



LIQUIDYNAMICS™

OILCOP

OilCop Component Wiring Installation Manual



**This info sheet contains important information.
READ AND KEEP FOR REFERENCE.**

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Introduction

This Installation manual contains information for the OilCop fluid management system designed and manufactured by Liquidynamics. The intent of this manual is to provide essential information to help ensure OilCop hardware is properly installed to provide trouble free operation.

Reference the OilCop system set up manual for instructions to properly configure the system in order to make full use of system capabilities.

Safety Symbols

The following safety symbols may be used throughout this manual to alert you to important safety hazards and precautions.



This symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



This symbol indicates a potentially hazardous situation which, if not avoided, may result in injury or damage to equipment.

Electricity

High voltage exists in, and is supplied to, the device. A potential shock hazard exists

Turn Power Off

Live power to a device creates a potential shock hazard. Always turn power off to the device and associated accessories when servicing the unit.

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Power and Environmental Requirements

All OilCop components, except the Controller (CTR), use low voltage DC power. Depending on the module, they are supplied with either 12 or 24 VDC external power packs which include 15 foot (5m) low voltage DC and 6 foot (2m) AC Power cords.

Part Number	Description	Voltage	Amperage
100854	Controller (CTR)	115 VAC	0.3A Max
100904	Communication Data Module (CDM)	USB	USB
100904X	Range Extender (EXT)	12 VDC	0.02A Min – 0.2A Max
100901	Fluid Control Module (FCM)	24 VDC	0.08A Min – 3.7A Max
100905	Remote LED Display (RED)	12 VDC	0.02A Min – 0.2A Max
100906A	Transaction Printer (TRP), Wired/Wireless	12 VDC	0.04A Min – 1.4A Max
100906B	Transaction Printer (TRP), Serial	12 VDC	0.04A Min – 1.4A Max
100903	Technician Access Console (TAC)	12 VDC	
100880	Tank Sensor Module (TSM)	24 VDC	

All OilCop power packs are auto switching and available with Global plugs.

The OilCop controller (CTR) must be powered via an Uninterruptible Power Supply (UPS), P/N 100884 for proper operation.

OilCop system modules must be protected from severe vibration, extremes in temperature, humidity, rain, and other conditions that could harm computerized electronic equipment. OilCop system operating temperature range is 32° to 104°F (0° to 40°C), storage temperature range is -40° to +165°F (-40° to +74°C).

Two-Wire / COM Cable

Shielded Cable

To ensure reliable operation, Liquidynamics REQUIRES the use of shielded (2 conductor AWG 20) cable for all Two-Wire/COM communication. Use Liquidynamics shielded cable P/N 100710-XX where “XX” designates length in feet.

Note: Throughout this manual, any cable used for Two-Wire/COM wiring, refers to shielded cable with drain wire.

Wire Length

Wire lengths exceeding 3,000 feet (1,000 m) may result in faulty communication.

Splices

Liquidynamics recommends that no splices be made in communication wiring. Each splice degrades signal strength and may result in poor system performance.

Four Wire Pulsar Solenoid Module (PSM) Cable

Non- Shielded Cable

Use P/N 100709-XX where “XX” designates length in feet 4-Conductor AWG 18 non-shielded cable or equivalent.

Wire Length

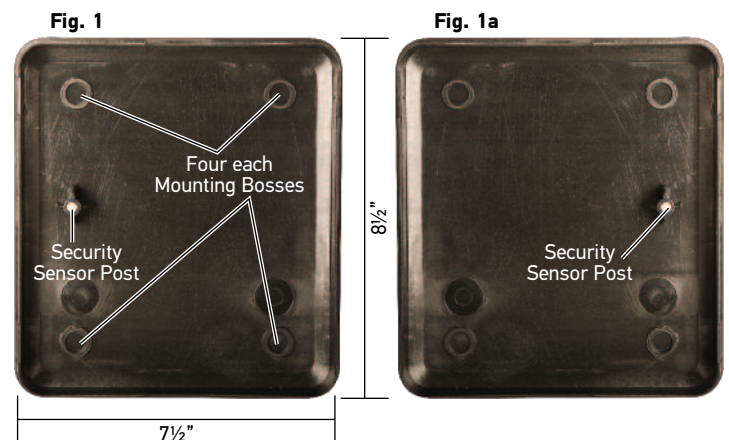
Improper system operation could result if PSM wire lengths exceed 300 feet (100 m).

Mounting Requirements

OilCop Module back covers have four raised circular bosses indicating locations for placement of 3/8” self-tapping screws to secure the back cover to a suitable mounting surface (Fig. 1).

Note: When mounting the Fluid Control Module (FCM) or Technician Access Console (TAC) back cover to a mounting surface, ensure the security sensor post on the back cover is positioned so it is located on the LEFT SIDE as shown in (Fig. 1).

Note: When mounting the Tank Sensor Module (TSM) or Input/Output Module (IOM), back cover must be installed with the security sensor post on the RIGHT SIDE. (Fig. 1a).



Controller (CTR)

The controller (CTR) may be placed on any flat surface or may be mounted vertically using two screws with 1/4 inch (0.63 cm) heads.

Space should also be allowed for the communication data module (CDM), Uninterrupted Power Supply (UPS) P/N 100884 and allow for routing power and two wire communication cables.

Communication Data Module (CDM)*

The Communication Data Module (CDM) should be placed within 3 foot (1m) of the Controller (CTR); the CDM is connected to the CTR using P/N 907043, USB 3 foot (1m) cable. The CDM has four sets of (Red +/White -) COM connectors labeled COM-1, COM-2, COM-3, COM-4 and a green shield ground connector located between the two

sets of COM connectors (Fig. 2). The four COM connectors allow the Two-Wire/COM network to be divided into module groups as follows:

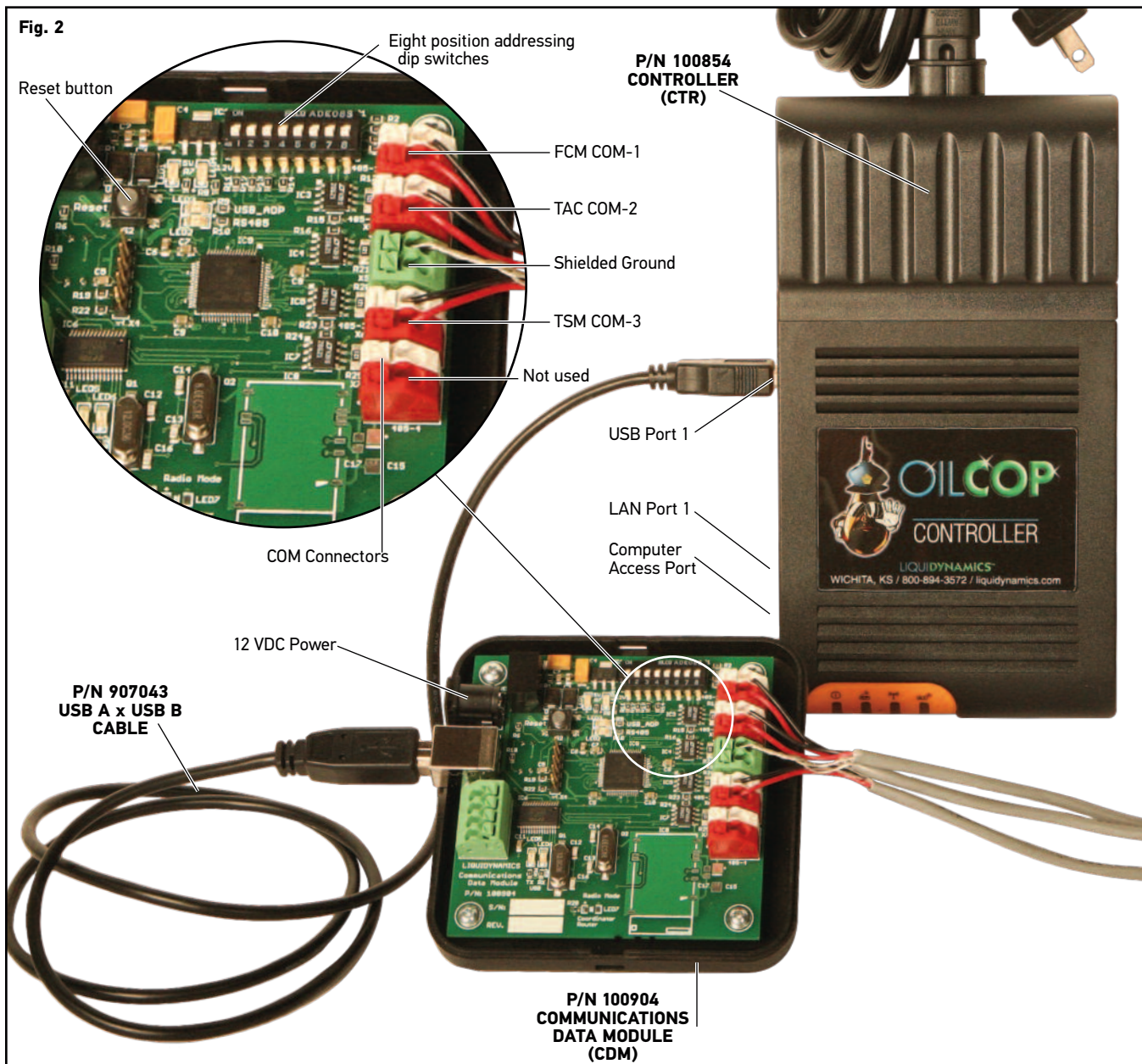
Two-Wire/COM-1 connector connects via daisy chain all Fluid Control Modules (FCMs) and Remote LED Displays (REDs).

