

# SCADAPack 4203 DR

## Installation, Operation and Maintenance Setup Manual

2/24/2017



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## Technical Support

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Questions and requests related to any part of this documentation can be directed to one of the following support centers:

### Technical Support: Americas, Europe, Middle East, Asia

Available Monday to Friday 8:00am – 6:30pm Eastern Time

Toll free within North America 1-888-226-6876

Direct Worldwide +1-613-591-1943

Email [supportTRSS@schneider-electric.com](mailto:supportTRSS@schneider-electric.com)

### Technical Support: Australia

Inside Australia 1300 369 233

Email [au.help@schneider-electric.com](mailto:au.help@schneider-electric.com)

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## Safety Information

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### Important Information

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a Danger or Warning safety message indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

### **DANGER**

**DANGER** indicates a hazardous situation which, if not avoided, **will result** in death or serious injury.

### **WARNING**

**WARNING** indicates a hazardous situation which, if not avoided, **can result** in death or serious injury.

### **CAUTION**

**CAUTION** indicates a potentially hazardous situation which, if not avoided, **can result** in minor or moderate injury.

### **NOTICE**

**NOTICE** is used to address practices not related to physical injury.

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## Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

## Before You Begin

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to the operator of that machine.

 <b>WARNING</b>
<b>EQUIPMENT OPERATION HAZARD</b> <ul style="list-style-type: none"><li>• Verify that all installation and set up procedures have been completed.</li><li>• Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.</li><li>• Remove tools, meters, and debris from equipment.</li></ul> Failure to follow these instructions can result in death or serious injury.

Follow all start-up tests recommended in the equipment documentation. Store all equipment documentation for future reference.

Test all software in both simulated and real environments.

Verify that the completed system is free from all short circuits and grounds, except those grounds installed according to local regulations (according to the National Electrical Code in the U.S.A, for instance). If high-potential voltage testing is necessary, follow recommendations in equipment documentation to help prevent accidental equipment damage.

## Operation and Adjustments

The following precautions are from the NEMA Standards Publication ICS 7.1-1995 (English version prevails):

- Regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components, there are hazards that can be encountered if such equipment is improperly operated.
- It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer's instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment

manufacturer's instructions and the machinery used with the electrical equipment.

- Only those operational adjustments actually required by the operator should be accessible to the operator. Access to other controls should be restricted to help prevent unauthorized changes in operating characteristics.

## Acceptable Use

SCADAPack controllers and expansion modules are intended for use in monitoring and controlling non-critical equipment only. They are not intended for safety-critical applications.

### **WARNING**

#### **UNACCEPTABLE USE**

Do not use SCADAPack controllers and expansion modules as an integral part of a safety system. These devices are not safety products.

**Failure to follow these instructions can result in death or serious injury.**

### **CAUTION**

#### **EQUIPMENT OPERATION HAZARD**

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Use only Schneider Electric software or approved software with Schneider Electric hardware products.

**Failure to follow these instructions can result in minor or moderate injury.**

## About The Book

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### At a Glance

#### Document Scope

This manual describes the operation and maintenance of the SCADAPack 4203DR controller.

#### Validity Notes

This document is valid for all versions of the SCADAPack 4203DR.

#### Product Related Information

 <b>WARNING</b>
<b>UNINTENDED EQUIPMENT OPERATION</b> The application of this product requires expertise in the design and programming of control systems. Only persons with such expertise should be allowed to program, install, alter and apply this product. Follow all local and national safety codes and standards. <b>Failure to follow these instructions can result in death or serious injury.</b>

#### User Comments

We welcome your comments about this document. You can reach us by e-mail at [supportTRSS@schneider-electric.com](mailto:supportTRSS@schneider-electric.com).

## Overview

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The SCADAPack 4203 DR is a two meter run flow computer with an integrated multivariable sensor. The transmitter is supplied with a pre-configured gas flow application and can also be programmed in Telepace Relay Ladder Logic, compiled C, and IEC 61131-3.

The SCADAPack 4203 DR transmitter provides a discrete input/output that can be used as status input, or as a high frequency counter input or a sinking digital output. A second high frequency counter input accepts low-level inputs from devices such as turbine meters. Standard analog output provides flexible control for variable speed motor drives, control valves, shutdowns, or whatever your site requires. The applied power source voltage is internally monitored and available for communication to the SCADA host.

These SCADAPack 4203 DR transmitters provide a Modbus mapping of transmitter functions that is compatible with the Rosemount 3095FB MVT. The transmitter can be used with or without the flow computer program.

The 4203 DR provides two fully functional RS-232/485 selectable serial ports. Either or both ports can be used with remote I/O, radios, local displays, or other serial devices. Either of the two provided serial ports can be used to communicate with another member of the SCADAPack family for I/O expansion.

The SCADAPack 4203 DR transmitter provides Modbus master/slave and EFM Modbus as its native protocols. DNP 3.0 protocol is optionally available. Custom protocols can be implemented using C programming.

These transmitters can optionally be configured using the SCADAPack 4000 Configurator UI, which is shipped on an accompanying Configuration CD. The SCADAPack 4000 Configurator supports the configuration, monitoring, and calibration of SCADAPack 4000 transmitters.

The SCADAPack 4203 DR is available in one of two formats, the standard sensor and the low profile sensor.



**Figure 1: 4203 DR Standard Sensor**



**Figure 2: 4203 DR Low Profile Sensor**

## Installation

### Mounting

The transmitter can be supported by the process piping as shown in *Figure 3* or mounted to a vertical or horizontal pipe or surface using the optional mounting bracket shown in *Figure 4*.

If the GFC is not installed in the vertical position as shown in *Figure 3* or *Figure 4*, readjust zero output to remove the position zero effect. The GFC should be mounted so that any moisture condensing or draining into the field-wiring compartment can exit through one of the two threaded conduit connections.

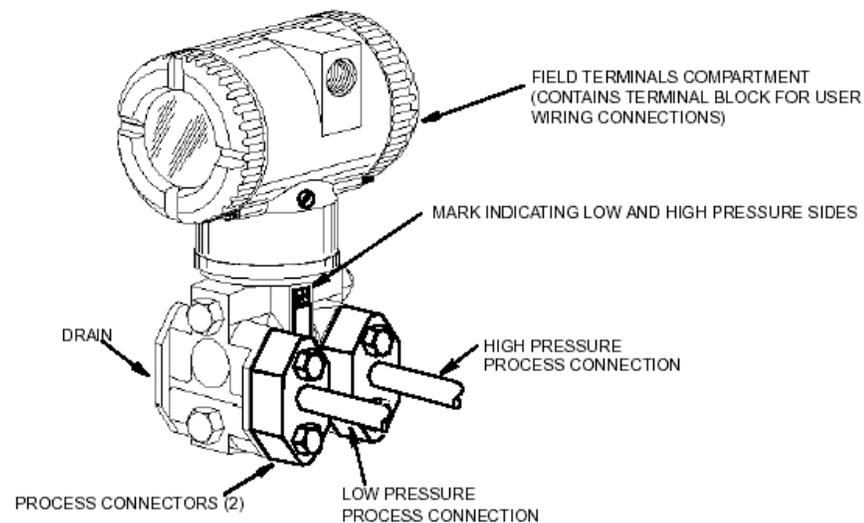
### ⚠ CAUTION

To avoid damage to the 4000 transmitter sensor, do not use any impact devices, such as an impact wrench or stamping device on the transmitter.

Use a suitable thread sealant on pipe connections.

### Process-Mounted Transmitter

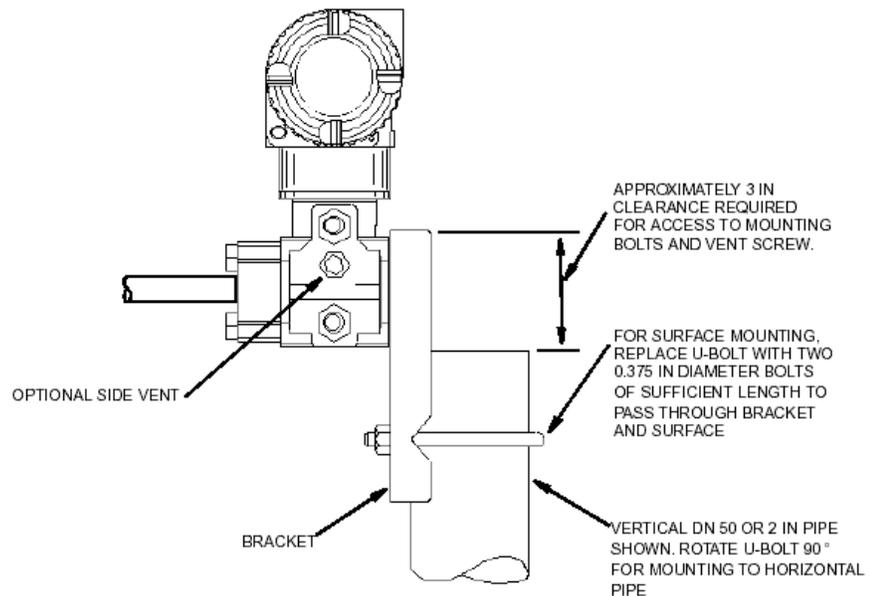
*Figure 3* shows a SCADAPack 4203 DR transmitter mounted to and supported by the process piping.



**Figure 3: Process-Mounted GFC**

## Pipe or Surface-Mounted Transmitter

To mount the transmitter to a pipe or surface, use the Optional Mounting Bracket Set (Model Code Option -M). Referring to *Figure 4*, secure the mounting bracket to the transmitter using the two lock washers and screws provided. Mount the GFC with mounting bracket to a vertical or horizontal, DN 50 or 2-in pipe. To mount to a horizontal pipe, turn the U-bolt 90° from the position shown in *Figure 4*. The mounting bracket can also be used for wall mounting by securing the bracket to a wall using the U-bolt mounting holes.



**Figure 4: Mounting the SCADAPack 4203 DR to a Pipe or Surface**

## Positioning the Transmitter Housing

The SCADAPack 4203 DR housing (top works) can be rotated up to one full turn in the counterclockwise direction when viewed from above for optimum access to adjustments, display, or conduit connections.

Do not rotate the housing more than one turn from the “as received” position. If there is doubt about the housing rotational position, turn fully clockwise and then back off no more than one full turn.

The small setscrew on the housing keeps the housing from being rotated too far. Damage to the housing can occur if this setscrew is tampered with.

## Manifold Types and Installation

Several manifold models are available to interface a transmitter with the process piping. The PGI-M573 has ½” FNPT inlets and ½” FNPT outlets, while the PGI-M673 has ½” FNPT inlets and Instrument Flange outlets. Two options are

available. The CDT option is of carbon steel construction while the SDJ option uses 316SS NACE construction (140F max) and has a fluorosilicone stem seal.

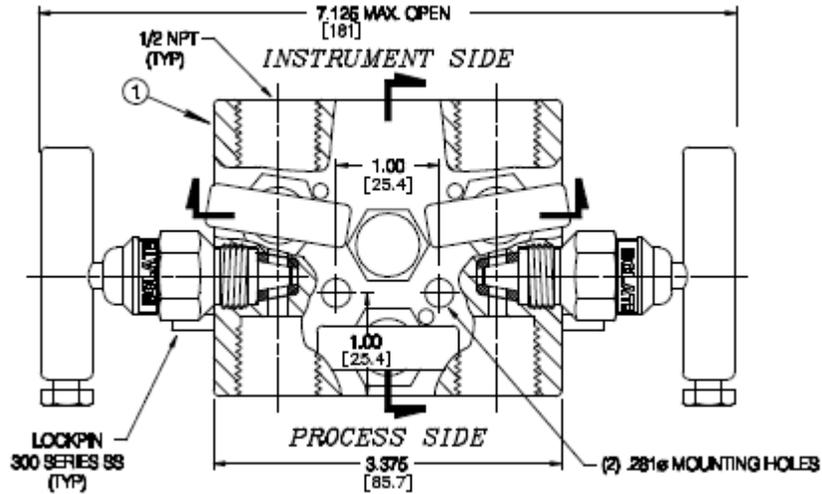


Figure 5: PGI-M573 Five Valve Manifold

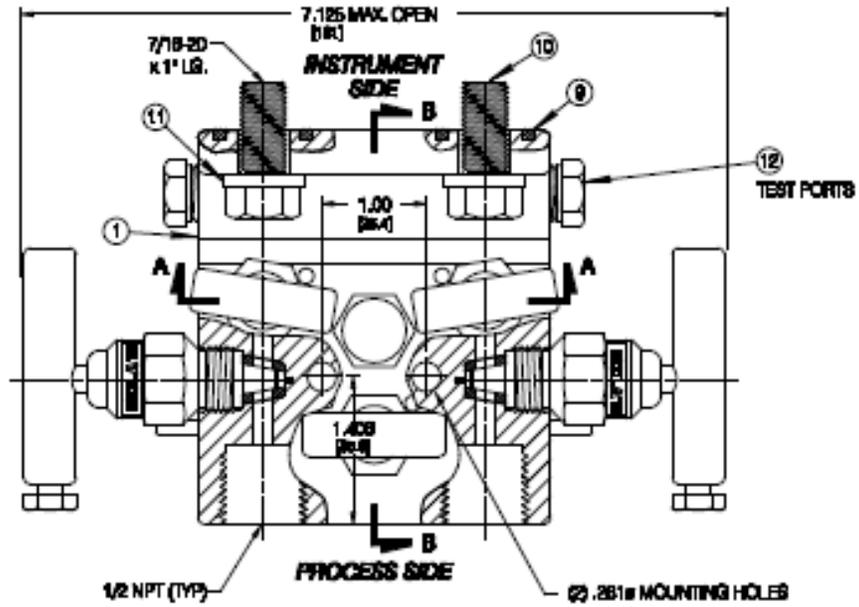
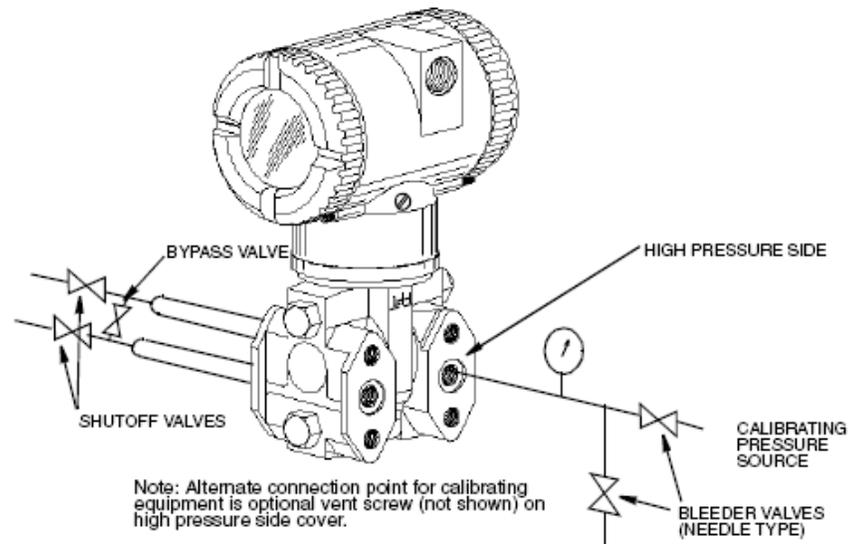


Figure 6: PGI-M673 Five Valve Manifold

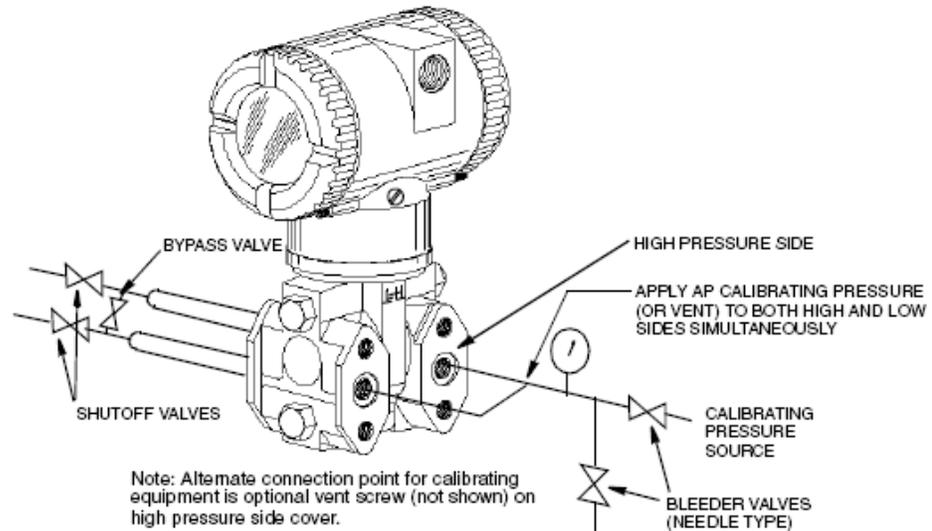
The bolts to mount the PGI-M673 model to the sensor are 7/16-20 x 1"

## Connections For Sensor Calibration

It should be noted that when an Absolute (Static) Pressure calibration is performed the bypass or cross feed valve on the manifold must be open. When performing a Differential Pressure calibration the bypass valve must be closed.



