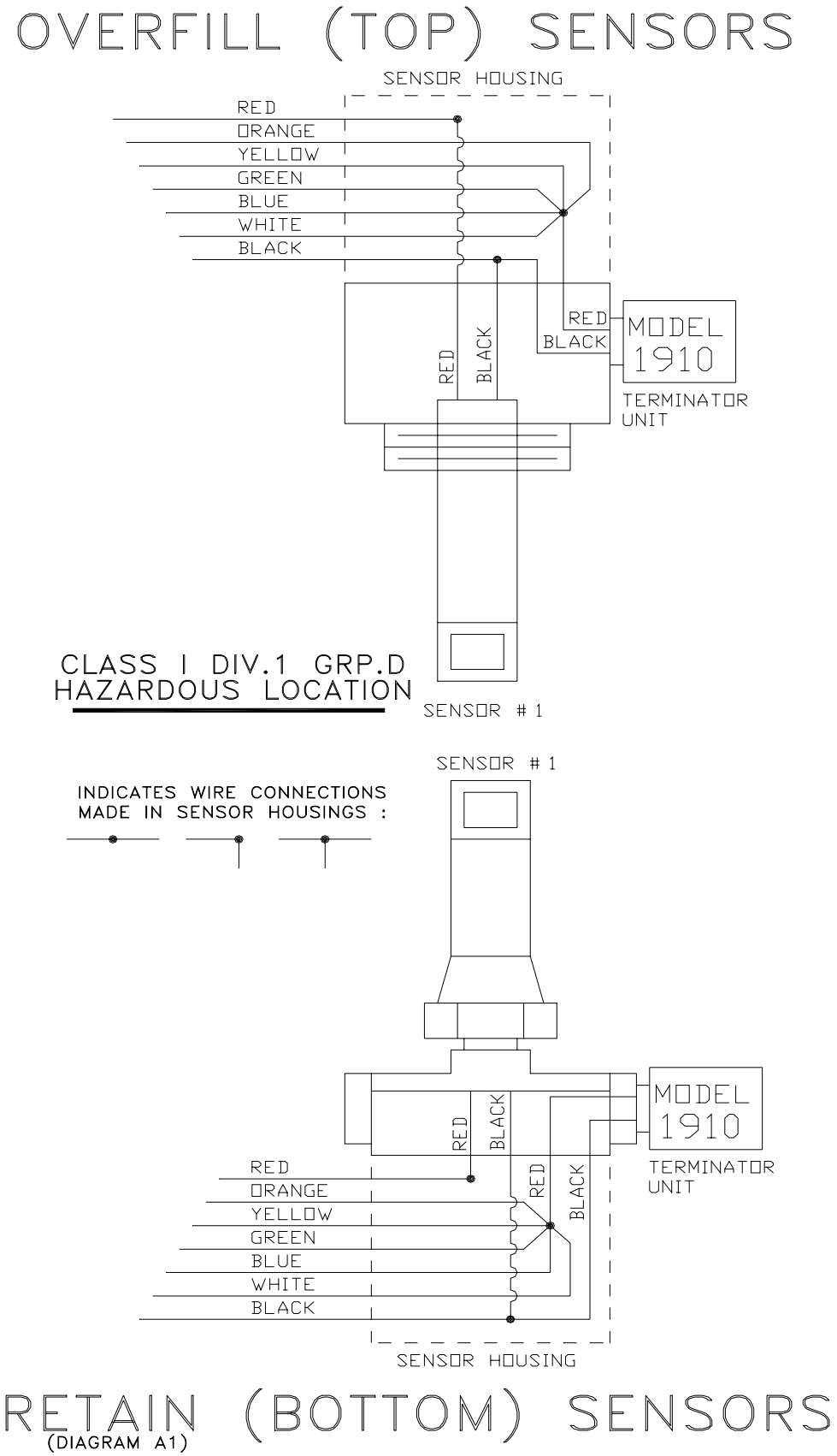


DIAGRAM A1 - 1 COMPARTMENT

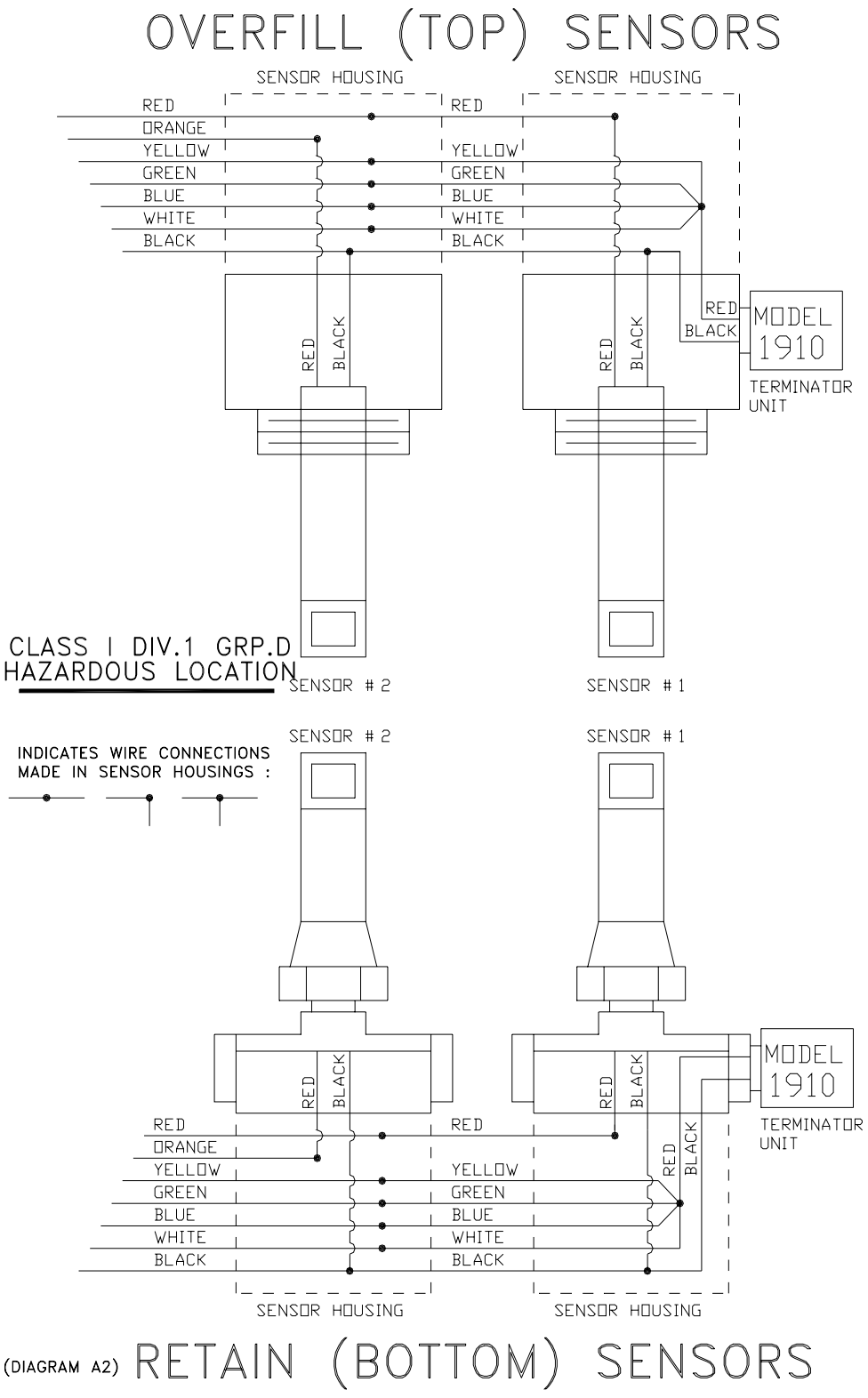


DIAGRAM A2 - 2 COMPARTMENT

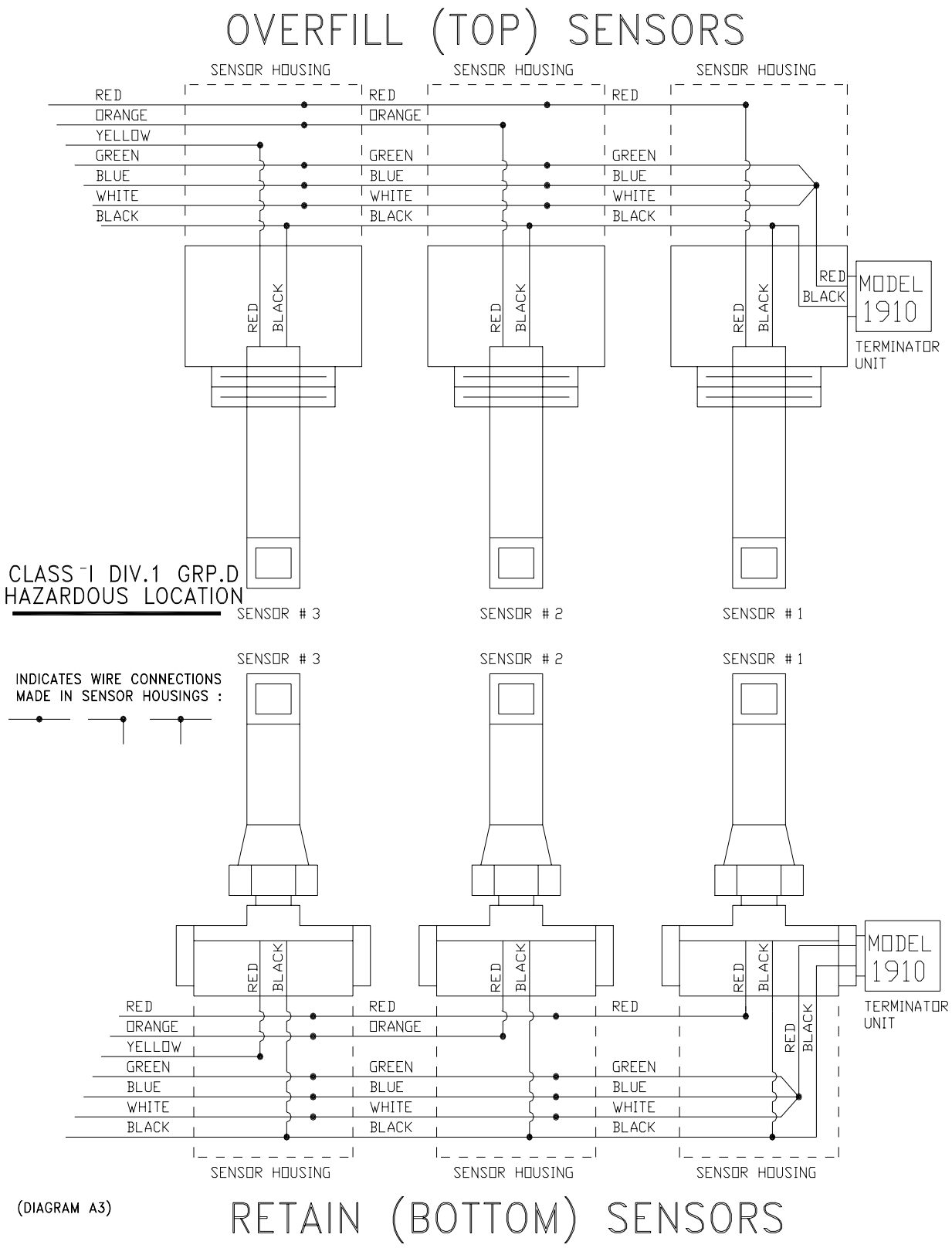


DIAGRAM A3 - 3 COMPARTMENT

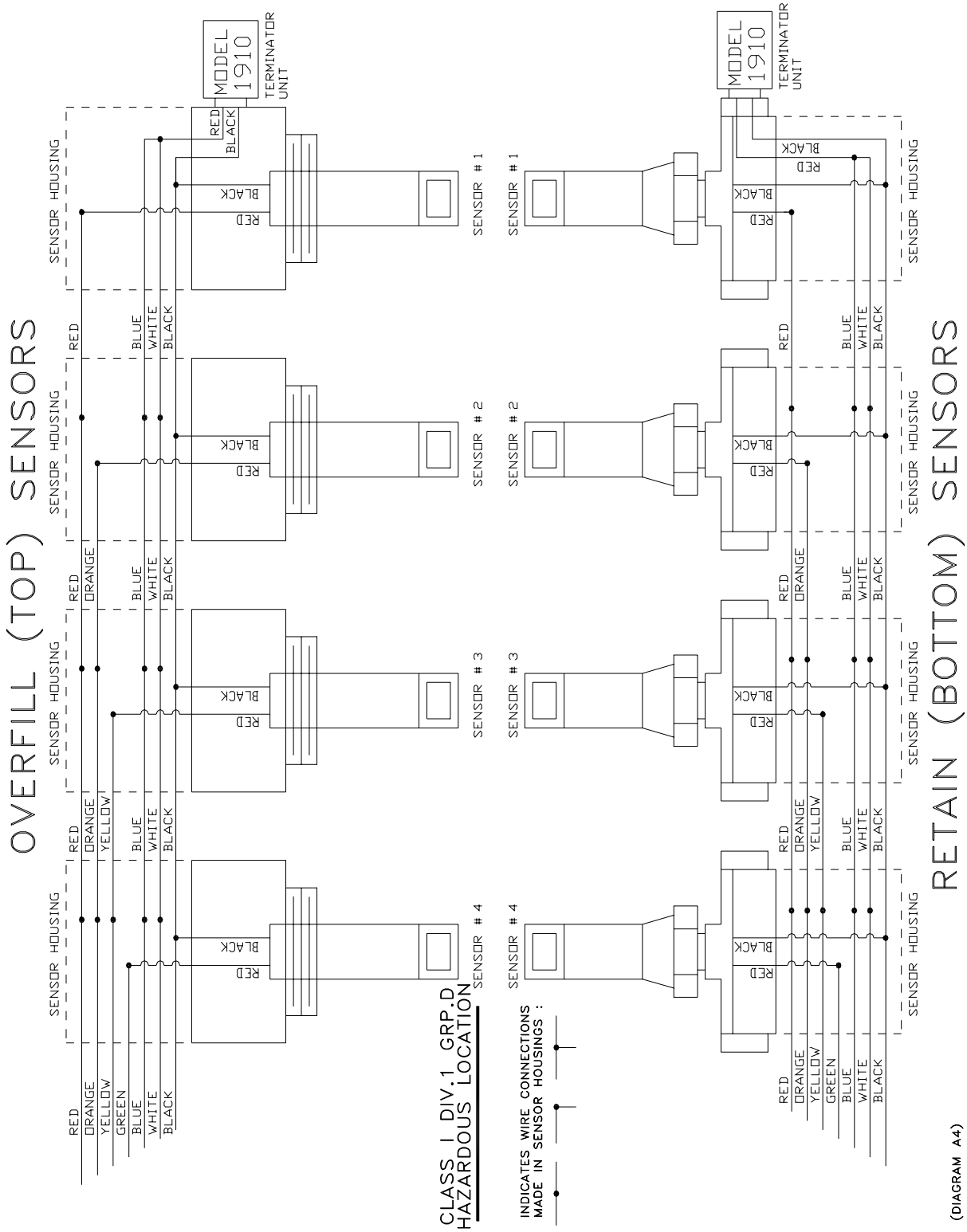


DIAGRAM A4 - 4 COMPARTMENT

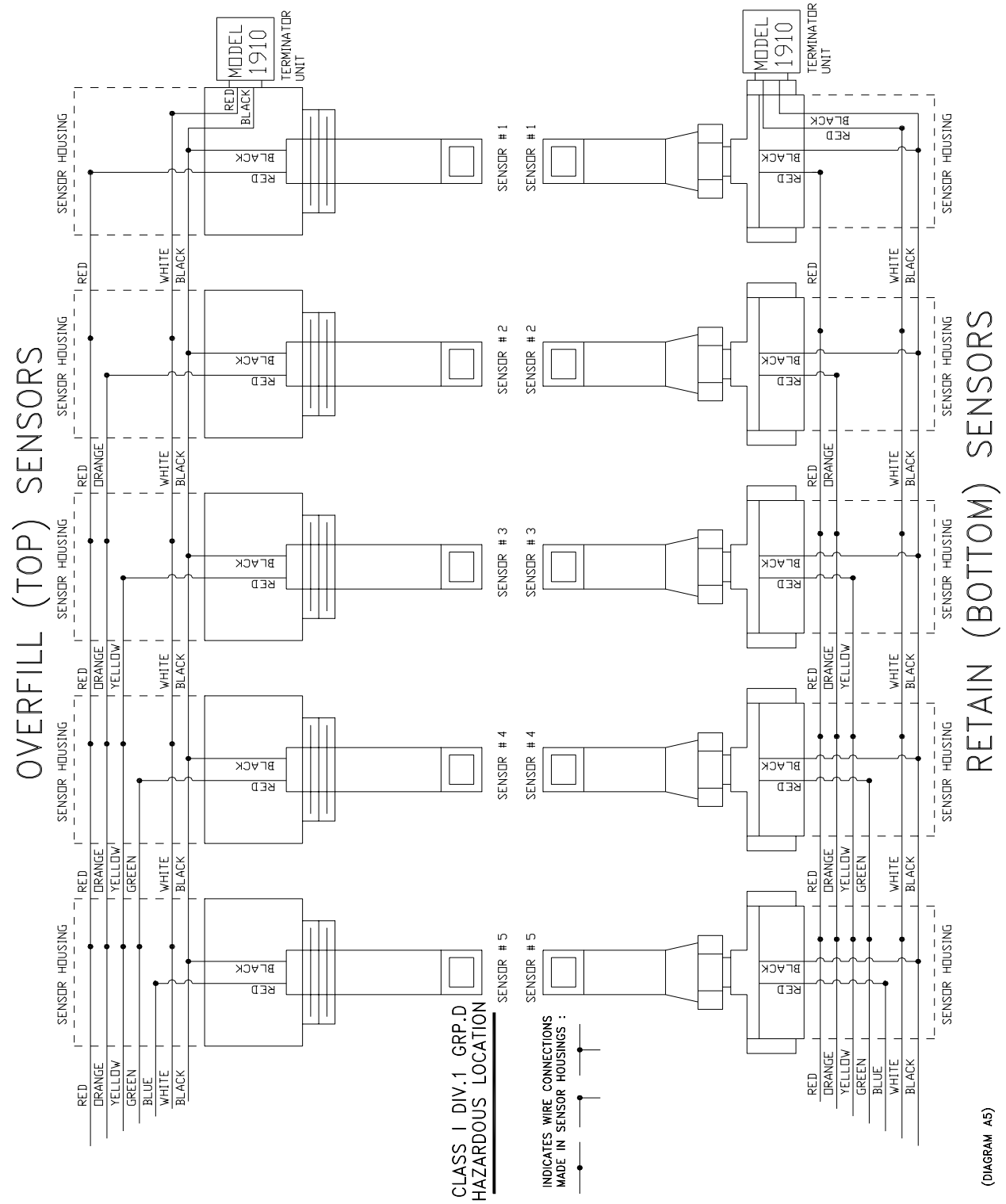


DIAGRAM A5 - 5 COMPARTMENT

6 COMPARTMENT INSTALLATIONS ARE WIRED SIMILAR TO 5 COMPARTMENT WIRING, WITH THE NUMBER 6 PAIR OF SENSORS REPLACING THE TERMINATOR UNIT(S). SEE DIAGRAM A5 FOR THE 5 COMPARTMENT WIRING DIAGRAM. THE WHITE WIRE IS CONNECTED IN COMPARTMENT #6 SENSOR HOUSING TO THAT SENSORS' RED WIRE, AND NOT SPLICED FOR CONTINUATION TO COMPARTMENT #5 IN BOTH PAIRS OF SENSORS (TOP AND BOTTOM).

9 WIRING INSTRUCTIONS - AUXILIARY INPUTS

The AUXILIARY INPUTS are three independent intrinsically safe signal sources connected to monitoring circuits. These inputs provide a voltage source that when connected to the COM common terminals, will enable the auxiliary permissive circuit. This, in addition to the normal overfill permissive circuit, controls the "PERMISSIVE" state of the module. You must have BOTH circuits permissive before any external permissive signals are given. The