Two-Wire/COM-2 connector connects via daisy chain all Technician Access Consoles (TACs).

Two-Wire/COM-3 connector connects via daisy chain all Tank Sensor Modules (TSMs) and Input/Output Modules (IOMs).

Two-Wire/COM-4 connector is not used.

Note: The CDM does not require use of a power pack, it is powered via the provided USB cable



Fluid Control Module (FCM)

Wiring the "FCM"

Locate the four sets of PSM connectors at the bottom of the printed circuit board (Fig. 3) labeled Disp (1-4). Each dispense position has a set of four connectors, the first connector, RED (+24 VDC solenoid power supply), the second connector, White (-24 VDC solenoid power supply). The third and fourth connectors, Green are the digital Pulsar input wires from the meter reed switch coming from the PSM.

The Two-Wire/COM connectors are located in the upper right hand corner of the FCM (Fig. 3). There are two sets of (Red+/White-) COM connectors labeled COM-1 and COM-2 with a green connector located between them. Use the top COM-1 connector to daisy chain all CDMs, FCMs and REDs.

Note: When daisy chaining FCM Two-Wire/COM communications, the COM-1 connector must be switched "OFF" by setting the mini on/off switch labeled X7 (Fig. 3). The X7 mini on/off switch is located left of the (Red+/White-) COM-1 connector, upper right corner (Fig. 3).

IMPORTANT! The last Module on the end of the Two-Wire/COM daisy chain MUST have its mini ON/OFF switch set to the "ON" position, thus properly terminating the COM daisy chain. Failure to terminate the COM in this manner will result in complete system communications failure.

Located in the upper left corner of the FCM is the connector for a Dry Contact. This Dry Contact is rated at up to 24 VDC, 5 amps maximum and "Closes" any time a reel is activated.

When using the Dry Contact, an external DC power source between (5 – 24 VDC) must be used to energize an isolation relay or solenoid valve.

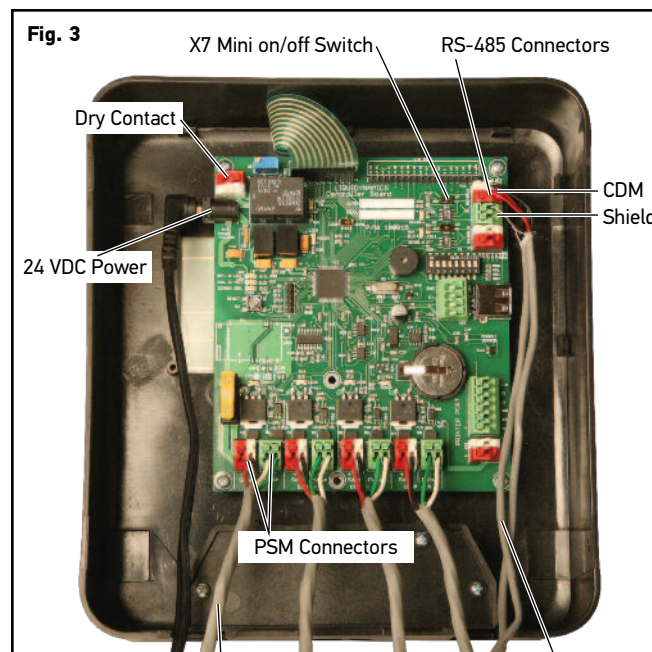


Do not supply AC power to the Dry Contact, this will result in permanent damage to the FCM.

Note: Do not apply AC power to the FCM until after all Modules sharing a common two wire/COM daisy chain have been connected and the physical address has been set.

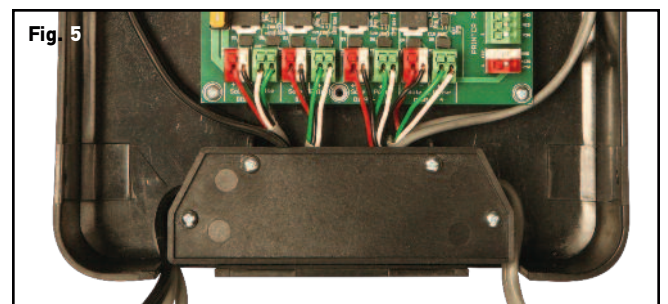
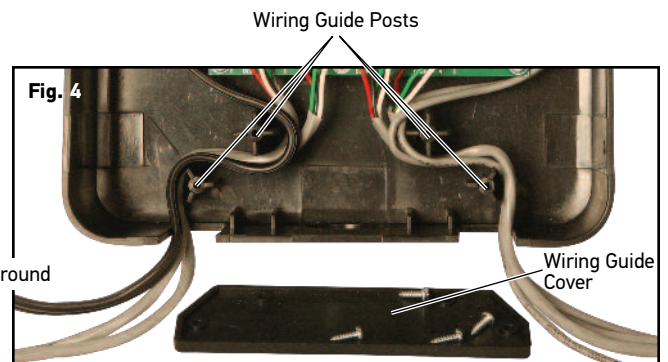
After all wiring connections are complete, plug the 24 VDC power pack plug into the receptacle located under the dry contact connector (Fig. 3).

When wiring has been completed, remove the wire guide cover (Fig. 4) located at the bottom of front cover by removing four #3 Phillips screws exposing the four wiring guide posts that are used to secure the low voltage power cable, PSM and Two-Wire/COM communications cables. Secure the cables by routing them in an "S" configuration, as shown in Fig. 4, around guide posts located on either side of the case. After cables are securely in place, reinstall the wire guide cover and secure with four #3 Philips head screws (Fig. 5).



4 Conductor, 18 Gauge Cable

2 Conductor, 20 Gauge Shielded Cable w/ Drain Wire



Remote LED Display (RED)

Wiring the "RED"

Two wire/COM connectors are located in the lower right hand corner of the RED. There is one set of (Red+/White-) COM RS 485-1 connectors labeled COM RS 485-1 and a green ground connector next to the COM RS 485-1 connector.

Note: When daisy chaining the remote display using Two-Wire/COM, the COM connector must be switched "OFF" by setting the Mini on/off switch (Fig. 6) labeled X4, located left of the (Red+/White-) COM connector, to the "Down" / OFF position.

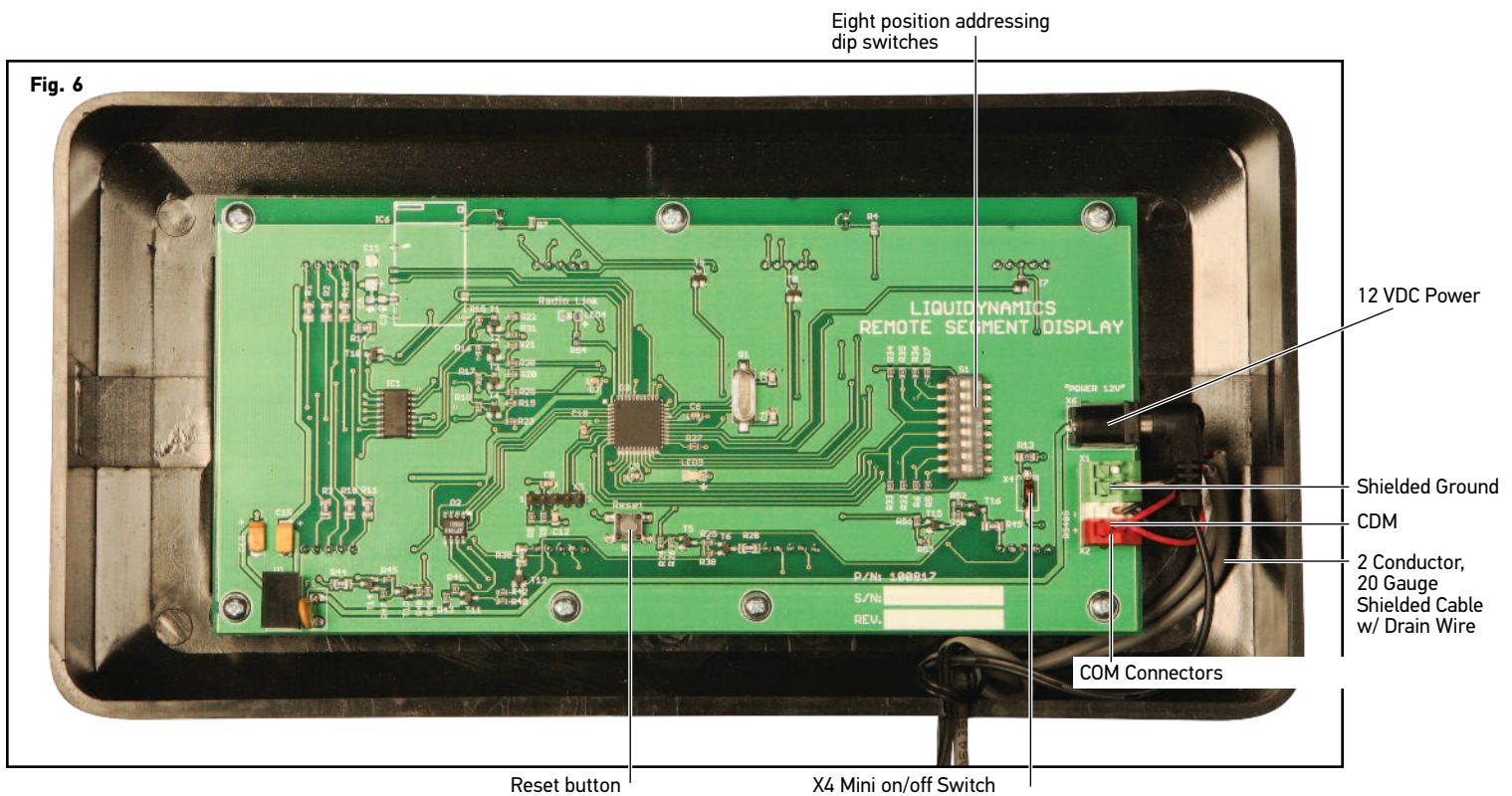
IMPORTANT! The last Module at the end of the two wire/COM daisy chain MUST have the mini ON/OFF switch set to the "Up" / ON position, thus properly terminating the COM daisy chain. Failure to terminate the COM will result in complete system communications failure.