**Figure 7: Differential Pressure Calibration Connections**



**Figure 8: Absolute Pressure Calibration Connections**

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## Optional Display Module

The optional display module is used to provide local display of meter run data. The display may be configured using the SCADAPack 4000 Configurator, Realflo, Flow Computer commands, or Modbus Register Mapping. The data to display and the interval between the displayed items is user defined.

The SCADAPack 4000 Configurator is installed from the Hardware Documentation CD. When installed on your PC, it is found in the Windows || Programs || Schneider Electric || 4000 program group. Refer to the online help document of this program for additional assistance in configuring your transmitter display.

The SCADAPack transmitter can also be configured using the Realflo application. Refer to the MVT Configuration commands section of the Realflo User and Reference manual for complete information on using Realflo to configure the Display Module.

The Display Control Configuration section of the TeleBUS Protocol Section of the Realflo User and Reference manual provides the information for using the Display Module with Flow Computer commands.

The Modbus Register Mapping section of this manual contains information on configuring the Display Module using Modbus registers.

Configuring a SCADAPack transmitter using the local display is possible with older transmitters only. See the application note "Configuring an older SCADAPack transmitter using the Local Display.pdf", located in the same directory as this document, for a detailed procedure. Newer SCADAPack transmitters no longer have this configuration menu available off the local display, and have to be configured using other means as noted above. If you cannot access the menu, it is not available on your transmitter version.

## Adding the Optional Display

To add the optional display, refer to *Figure 9* and proceed as follows:

Turn off the transmitter power source.

Remove the electronics compartment cover by rotating it counterclockwise. Screw in the cover lock if applicable.

Plug the display into the receptacle at the top of the electronics assembly.

Seat the O-ring in its groove in the display housing. Then insert the display into the electronics compartment by grasping the two tabs on the display and rotating it approximately 10° in a clockwise direction.

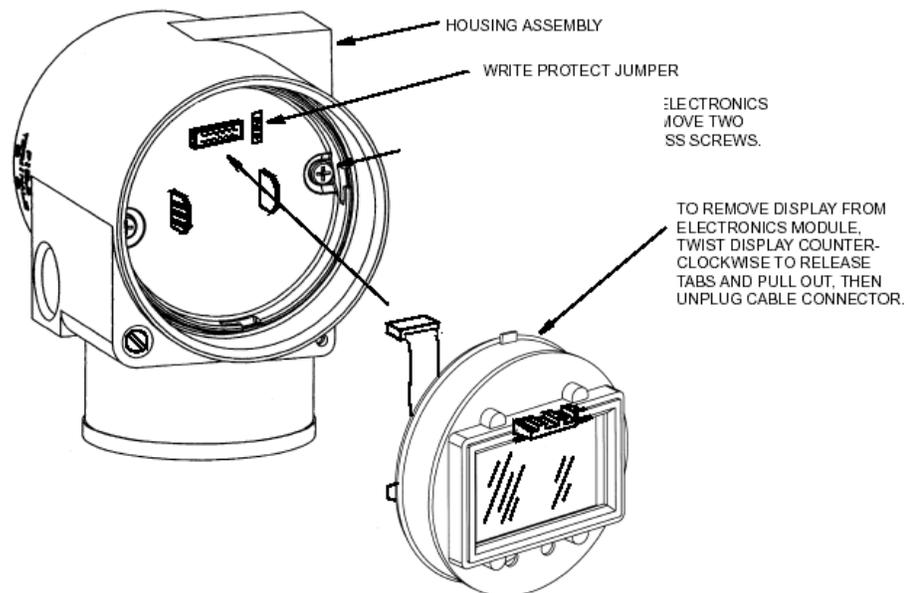
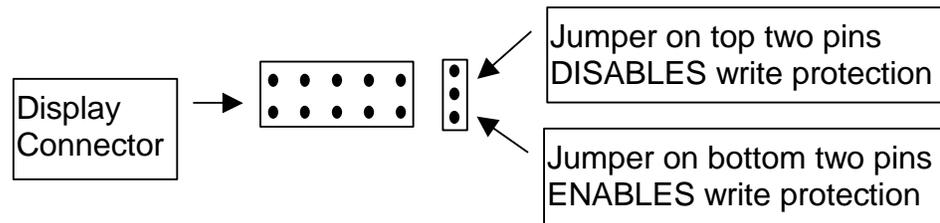
Install the new cover (with a window) onto the housing by rotating it clockwise until the O-ring contacts the housing; then continue to hand tighten it as much as possible (at least 1/4 turn). If cover locks are present, align the serration in the cover with the lock and unscrew the lock until it extends into the cover serration. Turn on the transmitter power source.

## Write Protect Jumper

The write protect jumper is located to the right of the display connector as shown in figure 3. The jumper is used to connect two of the three pins on the write protect header.

- Connecting the top two pins with the jumper disables the write protection.
- Connecting the bottom two pins with the jumper enables the write protection.

See the *Write Protect Jumper* section for information on the effects of the Write Protect jumper.



**Figure 9: Optional Display and Write Protect Jumper**

The optional display can be rotated within the housing to any of four positions at 90° increments.

To do this, grasp the two tabs on the display and rotate it about 10° in a counterclockwise direction. Pull out the display. Check that the O-ring is fully seated in its groove in the display housing. Turn the display to the desired

position, reinsert it in the electronics module, aligning the tabs on the sides of the assembly, and twist it in the clockwise direction.

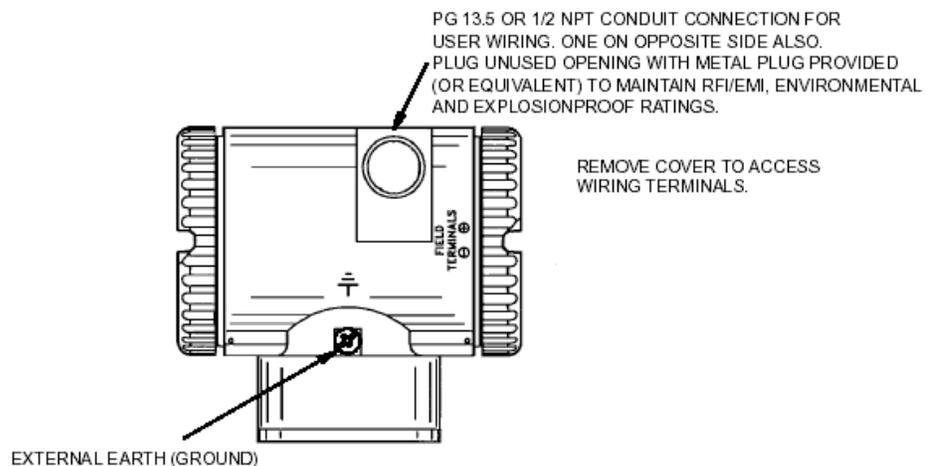
## Transmitter Wiring

The installation and wiring of the transmitter must conform to local code requirements.

**Note for North America:** Seal not required when installed with rigid conduit per requirements of the applicable electrical code. When using instrument cable approved for the hazardous location, a seal must be made with an approved cable gland or conduit seal per the requirements of the applicable electrical code.

**Note for ATEX IECEx:** Seal required when installed with rigid conduit per requirements of the applicable electrical code. When using instrument cable approved for the hazardous location, a seal must be made with an approved cable gland or conduit seal per the requirements of the applicable electrical code.

For access to the field terminals, thread the cover lock (if present) into the housing to clear the threaded cover and remove the cover from the field terminals compartment as shown in *Figure 10*. The embossed letters FIELD TERMINALS identify the proper compartment.



**Figure 10: Accessing Field Terminals**

The GFC uses screw termination style connectors for termination of field wiring. These connectors accommodate solid or stranded wires from 16 to 28 AWG. The connectors are removable for field service and replacement purposes. Leave enough slack in the field wiring for the connector to be removed.

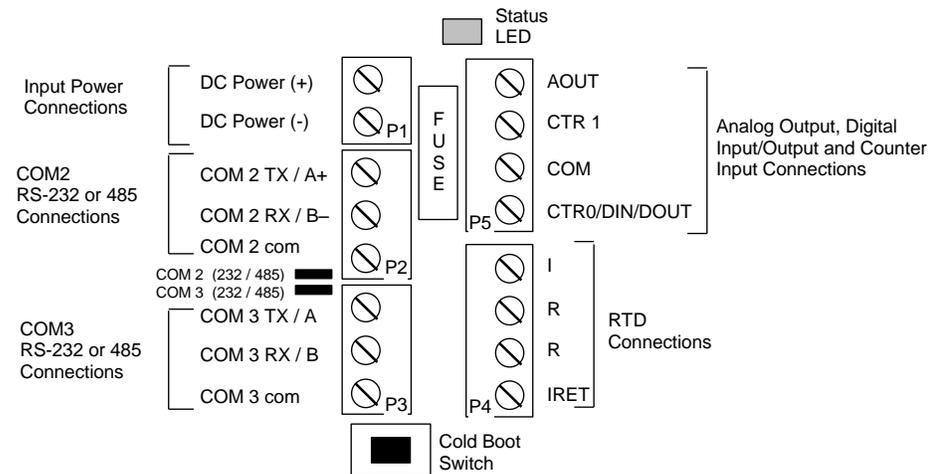
The use of transient/surge protection is recommended in installations prone to high levels of electrical transients and surges.

## ⚠ CAUTION

Remove power before servicing unit.

The transmitter threaded end cap with the terminal board wiring diagram is installed on the housing end that has the terminal board. This is a Class 1, Div. 2 Hazardous Locations requirement.

There are five connectors for field wiring. Refer to *Figure 11: Terminal Board Layout* for connector locations. Connector pinouts and wiring examples are described in each of the respective sections of this manual.



**Figure 11: Terminal Board Layout**

## Power Supply

The SCADAPack 4203 DR is powered from a 9 to 30VDC input power source.

- Input power is applied to the +PWR and –PWR terminals on connector P1.

Refer to section *Specifications* of this manual for the minimum and maximum operating voltages and input power requirements.

- When the input voltage is below the minimum recommended voltage the GFC will turn off.
- Exceeding the maximum input voltage or applying a reverse voltage may damage the GFC. External Fusing is recommended on early production of these models.

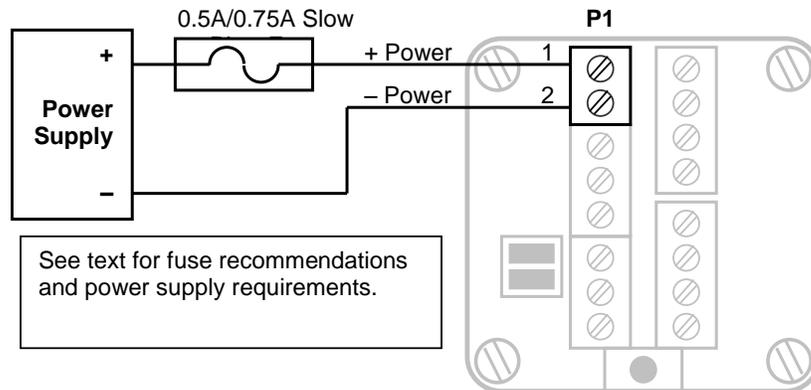
## Fusing

The SCADAPack 4203 DR requires fusing on the power supply inputs. This fusing is included on the terminal board. The fuse is located between connectors P1 and P5. Remove these connectors to have access to the fuse. The

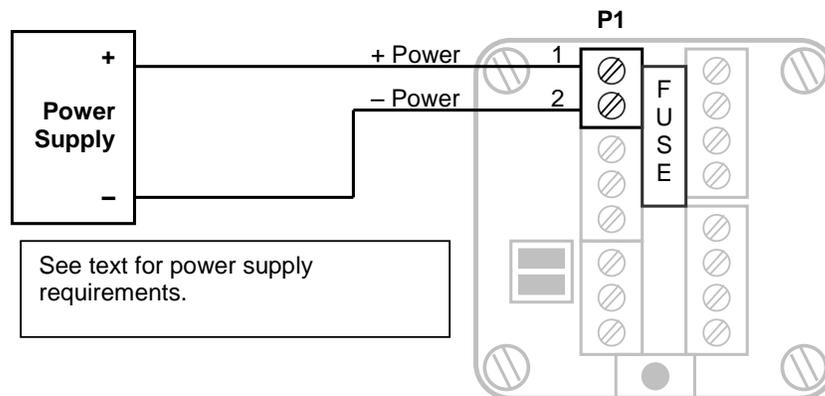
replacement fuse is a Littelfuse R452.750 for the transmitter. See *Figure 13: Input Power Wiring with Internal Fuse*.

Littelfuse R452.750 is available from Schneider Electric as part number TBUM200094.

External Fusing is recommended on early production DR transmitters. Use a 0.75A Slow Blow Fuse for the SCADAPack 4203 DR as shown in *Figure 12: Input Power Wiring with External Fuse*.



**Figure 12: Input Power Wiring with External Fuse**



**Figure 13: Input Power Wiring with Internal Fuse**

## System Grounding

The SCADAPack 4203 DR circuitry is electrically isolated from the housing for voltages up to 550Vac. Terminal board connections labeled COM on connectors P2, P3 and P5 are tied together and connected to -PWR on the input power terminal block P1. The Serial Communication Ports, Counter/Digital Inputs, Analog Outputs and Input Power share the same electrical common.

## Internal Analog Input

A SCADAPack 4203 DR transmitter has one internal analog input. These internal analog inputs are accessed from the user application program. The analog input monitors the supply voltage.

The analog input returns 16-bit integer values. Valid values are 0 to 32700. The input value is scaled to represent the voltage in mV with 100mV resolution.

For Telepace applications use:

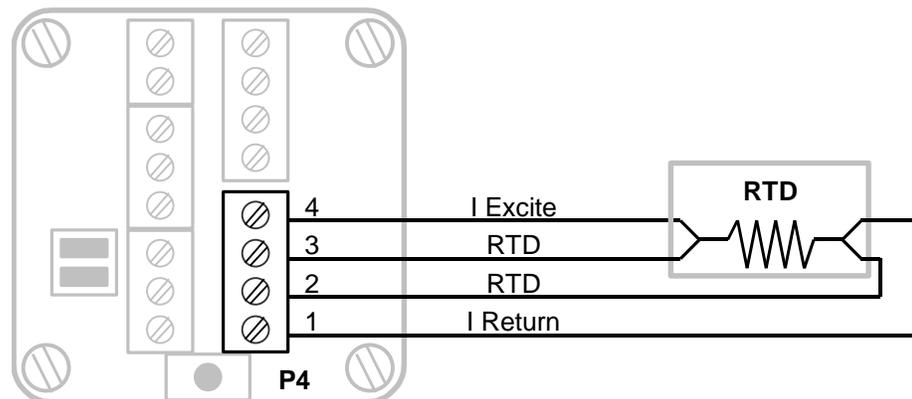
- The **4203 DR/4202 DR Extended I/O** module register assignment to read the supply voltage in mV on a SCADAPack 4203 DR.

For IEC 61131-1 applications use:

- The **ss4203dr** complex equipment to read the supply voltage in mV on a SCADAPack 4203 DR.

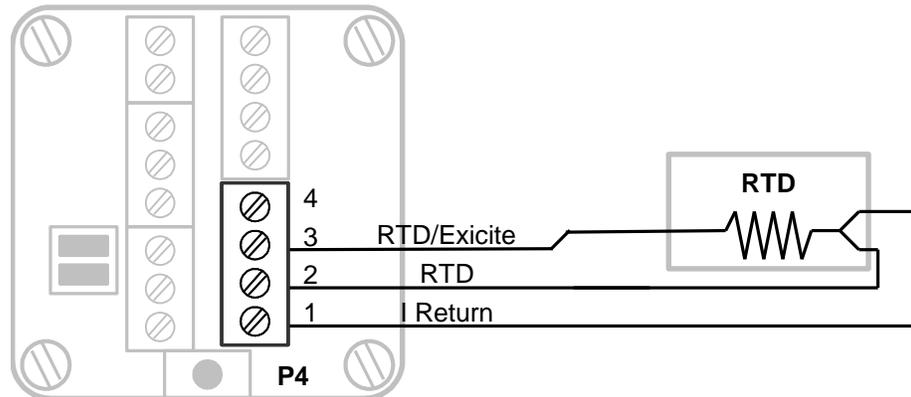
## RTD Input

The SCADAPack 4203 DR requires a connection to an RTD. A 4-wire connection to the RTD is recommended for the highest accuracy. Refer to *Figure 14: Transmitter 4-Wire RTD Wiring* for wiring information for 4-Wire RTDs to the transmitter.