CONTROL DIAGRAM of Figure 5 shows the connections to TB5, which is to the right of TB2, the sensor connections. This figure also shows the auxiliary devices as simple switches. Unused inputs MUST be connected to a COM common terminal next to itself.

The color code of the wires used enable you to use the CIVACON 5 or 7 conductor cable. Please remember that these signals are intrinsically safe and cannot be run with any other wires in a cable. Only the auxiliary wires and their commons can be run together in a cable.

Any type of simple switch may be used as the switching device. These can be pressure switches which connect to the air lines to indicate a pressurized line, or an un-pressurized condition. The switch could also be a micro-switch to indicate the position of something that moves. In all cases, this switching mechanism cannot be accidentally connected to a NON-intrinsically safe voltage source. Because of this low switching current requirement for intrinsically safe circuits, the contact material on the switching mechanism should be GOLD plated. If corrosive contact materials are used, then the integrity of the switched signal could be compromised, and not work reliably all the time. If this contact plating is not available, then the best possible material should be use, with every effort made to keep the corrosive atmospheres out of the switching chamber of the device.

Which leads us to the next problem of corrosion, keeping the connections to the wires free from corrosion. Boots, sealant, junction boxes, or any means must be used to maintain the integrity of the connection to the switching device. The cables' integrity to moisture must also be maintained with any exposed internal wires. Sealing the ends of the cable jacket are suggested, unless the cable enters a junction box that has strain relief fittings on it to keep the moisture outside of itself.

9.1 WIRING INSTRUCTIONS - AUXILIARY OUTPUT

The AUXILIARY OUTPUT terminal from a primary monitor may be connected to a single AUXILIARY INPUT terminal of a secondary monitor. This secondary monitor should be wired to the socket outputs of TB3, as this is the controlling monitor.

10 WIRING INSTRUCTIONS - SOCKETS

Locate and mount the socket housings, using the bolt holes provided on the enclosure, in the vicinity of the bottom loading adapters. Take into account the plug and cable that will be coming from the rack monitoring equipment so that it does not interfere with the bottom loading adapters when connected.