Locate the 8 position Dip switch (Fig. 6) and set the physical address per instructions on page 10, "Setting the Physical Address".

Note: Do not apply AC power to the power pack until after all Modules sharing a common two wire/COM daisy chain wiring have been connected and physical addresses have been set.

After all wiring connections have been completed and the physical address has been set, plug the 12 VDC power pack plug into the receptacle (Fig. 6) located above the two wire/COM communication connectors.

Re-attach the "RED" to the back cover.



Technician's Access Console (TAC)

Wiring the "TAC"

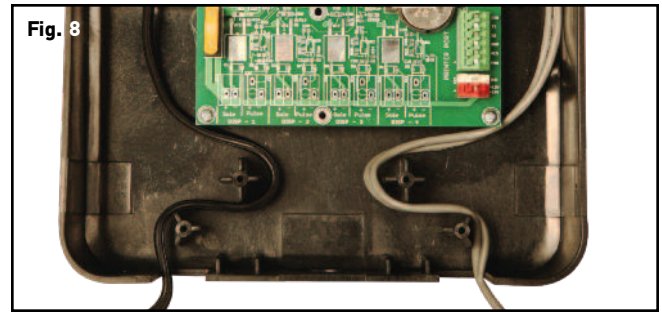
The Two wire/COM RS 485-1 communications connectors are located in the upper right hand corner of the TAC (Fig. 7). There are two sets of Red+/White- COM connectors labeled COM-1 and COM-2 with a green connector located between the two COM connectors. Use the top COM-1 connector to daisy chain all FCMs and Communications Data Modules (CDMs).

Note: When daisy chaining TAC two wire/COMs the COM-1 connector must be switched "OFF" (Fig. 7) by setting the mini on/off switch labeled X7, located left of the (Red+/White-) COM-1 connector, to the OFF position.

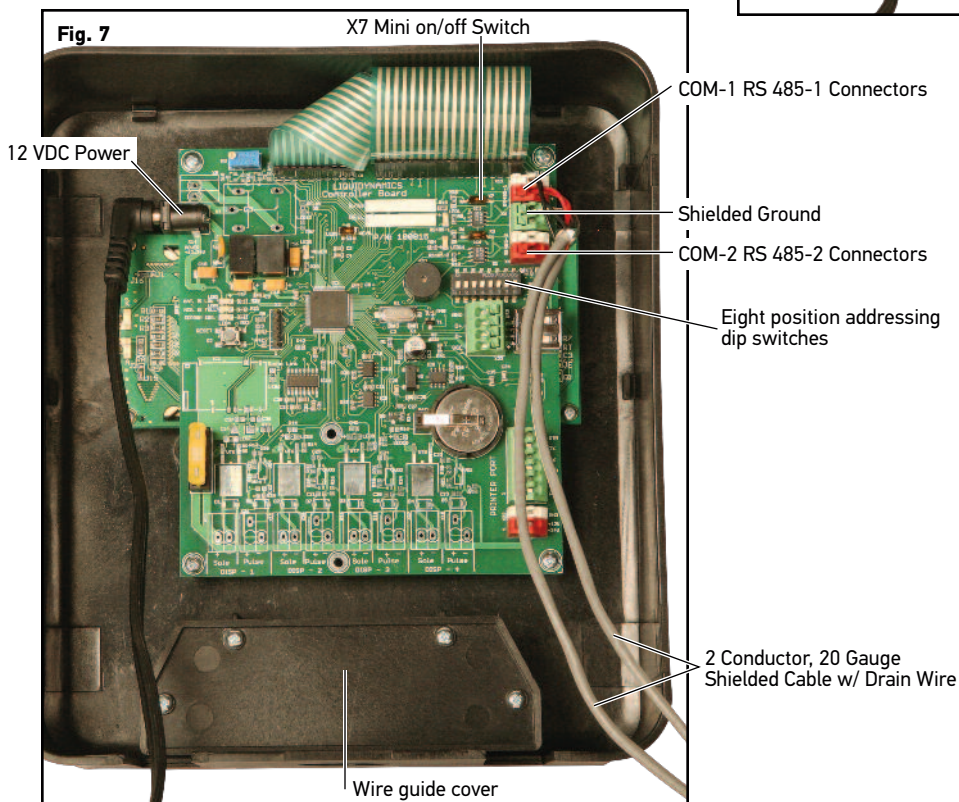
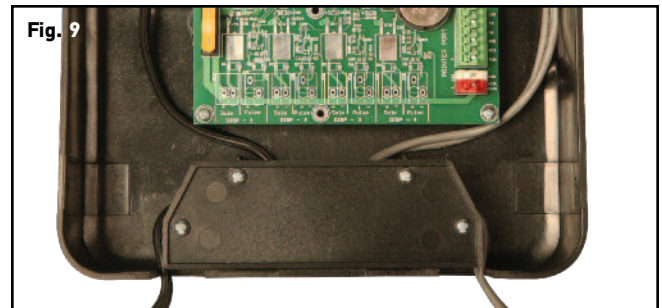
IMPORTANT! The last Module at the end of the two wire/COM daisy chain MUST have the mini ON/OFF switch set to the ON position, thus properly terminating the COM daisy chain. Failure to terminate the COM properly will result in complete system communication failure.

Note: Do not apply AC power to the power pack until after all Modules sharing a common two wire/COM daisy chain wiring have been connected and physical addresses have been set.

After all wiring connections have been completed and the physical address has been set, plug the 12 VDC power pack plug into the receptacle located in the upper left hand corner of the TAC (Fig. 7)



When wiring is complete, remove the wire guide cover located at the bottom of front cover (Fig. 7) by removing four #3 Phillips screws, exposing the four wiring guide posts that are used to secure the low voltage power cable and Two-Wire/COM communications cables. Secure the cables by routing them in an "S" configuration around two guide posts as shown in Fig. 8. After cabling is in place, reinstall the wire guide cover and secure with the four #3 Philips head screws (Fig. 9).



Tank Sensor Module (TSM)

Wiring the "TSM"

There are four sets of Sensor connectors at the bottom of the printed circuit board (Fig. 10) labeled Sensor (1-4). Each Sensor position has four connectors, first, RED connector (labeled "+ Red"), second, WHITE connector (labeled "- Black"), third, GREEN connector (labeled "IN white") and the fourth, Green connector (labeled "- Green").



If transmitter wiring is incorrect when power is applied, the transmitter will be permanently damaged and must be replaced.

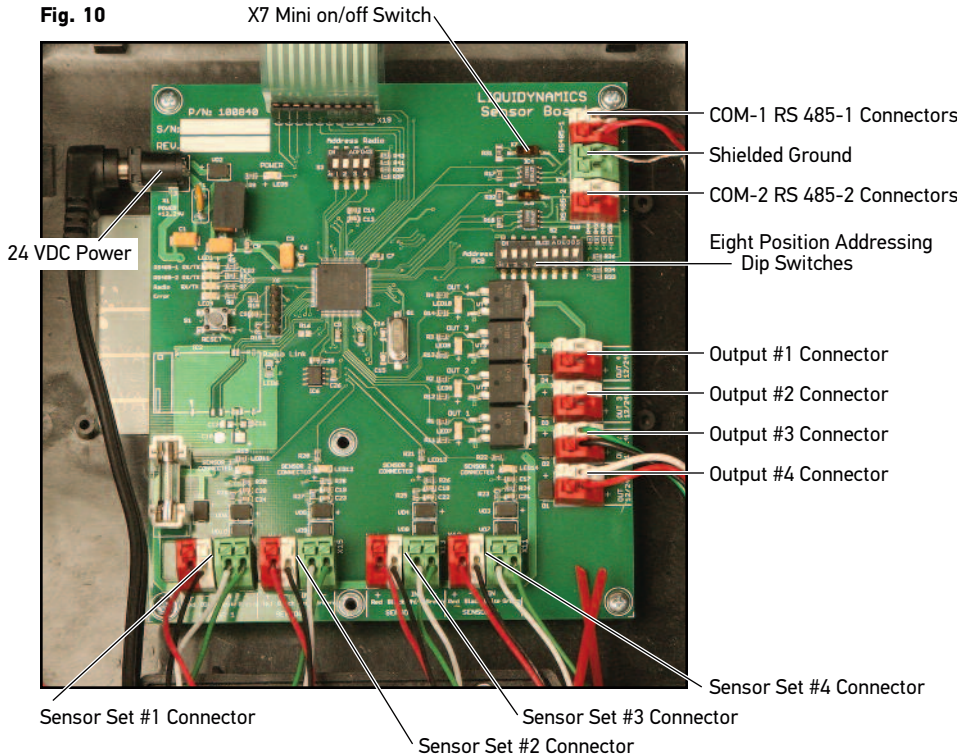
Note: Each sensor has a red plastic atmosphere reference tube inside the transmitter cable (Fig. 11), this tube must not be obstructed in order for the transmitter to function properly.