**Figure 14: Transmitter 4-Wire RTD Wiring**

A 3 wire RTD can be used with a minimal reduction in accuracy in the transmitter. When using 3 wire RTDs run 4 wires as long as possible from the terminal board to the RTD. See *Figure 15* for wiring information for 3-Wire RTDs to the transmitter.



**Figure 15: Transmitter 3-Wire RTD Wiring**

A 3 wire RTD can be used with the SCADAPack 4203 DR. The transmitter RTD circuitry will compensate for the resistance in the connection to pin 3. See *Figure 15* for wiring information for 3-Wire RTDs on the transmitter.

The transmitter RTD inputs have been declared as non-incendive for use in Class 1 Div. 2 Hazardous locations. Ordinary wiring methods can be used in accordance with the NEC and CEC.

## Analog Output

The SCADAPack 4203 includes one 0-20mA current sinking analog output. The analog output is a sinking type in the sense that it limits the current flowing through its terminals to 0-20mA. When a value of 0 is written to the D/A converter, the analog output allows 0mA of current flow through its terminals. When a value of 32760 is written to the D/A converter, the analog limits the current flow through its terminals to 20mA. Given that the analog output is referenced to a power source, these currents have to be provided through an external load.

Refer to the appropriate software manual for information on using the analog output in application programs. For Telepace and IEC 61131-1 applications refer to the Register Assignment or I/O Complex Equipment respectively, for the controller.

When a sinking analog output is wired to an external device confirm the operating characteristics of the analog output are considered. As can be seen in *Figure 16: Analog Output Wiring* the LOAD does not connect to ground at any point. The LOAD must be able to float above ground in order for the analog output to function. Connect the analog output to a differential input device

For example, in the wiring example shown in Figure 10, the points A and B will each be at a positive voltage based on the sinking current output, the LOAD resistance and the Power Supply voltage.

For a sinking current of 0 mA, a LOAD resistance of 250 Ohms and a power supply voltage of 24VDC the voltage at both A and B points is 24VDC.

For a sinking current of 20 mA, a LOAD resistance of 250 Ohms and a power supply voltage of 24VDC the voltage at point B is 24VDC and the voltage at point A is 24VDC minus 5VDC (20 mA x 250 Ohms) or 19VDC.

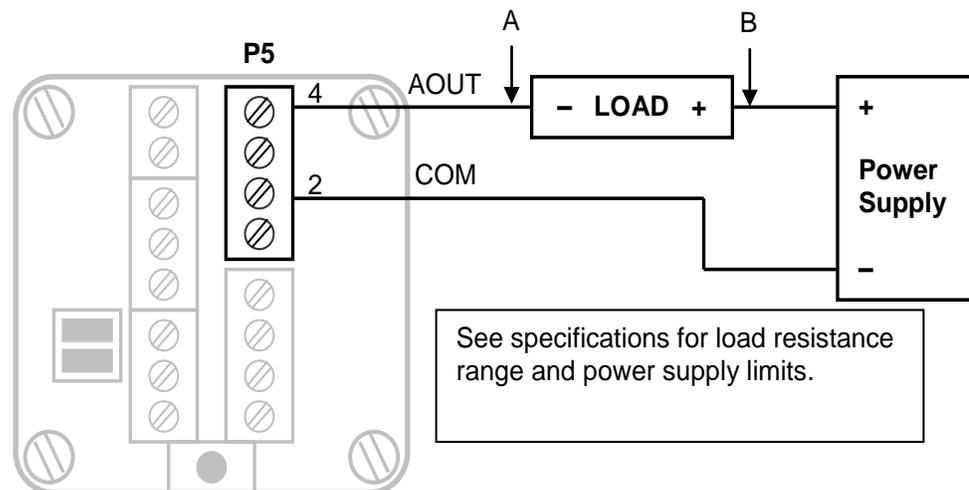
The LOAD cannot be connected to ground in any wiring configuration for the analog output.

## NOTICE

### UNEXPECTED EQUIPMENT OPERATION

Analog output signals must be shielded using Belden 9322 or equivalent, when the unit is operating in an electrically noisy environment or to meet the requirements of EN61000-6-2.

**Failure to follow these instructions can result in equipment damage.**



**Figure 16: Analog Output Wiring**

### Current Outputs

The analog output is a sinking output that is not ground referenced. The load connects between connector P5, pin 4 and a positive power supply as shown in *Figure 16: Analog Output Wiring*. Refer to the *Specifications* section for power supply limits and load resistance ranges.

### Voltage Outputs

To obtain voltage outputs, connect a load resistor in the current output. Connect the voltage device across the load resistor. The table below list resistance values and output range settings for two common voltage ranges. The resistance value listed is the parallel resistance of the device and the load resistor.

Voltage Range	Resistance	Output Range
0 to 5V	250 $\Omega$	0-20mA
0 to 10V	500 $\Omega$	0-20mA

### Analog Outputs Data Format

The analog output has a 12-bit, unipolar, digital to analog converter. There are 4096 counts in the output signal range. The 0-20mA output range resolution is 4.88 $\mu$ A/count. The table below shows the output current for several D/A values. Given that the analog output is referenced to a power source, these currents have to be provided through a load.

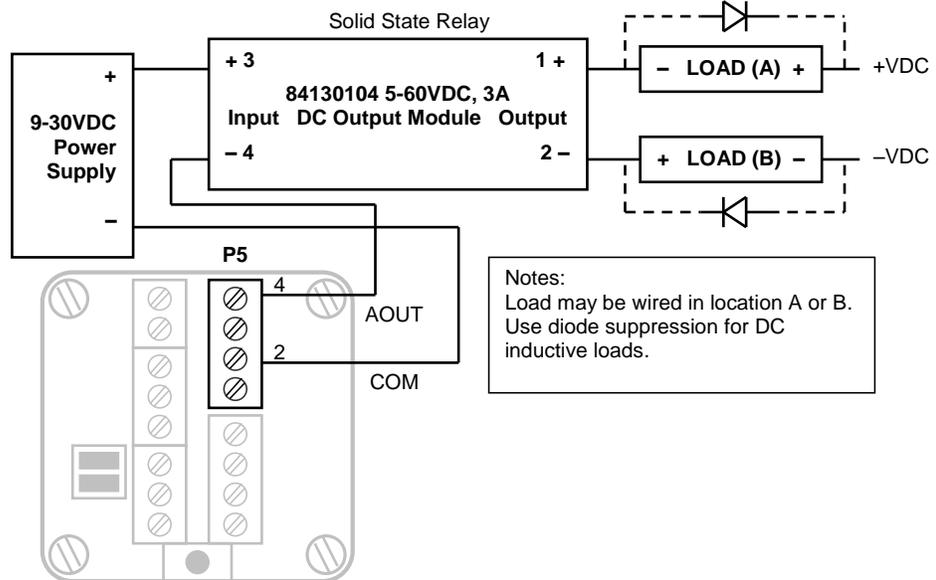
D/A Value	Current
0	0mA
8	4.88 $\mu$ A
6552	4mA
16384	10mA
24576	15mA
32760	19.995mA

### Digital Output Control with External Relay

The analog output can be used to control an external relay. Electromechanical or solid state relays that meet the output requirements of the analog output can be used. An example of AC and DC digital outputs is shown using solid state relay modules. These examples use DIN rail mounted output modules from Crouzet/Gordos. These modules have a 4-32VDC input range.

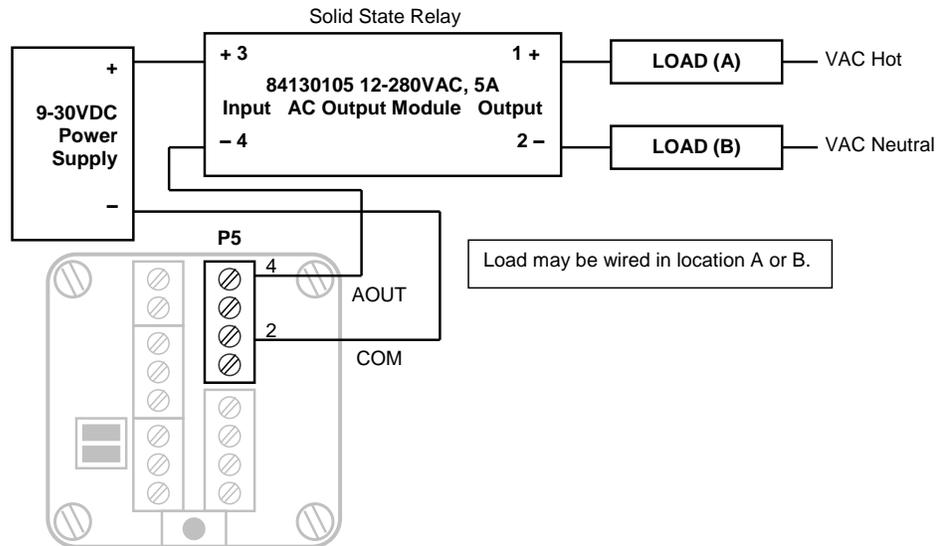
Turn OFF an output module by writing 0 to the Analog Output. Turn ON an output module by writing 32767 (20mA) to the Analog Output. Lower currents can be used to save power. Refer to the relay specifications for the input requirements for the selected relay.

Model 84130104 is a 5-60VDC, 3A DC output module with integrated fuse. Refer to *Figure 17: DC Digital Output Wiring Example* for wiring details.



**Figure 17: DC Digital Output Wiring Example**

Model 84130105 is a 12-280VAC, 5A AC output module with integrated fuse. Refer to *Figure 18: AC Digital Output Wiring Example* for wiring details.



**Figure 18: AC Digital Output Wiring Example**

## Digital I/O and Counters

The SCADAPack 4203 DR has a turbine meter counter input identified as CTR1. Counter input CTR1 includes a built in pre-amplifier and is designed to work with turbine meter inputs. This counter input operates as a counter only.

In addition to the turbine meter input the SCADAPack 4203 DR has a multi-purpose counter input and digital input/output connection identified as CTR0/DIN/DOOUT.

The CTR0/DIN/DOOUT counter / input is used with open collector or drain output devices, relay contacts or switches. The CTR0/DIN/DOOUT digital output is an open drain (sinking) digital output.

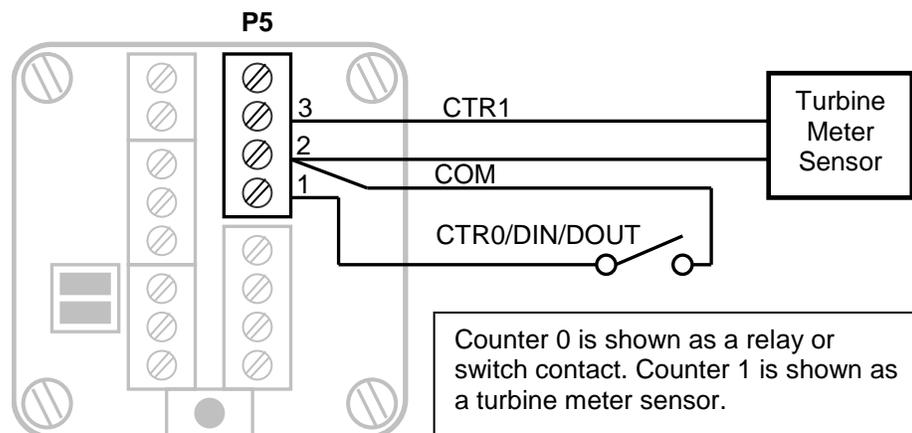
## NOTICE

### UNEXPECTED EQUIPMENT OPERATION

Counter input signals must be shielded using Belden 9322 or equivalent, when the unit is operating in an electrically noisy environment or to meet the requirements of EN61000-6-2.

**Failure to follow these instructions can result in equipment damage.**

Refer to the appropriate software manual for information on using counter Inputs in application programs. For Telepace applications and IEC 61131-1 applications, refer to the Register Assignment and I/O Complex Equipment respectively for the GFC.



**Figure 19: Digital and Counter Input Wiring**

### Turbine Meter Counter Input - CTR1

The SCADAPack 4203 allows for the direct connection to one turbine meter sensor. These sensors produce millivolt outputs and an external pre-amplifier is not required when used with the transmitter. The turbine meter input can be used in low noise environments with shielded cabling. Counter 1 is shown with a direct connection to a turbine meter sensor. Shielded wiring is used and the shield should be connected at one end only. There is an enclosure ground connection that can be used for this purpose.

### Counter / Digital Input - CTR0/DIN/DOUT

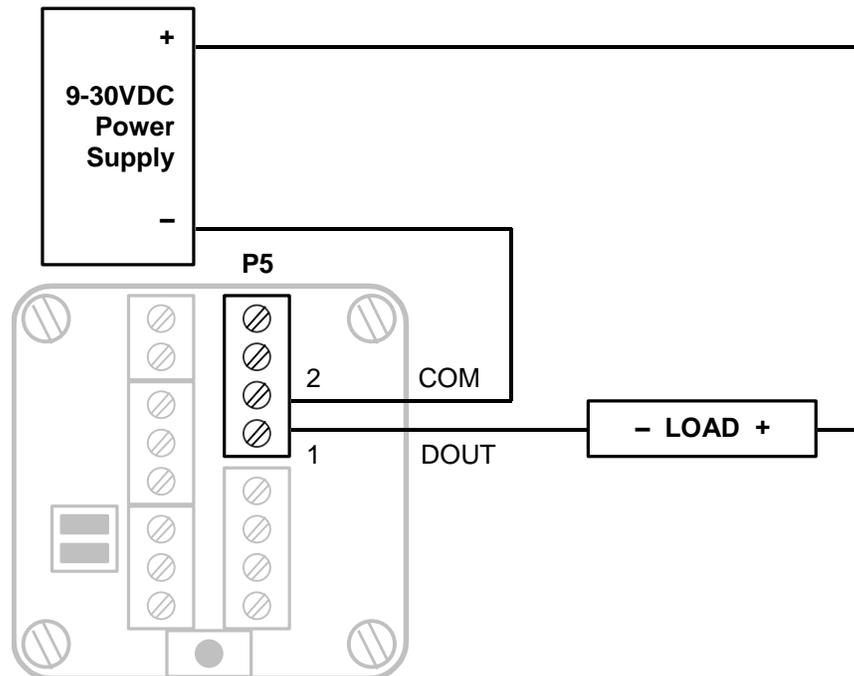
The counter/digital input is used to count or monitor contact closures and open collector/drain devices. The input circuitry provides 5mA of wetting current for the contact.

Refer to *Figure 19: Digital and Counter Input Wiring* for examples of wiring to this input. This input shares a Common with CTR1.

The CTR0/DIN/DOUT counter digital input is a high-speed input. Check that the applied input is free of contact bounce.

### Digital Output - CTR0/DIN/DOUT

The CTR0/DIN/DOUT is an open drain (sinking) digital output. The output is typically used to control 12VDC to 24VDC loads with currents up to 500mA. The positive side of the load connects to a +ve (30VDC maximum) power supply. The negative side of the load connects to connector P5, 1. Refer to *Figure 20: Digital Output Wiring Example* for wiring details.



**Figure 20: Digital Output Wiring Example**

## Serial Communication

The SCADAPack 4203 DR is equipped with two serial communication ports for user interface to the controller. Both serial communication ports support RS-232 serial communication and RS-485 serial communication.

In addition to these two serial ports these GFC's have an internal serial port defined as COM1. This serial port is not assessable by users and is used for communication between the controller and the sensor.

User serial ports on the transmitter are designated COM2 and COM3. Connections to COM2 and COM3 are made using removable 3 position terminal blocks.