Conduit openings are provided at the OBM so that each type of socket used may have its own conduit connection only if the auxiliary inputs are not used. If the auxiliary inputs are used, use the convention shown in Figure 2. It combines the Thermistor and Float outputs into one cable exit. This convention is not required but will help in troubleshooting and tracing the system output if a problem should occur. Cross reference the CIVACON part number of the socket to its proper wiring diagram and connect accordingly (refer to Figures 6, 7, and 8). Please use the CIVACON Instruction Sheet H50200PA, which is packaged with each socket, for additional reference information on the sockets.

Strain reliefs are recommended for all cable entry locations. Note that pipe plugs are required to be installed in all of the openings which are not used for cable entry. A thread sealant is also recommended to be used with each strain relief or pipe plug.

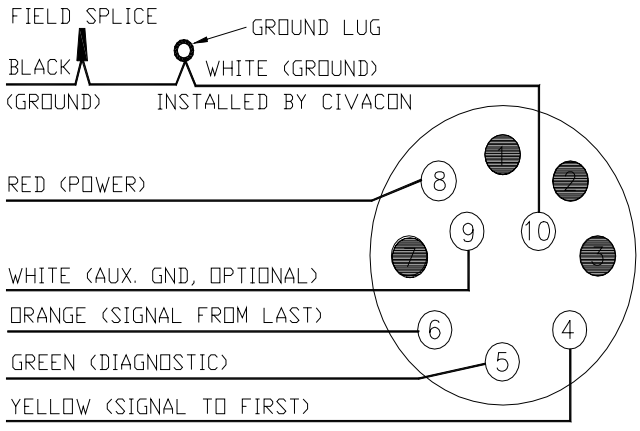
Suitable for connection to the Intrinsically Safe outputs from CIVACON Rack Monitors, Models 8100 Series, 8300 Series, 8400 Series.