Two wire/COM Wiring

Two wire/COM connectors are located in the upper right hand corner of the TSM. There are two sets of (Red+/White-) COM connectors labeled COM-1 RS 485-1 and COM-2 RS 485-2 with a green connector located between the two COM connectors. Use the top COM-1 connector for daisy chaining other TSMs and the Communication Data Module (CDM).

Note: When daisy chaining TSMs two wire/COM the COM-1 connector must be switched "OFF" by setting the Mini on/off switch labeled X7, located left of the (Red+/White-) COM-1 connector (Fig. 10), to the (left) OFF position.

IMPORTANT! The last TSM at the end of the two wire/COM daisy chain MUST have the Mini ON/OFF switch set to the ON (left) position, thus properly terminating the COM daisy chain. Failure to terminate the COM will result in complete system communications failure.



24 VDC Output Relay Wiring

There are four sets of output connectors on the right side of the printed circuit board (Fig. 10) labeled Out (1-4). Each output position has two connectors, Red+ 24 VDC and White-

Note: Each Output is rated not to exceed 5 AMP load.

Note: Do not apply AC power to the power pack until after all Modules sharing a common two wire/COM daisy chain wiring have been connected and physical addresses have been set.

After all wiring connections have been completed and the physical address has been set, plug the 24 VDC power pack plug into the receptacle located in the upper left hand corner of the TSM (Fig. 10)

When wiring is complete, remove the wire guide cover located at the bottom of front cover (Fig. 11), by removing four #3 Phillips screws and exposing four wiring guide posts. These are used to secure the low voltage DC power cable, Output relay wiring and Two-Wire/COM communications cabling. Secure the cables by routing them in an "S" configuration around two guide posts as shown in (Fig. 12). Then, each Level Transmitter cable must be placed diagonally across the guide post from opposite sides(Fig. 12). This will protect the red plastic atmosphere reference tube inside each transmitter cable from becoming pinched and obstructing the atmosphere reference tube.

After cables are in place, reinstall the wire guide cover (Fig. 13) and secure with four #3 Philips head screws.

2 Conductor, 20 Gauge
Shielded Cable w/ Drain Wire

Fig. 11

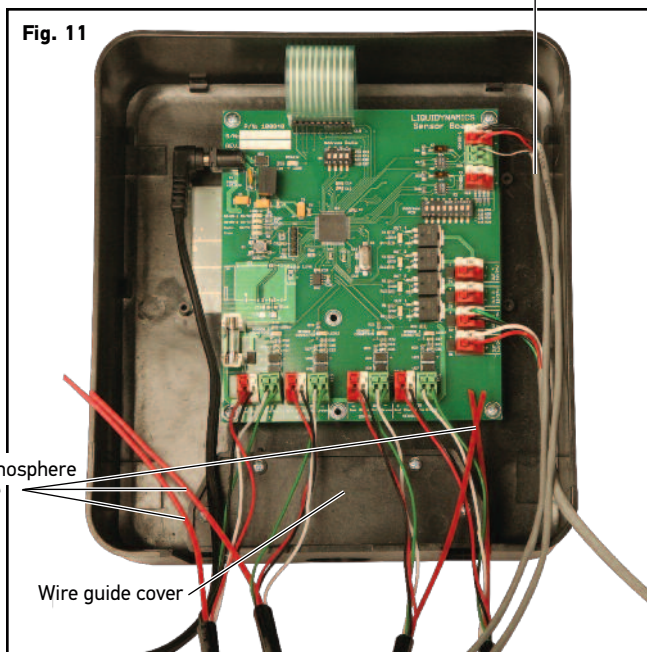


Fig. 13

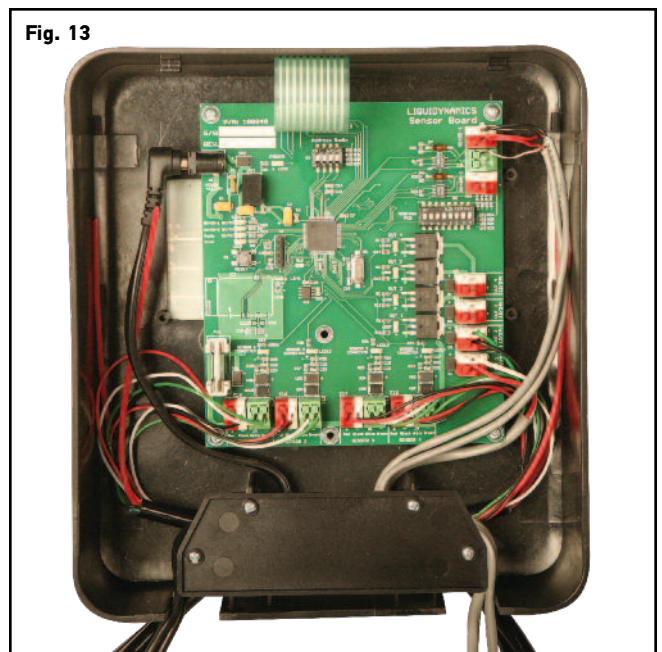
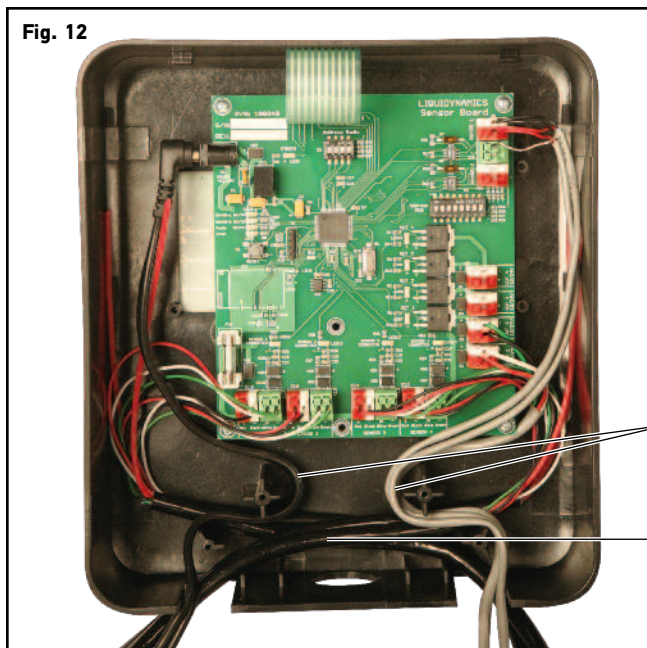


Fig. 12



Cables Route in an "S" Configuration

Level Transmitter Cable Placed Diagonally

Setting Module Physical Address

In order for the OilCop controller to communicate with all modules in a system, each module must be assigned a unique numerical address, similar to your home postal address, in this case addresses will range from 0 to 255.

It is considered good practice to assign numeric address values (for like items) in numeric order such as beginning with the Communication Data Module (CDM), assigning it address #0, and then assign the next physically closest module connected to the Two-Wire/COM(x) daisy chain address #1, etc.

So in the case of an OilCop network consisting of two FCMs, one RED, one TAC and two TSMs we would address the CDM as #0, FCM-1 as #1, FCM-2 as #2, RED as #1, TAC as #1, TSM-1 as #1 and TSM-2 as #2.

IMPORTANT: All boards sharing the same COM port must have different addresses.

Component	Port
FCM	COM 1
TAC	COM 2
TSM	COM 3

Setting the address consist of setting a combination of 8 switches on the DIP switch to either ON or OFF.

To determine the address setting, add up the Decimal value associated with the Switch # that is set to ON by using Table 1. As an example, If switch 1 and 8 are set to ON and the remaining switches are set to OFF simply add Switch 1 (Decimal value = 1) + Switch 8 (Decimal value 128) = 129 and this is the address. If all switches are set to OFF then the address is zero (0) and if all switches are set to ON the address is 255.

Switch #	1	2	3	4	5	6	7	8
Decimal value	1	2	4	8	16	32	64	128

Table 1

Example: Address set to 1.

Switch #	1	2	3	4	5	6	7	8
Switch Pos.	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF

Example 1

Example: Address set to 2.

Switch #	1	2	3	4	5	6	7	8
Switch Pos.	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF

Example 2

Example: Address set to 3.