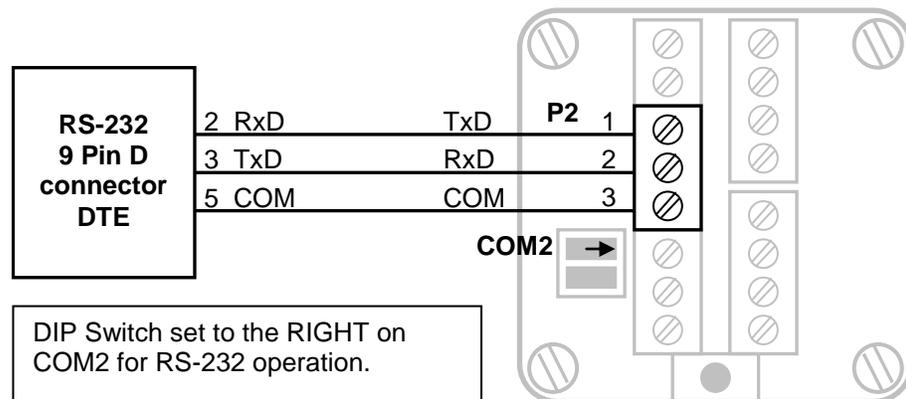
### RS-232 Serial Communications Ports

Both COM2 and COM3 are capable of RS-232 operation. RS-232 operation is selected by installing the appropriate jumper link on the terminal board labeled COM2 and COM3. RS-232 operation uses RxD, TxD and COM signals. Refer to *Figure 21: COM2 RS-232 Wiring* and *Figure 22: COM3 RS-232 Wiring* for connector wiring descriptions.

#### NOTES:

- The low power transmitters used in COM2 and COM3 generate 0 to 5V levels. This is less than the RS-232 specification but still compatible with RS-232 receivers. Cables should be limited to a maximum of 10 ft (3m).
- Shielded cable should be used to isolate the signals from noise and to comply with FCC and CE regulatory requirements. The shield is connected to Ground at one end only.

### RS-232 Wiring Examples



**Figure 21: COM2 RS-232 Wiring**

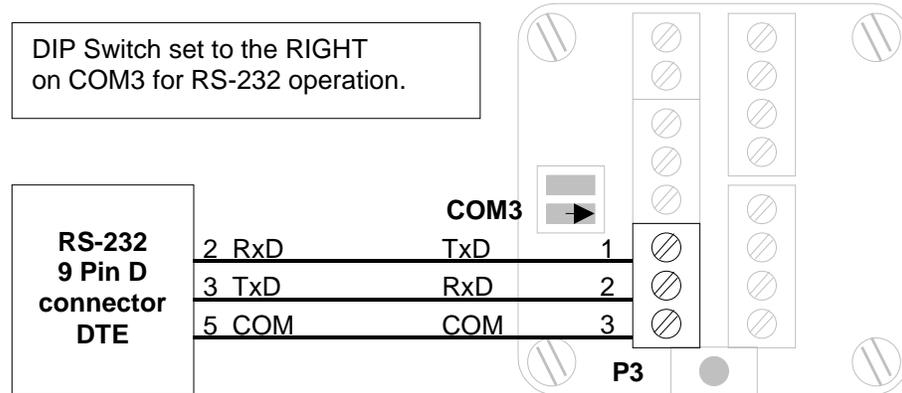


Figure 22: COM3 RS-232 Wiring

### COM1 RS-232 Serial Port Settings

The following table shows the serial and protocol communication parameters supported by COM1. These parameters are fixed and cannot be changed by users.

Parameter	Supported Values
Baud Rate	4800
Duplex	Full
Parity	None
Data Bits	8 Bits
Stop Bits	1 Bit
Receive Flow Control	None
Transmit Flow Control	None
Protocol	Sensor

### COM2 RS-232 Serial Port Settings

The following table shows the serial and protocol communication parameters supported by COM2. These parameters are set from Telepace, IEC 61131-1 or from an application program running in the controller. Default values are set when a Cold Boot or Service Boot is performed on the controller.

Parameter	Supported Values
Baud Rate	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200 Default: 9600
Duplex	Full and Half Default: Half
Parity	Odd, None or Even      Default: None
Data Bits	7 or 8 Bits                  Default: 8 Bits

Parameter	Supported Values
Stop Bits	1 or 2 Bits      Default: 1 Bit
Receive Flow Control	None
Transmit Flow Control	None
Station	1 to 65534      Default: 1
Protocol	None, Modbus RTU or Modbus ASCII, DF1 and DNP. Default: Modbus RTU
Addressing Mode	Standard or Extended      Default: Standard

### COM3 RS-232 Serial Port Settings

The following table shows the serial and protocol communication parameters supported by COM3. These parameters are set from Telepace, IEC 61131-1 or from an application program running in the controller. Default values are set when a Cold Boot or Service Boot is performed on the controller.

Parameter	Supported Values
Baud Rate	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200 Default: 9600
Duplex	Full and Half Default: Half
Parity	Odd, None or Even      Default: None
Data Bits	7 or 8 Bits      Default: 8 Bits
Stop Bits	1 or 2 Bits      Default: 1 Bit
Receive Flow Control	ModbusRTU      Default: ModbusRTU
Transmit Flow Control	Ignore CTS or None      Default: None
Station	1 to 65534      Default: 1
Protocol	None, Modbus RTU or Modbus ASCII, DF1 and DNP. Default: Modbus RTU
Addressing Mode	Standard or Extended      Default: Standard

### RS-485 Serial Communications Ports

Both COM2 and COM3 are capable of 2 wire RS-485 operation. RS-485 operation is selected by removing the appropriate jumper link on the terminal board labeled COM2 and COM3. RS-485 operation uses A+ and B- signals. Refer to *Figure 23: COM2 RS-485 Wiring* and *Figure 24: COM3 RS-485 Wiring* for connector wiring descriptions.

RS-485 uses balanced differential signals. Proper RS-485 operation requires that devices communicating on the signal pair be referenced to the same point. In the transmitter, this reference point is established by the devices connected to the

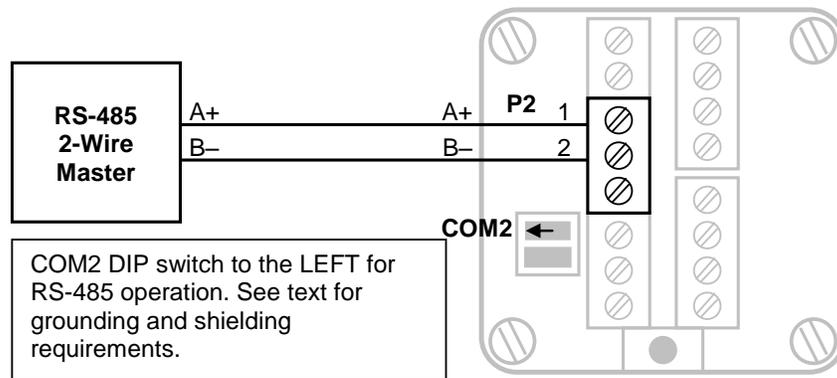
Power Input and I/O. The incoming power (–PWR on P1,1) will generally establish the reference point.

The RS-485 serial communication ports transmit and receive differential voltages to other RS-485 devices on a network. The RS-485 specification allows a maximum of 32 devices connected on a single RS-485 network. The specification for RS-485 recommends that the cable length should not exceed a maximum of 4000 feet or 1200 meters. Termination resistors are required when using long cable lengths and high baud rates. Refer to section *0-RS-485 Termination Resistors* for information on termination resistors.

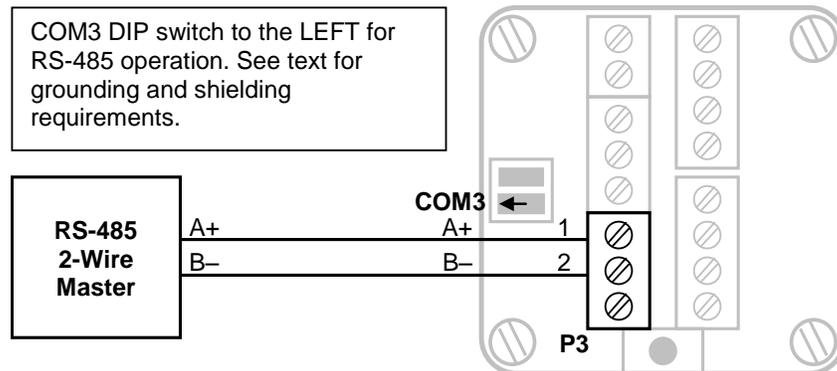
The signal grounds of the RS-485 devices in the network are not connected together but instead are referenced to their respective incoming electrical grounds. The grounds of the RS-485 devices on the network must be within several volts of each other.

Shielded cable should be used to isolate the signals from noise and to comply with FCC and CE regulatory requirement. The shield is connected to Ground at one end only.

### RS-485 Wiring Examples



**Figure 23: COM2 RS-485 Wiring**



**Figure 24: COM3 RS-485 Wiring**

## RS-485 Bias Resistors

The RS-485 receiver inputs on the SCADAPack 4203 DR are biased so that received data is driven to a valid state (space) when there are no active drivers on the network. The value of these bias resistors is 5100 ohms from Ground to the B- input and 5100 ohms from +5V to the A+ input.

## RS-485 Termination Resistors

Termination resistors are required in long networks operating at the highest baud rates. Shorter networks in high noise environments may also benefit from terminations. Networks as long 1000 ft. operating at 9600 baud will function without termination resistors. Terminations should be considered if the baud rate is higher and the network is longer.

When termination resistors are required, they are installed on the first and last station on the RS-485 wire pair. Other stations should not have termination resistors.

RS-485 networks are generally terminated with 120-ohm resistors on each end. The required 120-ohm resistor is supplied and installed by the user. When using termination resistors it is necessary to increase the line biasing by adding lower value bias resistors in order to generate at least 0.2V across RS-485 line. The suggested value of the bias resistors is 470 ohms. One bias resistor is installed from the RS-485 line B- to COM. The second bias resistor is installed from the RS-485 line A+ to +5V. +5V is not available on the transmitter but may be available on another device on the RS-485 network.

## COM2 RS-485 Serial Port Settings

The following table shows the serial and protocol communication parameters supported by COM2. These parameters are set from Telepace, IEC 61131-1 or from an application program running in the controller. Default values are set when a Cold Boot or Service Boot is performed on the controller.

Parameter	Supported Values
Baud Rate	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200  Default: 9600
Duplex	Full and Half  Default: Half
Parity	Odd, None or Even      Default: None
Data Bits	7 or 8 Bits      Default: 8 Bits
Stop Bits	1 or 2 Bits      Default: 1 Bit
Receive Flow Control	None
Transmit Flow Control	None
Station	1 to 65534      Default: 1

Parameter	Supported Values
Protocol	None, Modbus RTU or Modbus ASCII, DF1 and DNP. FTDefault: Modbus RTU
Addressing Mode	Standard or Extended Default: Standard

### COM3 RS-485 Serial Port Settings

The following table shows the serial and protocol communication parameters supported by COM3. These parameters are set from Telepace, IEC 61131-1 or from an application program running in the controller. Default values are set when a Cold Boot or Service Boot is performed on the controller.

Parameter	Supported Values
Baud Rate	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200 Default: 9600
Duplex	Full and Half Default: Half
Parity	Odd, None or Even Default: None
Data Bits	7 or 8 Bits Default: 8 Bits
Stop Bits	1 or 2 Bits Default: 1 Bit
Receive Flow Control	ModbusRTU Default: ModbusRTU
Transmit Flow Control	Ignore CTS or None Default: None
Station	1 to 65534 Default: 1
Protocol	None, Modbus RTU or Modbus ASCII, DF1 and DNP. Default: Modbus RTU
Addressing Mode	Standard or Extended Default: Standard

## Operation

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### Operating Modes

A SCADAPack 4203 may start up in RUN, SERVICE, SENSOR BOOT, COLD BOOT, FACTORY BOOT, or REENTRY BOOT modes.

Start up in the RUN mode automatically executes Ladder Logic and C/C++ programs in the controller memory.

Start up in the SERVICE mode stops the programs to allow reprogramming and controller initialization.

Start up in the COLD BOOT mode initializes the controller and erases application programs.

Start up in FACTORY boot reformats the Flash file system, initializes the controller and erases application programs.

REENTRY boot is performed as part of the firmware upgrade process.

Each boot mode is determined by the amount of time that the LED power switch is depressed when power is applied or a board reset occurs.

The boot mode is not performed until the LED power switch is released. As such power can be removed prior to releasing the LED power switch without performing the selected boot mode.

The following sections describe in detail the selection of each operating mode.

### Run Mode

RUN mode is the normal operating mode of the controller. Check that the Cold Boot push button is not pushed when power is applied to start Run mode operation. When power is applied to the controller board:

- The user defined serial communication parameters for COM ports are used.
- If a Telepace Ladder Logic or IEC 61131-1 application program is loaded in RAM, it is executed.
- If a Telepace or IEC 61131-1 C application program is loaded in RAM and the program checksum is correct, it is executed.
- If there is no application program in RAM and there is an application program in flash ROM then the flash ROM program will be executed.
- The controller lock settings and password are used.

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## Service Mode

Service mode is used during application programming and maintenance work. When the controller starts in Service mode:

- The default serial communication parameters are used (see section **Serial Communication** for a description of the default parameters).
- The Sensor driver is installed on Com 1. Com 1 is set to Sensor protocol, 4800 Baud, no parity, 8 data bits and one stop bit.
- The Telepace Ladder Logic or IEC 61131-1 program is stopped.
- The C program is stopped.
- Application programs are retained in non-volatile memory.
- The controller lock settings and password are used.
- Service mode is selected by performing a **Service Boot** using the following procedure:
  - Remove power from the controller.
  - Push and hold the Cold Boot button down.
  - Apply power to the controller.
  - Continue holding the Cold Boot push button down STAT LED turns on solid. This will take about 3 seconds.
  - Release the Cold Boot push button.
- The Service Boot remains in effect until the GFC is reset.

If the Cold Boot push button is released before the STAT LED turns on, the controller will start in RUN mode.

## Sensor Mode

The Sensor Mode allows direct communication with the sensor electronics. This mode is provided to allow use of applications and tools that communicate directly with the sensor electronics. When the controller starts in Sensor mode:

- The com1 and com2 serial ports operate at 4800 baud, no parity, 8 data bits, and one stop bit.
- The com3 serial port does not function.
- Sensor messages received on com2 are transmitted on com1 with the initial FF removed. Sensor messages received on com1 are transmitted on com2. Sensor timing restrictions are observed when transmitting. In effect, the transmitter is acting as a repeater.
- The Telepace Ladder Logic or IEC 61131-1 program is stopped.
- The C program is stopped.
- No other controller features are available.

Sensor mode is selected by performing a Sensor Boot using the following procedure:

- Remove power from the controller.
- Push and hold the Cold Boot push button down.
- Apply power to the controller.
- A Sensor boot occurs when the Cold Boot push button is pushed and held for between 15 and 30 seconds. The STAT LED blinks rapidly after 15 seconds to indicate the Sensor boot mode is selected.
- The STAT LED will blink short, short, long while the controller is in the Sensor mode.
- The Sensor Boot remains in effect until the controller is reset.

If the Cold Boot push button is released before the STAT LED starts to blink rapidly the controller will start in Service mode.

## Cold Boot Mode

Cold Boot mode is used after installing new controller firmware or when it is desirable to initialize the 4203 DR to its default state. When the controller starts in Cold Boot mode:

- The default serial communication parameters are used (see section **Serial Communication** for a description of the default parameters).
- The Sensor driver is installed on com1. Com1 serial port parameters are set to 4800-baud, no parity, 8 data bits, and one stop bit.
- The Telepace Ladder Logic or IEC 61131-1 programs are erased.
- The C program is erased.
- The registers in the I/O database or I/O Connection are initialized to their default values.
- The Register Assignment is erased.
- The controller is unlocked.

Cold Boot mode is selected by performing a Cold Boot using the following procedure:

- Remove power from the controller.
- Push and hold the Cold Boot push button down.
- Apply power to the controller.
- A Cold Boot occurs when the Cold Boot push button is pushed and held for more than 30 seconds. The STAT LED blinks slowly after 30 seconds to indicate the Cold Boot mode is selected.

If the Cold Boot push button is released before the STAT LED starts to blink slowly the controller will start in Sensor mode.

## Factory Boot Mode

FACTORY BOOT mode is used to reformat the Flash File system and initialize the SCADAPack 4203 controller to factory default settings. When the controller starts in FACTORY BOOT mode:

- The default serial and Ethernet communication parameters are used (see section **Serial Communication** for a description of the default parameters).
- The Telepace Ladder Logic or IEC 61131-1 and C Tools programs are erased.
- The C program is erased.
- The registers in the I/O database or I/O Connection are initialized to their default values.
- The Register Assignment is erased.
- The controller is unlocked.
- Flash File system is reformatted.

FACTORY BOOT mode is selected by performing the following procedure:

- Remove power from the SCADAPack controller.
- Hold down the LED POWER button.
- Apply power to the SCADAPack controller.
- Continue holding the LED POWER button for longer than 30 seconds until the STAT LED turns solid.
- Release the LED POWER button.

The FACTORY boot will take approximately 60 seconds to complete. During this time the controller may appear unresponsive while the file system is being formatted to fix any corruption. The STAT LED will remain on until the FACTORY boot has completed.