CIVACON OPTIC SOCKETS

Match your socket model number with the model numbers below.

Connect the shown wires below to the OPTIC section of the terminal strip on the monitor.
CAUTION: The OPTIC RED and ORANGE wires are NOT the same wires as the THERMISTOR wires.

MODEL No.'s 4100, 4200, & 4201



MODEL No. 4300

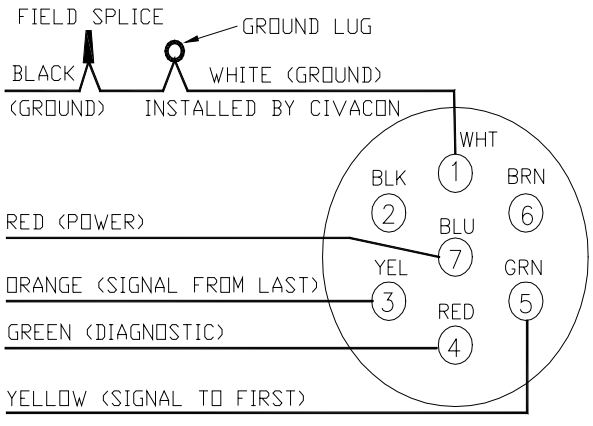


FIGURE 6 - OPTIC
VIEWED FROM WIRE CONNECTION SIDE

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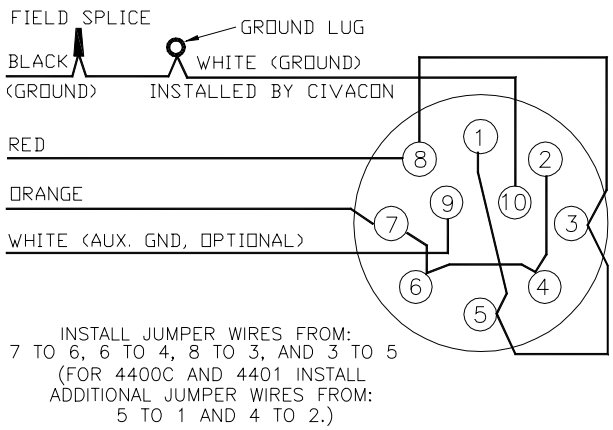
CIVACON THERMISTOR SOCKETS

Match your socket model number with the model numbers below.

Connect the shown wires below to the THERM section of the terminal strip on the monitor.

CAUTION: The THERMISTOR RED and ORANGE wires are NOT the same wires as the OPTIC wires.

MODEL No.'s 4400, 4400C, & 4401



MODEL No. 4500

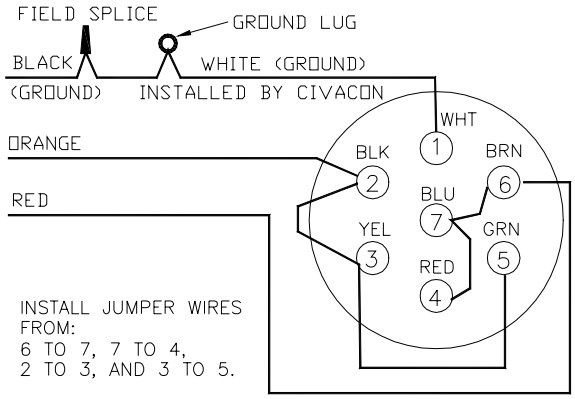


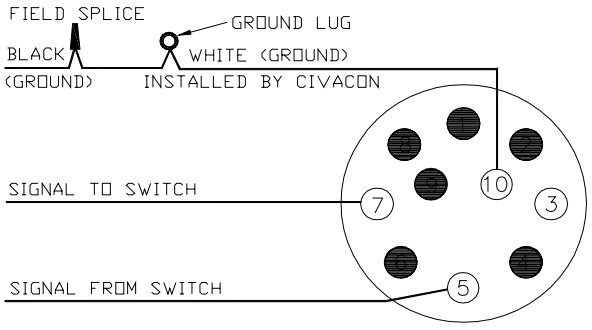
FIGURE 7 - THERMISTOR
VIEWED FROM WIRE CONNECTION SIDE

CIVACON FLOAT SOCKETS

Match your socket model number with the model numbers below.

Connect the shown wires below to the FLOAT section of the terminal strip on the monitor.

MODEL NO. 4700



MODEL NO.4600

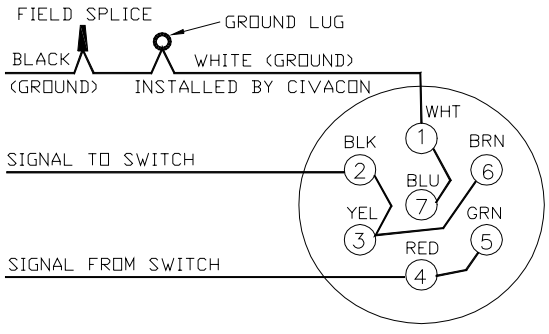


FIGURE 8 - FLOAT
VIEWED FROM WIRE CONNECTION SIDE

11 POWER ON TEST

Make one last check of all wiring to ensure proper connections. Check closely the sensor wiring and wire crimp connections. Wiring errors are the most common mistakes made during installation. Turn power ON to the ROM II™ onboard monitor. Be sure to use a well charged battery or filtered 12VDC power supply. Battery chargers will not work unless properly filtered by a 12VDC battery.

11.1 STATUS LIGHTS [LEDs]

Check for the following conditions.

The **POWER** light is the YELLOW LED at the lower left-hand side of the monitor. When this light is **ON**, it is indicating that power is being applied to the power terminals of the monitor (refer to Figure 5), and that the internal fuse is intact. The NORMAL indication of the POWER LED is an **ON** state.