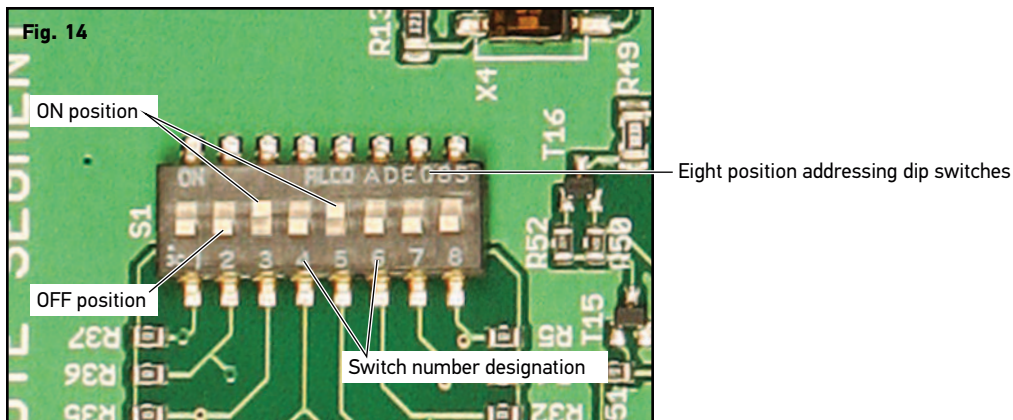
Switch #	1	2	3	4	5	6	7	8
Switch Pos.	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF

Example 3

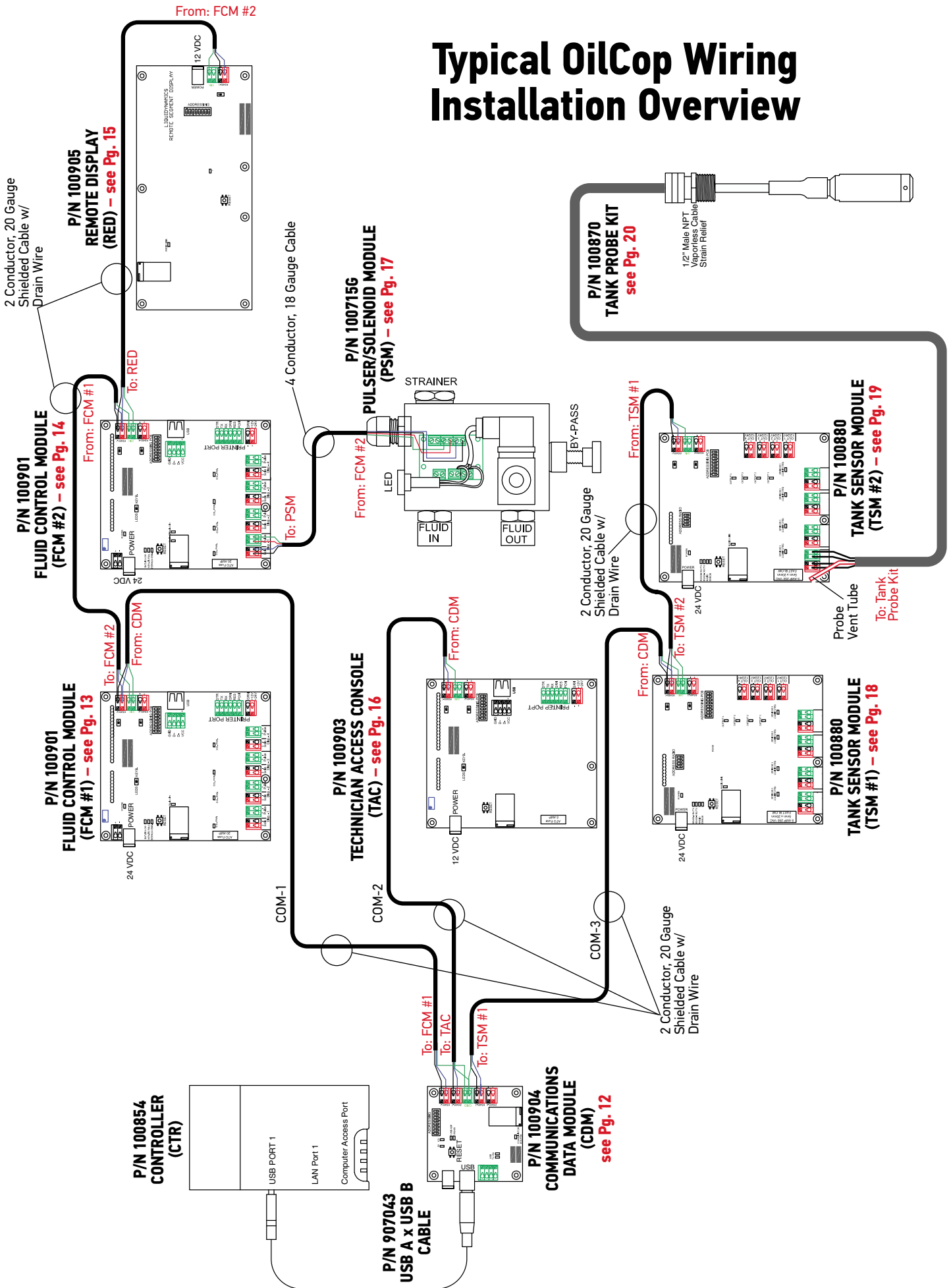
Example: Address set to 9.