## Boot Mode Effects

The table below summarizes the effects of the various boot modes.

Run Boot	Service Boot	Cold Boot	Factory Boot	Re-entry Boot	Action
		X	X		IP Address set to default
	X	X	X		Serial settings set to default
		X	X		Lock settings set to default
	X	X	X		S&F settings set to default
		X	X		LED power set to default
		X	X		Register assignment erased

Run Boot	Service Boot	Cold Boot	Factory Boot	Re-entry Boot	Action
		X	X	IEC 61131-1- Yes Telepace if upgrading from firmware before 1.40	Database initialized
		X	X	IEC 61131-1 – Yes Telepace if upgrading from firmware before 1.40	Logic application erased
		X	X		C/C++ Applications Erased
		X	X		Application files are erased
			X		Flash File System reformatted
X					C/C++ Applications started
X					Logic application started
				X	Communication settings on active interface retained
		X	X	X	Settings saved to non- volatile memory
		X	X		Ladder logic in flash is erased
	X	X	X		Protocols are set to defaults

## LED Status Indicator

The STAT LED indicates an alarm condition. The STAT LED blinks when an alarm occurs. The STAT LED turns off when all alarms clear.

The STAT LED blinks a binary sequence indicating alarm codes. The sequences consist of long and short flashes, followed by an off delay of 1 second. The sequence then repeats. The sequence may be read as the Controller Status Code. A short flash indicates a binary zero. A long flash indicates a binary one. The least significant bit is output first. As few bits as possible are displayed, all leading zeros are ignored. The application program defines the values of the alarm codes.

The table below shows the meaning of the sequences.

<b>Sequence</b>	<b>CONTROLLER STATUS CODE</b>
Off	0 = Normal
1 Short, 1 Long	I/O Module communication indication
2 Short, 1 Long	Register Assignment Checksum indication
3 Short, 1 Long	SCADAPack 4203 is in low power mode.

## LED Power Control

The STAT LED on the SCADAPack 4203 DR can be disabled to conserve power. This is particularly useful in solar powered or unattended installations.

The application program sets the default state of the LED power. The state of the STAT LED, on or off, and the time to return to the default state may be set in the Telepace, IEC 61131-1 or C application. The default state is set for ON.

For Telepace applications the CNFG LED Power Settings register assignment is used to control the STAT LED default state and time to return to the default state.

For IEC 61131-1 applications the settled function is used to control the STAT LED default state and time to return to the default state.

## Firmware Loading

Periodically the firmware for a controller is updated to add new features or provide bug fixes. As they become available new firmware versions may be downloaded from <http://www.schneider-electric.com>.

Allowed connection for firmware loading for a SCADAPack 4203 controller is com2 and com3.

## Using Realflo

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Check that the Realflo Application is installed on the PC you are using. If it is not installed then insert the Realflo CD into your CD-ROM drive and run install from the autorun menu.

Open the Realflo Gas Flow application by clicking the *Windows Start* button then selecting *Programs* then select the *Realflo* group and click *Realflo*.

The SCADAPack 4203DR has been configured at the factory with a sample configuration. The following sections will describe how to read, monitor and modify this configuration using Realflo.

### Connect to the SCADAPack Serial Port

The SCADAPack 4203DR have two serial communication ports COM2 and COM3. These serial ports are on connectors, P2 (COM2) and P3 (COM3).

Each serial port may be selected for RS-232 or RS-485 operation using switches COM2 and COM3. These switches are located to the left of connector P3. With the switch in the right hand position the serial port is RS-232 and with the j switch in the left hand position the serial port is RS-485. These jumpers are installed at the factory making both serial ports RS-232.

Connect one of the serial ports to the PC that is running Realflo.

### Open a New Configuration File

From the Realflo window click the *File* menu button and then click *New*. When this is done the *Create New File* dialog is opened.

Select *Read configuration from the Flow Computer* and click the *Next* button. In the Connect to Flow Computer dialog select *Choose/View Communication Settings*. In the PC Communication Settings select Modbus RTU and then configure the *Port* setting for the serial port used on the PC running Realflo. The default serial port settings on the SCADAPack 4203DR are 9600, 8, none, 1.

Click the *Next* button to read the flow run configuration from the SCADAPack 4203DR.

Once the configuration is read from the SCADAPack 4203DR the Save File dialog will open to prompt for a location to save the file. Once a location is selected click the *Next* button and then click the *Finish* button.

### Monitor the Current Flow Readings

From the *Maintenance* menu select *Update Readings* to monitor the flow run parameters. This completes the Getting Started procedure.

---

## Viewing and Modifying Flow Run Configuration

The Flow Run Configuration will need to be modified to suit your application requirements. To view the flow run configuration that was installed at the factory do the following.

From the *Maintenance* menu select *Update Readings* to stop the update.

From the *Configuration* menu select *Flow Run*. In the *Select Run to Configure* dialog check that 1 is selected and click the *OK* button. The *Configuration – Run 1* dialog is opened. The *Configured* windows contain data and the *Actual* windows are blank.

Click the *Read Run* button at the bottom of the dialog. The *Configured* and *Actual* windows will contain the same information.

You can select configuration tabs across the top of the dialog to see the configuration parameters for each tab.

Refer to the Realflo User manual for complete details on the configuration parameters used in each tab.

## Re-Zero Differential Pressure

To compensate for the mounting position effects it is necessary to perform a re-zero of the Differential Pressure.

Follow the steps in the Open Configuration File procedure above to check that you have Realflo opened and are communicating with the SCADAPack 4203DR.

From the *Maintenance* menu select *Calibration*. If *Calibration* selection is greyed out you will need to click on the *Update Readings* selection to stop updating readings.

In the Sensor Calibration dialog select the *Sensor* radio button and click the *Next* button at the bottom of the dialog.

In the Sensor Calibration dialog select the *Calibrate Differential Pressure Sensor* by clicking in the white box at the left of the selection. Then click the *Next* button at the bottom of the dialog.

During the re-zeroing of the Differential Pressure the SCADAPack 4203DR transmitter inputs are forced to either a fixed value or the current value so the flow calculations are not interrupted during the re-zeroing. Select *Current Value* or *Fixed Value* for each input. Then click the *Next* button at the bottom of the dialog.

When the Record As Found Values dialog is displayed the SCADAPack 4203DR transmitter is ready to be re-zeroed. It is recommended that the Differential pressure be zeroed at line pressure. Adjust the manifold or external piping such that the H and L sides of the SCADAPack 4203DR are equalized at line pressure.

In the Record As Found Values dialog enter 0 (zero) for the *Applied Value* and click the *Record* button. Then click the *Next* button at the bottom of the dialog.

If the Applied Value and the Measured Value are not within the transmitter accuracy then re-zeroing will be required. Select the *Yes* radio button. If the Applied and Measured values are within the transmitter accuracy select *No*. Then click the *Next* button at the bottom of the dialog.

In the Calibrate Sensor dialog click the *Re-Zero* radio button and enter a value of 0.0 in the *Re-Zero* window. Click the *Re-Zero* button and wait several seconds for the Measured Value to be updated. Once you are satisfied the Measured Value is within specification click the *Next* button at the bottom of the dialog.

In the Record As Left Values dialog enter 0 (zero) for the Applied Value and click the *Record* button. Then click the *Next* button at the bottom of the dialog.

Reconnect the transmitter to the process and then click the *Finish* button.

## Verify Atmospheric Pressure

The Static Pressure sensor on the SCADAPack 4203DR is an absolute pressure sensor. The sensor does not require re-zeroing at the installed location. If you wish to verify the Static Pressure zero you will need a barometer that is at least as accurate as the SCADAPack 4203DR transmitter.

Follow the steps in the Open Configuration File procedure above to confirm you have RealFlo opened and are communicating with the transmitter.

From the *Flow Computer* menu select *Calibration*. If the *Calibration* selection is greyed out you will need to click on the *Update Readings* selection to stop updating readings.

In the Sensor Calibration dialog select the *Sensor* radio button and click the *Next* button at the bottom of the dialog.

In the Sensor Calibration dialog select the *Calibrate Static Pressure Sensor* by clicking in the white box at the left of the selection. Then click the *Next* button at the bottom of the dialog.

During the verification of the Static Pressure, the SCADAPack 4203DR transmitter inputs are forced to either a fixed value or the current value, so the flow calculations are not interrupted during the re-zeroing. Select *Current Value* or *Fixed Value* for each input. Then click the *Next* button at the bottom of the dialog.

When the Record As Found Values dialog is displayed you can remove the transmitter from the process. Once the transmitter is isolated from the process, vent both the high and low sides of the sensor to atmosphere.

In the Record As Found Values dialog enter the reading from your barometer for the *Applied Value* and click the *Record* button. Then click the *Next* button at the bottom of the dialog.

If the Applied Value and the Measured Value are not within the SCADAPack 4203DR transmitter accuracy, then re-zeroing will be required. Select the *Yes* radio button. If the Applied and Measured values are within the transmitter accuracy, select *No*. Then click the *Next* button at the bottom of the dialog.

In the Calibrate Sensor dialog click the *Re-Zero* radio button and enter a value from the barometer in the *Applied Value* window. Click the *Re-Zero* button and wait several seconds for the Measured Value to be updated. Once you are satisfied the Measured Value is within specification click the *Next* button at the bottom of the dialog.

In the Record As Left Values dialog enter the reading from your barometer for the Applied Value and click the *Record* button. Then click the *Next* button at the bottom of the dialog.

Reconnect the transmitter to the process and then click the *Finish* button.

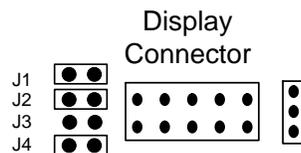
## Industry Canada Lockout

This section applies when:

The SCADAPack 4203DR controller has been purchased as an Industry Canada approved gas flow computer. Refer to the Realflo User and Reference manual for the commands that are disabled in Realflo when the lock out is enabled.

- Firmware version 1.51 is installed, the flow computer option is enabled, the gas flow computer application version 6.74 is installed and jumper J4 has been inadvertently removed from the 4203DR gas flow computer.
- If the Industry Canada lockout is enabled by mistake the firmware will not allow new firmware to be installed. To deactivate the lockout simply insert a jumper into J4 position.

The SCADAPack 4203DR controller uses jumper J4 at the left side of the Display connector to enable or disable the Industry Canada lock out.



J1 - System Jumper, Required

J2 - System Jumper, Required

J3 - Not Used

J4 - Remove for Industry Canada

## Modbus Register Mapping

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The tables in this section of the manual describe the SCADAPack 4203 DR parameters that are assigned to Modbus registers. The registers defined may be read only or read and write registers. The Read/Write column in the tables indicates the register type.

- **Read** indicates the register is read only.
- **Read/Write** indicates the register may be read or written to.

### Write Protect Jumper

The transmitter can be write protected by installing the write-protect jumper. See Figure 9: Optional Display and Write Protect Jumper for the location of the write protection jumper.

- When the write-protect jumper is installed, registers 40001 to 40499 are read only.
- When the write-protect jumper is not installed, the read/write ability corresponds to the table.

When the write protect jumper is changed while the transmitter is powered it may take up to one minute for the change to be recognized.

### Software Write Protect

The Flow Computer must log all changes to measurement parameters. When the flow computer is running the software write-protect is enabled. This prevents Modbus protocol commands and logic applications from writing the transmitter registers.

- When the software write-protect is enabled, registers 40001 to 40499 are read only via Modbus commands, Ladder Logic register access, and IEC 61131-1 register access. C programs can write to the registers in the normal fashion.
- When the software write-protect is disabled, the read/write ability corresponds to the table.

The software write-protect is disabled by default at reset.

### Data Formats

Data formats defined in the table below are used in the 4203 DR controllers.

Table 1: Data Format

Data Type	Registers Required	Description
Integer	1	Unsigned integer in the range 0 to 65535.
Float	2	IEEE single precision floating-point number. The byte order is determined by the contents of the Floating Point Byte Order register, 40132. Floating-point values are stored in two consecutive registers. Read or write both registers in the same Modbus command.
ASCII	1	Two characters are stored in each register. Valid values are any ASCII character. The first character is in the low order byte, the second in the high order byte.  The string is terminated with a NULL (= 0) character if it is less than 8 characters. Set the first register to 0 to indicate a NULL (empty) string.

## Modbus Registers

Table 2: Modbus Registers

Register	Type	Read/Write	Parameter
40001	Integer	Read	<b>Manufacturer's Code</b> This register holds a constant value of 4000. This indicates the transmitter is manufactured by Schneider Electric.
40002	Integer	Read	<b>Type Code</b> This indicates the model of the transmitter. Type Code 42990 = SCADAPack 4203 DR
40003	Integer	Read	<b>Software Revision Level</b> This register holds the revision number of the controller firmware.
40004	Integer	Read	<b>Sensor Software Version Level</b> This register holds the version number of the sensor firmware. This is read from the sensor. It uses the format: MAJOR_VERSION * 100 +

Register	Type	Read/Write	Parameter
			MINOR_VERSION. For example: 1.19 would be viewed as 119 in register 40004.
40005 - 40006			Reserved
40007 - 40008	Integer	Read	<b>Transmitter Serial Number</b> Register 40007 holds the manufacture date as bits in the format YYYYYYYYMMMMDDDDDD, where these bits correspond to Year+1986/Month/Day. Register 40008 holds the core number.
40009	Integer	Read	<b>Sensor Hardware Version</b> This register holds the version number of the sensor hardware. This is read from the sensor.
40010	Integer	Read	<b>Modbus Revision</b> This register holds the Modbus mapping and protocol revision. It is fixed at 1.
40011	Integer	Read/Write	<b>Sensor Type</b> This register selects if the Static Pressure measures gage or absolute pressure. A value of 1 means gage pressure. The gage pressure is calculated by measuring the absolute pressure and adding the contents of register 40399. The user must set the value in register 40399 for the gage pressure to be accurate. A value of 0 means absolute pressure.
40012 - 40014			Reserved
40015	Integer	Read/Write	<b>Baud rate (com2)</b> This register is used to set the baud rate on Com2 of this transmitter. When the value of this register changes, the baud rate on Com2 is changed accordingly. Valid values are:

Register	Type	Read/Write	Parameter
			0 = 75 1 = 110 2 = 150 3 = 300 4 = 600 5 = 1200 6 = 2400 7 = 4800 8 = 9600 (default) 9 = 19200 10 = 38400 11 = 57600 12=115200
40016	Integer	Read/Write	<b>Transmitter Address</b> This register holds the transmitter address. This information comes from the COM2 station number. Changing this value also changes the COM2 serial port settings to the new Modbus station number and makes the settings permanent.
40018 - 40031			Reserved
40032 - 40035	ASCII	Read/Write	<b>Tag name (8 characters)</b> These registers hold the transmitter tag name. The tag name can be up to 8 characters. Two characters are stored in each register. Valid values are any ASCII character.
40036 - 40043	ASCII	Read/Write	<b>Description (16 characters)</b> These registers hold the transmitter description. The description can be up to 16 characters. Two characters are stored in each register. Valid values are any ASCII character.
40044 - 40059	ASCII	Read/Write	<b>Message (32 characters)</b> These registers hold the transmitter message. The message can be up to 32 characters. Two characters are stored in each register. Valid values are any ASCII character.