The **PERMIT** light is the GREEN LED above the POWER LED on the left-hand side of the monitor. When this light is **ON**, it is indicating that the sensors are operating, and NOT detecting an overfill situation. This is a "PERMISSIVE" condition. Any RED LED **ON** should cause this GREEN LED to be turned **OFF**. The NORMAL indication of the PERMIT LED is an **ON** state.

The **COMPARTMENT DIAGNOSTIC** lights are the RED LEDs located horizontally on the upper half of the monitor. The functions of these RED LEDs are to indicate which compartment is in an overfill or retain condition, and to assist in the troubleshooting of the ROM II™ overfill system in case of a mechanical or electrical problems. When less than 6 compartments are present on a trailer, the terminator unit(s) should be connected to the un-used channels of the monitor. The NORMAL indication of the COMPARTMENT DIAGNOSTIC LEDs is an **OFF** state.

If a sensor is causing a problem or is "wetted", it should light its' corresponding RED LED. The LED designated as NUMBER ONE is for the sensor nearest the cab. So if the NUMBER TWO LED is lit, this means the second sensor from the cab is either wet or faulty. This condition must be troubleshot before testing may continue. Corrective actions include repairing the faulty wiring, or replacing the defective sensor if required.

The **TIMER STATUS** GREEN LED is located below the RED compartment diagnostic LEDs, and to the left. This LED flashes when the retain reset timer is counting (running). There are two conditions that enable the retain reset timer.

1 - When there is NO retained product, and all the RED LEDs are OFF. The first instance that a compartment is loaded with product, and a retain (bottom) compartment diagnostic LED comes ON, this will start the timer counting.

2 - The other instance is when there is retained product on board, and at least one of the lower RED LEDs is ON. Pressing or activating the RESET switch will start the timer counting also.

When the timer finishes counting after about 40 minutes, the LED will go out. Resetting the power will also reset the timer back to zero. The NORMAL indication for this LED in a static condition is an **OFF** state.

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The **AUX INPUTS** GREEN LEDs are located below the RED compartment diagnostic LEDs, and to the right. They are organized in a 1, 2, 3 pattern, left to right, and correspond to the same order as the terminals of TB5. These LEDs must be **ON** to have the monitor be in a "PERMISSIVE" state if the sensors are not wetted.

The **SOCKET STATUS** YELLOW LEDs are located below the AUX INPUTS LEDs, and are NOT normally ON unless an appropriate testing device is connected to the socket output terminals of TB3. The left one corresponds to the OPTIC output, and lights when there is sufficient voltage present between the RED and BLK terminals of the OPTIC output of TB3. The right one corresponds to the THERMISTOR output, and lights when there is sufficient voltage present between the RED or ORN terminal, and BLK terminal of the THERM output of TB3, and there is a permissive status present in the monitor. This LED may flutter in brightness.

If the above conditions do not exist, refer to the Troubleshooting section of this manual.

11.2 TESTING THE SENSORS

Wet each top (overfill) sensor and watch for the corresponding red diagnostic LED to light SOLID. If the LED does not light, or the wrong LED lights, check the wiring of that sensor to the correct terminal block input.

Testing the bottom (retain) sensors can be accomplished by filling each compartment with water until the sensors sensing point is wetted, and watch for the red diagnostic LED to light SOLID. If the LED does not light, or the wrong LED lights, check the wiring of that sensor to the correct terminal block input. Then drain the compartment and check that the previously lit diagnostic LEDs have turned off. Sensors, with LEDs remaining lit because of fluid remaining in the tank, must be threaded deeper into the tank compartment. It is recommended to remove the sensor and tap the half coupling deeper into the tank using a ½-14 NPT tap.

If the above condition does not exist, refer to the Troubleshooting section of this manual.

11.3 SOCKET TEST

The socket output connections can be tested using a Model 1391 Optic System Tester, and a volt-ohm meter. Test the Thermistor and Optic outputs using the instructions that come with the Model 1391, or the Model 1391 instructions in the Troubleshooting section of this manual. Float output can be tested by checking for continuity (zero ohms) when permissive (green LED is on).

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12 TROUBLESHOOTING GUIDE

Good troubleshooting practices are defined procedures that when followed will give fast results to help isolate problem areas. This troubleshooting section is arranged in a flow chart outline, and the steps should be followed in the order as they appear.

12.1 TOOLS REQUIRED

1- CIVACON Screw driver, small flat blade (packaged with ROM II™ monitor).
2- Screw drivers, #1 or #2 Phillips, and 3/16" flat blade.
3- Wrench, 7/16 inch.
4- Volt-ohm meter.
5- Model 1391 Optic System Tester, with H50325 Thermistor test leads.

12.2 SYSTEM OVERVIEW

The monitor electronics are internally fused, and these fuses are not replaceable. The average power consumption of the electronics in the monitor is less than ¼ Amp. It is recommended that a ¼ Amp external fuse be installed in the power supply line. The voltage being run to the TB1 power terminals is not intrinsically safe. The wire from the power terminals (TB1) **MUST NOT** be run with intrinsically safe wiring. All power input connections are made at TB1. Check to make sure that all of the above testing procedures have been followed, and that all of the wiring is correct.

12.3 PROBLEM SYMPTOMS

First look for the symptom that best resembles the condition of your ROM II™ system. Start by removing the cover, gasket, and window of the OBM, and saving the hardware.

Symptom sub-sections are shown below in bold type and underlined.

12.3.1 No green permit LED or dimly lit; No yellow power LED or dimly lit; other LEDs are also out or dimly lit.

ACTION: Measure voltage at TB1 with volt meter (set on DC volt scale). Voltage on TB1 should be between 11.0 V and 16.0 V. And the correct polarity.

RESULTS: Is Voltage below 11.0V ?
- 1 - Check battery voltage;
- 2 - Check inline fuse or switch, and for corroded contacts;
- 3 - Check for corroded wire connections or defective 7 way connector in nose box;
- 4 - Non-filtered power supply used to power trailer (do not use battery charger);

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5 - Other accessories on the same 12VDC circuit, like marker lights or brake lights; thereby sagging the voltage down.

RESULTS: Is Voltage OK (11.0V to 16.0V) ?