Switch #	1	2	3	4	5	6	7	8
Switch Pos.	ON	OFF	OFF	ON	OFF	OFF	OFF	OFF

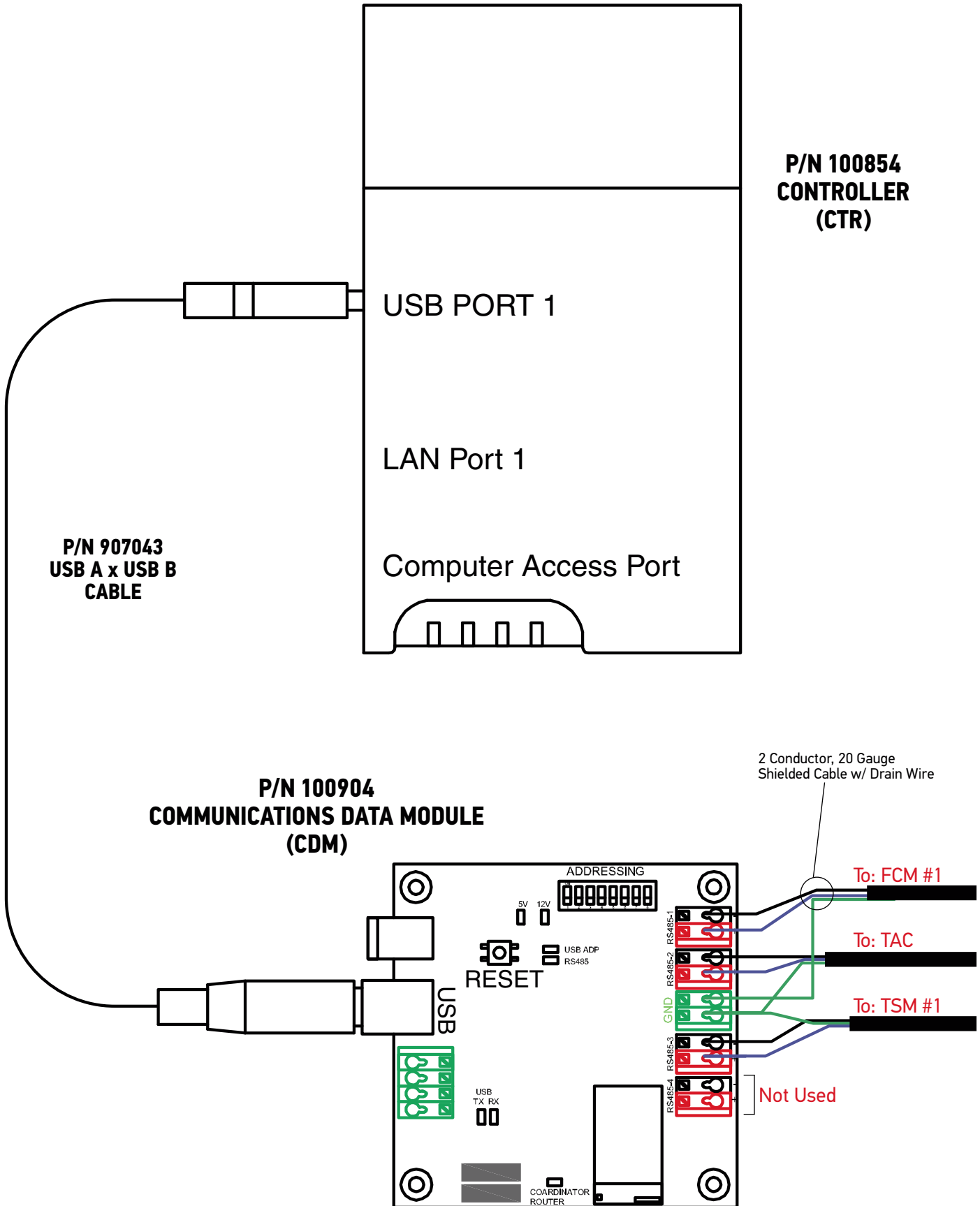
Example 4



Typical OilCop Wiring Installation Overview

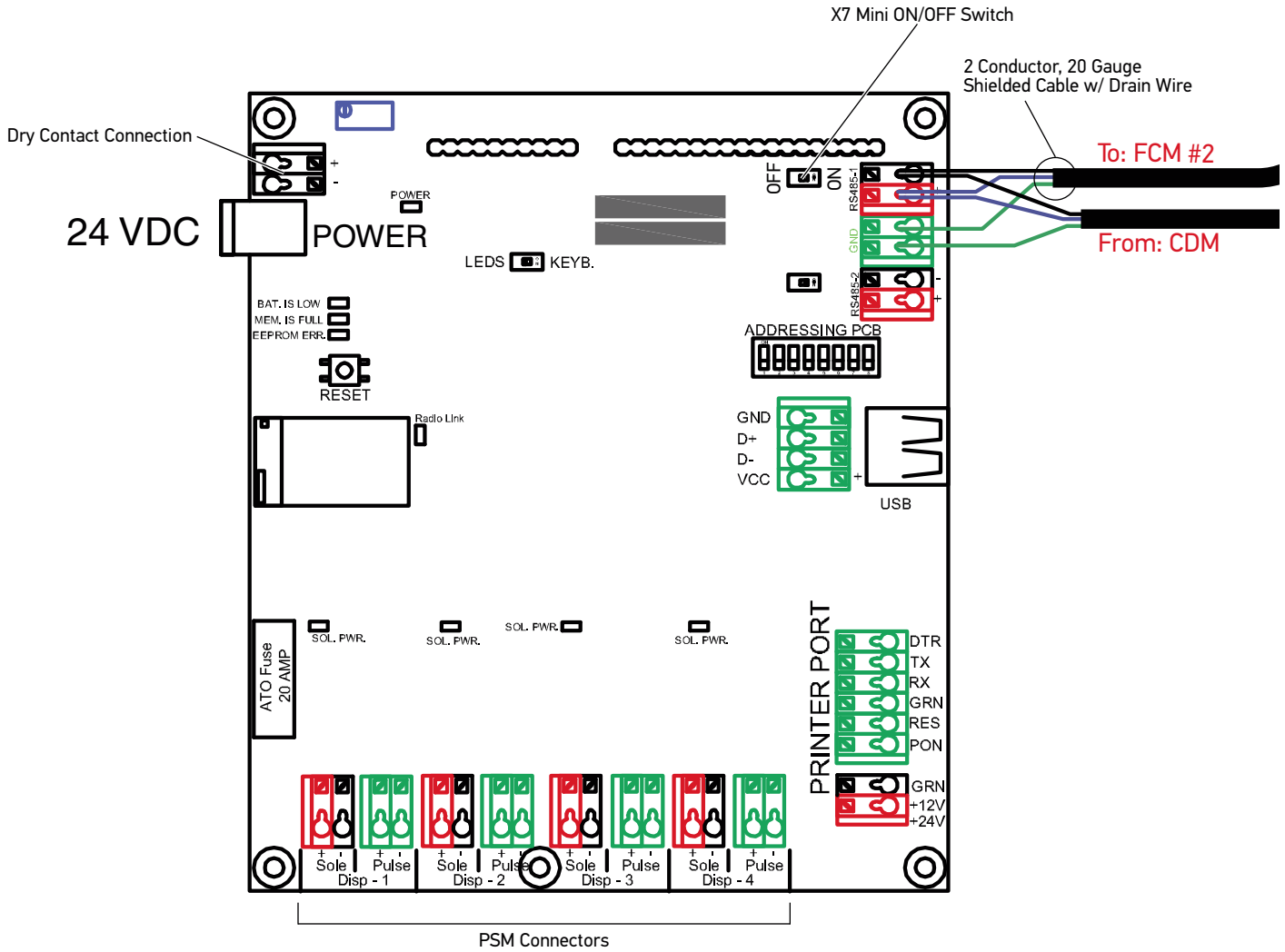


Typical OilCop Wiring CTR & CDM



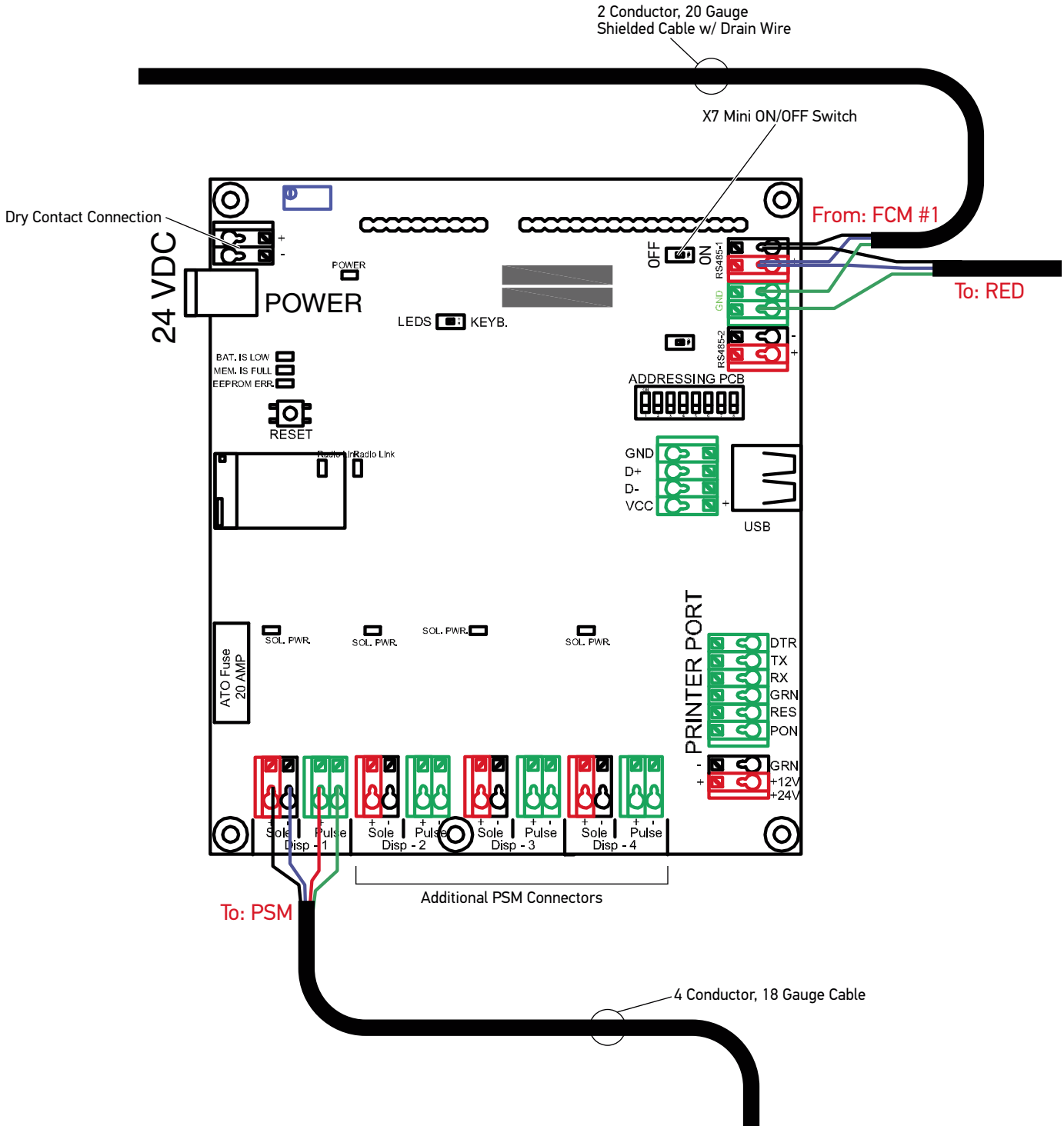
Typical OilCop Wiring FCM #1

P/N 100901
FLUID CONTROL MODULE