Register	Type	Read/Write	Parameter
40060	Integer	Read/Write	<p><b>Differential Pressure Units</b></p> <p>This register holds a value representing the engineering units for the differential pressure. Valid values are shown below.</p> <p>2 = Pascals (Pa)  3 = kiloPascal (kPa)  6 = inches of water at 68 F</p>
40061	Integer	Read/Write	<p><b>Static Pressure Units</b></p> <p>This register holds a value representing the engineering units for the static pressure. Valid values are shown below.</p> <p>3 = kiloPascal (kPa)  4 = megaPascal (MPa)  5 = pounds per square inch (psi)</p>
40062	Integer	Read/Write	<p><b>Process Temperature Units</b></p> <p>This register holds a value representing the engineering units for the process temperature. Valid values are shown below.</p> <p>20 = degrees Celsius (C)  21 = degrees Fahrenheit (F)</p>
40063 – 40125			Reserved
40126	Integer	Read/Write	<p><b>Display Scan Interval</b></p> <p>This register controls the display scan interval. It will hold the value in seconds that each reading selected in the Display Control will remain on the display. Valid values will be integers between 2000 and 60000 ms.</p>
40127			Reserved
40128	Bit field	Read/Write	<p><b>Display Control</b></p> <p>This register controls which items are displayed on the display. This register is a bit-mapped field. The following shows the effects of individual bits. When a bit is turned on the floating point value and associated text will be cycled through on the display.</p> <p>Bit 00 = Display DP in transmitter units</p>



Register	Type	Read/Write	Parameter
			<p>IEEE 754 format. Numbers are made up of one sign bit (S), eight exponent bits (E), and twenty-three mantissa bits (M). A number consists of 4 bytes as shown below.</p> <p>Byte A    Byte B    Byte C Byte D</p> <p>SEEE EEEE EMMM MMMM MMMM MMMM MMMM MMMM</p> <p>The only valid value is 0. The register will return 0 when read.</p> <p>0 = A B C D (default, Realflo format)</p> <p>1 = C D A B (not available)</p> <p>2 = D C B A (not available)</p> <p>3 = B A D C (not available)</p>
40133 - 40144			Reserved
40145	Integer	Read	<p><b>com2 framing errors</b></p> <p>This register holds the number of framing errors on com2. This register is cleared when the controller is reset.</p>
40146	Integer	Read	<p><b>com2 parity errors</b></p> <p>This register holds the number of parity errors on com2. This register is cleared when the controller is reset.</p>
40147	Integer	Read	<p><b>com2 overrun errors</b></p> <p>This register holds the number of character-overrun errors on com2. This register is cleared when the controller is reset.</p>
40148	Integer	Read	<p><b>com2 Modbus checksum errors</b></p> <p>This register holds the number of Modbus checksum errors on com2. This register is cleared when the controller is reset.</p>
40149	Integer	Read	<p><b>com2 Modbus commands received</b></p> <p>This register holds the number of Modbus commands received on com2. This register is cleared when the controller is reset.</p>

Register	Type	Read/Write	Parameter
40150	Integer	Read	<b>com2 Modbus responses sent</b> This register holds the number of Modbus responses sent on com2. This register is cleared when the controller is reset.
40151	Integer	Read	<b>com3 framing errors</b> This register holds the number of framing errors on com3. This register is cleared when the controller is reset.
40152	Integer	Read	<b>com3 parity errors</b> This register holds the number of parity errors on com3. This register is cleared when the controller is reset.
40153	Integer	Read	<b>com3 overrun errors</b> This register holds the number of character-overrun errors on com3. This register is cleared when the controller is reset.
40154	Integer	Read	<b>com3 Modbus checksum errors</b> This register holds the number of Modbus checksum errors on com3. This register is cleared when the controller is reset.
40155	Integer	Read	<b>com3 Modbus commands received</b> This register holds the number of Modbus commands received on com3. This register is cleared when the controller is reset.
40156	Integer	Read	<b>com3 Modbus responses sent</b> This register holds the number of Modbus responses sent on com3. This register is cleared when the controller is reset.
40157	Integer	Read	<b>Sensor framing errors</b> This register holds the number of framing errors on Sensor communication with the sensor electronics. This register is cleared when the controller is reset.
40158	Integer	Read	<b>Sensor parity errors</b> This register holds the number of

Register	Type	Read/Write	Parameter
			parity errors on Sensor communication with the sensor electronics. This register is cleared when the controller is reset.
40159	Integer	Read	<b>Sensor overrun errors</b> This register holds the number of character-overrun errors on Sensor communication with the sensor electronics. This register is cleared when the controller is reset.
40160	Integer	Read	<b>Sensor checksum errors</b> This register holds the number of checksum errors on Sensor communication with the sensor electronics. This register is cleared when the controller is reset.
40161	Integer	Read	<b>Sensor commands sent</b> This register holds the number of Sensor commands sent to the sensor electronics. This register is cleared when the controller is reset.
40162	Integer	Read	<b>Sensor responses received</b> This register holds the number of Sensor responses received from the sensor electronics. This register is cleared when the controller is reset.
40164 – 40203			Reserved
40204	Integer	Read	<b>Scaled Integer Method</b> This register is included only for 3095 compatibility. Scaled integers are not supported. The only valid value is 0. The register will return 0 when read.
40205	Integer	Read/Write	<b>Reset to Default Parameters</b> Writing to this register resets the transmitter to default parameters. The transmitter calibration is reset to full scale with an offset of zero. The transmitter should be re-zeroed after this action. A sequence of three numbers is

Register	Type	Read/Write	Parameter
			<p>written to the register to cause a reset. This prevents accidental modification of the register from resetting the parameters. Use the following procedure to reset the parameters.</p> <p>Write the value 493 to the register.</p> <p>Write the value 27254 to the register.</p> <p>Write the value 6003 to the register.</p> <p>To abort the sequence once it is started write any value other than the next value in the sequence.</p> <p>See the <b>Default Parameters</b> table for default values.</p>
40206	Integer	Read/Write	<p><b>Sensor operating mode</b></p> <p>This register controls the operating mode of the transmitter: online mode, offline mode, or calibrate mode.</p> <p>Process values are updated only in the online mode.</p> <p>This register must be set to offline mode before changing engineering units or re-ranging the transmitter.</p> <p>This register must be in either offline mode or calibrate mode before changing the damping values.</p> <p>This register must be set to calibration mode before changing the span or the zero.</p> <p>Changes are not applied until the unit is placed online. Valid values shown below. The default value is 0 (online).</p> <p>0 = online mode, normal operation</p> <p>63 = offline mode, change engineering units, re-range transmitter or change damping values.</p> <p>255 = calibrate mode, change</p>

Register	Type	Read/Write	Parameter
			<p>zero, span or damping values. The display will indicate OFFLINE when the transmitter is in the offline or calibrate modes. The display will operate normally in the online mode. When the transmitter is in offline mode the only valid mode change is to online mode.</p> <p>This register is cleared when the power is lost to the transmitter. The transmitter starts in online mode. If power is lost while in either calibration or offline mode the transmitter may report incorrect measurement values. Should this occur put the GFC in offline mode and write a valid DP Damping value. The GFC will now need to be returned to online mode to complete the recovery.</p>
40207 – 40208	Float	Read/Write	<p><b>1<sup>st</sup> user defined display value</b></p> <p>These registers hold the floating-point value that will be included in the display cycle if the bit to display the 1<sup>st</sup> user defined data set is turned on in the Display Control register. Only values between –9999 and 99999 can be displayed. Any value outside of that range will be replaced by ----- (5 dashes) on the display.</p>
40209 – 40215	ASCII	Read/Write	<p><b>1<sup>st</sup> user defined display text</b></p> <p>These registers hold the text that will be included in the display cycle if the bit to display the 1<sup>st</sup> user defined data set is turned on in the Display Control register. Each register holds 2 ASCII characters. The first 7 ASCII characters will be displayed on line 2 of the display, followed by the second 7 ASCII characters. The</p>

Register	Type	Read/Write	Parameter
			Table 4- <i>Display Module ASCII Characters</i> table below lists the displayable characters.
40216 – 40217	Float	Read/Write	<p><b>2<sup>nd</sup> user defined display value</b></p> <p>These registers hold the floating-point value that will be included in the display cycle if the bit to display the 2<sup>nd</sup> user defined data set is turned on in the Display Control register. Only values between –9999 and 99999 can be displayed. Any value outside of that range will be replaced by ----- (5 dashes) on the display.</p>
40218 – 40224	ASCII	Read/Write	<p><b>2<sup>nd</sup> user defined display text</b></p> <p>These registers hold the text that will be included in the display cycle if the bit to display the 2<sup>nd</sup> user defined data set is turned on in the Display Control register. Each register holds 2 ASCII characters. The first 7 ASCII characters will be displayed on line 2 of the display, followed by the second 7 ASCII characters. The</p> <p>Table 4-<i>Display Module ASCII Characters</i> table below lists the displayable characters.</p>
40225 – 40226	Float	Read/Write	<p><b>3<sup>rd</sup> user defined display value</b></p> <p>These registers hold the floating-point value that will be included in the display cycle if the bit to display the 3<sup>rd</sup> user defined data set is turned on in the Display Control register. Only values between –9999 and 99999 can be displayed. Any value outside of that range will be replaced by ----- (5 dashes) on the display.</p>
40227 – 40233	ASCII	Read/Write	<p><b>3<sup>rd</sup> user defined display text</b></p> <p>These registers hold the text that will be included in the display cycle if the bit to display the 3<sup>rd</sup></p>

Register	Type	Read/Write	Parameter
			<p>user defined data set is turned on in the Display Control register. Each register holds 2 ASCII characters. The first 7 ASCII characters will be displayed on line 2 of the display, followed by the second 7 ASCII characters. The</p> <p>Table 4-<i>Display Module ASCII Characters</i> table below lists the displayable characters.</p>
40234 – 40235	Float	Read/Write	<p><b>4<sup>th</sup> user defined display value</b></p> <p>These registers hold the floating-point value that will be included in the display cycle if the bit to display the 4<sup>th</sup> user defined data set is turned on in the Display Control register. Only values between –9999 and 99999 can be displayed. Any value outside of that range will be replaced by ----- (5 dashes) on the display.</p>
40236 – 40242	ASCII	Read/Write	<p><b>4<sup>th</sup> user defined display text</b></p> <p>These registers hold the text that will be included in the display cycle if the bit to display the 4<sup>th</sup> user defined data set is turned on in the Display Control register. Each register holds 2 ASCII characters. The first 7 ASCII characters will be displayed on line 2 of the display, followed by the second 7 ASCII characters. The</p> <p>Table 4-<i>Display Module ASCII Characters</i> table below lists the displayable characters.</p>
40243 – 40244	Float	Read/Write	<p><b>5<sup>th</sup> user defined display value</b></p> <p>These registers hold the floating-point value that will be included in the display cycle if the bit to</p>

Register	Type	Read/Write	Parameter
			display the 5 <sup>th</sup> user defined data set is turned on in the Display Control register. Only values between -9999 and 99999 can be displayed. Any value outside of that range will be replaced by ----- (5 dashes) on the display.
40245 – 40251	ASCII	Read/Write	<p><b>5<sup>th</sup> user defined display text</b></p> <p>These registers hold the text that will be included in the display cycle if the bit to display the 5<sup>th</sup> user defined data set is turned on in the Display Control register. Each register holds 2 ASCII characters. The first 7 ASCII characters will be displayed on line 2 of the display, followed by the second 7 ASCII characters. The</p> <p>Table 4-<i>Display Module ASCII Characters</i> table below lists the displayable characters.</p>
40252 – 40253	Float	Read/Write	<p><b>6<sup>th</sup> user defined display value</b></p> <p>These registers hold the floating-point value that will be included in the display cycle if the bit to display the 6<sup>th</sup> user defined data set is turned on in the Display Control register. Only values between -9999 and 99999 can be displayed. Any value outside of that range will be replaced by ----- (5 dashes) on the display.</p>
40254 – 40260	ASCII	Read/Write	<p><b>6<sup>th</sup> user defined display text</b></p> <p>These registers hold the text that will be included in the display cycle if the bit to display the 6<sup>th</sup> user defined data set is turned on in the Display Control register. Each register holds 2 ASCII characters. The first 7 ASCII characters will be displayed on line 2 of the display, followed by the second 7 ASCII characters.</p>

Register	Type	Read/Write	Parameter
			<p>The</p> <p>Table 4-<i>Display Module ASCII Characters</i> table below lists the displayable characters.</p>
40261 – 40262	Float	Read/Write	<p><b>7<sup>th</sup> user defined display value</b></p> <p>These registers hold the floating-point value that will be included in the display cycle if the bit to display the 7<sup>th</sup> user defined data set is turned on in the Display Control register. Only values between –9999 and 99999 can be displayed. Any value outside of that range will be replaced by ----- (5 dashes) on the display.</p>
40263 – 40269	ASCII	Read/Write	<p><b>7<sup>th</sup> user defined display text</b></p> <p>These registers hold the text that will be included in the display cycle if the bit to display the 7<sup>th</sup> user defined data set is turned on in the Display Control register. Each register holds 2 ASCII characters. The first 7 ASCII characters will be displayed on line 2 of the display, followed by the second 7 ASCII characters.</p> <p>The</p> <p>Table 4-<i>Display Module ASCII Characters</i> table below lists the displayable characters.</p>
40270 – 40271	Float	Read/Write	<p><b>8<sup>th</sup> user defined display value</b></p> <p>These registers hold the floating-point value that will be included in the display cycle if the bit to display the 8<sup>th</sup> user defined data set is turned on in the Display Control register. Only values between –9999 and 99999 can be displayed. Any value outside of that range will be replaced by ----- (5 dashes) on the display.</p>

Register	Type	Read/Write	Parameter
40272 – 40278	ASCII	Read/Write	<p><b>8<sup>th</sup> user defined display text</b></p> <p>These registers hold the text that will be included in the display cycle if the bit to display the 8<sup>th</sup> user defined data set is turned on in the Display Control register. Each register holds 2 ASCII characters. The first 7 ASCII characters will be displayed on line 2 of the display, followed by the second 7 ASCII characters. The</p> <p>Table 4-<i>Display Module ASCII Characters</i> table below lists the displayable characters.</p>
40279 – 40280	Float	Read/Write	<p><b>9<sup>th</sup> user defined display value</b></p> <p>These registers hold the floating-point value that will be included in the display cycle if the bit to display the 9<sup>th</sup> user defined data set is turned on in the Display Control register. Only values between –9999 and 99999 can be displayed. Any value outside of that range will be replaced by ----- (5 dashes) on the display.</p>
40281 – 40287	ASCII	Read/Write	<p><b>9<sup>th</sup> user defined display text</b></p> <p>These registers hold the text that will be included in the display cycle if the bit to display the 9<sup>th</sup> user defined data set is turned on in the Display Control register. Each register holds 2 ASCII characters. The first 7 ASCII characters will be displayed on line 2 of the display, followed by the second 7 ASCII characters. The</p> <p>Table 4-<i>Display Module ASCII Characters</i> table below lists the displayable characters.</p>

Register	Type	Read/Write	Parameter
40288 – 40289	Float	Read/Write	<p><b>10<sup>th</sup> user defined display value</b></p> <p>These registers hold the floating-point value that will be included in the display cycle if the bit to display the 10<sup>th</sup> user defined data set is turned on in the Display Control register. Only values between –9999 and 99999 can be displayed. Any value outside of that range will be replaced by ----- (5 dashes) on the display.</p>
40290 – 40296	ASCII	Read/Write	<p><b>10<sup>th</sup> user defined display text</b></p> <p>These registers hold the text that will be included in the display cycle if the bit to display the 10<sup>th</sup> user defined data set is turned on in the Display Control register. Each register holds 2 ASCII characters. The first 7 ASCII characters will be displayed on line 2 of the display, followed by the second 7 ASCII characters. The</p> <p>Table 4-<i>Display Module ASCII Characters</i> table below lists the displayable characters.</p>
40297 – 40298	Float	Read/Write	<p><b>11<sup>th</sup> user defined display value</b></p> <p>These registers hold the floating-point value that will be included in the display cycle if the bit to display the 11<sup>th</sup> user defined data set is turned on in the Display Control register. Only values between –9999 and 99999 can be displayed. Any value outside of that range will be replaced by ----- (5 dashes) on the display.</p>
40299 – 40305	ASCII	Read/Write	<p><b>11<sup>th</sup> user defined display text</b></p> <p>These registers hold the text that will be included in the display cycle if the bit to display the 11<sup>th</sup> user defined data set is turned on in the Display Control register. Each register holds 2 ASCII</p>

Register	Type	Read/Write	Parameter
			characters. The first 7 ASCII characters will be displayed on line 2 of the display, followed by the second 7 ASCII characters. The <b>Display Module ASCII Characters</b> table below lists the displayable characters.
40306 – 40307	Float	Read/Write	<b>12<sup>th</sup> user defined display value</b> These registers hold the floating-point value that will be included in the display cycle if the bit to display the 12 <sup>th</sup> user defined data set is turned on in the Display Control register. Only values between –9999 and 99999 can be displayed. Any value outside of that range will be replaced by ----- (5 dashes) on the display.
40308 – 40314	ASCII	Read/Write	<b>12<sup>th</sup> user defined display text</b> These registers hold the text that will be included in the display cycle if the bit to display the 12 <sup>th</sup> user defined data set is turned on in the Display Control register. Each register holds 2 ASCII characters. The first 7 ASCII characters will be displayed on line 2 of the display, followed by the second 7 ASCII characters. The  Table 4- <b>Display Module ASCII Characters</b> table below lists the displayable characters.
40315 – 40398			Reserved
40399 - 40400	Float	Read/Write	<b>Atmospheric Pressure</b> These registers hold the user-specified atmospheric pressure as a floating-point number in the specified floating-point format. This value is used when the sensor type is set to gage using register 40011. This value is ignored if the sensor type is set to absolute.