1 - Check for sensor wires shorted to ground;

2 - If voltage on TB1 is OK, and all the LEDs are out, the internal fuse is blown. **Replace the monitor.**

RESULTS: Is Voltage over 16.0V ?

1 - Check voltage source immediately ! You may overheat the monitor and blow the fuse if not corrected immediately.

12.3.2 A Red compartment diagnostic LED is flashing.

ACTION: Remove the sensor wire corresponding with the flashing LED. (Example: If #4 top LED is flashing, then remove sensor wire in the monitor at TB2 "COMP4" of "TOP SENSORS"; and switch this wire connection with a wire from the next nearest working sensor connection. e.g.- "COMP3").

RESULTS: If the same LED continues to flash, **replace the monitor.**

RESULTS: If flashing LED changes to the location of the exchanged wire, continue the following ACTION.

1 - Inspect the 7 conductor cable for damage.

2 - Look for wires pinched in all sensor housing lids, or cable hold down tabs on the roll-over rail.

3 - Inspect wire connections located in (each) sensor housing.

A - If the wires are OK, measure voltage at problem sensor. If the voltage is 8.0 Volts to 11.0 Volts, **replace the sensor**.

B - If voltage is not OK, re-inspect the 7 conductor cable for damage; and **replace if necessary**.

12.3.3 A Red diagnostic light is on solid.

ACTION: Check tank compartment for a wetted sensor first. If sensor is wet, then **"Un-wet" the sensor**. Does this correct the problem ? Otherwise continue below.

ACTION: Remove the sensor wire corresponding with the solid lighted LED. (Example: If #4 top LED is lit solid, then remove sensor wire in the monitor at TB2 "COMP4" of "TOP SENSORS"; and switch the wire connection with a wire from the next nearest working sensor connection. e.g.- "COMP3").

RESULTS: If the same LED continues to light solid, **replace the monitor.**

RESULTS: If LED changes to the location of the exchanged wire, **replace the sensor.**

12.3.4 Trailer will not load at loading rack; appropriate yellow and green

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LEDs are lit.

ACTION: Check that the sockets are wired properly. See the section on sockets in this manual for socket wiring information. **Correct any wiring mistakes if found.** Does this correct the problem ? Otherwise continue below.

ACTION: Determine which socket output section you are having problems with. Use the following appropriate section for troubleshooting. The TB3 output sections may be tested a two locations. At the rear of the socket with the faceplate removed, but the wires still connected to it. Or at TB3 on the monitor. To be able to test the outputs at this TB3 location, it is usually a good idea to disconnect the wires from the appropriate cable, and add short wires to the terminals so the test leads from the tester may be clipped onto the wires exposed conductors. This method will be indicated below, if required.

Float output: Using an Ohm meter, check for continuity (zero ohms) across TB3 - BRN to BRN.

1 - High resistance (>100 ohms), **replace the monitor**.
2 - Low resistance (0 to 100 ohms), **re-check wiring and wire connections, because this is a correct reading.**

NOTICE: THE THERMISTOR AND OPTIC OUTPUTS OF THE MONITOR REQUIRE THE MODEL 1391 TESTER TO TEST THEM. THESE OUTPUTS REQUIRE AN EXTERNAL VOLTAGE TO POWER THEM UP.

Thermistor output: Using the Model 1391 and H50325 Thermistor output test lead set, test the thermistor output section of the monitor. Follow the instructions packaged with Model 1391 Optic System Tester, or follow these instructions with H50325 Thermistor output test leads.

1 - Remove cable wire connections from TB3 "THERM" - ORN, RED, and BLK.
2 - Connect small pieces of wire, stripped on both ends, into TB3 "THERM" - ORN, RED, and BLK.
3 - Connect red boot clip leads to TB3 "THERM" - ORN and RED.
4 - Connect black boot clip lead to TB3 "THERM" - BLK.
5 - Plug the H50325 Thermistor test lead set to Model 1391 tester, and turn ON the tester.
6 - Does the THERM SOCKET STATUS LED (YELLOW) light on the monitor ? Continue if lit, otherwise **replace the monitor.**
7 - Touch red test sensor to TB3 "THERM" - RED, and then ORN. A solid tone should be heard on both RED and ORN connections. If the tone is missing, **replace the monitor.**
8 - If the above conditions are met, then you may have an **intermittent** THERMISTOR output problem, or the RACK system may be at fault.

Optic output: Follow the instructions packaged with Model 1391 Optic System Tester, or follow these instructions. Use the OPTIC test lead set that has four wires with four alligator clips and rubber boots.

1 - Remove cable wire connections from TB3 "OPTIC" - ORN, YEL, RED, and BLK.
2 - Connect small pieces of wire, stripped on both ends, into TB3 "THERM" - ORN, YEL, RED, and BLK.
3 - Connect red boot clip leads to TB3 "THERM" - ORN, YEL, and RED matching the color code of the wires. (Example: TB3 "OPTIC" - RED to red test lead wire).
4 - Connect black boot clip lead to TB3 "THERM" - BLK.
5 - Plug the OPTIC test lead set to Model 1391 tester, and turn ON the tester.
6 - Does the OPTIC SOCKET STATUS LED (YELLOW) light on the monitor ? Continue if lit, otherwise **replace the monitor.**
7 - A beeping tone should be heard. If the tone is missing, **replace the monitor.**
8 - If the above conditions are met, then you may have an **intermittent** OPTIC output problem, or the RACK system may be at fault

12.3.5 Reset switch will not cause monitor to switch permissive when tank contains retained product. (A lower RED LED ON)

ACTION: Check wire connections at TB4B "RESET" - BLK to BLK. **Correct any wiring mistakes if found.** Does this correct the problem ? Otherwise continue below.

ACTION: Check operation of switch; remove switch wires from TB4B "RESET" - BLK and BLK.