(FCM) #1



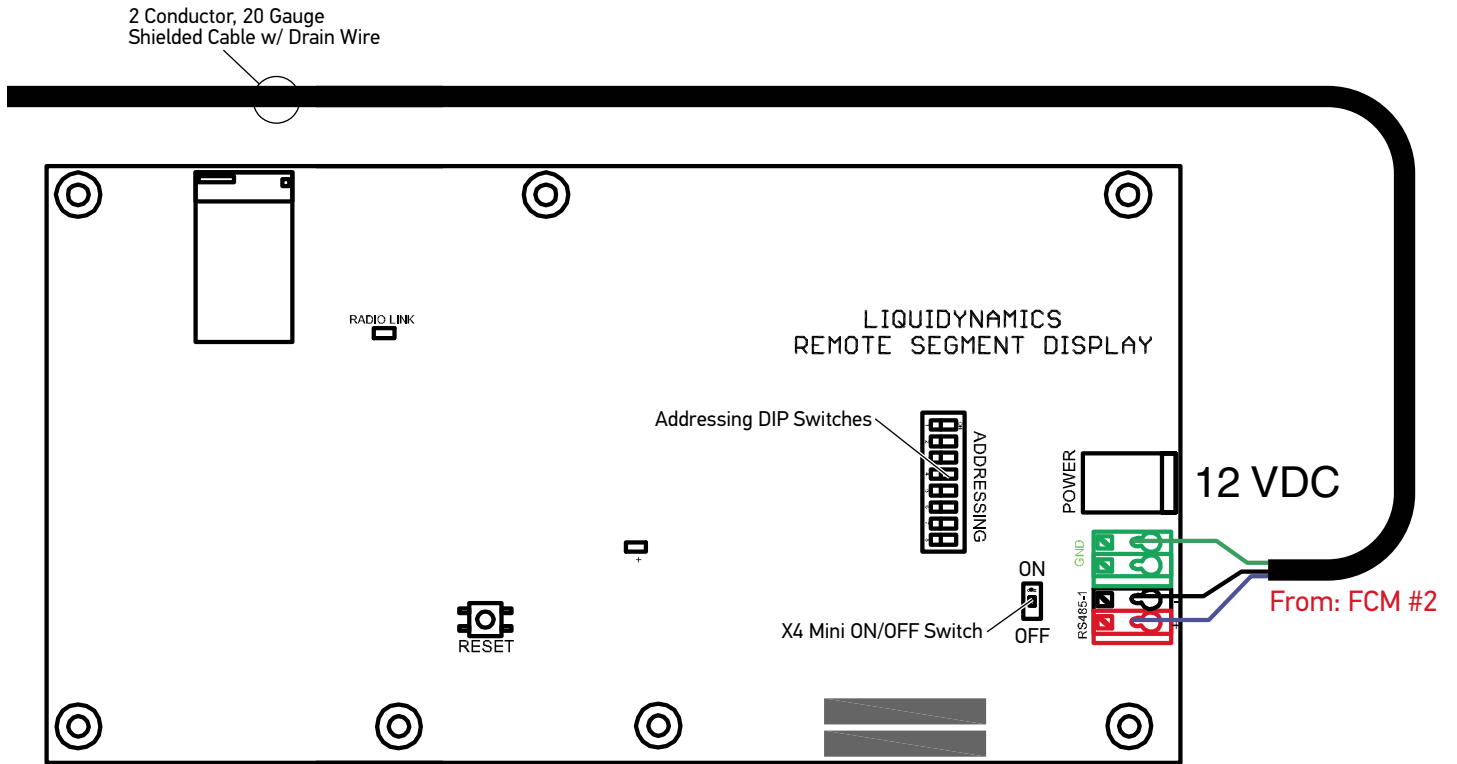
Typical OilCop Wiring FCM #2

P/N 100901
FLUID CONTROL MODULE
(FCM) #2



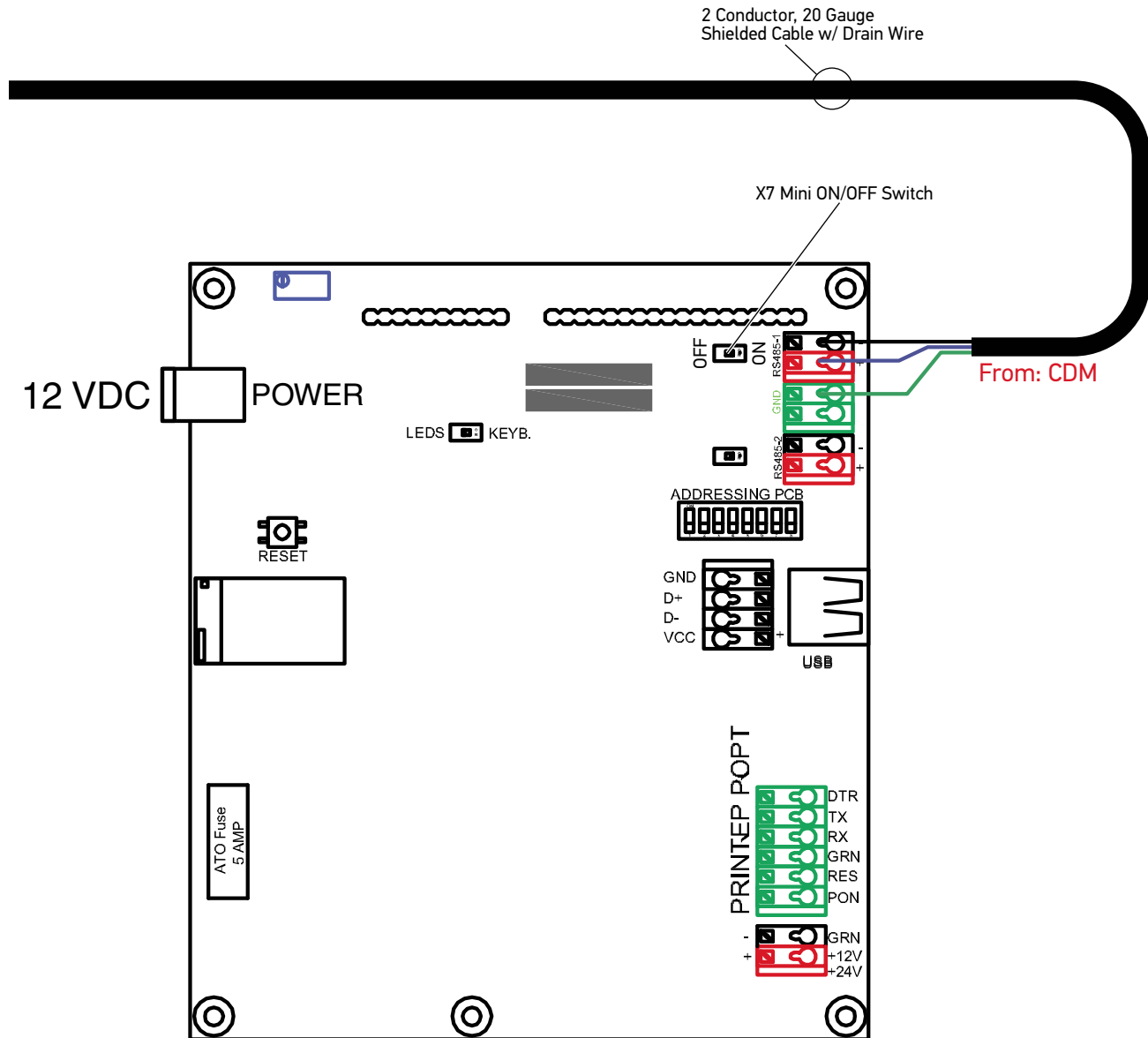
Typical OilCop Wiring RED

P/N 100905
REMOTE DISPLAY
(RED)



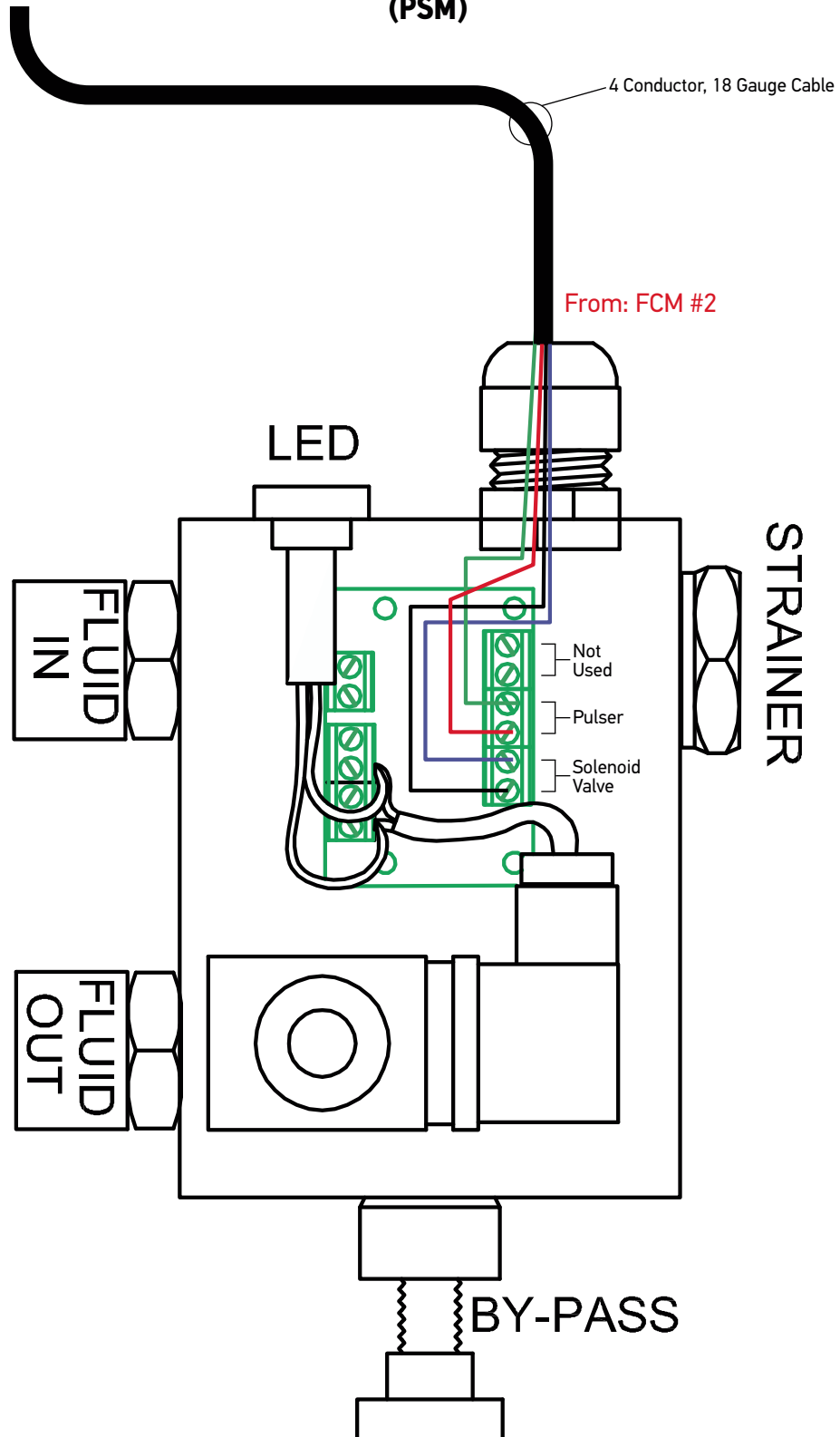
Typical OilCop Wiring TAC

P/N 100903
TECHNICIAN ACCESS CONSOLE
(TAC)