Register	Type	Read/Write	Parameter
			<p>The value in this register must be in the same units as the static pressure.</p> <p>The transmitter must be in the offline mode to change this register. No change will be made if the transmitter mode is not correct.</p>
40401 - 40402	Float	Read	<p><b>Differential Pressure (DP)</b></p> <p>These registers hold the differential pressure as a floating-point number in the specified floating-point format.</p>
40403 - 40404	Float	Read	<p><b>Static Pressure (SP)</b></p> <p>These registers hold the static pressure as a floating-point number in the specified floating-point format. The diagnostic bits indicate the validity of this register.</p>
40405 - 40406	Float	Read	<p><b>Process Temperature (PT)</b></p> <p>These registers hold the process temperature as a floating-point number in the specified floating-point format.</p>
40407	Integer	Read	<p><b>Diagnostic Bits</b></p> <p>This register holds a bit-mapped value. The individual bits correspond to these conditions</p> <ul style="list-style-type: none"> <li>15 Calibration flag (see register 40206)</li> <li>14 The process values may not be valid <ul style="list-style-type: none"> <li>– If this bit is the only bit set then contact Technical Support.</li> </ul> </li> <li>13 Primary Variables are outside specification</li> <li>12 DP signal above Upper Range Limit (URL) +10%</li> <li>11 DP signal above Upper Range Limit (URL)</li> </ul>

Register	Type	Read/Write	Parameter
			10 DP signal above Upper Operating Limit (URV)
			9 DP signal below Lower Operating Limit (LRV)
			8 DP signal below Lower Range Limit (LRL)
			7 DP signal below Lower Range Limit (LRL) – 10%
			6 SP signal above Upper Range Limit (URL) +10%
			5 SP signal above Upper Range Limit (URL)
			4 SP signal above Upper Operating Limit (URV)
			3 SP signal below Lower Operating Limit (LRV)
			2 SP signal below Lower Range Limit (LRL)
			1 SP signal below Lower Range Limit (LRL) – 10%
			0 N/A
40408	Integer	Read	<b>Diagnostic Bits</b> This register holds a bit-mapped value. The individual bits correspond to these conditions. Bit 15 = N/A Bit 14 = RTD signal above Upper Range Limit (URL) +10% Bit 13 = RTD signal above Upper Range Limit (URL) Bit 12 = RTD signal above Upper Operating Limit (URV) Bit 11 = RTD signal below Lower

Register	Type	Read/Write	Parameter
			<p>Operating Limit (LRV)</p> <p>Bit 10 = RTD signal below Lower Range Limit (LRL)</p> <p>Bit 09 = RTD signal below Lower Range Limit (LRL) – 10%</p> <p>Bit 08 = N/A</p> <p>Bit 07 = Primary Variable is bad.</p> <p>Bit 06 = Secondary Variable is bad.</p> <p>Bit 05 = Tertiary Variable is bad.</p> <p>Bit 04 = Reserved</p> <p>Bit 03 = Reserved</p> <p>Bit 02 = Reserved</p> <p>Bit 01 = Reserved</p> <p>Bit 00 = Off-line Flag (see register 40206)</p>
40409	Integer	Read	<p><b>Diagnostic Bits</b></p> <p>This register holds a bit-mapped value. The individual bits correspond to these conditions.</p> <p>Bit 15 = Sensor module is not updating</p> <p>Bit 14 = reserved</p> <p>Bit 13 = Sensor microprocessor is not responding</p> <p>Bit 12 = reserved</p> <p>Bit 11 = reserved</p> <p>Bit 10 = reserved</p> <p>Bit 09 = reserved</p> <p>Bit 08 = RTD Offset is outside normal range. The RTD should be checked for physical damage if this bit is enabled. Comparing RTD results with a known good RTD and checking the resistance between the RTD and case is recommended.</p> <p>Bit 07 = reserved</p> <p>Bit 06 = reserved</p> <p>Bit 05 = reserved</p> <p>Bit 04 = reserved</p> <p>Bit 03 = reserved</p> <p>Bit 02 = reserved</p>

Register	Type	Read/Write	Parameter
			Bit 01 = Hardware write protect status Bit 00 = Software write protect status
40410	Integer	Read	<b>Diagnostic Bits</b> This register is reserved for future diagnostic bits. This register contains 0.
40411	Integer	Read	<b>Diagnostic Bits</b> This register is reserved for future diagnostic bits. This register contains 0.
40412	Integer	Read	<b>Diagnostic Bits</b> This register is reserved for future diagnostic bits. This register contains 0.
40413 - 40414	Float	Read	<b>DP Upper Range Limit</b> These registers hold the DP upper range value as a floating-point number in the specified floating-point format.
40415 - 40416	Float	Read	<b>DP Lower Range Limit</b> These registers hold the DP lower range value as a floating-point number in the specified floating-point format.
40417 - 40418	Float	Read/Write	<b>DP Upper Operating Limit</b> These registers hold the DP upper operating limit as a floating-point number in the specified floating-point format. The transmitter must be in the offline mode to change this register. No change will be made if the transmitter mode is not correct. The DP upper operating limit may be set higher than the primary variable upper range limit. The primary variable upper operating limit may be set as high as 1.5 times the primary variable upper range limit, provided that the difference between the primary variable UOL and primary variable

Register	Type	Read/Write	Parameter
			LOL is no larger than the difference between the primary variable URL and primary variable LRL. The difference between the primary variable UOL and primary variable LOL must also be larger than 1% of the primary variable URL.
40419 - 40420	Float	Read/Write	<p><b>DP Lower Operating Limit</b></p> <p>These registers hold the DP lower operating limit as a floating-point number in the specified floating-point format.</p> <p>The transmitter must be in the offline mode to change this register. No change will be made if the transmitter mode is not correct.</p> <p>The DP lower operating limit may be set lower than the primary variable lower range limit. The primary variable lower operating limit may be set as low as 1.5 times the primary variable lower range limit, provided that the difference between the primary variable UOL and primary variable LOL is no larger than the difference between the primary variable URL and primary variable LRL. The difference between the primary variable UOL and primary variable LOL must also be larger than 1% of the primary variable URL.</p>
40421 - 40422	Float	Read	<p><b>SP Upper Range Limit</b></p> <p>These registers hold the SP upper range value as a floating-point number in the specified floating-point format.</p>
40423 - 40424	Float	Read	<p><b>SP Lower Range Limit</b></p> <p>These registers hold the SP lower range value as a floating-point number in the specified floating-point format.</p>
40425 - 40426	Float	Read/Write	<p><b>SP Upper Operating Limit</b></p> <p>These registers hold the SP upper</p>

Register	Type	Read/Write	Parameter
			<p>operating limit as a floating-point number in the specified floating-point format.</p> <p>The transmitter must be in the offline mode to change this register. No change will be made if the transmitter mode is not correct.</p> <p>The SP upper operating limit may be set higher than the secondary variable upper range limit. The secondary variable upper operating limit may be set as high as 1.25 times the secondary variable upper range limit. The difference between the secondary variable UOL and secondary variable LOL must also be larger than 1% of the secondary variable URL.</p>
40427 - 40428	Float	Read/Write	<p><b>SP Lower Operating Limit</b></p> <p>These registers hold the SP lower operating limit as a floating-point number in the specified floating-point format.</p> <p>The transmitter must be in the offline mode to change this register. No change will be made if the transmitter mode is not correct.</p> <p>The SP lower operating limit must be greater than or equal to 0 if absolute pressure is selected, or – 1* atmospheric reference if gage pressure is selected. The difference between the secondary variable UOL and secondary variable LOL must also be larger than 0.5% of the secondary variable URL.</p>
40429 - 40430	Float	Read	<p><b>PT Upper Range Limit</b></p> <p>These registers hold the PT upper range value as a floating-point number in the specified floating-point format.</p>
40431 - 40432	Float	Read	<p><b>PT Lower Range Limit</b></p>

Register	Type	Read/Write	Parameter
			These registers hold the PT upper range value as a floating-point number in the specified floating-point format.
40433 - 40434	Float	Read/Write	<p><b>PT Upper Operating Limit</b></p> <p>These registers hold the PT upper operating limit as a floating-point number in the specified floating-point format.</p> <p>The transmitter must be in the offline mode to change this register. No change will be made if the transmitter mode is not correct.</p> <p>The PT upper operating limit may be set higher than the tertiary variable upper range limit. The tertiary variable upper operating limit may be set as high as 1.25 times the tertiary variable upper range limit, provided that the difference between the tertiary variable UOL and tertiary variable LOL is no larger than the difference between the tertiary variable URL and tertiary variable LRL. The difference between the tertiary variable UOL and tertiary variable LOL must also be larger than 0.5% of the tertiary variable URL.</p>
40435 - 40436	Float	Read/Write	<p><b>PT Lower Operating Limit</b></p> <p>These registers hold the PT lower operating limit as a floating-point number in the specified floating-point format.</p> <p>The transmitter must be in the offline mode to change this register. No change will be made if the transmitter mode is not correct.</p> <p>The PT lower operating limit may be set lower than the tertiary variable lower range limit. The tertiary variable lower operating limit may be set as low as absolute</p>

Register	Type	Read/Write	Parameter
			zero (-273.15 °C, -459.67°F, 0 K, or 0 °R), provided that the difference between the tertiary variable UOL and tertiary variable LOL is no larger than the difference between the tertiary variable URL and tertiary variable LRL. The difference between the tertiary variable UOL and tertiary variable LOL must also be larger than 0.5% of the tertiary variable URL.
40437 - 40438	Float	Write	<p><b>DP offset</b></p> <p>These registers are used to change the DP offset as a floating-point number in the specified floating-point format. This register is write only.</p> <p>The transmitter must be in the calibrate mode to change this register. No change will be made if the transmitter mode is not correct.</p> <p>The DP offset must be within 0.5 * primary variable URL of the default reading.</p>
40439 - 40440	Float	Write	<p><b>DP Span</b></p> <p>These registers hold the DP span as a floating-point number in the specified floating-point format.</p> <p>The value written is the new span in configured units.</p> <p>The transmitter must be in the calibrate mode to change this register. No change will be made if the transmitter mode is not correct.</p> <p>The DP span entered divided by the transmitter span limit must result in a value of between 0.5 and 2.0.</p>
40441 - 40442	Float	Read/Write	<p><b>DP Damping</b></p> <p>These registers hold the DP damping as a floating-point number in the specified floating-</p>

Register	Type	Read/Write	Parameter
			<p>point format.</p> <p>Valid values are 0.0 (damping off), 0.25, 0.5, 1.0, 2.0, 4.0, 8.0, 16.0, and 32.0 seconds. The default value is 0 (damping off).</p> <p>The transmitter must be in the offline or calibrate mode to change this register. No change will be made if the transmitter mode is not correct.</p>
40443 - 40444	Float	Write	<p><b>SP offset</b></p> <p>These registers are used to change the SP offset as a floating-point number in the specified floating-point format. This register is write only.</p> <p>The transmitter must be in the calibrate mode to change this register. No change will be made if the transmitter mode is not correct.</p> <p>The SP offset must be within 0.5* secondary variable URL of the default reading.</p>
40445 - 40446	Float	Write	<p><b>SP Span</b></p> <p>These registers hold the SP slope as a floating-point number in the specified floating-point format.</p> <p>The value written is the new span in configured units.</p> <p>The transmitter must be in the calibrate mode to change this register. No change will be made if the transmitter mode is not correct.</p> <p>The span entered divided by the transmitter span limit must result in a value of between 0.5 and 2.0. In order to change the span at least 5% of the rated pressure must be applied, otherwise the calibration will be rejected.</p>
40447 - 40448	Float	Read/Write	<p><b>SP Damping</b></p> <p>These registers hold the SP damping as a floating-point</p>

Register	Type	Read/Write	Parameter
			number in the specified floating-point format. Valid values are 0.0 (damping off), 0.25, 0.5, 1.0, 2.0, 4.0, 8.0, 16.0, and 32.0 seconds. The default value is 0 (damping off). The transmitter must be in the offline or calibrate mode to change this register. No change will be made if the transmitter mode is not correct.
40449 - 40450	Float	Read/Write	<b>PT Offset</b> These registers hold the PT offset as a floating-point number in the specified floating-point format. The transmitter must be in the calibrate mode to change this register. No change will be made if the transmitter mode is not correct. The PT offset may be adjusted from the default value by up to 1% of the tertiary URL.
40451 - 40499			Reserved
40500	Integer	Read/Write	Reserved for analog output (see default register assignment)

### Default Parameters

A SCADAPack 4203 DR transmitter is reset to default values when the correct sequence is written to register 40205. The following table shows the registers that are reset and their default values.

**Table 3: SCADAPack 4203 DR -Default Parameters**

Register	Type	Value	Parameter
40060	Integer	inches of water at 68 F	Differential Pressure Units
40061	Integer	Psia	Static Pressure Units
40062	Integer	degrees C	Process Temperature Units
40407	Integer	current conditions	Diagnostic Bits
40408	Integer	current conditions	Diagnostic Bits
40409	Integer	current conditions	Diagnostic Bits
40410	Integer	0	Diagnostic Bits
40411	Integer	0	Diagnostic Bits
40412	Integer	0	Diagnostic Bits
40417 - 40418	Float	factory maximum sensor limit	DP Upper Operating Limit
40419 - 40420	Float	0.0	DP Lower Operating Limit
40425 - 40426	Float	factory maximum sensor limit	SP Upper Operating Limit
40427 - 40428	Float	0.0t	SP Lower Operating Limit
40433 - 40434	Float	factory maximum sensor limit	PT Upper Operating Limit
40435 - 40436	Float	factory minimum sensor limit	PT Lower Operating Limit
40437 - 40438	Float	0.0	DP offset
40439 - 40440	Float	1.0	DP Slope (factory calibration)
40441 - 40442	Float	0.0	DP Damping
40443 - 40444	Float	0.0	SP offset
40445 - 40446	Float	1.0	SP slope (factory calibration)
40447 - 40448	Float	0.0	SP Damping
40449 - 40450	Float	0.0	PT Offset

### Display Module ASCII Characters

The table below lists the useable ASCII characters for the Display Module. The User Defined Display Text registers use these characters.

Table 4: Display Module ASCII Characters

Hex Value	Character	Hex Value	Character	Hex Value	Character
0x20	Space	0x48	H	0x62	b
0x25	%	0x49	I	0x63	c
0x2A	*	0x4A	J	0x64	d
0x2B	+	0x4B	K	0x65	e
0x2D	-	0x4C	L	0x66	f
0x2F	/	0x4D	M	0x67	g
0x30	0	0x4E	N	0x68	h
0x31	1	0x4F	O	0x69	i
0x32	2	0x50	P	0x6A	j
0x33	3	0x51	Q	0x6B	k
0x34	4	0x52	R	0x6C	l
0x35	5	0x53	S	0x6D	m
0x36	6	0x54	T	0x6F	n
0x37	7	0x55	U	0x70	o
0x38	8	0x56	V	0x71	p
0x39	9	0x57	W	0x72	q
0x3C	<	0x58	X	0x73	r
0x3D	=	0x59	Y	0x74	s
0x3E	>	0x5A	Z	0x75	t
0x41	A	0x5B	[	0x76	u
0x42	B	0x5C	\	0x77	v
0x43	C	0x5D	]	0x78	w
0x44	D	0x5E	^	0x79	x
0x45	E	0x5F	_	0x7A	y
0x46	F	0x60	'	0x70	z
0x47	G	0x61	A		

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## Maintenance

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A SCADAPack 4203 DR transmitter requires little maintenance. If the program is lost during power outages, the lithium battery may require replacement.

The analog input and output circuitry is calibrated at the factory and does not require periodic calibration. Calibration may be necessary if the module has been repaired as a result of damage.

If the controller is not functioning correctly, contact [Schneider Electric Technical Support](#) for information on returning the SCADAPack Controller for repair.

 <b>WARNING</b>
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Remove power or confirm the area is known to be non-hazardous before changing field wiring, including the wiring to the RS-232 ports.
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Failure to follow these instructions can result in death, serious injury or equipment damage.
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## Lithium Battery

A small lithium battery powers the CMOS memory and real-time clock when input power is removed. The 3.6V lithium battery will measure a typical value of 3500 to 3700. A reading less than 3000 (3.0V) indicates that the lithium battery requires replacement.

## Lithium Battery Replacement

The battery should not require replacement under normal conditions. The shelf life of the battery is 10 years. The battery is rated to maintain the real-time clock and RAM data for two years with the power off. Accidental shorting or extreme temperatures may damage the battery.

Battery replacement requires complete disassembly of the electronics assembly inside the controller. Extreme care should be used when disassembling and reassembling the device. Carefully replace any cables that are removed in the disassembly process. Do not to pinch or damage these cables during reassembly. It is necessary to replace the tie-wrap to mechanically secure the battery.