RESULTS: Measure continuity of switch with an ohm meter; switch should measure open (infinite) resistance. Push the button or turn the keyswitch, and measure resistance again. The switch should measure zero ohms. If this test is not good, **replace the switch.**

ACTION: If the switch checks good, and the wire connections are OK, **then replace the monitor.**

12.3.6 Auxiliary input switches will not cause monitor to switch permissive.

ACTION: Are the three GREEN AUX INPUT LEDs lit ? If they are, and all the other problem possibilities have been checked and passed, **then replace the monitor.** If not, continue below.

ACTION: If they are not all lit, check wire connections at TB5 - AUX1, AUX2, AUX3, and COM. **Correct any wiring mistakes if found.** Does this correct the problem ? Otherwise continue below.

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ACTION: If they are not all lit, test the input terminal corresponding to the LED that is NOT lit. Check the terminal by taking a small piece of wire and shorting the COM terminal to the corresponding input terminal at TB5 - AUX1, AUX2, AUX3, that is NOT lit. Does the LED light, and does this correct the problem ? If it does, **find and correct any wiring mistakes.** If it does NOT, **then replace the monitor.**

When replacing the monitor, use the instructions in the next section.

13 REPLACEMENT MODULES

SAFETY FIRST!! POWER MUST BE OFF WHEN INSTALLING OR REMOVING POWER LEADS TO THE MONITOR. THE WIRES FOR THE POWER FROM THE BATTERY MUST BE KEPT SEPARATE FROM THE SENSOR AND SOCKET WIRING! USE CAUTION WHEN REPLACING THE MODULE. ENSURE ALL WIRING IS PROPERLY RECONNECTED TO THE CORRECT TERMINALS ON THE MODULE.

The monitor electronics are replaced as a module. There are **NO** replaceable or repairable parts inside the module. The replacement module is a slightly different part number that the original unit because you normally don't need to replace the aluminum enclosure that the module is mounted in.

The standard US version replacement module is a Model 3252. This is a 12 Volt, 6 channel (compartment), top and bottom version; with three auxiliary inputs.

It is imperative that the four mounting screws (with lockwashers) be re-installed on the module to secure it to the enclosure. Every replacement module comes with new screws incase you have lost the original screws

If the monitor is operating as described in the above POWER ON TEST section, you may securely replace the cover frame, window, and the gasket using the saved hardware.

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14 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 which 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:

CIVACON 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.
CIVACON MAKES NO WARRANTY OF FITNESS FOR A PARTICULAR USE.

14.1 TECHNICAL ASSISTANCE

If at any time during the installation a question arises that is not covered in this Installation Instruction, or with any other applicable documents referenced, feel free to call the **CIVACON TECHNICAL ASSISTANCE LINE :**

In the U.S.A., Call 1-800-5 CIVACON . (800-524-8226) or visit our online help section on our website at WWW.CIVACON.COM

For the **CUSTOMER SERVICE DEPARTMENT :**
In the U.S.A., Call 1-888-526-5657 ; In other countries, call your local agent.

civacon™
4304 MATTOX RD. * KANSAS CITY, MO 64150
PH: (816) 741-6600 * FAX: (816) 741-1061
(888) 526-5657 (888) 634-1433

SEALED WIRE CONNECTIONS

1 - IT IS IMPERATIVE THAT ALL WIRE CONNECTIONS BE CORROSION FREE FOR PROPER SYSTEM PERFORMANCE.

2 - ALL CIVACON SUPPLIED WIRE IS TIN COATED TO RESIST CORROSION.

3 - ALWAYS DOUBLE CHECK THAT YOUR WIRING CONNECTIONS ARE ELECTRICALLY CORRECT BEFORE CRIMPING.

4 - WHEN POSSIBLE, ENSURE NO MOISTURE ENTERS THE WIRE JUNCTION AREA OF THE ENCLOSURE.

5 - AS A SECONDARY PRECAUTION AGAINST MOISTURE AND CORROSION, WE HAVE FOUND THAT A SMALL AMOUNT OF SILICONE RUBBER SEALANT IN EACH CRIMP CONNECTION WILL DETER CORROSION.

6 - WE SUGGEST USING THE PERMATEX® BRAND OF SILICONE SEALANT CALLED ULTRA BLUE , PART # 77B. THIS IS A NON-CORROSIVE TYPE OF SILICONE SEALANT. DO NOT USE GENERIC SILICONE (BATHTUB TYPE) SEALANT BECAUSE IT IS USUALLY CORROSIVE ON COPPER AND TIN.

7 - TAKE THE SEALANT NOZZLE AND PLACE IT IN THE BOTTOM OF THE END SPLICE TERMINAL. (IT USUALLY HAS A WHITE NYLON HOUSING)

8 - SQUEEZE A BEAD OF SEALANT INTO THE BOTTOM OF THE END SPLICE TERMINAL, AND CONTINUE SQUEEZING AS YOU REMOVE THE NOZZLE. ENSURE THAT THERE IS NO LARGE AIR BUBBLE IN THE END OF THE SPLICE.

9 - STOP WHEN THE BEAD REACHES THE END OF THE TERMINAL HOUSING.

10 - STRIP THE WIRES TO THE PROPER LENGTH, AND TWIST THEM TOGETHER.

11 - INSERT THE TWISTED WIRES INTO THE FILLED END SPLICE TERMINAL, AND CRIMP THE CONNECTION. REMOVE ANY EXCESS SEALANT FROM THE CONNECTION.

12 - PULL ON THE CRIMP TO ENSURE A GOOD CONNECTION IS MADE, AND THEN LEAVE IT ALONE TO CURE.

13 - ANYBODY'S SEALED TYPE SPLICES MAY USUALLY BE USED IN PLACE OF THE SPLICES SUPPLIED BY CIVACON. TEST THEM FOR YOUR COMPATIBILITY.

14 - IF YOU WANT TO USE A GREASE INSTEAD OF A SEALANT, USE TRUCK-LITE® BRAND NYK-77 CORROSION PREVENTIVE COMPOUND.

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For TECHNICAL ASSISTANCE In the U.S.A., Call 1-800-5 CIVACON or visit our online help section on our website at WWW.CIVACON.COM

MATTOX RD. * KANSAS CITY, MO 64150
PH: (816) 741-6600 * FAX: (816) 741-1061
(888) 526-5657 (888) 634-1433