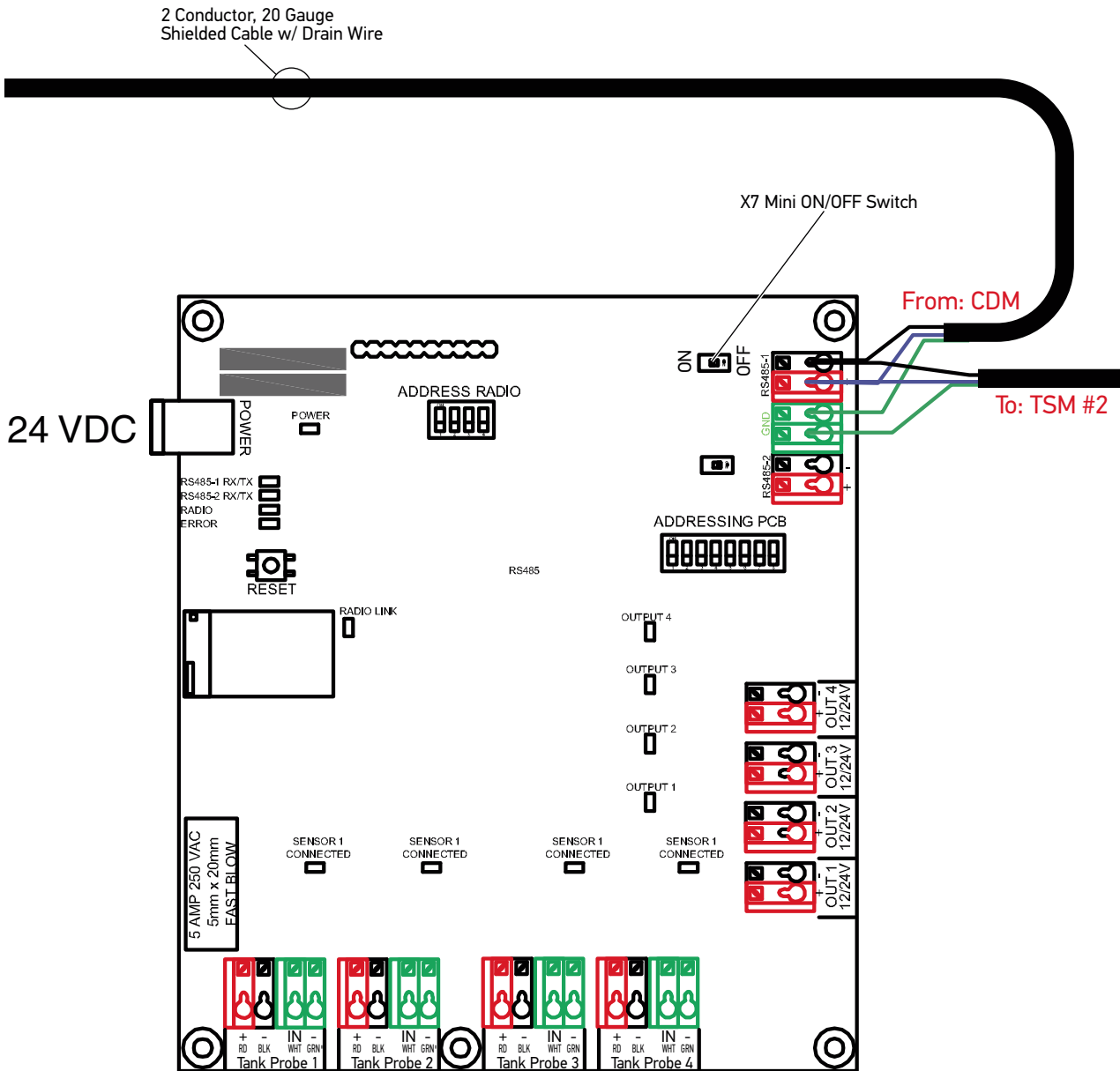
Typical OilCop Wiring PSM

P/N 100715G
PULSER/SOLENOID MODULE
(PSM)



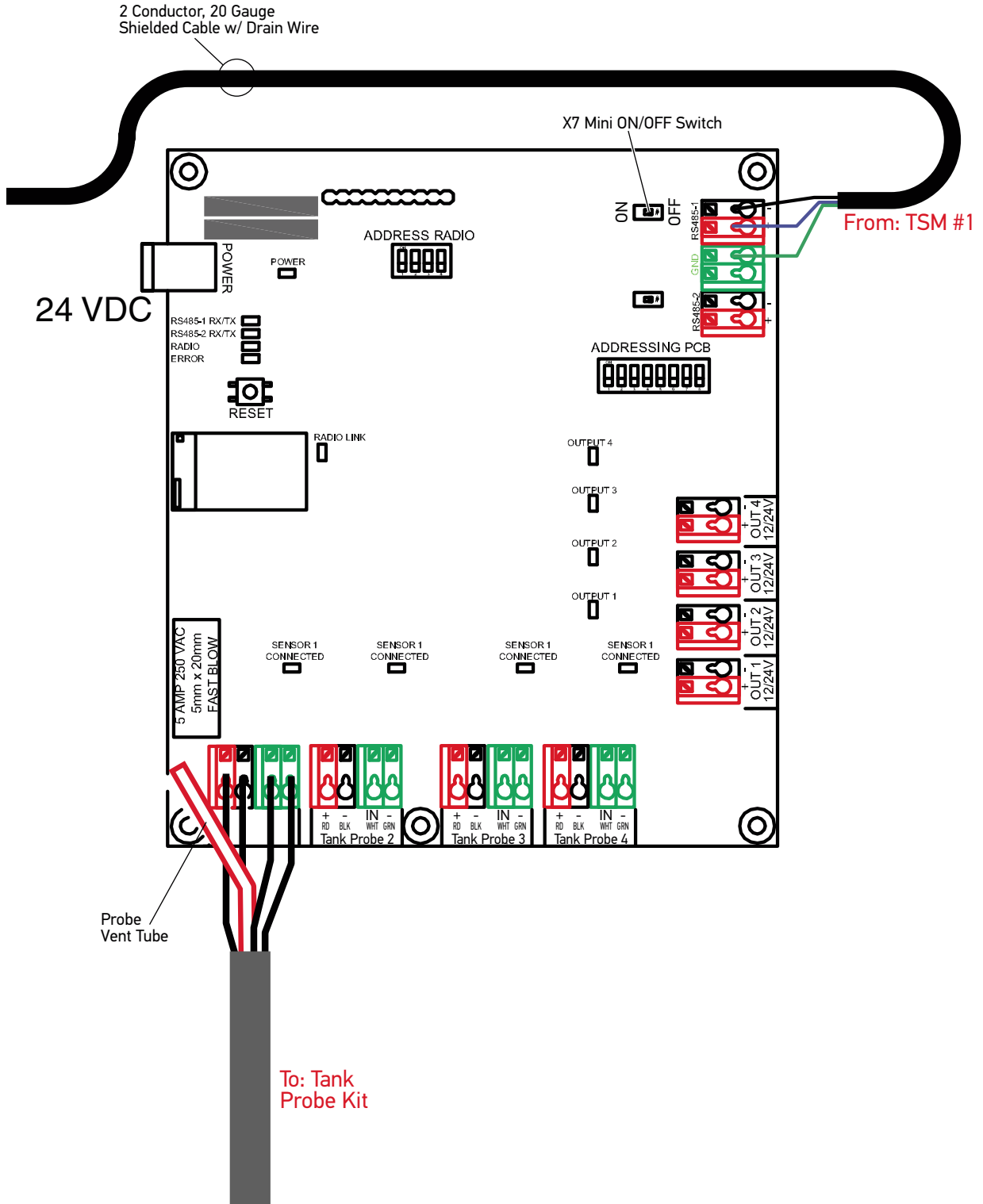
Typical OilCop Wiring TSM #1

**P/N 100880
TANK SENSOR MODULE
(TSM) #1**



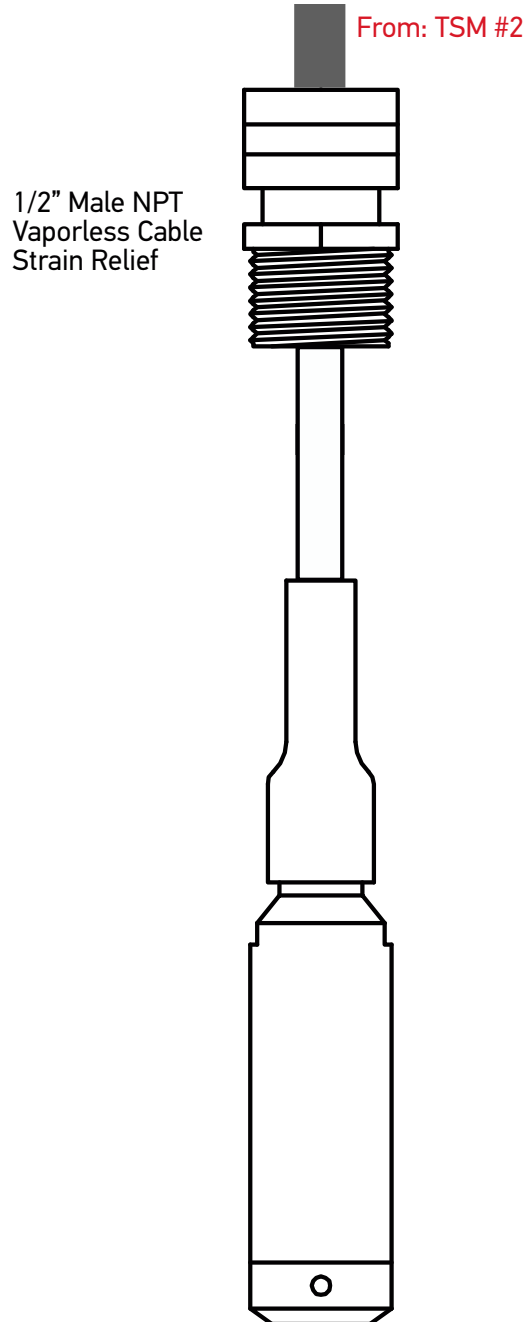
Typical OilCop Wiring TSM #2

P/N 100880 TANK SENSOR MODULE (TSM) #2



Typical OilCop Wiring TANK PROBE KIT

**P/N 100870-02
TANK PROBE KIT**



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