A SCADAPack transmitter must be cold booted after a battery replacement to initialize RAM. Unpredictable operation may result if a cold boot is not performed.

Read through the following steps and gain an understanding of the replacement process before beginning.

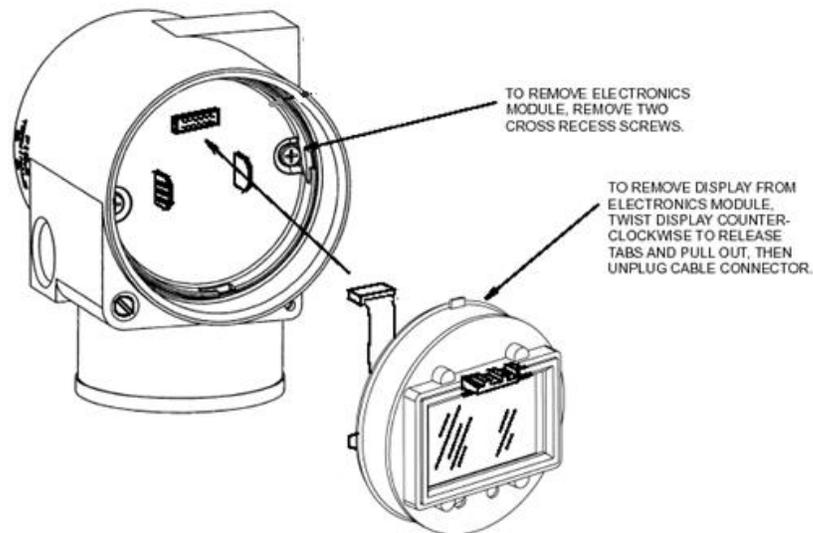
Step 1 Have a replacement battery ready for installation once the old battery is removed. A replacement battery is available from Schneider Electric. The part number is TBUM297268.

Step 2 Save Realflo configuration and logs/history files and any Telepace of IEC 61131-1 programs. Retrieve these files before disconnecting power.

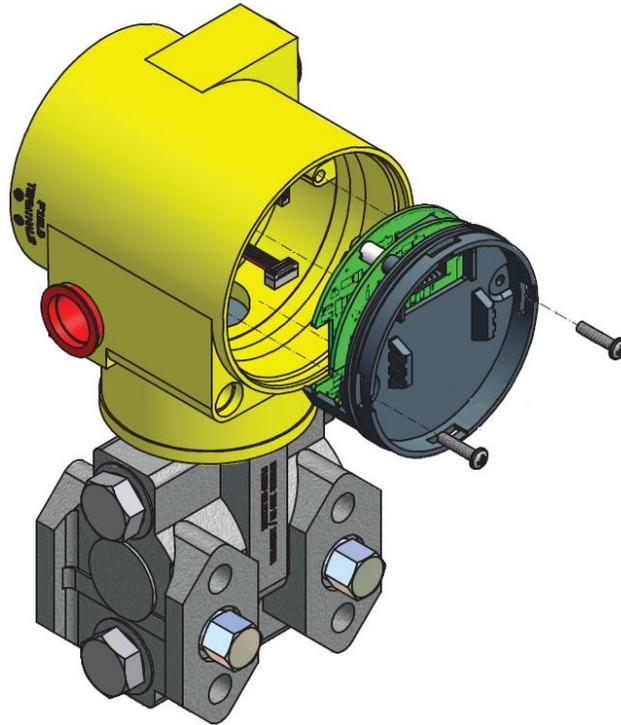
Step 3 Remove power to the transmitter.

Step 4 Remove the front cover of the transmitter. This is the cover with the LCD display or if no display is present this is the cover opposite the Field Wiring cover. The field wiring cover is identified on the transmitter chassis.

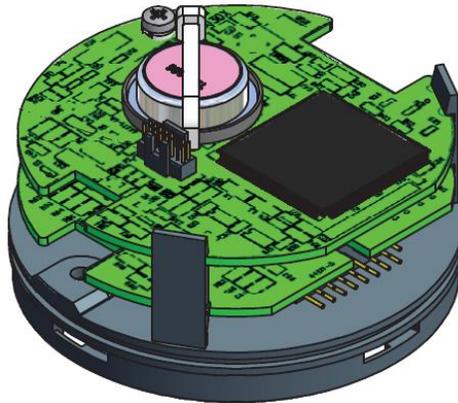
Step 5 Remove the LCD display, if present, using the following diagram as a guide.



Step 6 Remove the Controller board/Sensor interface housing as shown in the following diagram. Check that none of the 3 connecting cables to the Controller board/Sensor interface become disconnected. If they are disconnected during the replacement procedure reconnect them at the completion of the procedure. Connectors are keyed and easy to mate with the socket.



Step 7 Once the Controller board/Sensor interface housing is removed gently tilt the assembly to expose the lithium battery. Use wire cutters to remove the tywrap. The tywrap is used to keep the battery in place during shipment and does not need to be replaced with the new battery. Refer to the following for the location of the battery.



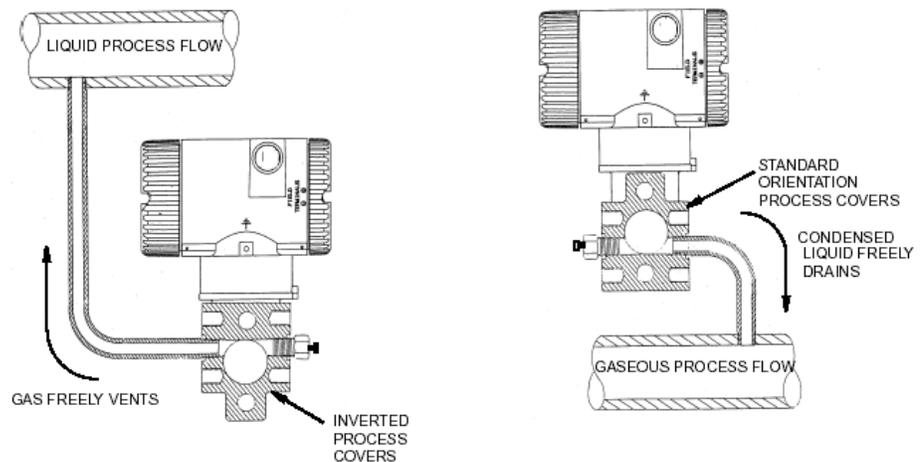
Step 8 Unplug the battery from the circuit board and replace with the new battery. The circuit board has a keyed socket for plugging the new battery in.

Step 9 Gently reassemble the transmitter checking all cables are connected and are not pinched during reassembly.

Step 10 Once transmitter is reassembled reconnect power and reload the Realflo configuration and Telepace or IEC 61131-1 programs.

## Rotating Process Covers for Venting

As received, the IDP10 Transmitter provides sensor cavity draining without the need for side drain connections, regardless of whether the transmitter is mounted vertically or horizontally. Sensor cavity venting is provided by mounting horizontally or with the optional vent screw (-V). However, if you did not specify this option, you can still achieve venting (instead of draining) with vertical mounting by rotating the process covers. See *Figure 25*.



**Figure 25: Sensor Cavity Venting and Draining**

To rotate the process covers, refer to *Figure 25: Sensor Cavity Venting and Draining* and proceed as follows:

- Remove the process covers from the sensor by removing two hex head bolts.
- Replace the gaskets in the process covers.
- Rotate the process covers so that the longer tab is at the bottom.
- Reinstall the process covers and bolts. Torque the cover bolts to 100 Nm (75 lbft) in several even increments. Torque values are 66 Nm (50 lbft) when optional 316 ss bolts are specified.
- Pressure test the sensor and process cover assembly by applying a hydrostatic pressure of 150% of the maximum static and over range pressure (see page 3) to both sides of the process cover/sensor assembly simultaneously through the process connections. Hold pressure for one minute. There should be no leakage of the test fluid through the gaskets. If leakage occurs, retighten the cover bolts per Step 4 or replace the gaskets and retest.

Perform hydrostatic test with a liquid and follow proper hydrostatic test procedures.

## **Sensor Calibration**

The Calibration requirements are determined by the local regulatory agency and/or corporate policies.

Field Calibration is Not Recommended unless the Calibration Equipment is at least 2X more accurate than the sensor itself ( $\pm 0.05\%$  of span and  $\pm 0.15^\circ\text{C}$  for temp.).

If Calibration is required and equipment with the necessary accuracy is not available, please return the unit to Schneider Electric or send to a Calibration Lab.

Realflo provides a Calibration Wizard to guide you through the steps to calibrate the sensor. See the Realflo wizards>>Calibrate Input Wizards>>MVT Calibration section of the Realflo User and Reference manual. Realflo provides a record of the calibration in the Event Log as well as a Calibration Report that can be printed for your records.

See the *Connections For Sensor Calibration* section for details on how to connect to the sensor for the calibration process.

## Troubleshooting

### Analog Output

Condition	Action
Outputs are 0mA	Check the power supply. Check the wiring. The analog output on this transmitter is a sinking type and is not ground referenced.
The full-scale output is less than 20mA.	Check that the load resistance and power supply is within specification.
Output is constant and should be changing.	Check that the analog output is not forced.

### Digital Input

Condition	Action
Input is off when a voltage is supplied.	Remove the voltage. The digital input monitors contacts or transistor collector/drain only.
Input is on when no signal is applied.	Check that the digital input is not forced on.
Input is off when a signal is applied.	Check that the digital input is not forced off.

### Digital Output

Condition	Action
Using Telepace firmware cannot turn output on or off.	Check that the 4203 DR/4202 DR Extended I/O register assignment is being used.
Using IEC 61131-1 firmware cannot turn output on or off.	Check that the ss4203dr I/O equipment is added to I/O connection.
Output is on when no signal is applied.	Check that the digital input is not forced on.
Output is off when a signal is applied.	Check that the digital input is not forced off.

### Counter Inputs

Condition	Action
Incorrect counts on	CTR0/DIN0counter digital input is a high-speed input. Check that the applied input is free of

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Condition	Action
CTR/DIN0	contact bounce.

## Specifications

Disclaimer: Schneider Electric reserves the right to change product specifications. For more information visit <http://www.schneider-electric.com>.

### General

<b>I/O Terminations</b>	2, 3 and 4 pole, removable terminal blocks. 16 to 28 AWG 8A contacts
<b>Environment</b>	5% RH to 95% RH, non-condensing -40°C to 70°C -40°F to 158°F

### Controller

<b>Processors</b>	32-bit ARM microcontroller, 32MHz clock integrated watchdog timer Sensor interface co-processor
<b>Memory</b>	4MBytes CMOS RAM 8MBytes Flash ROM 1kBytes EEPROM
<b>Non-volatile RAM</b>	CMOS RAM with lithium battery retains contents for 2 years with no power
<b>Clock calendar</b>	±1 minute/month at 25°C +1/-3 minutes/month 0 to 50°C

### Communications

<b>Communication Port COM2 and COM3</b>	3 position removable terminal block Switch selectable RS-232 or RS485
<b>RS-232</b>	TxD and RxD implemented. RS-232 compatible serial port (CMOS) Functions when COM2/3 switch is in RS232 position.
<b>RS-485</b>	2-wire half duplex. 5100Ω bias resistors Functions when COM2/3 switch is in RS485 position.
<b>COM2 Baud Rate</b>	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200

<b>COM3 Baud Rate</b>	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200
<b>Parity</b>	none, even, or odd
<b>Word Length</b>	7 or 8 bits
<b>Stop Bits</b>	1 or 2 bits
<b>Transient Protection</b>	COM2, COM3: 2.5kV surge withstand capability as per ANSI/IEEE C37.90.1-1989
<b>Isolation</b>	Common ground return connected to negative side of Vin power input.
<b>Cable Length</b>	RS-232 –maximum 10 ft (3 m) RS-485 –maximum 4000 ft (1200 m)
<b>Protocol</b>	TeleBUS (compatible with Modbus RTU and Modbus ASCII)
<b>Protocol Modes</b>	Slave, master, master/slave, store and forward

## Visual Indicators

<b>Status</b>	Internal Status LED (shows functional status)
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## Power Supply

<b>DC power Input</b>	9V minimum 30V maximum Typically 165mW (at 12V) during normal operation. Reduced Power Mode. Typically 330mW (at 12V) during normal operation. Full Power Mode. Maximum 400mW (at 30V) at full temperature range, DIN0 ON and Communication on both serial ports Full Power Mode.
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## Analog Input

<b>Power Input Voltage Monitor</b>	8 bits resolution Accuracy $\pm 1.0V$ . 9-32.768V measurement range 0-32.768V scaling
<b>Isolation</b>	Common ground return connected to negative side of Vin power input.

## Analog Output

<b>Output Signal</b>	0-20mA
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<b>Range</b>	
<b>Load Resistance Range</b>	550 to 1400Ω with 30Vdc supply 250 to 1100Ω with 24Vdc supply 0 to 850Ω with 19Vdc supply 0 to 500Ω with 12Vdc supply 0 to 350Ω with 9Vdc supply Analog output sinks current. Maximum power dissipation is 380mW. Example: 20mA at 19V.
<b>Output Type</b>	Single ended regulation on negative side with positive side of load connected to a positive voltage.
<b>Isolation</b>	Common ground return connected to negative side of Vin power input.
<b>Resolution</b>	12 bits
<b>Accuracy</b>	Specified from 0.5-20mA ±0.15% of full scale at 25°C (77°F) ±0.25% of full scale over temperature range
<b>Noise and Ripple</b>	0.04% maximum
<b>Transient Protection</b>	Transient: 2.5kV surge withstand capability as per ANSI/IEEE C37.90.1-1989
<b>Response Time</b>	Less than 10μs for 10% to 90% signal change

### Turbine Meter Counter Input

<b>Type</b>	Counter 1 Single turbine meter input. Designed for use with low voltage, turbine meter outputs.
<b>Turbine Meter Sensitivity</b>	Minimum input 30mVp-p at 5-50Hz. Minimum input 150mVp-p at 150Hz. Minimum input 650mVp-p at 5kHz. Minimum input 750mVp-p at 10kHz. Maximum input 4Vp-p using internal amplifier.
<b>Transient Protection</b>	2.5kV surge withstand capability as per ANSI/IEEE C37.90.1-1989
<b>Isolation</b>	Common ground return connected to Chassis Ground.

### Digital Counter Input

<b>Type</b>	Counter 0. Dry contact input. Wetting current typically 5mA. Contact closure to ground is ON. Open input is OFF.
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<b>Frequency</b>	0-10kHz.
<b>Input Thresholds</b>	0.8V typical turn on input voltage. Less than 0.4V turn on input voltage. 1.5V typical turn off input voltage. Greater than 2.0V turn off input voltage.
<b>Contact Resistance</b>	ON input requires less than 100Ω contact resistance. OFF input requires greater than 1kΩ contact resistance.
<b>Transient Protection</b>	2.5kV surge withstand capability as per ANSI/IEEE C37.90.1-1989
<b>Isolation</b>	Common ground return connected to Chassis Ground.

## Digital Output

<b>Type</b>	Open drain sinking
<b>Load Range</b>	500mA maximum 30VDC maximum
<b>Transient Protection</b>	2.5kV surge withstand capability as per ANSI/IEEE C37.90.1-1989
<b>Isolation</b>	Common ground return connected to Chassis Ground.
<b>Note</b>	Digital Output available on version 5 and later controller hardware.

## Transmitter Functional Specifications

### Span and Range Limits for Differential Pressure & Absolute Pressure

Span Code	Differential Pressure		Absolute Pressure	
	inches of H <sub>2</sub> O	kPa	psia	MPa
A	0.5 to 30 inH <sub>2</sub> O	(0.12 to 7.5 kPa)	1 to 100 psi	(0.007 to 0.7 MPa)
B	2 to 200 inH <sub>2</sub> O	(0.50 to 50 kPa)	3 to 300 psi	(0.021 to 2.1 MPa)
C	10 to 840 inH <sub>2</sub> O	(2.50 to 210 kPa)	3 to 300 psi	(0.021 to 2.1 MPa)
D	2 to 200 inH <sub>2</sub> O	(0.50 to 50 kPa)	30 to 1500 psi	(0.21 to 10 MPa)
F	3 to 300 inH <sub>2</sub> O	(0.75 to 75 kPa)	30 to 1500 psi	(0.21 to 10 MPa)
E	10 to 840 inH <sub>2</sub> O	(2.50 to 210 kPa)	30 to 1500 psi	(0.21 to 10 MPa)
J	2 to 200 inH <sub>2</sub> O	(0.50 to 50 kPa)	30 to 3000 psi	(0.21 to 21 MPa)
K	3 to 300 inH <sub>2</sub> O	(0.75 to 75 kPa)	30 to 3000 psi	(0.21 to 21 MPa)
L	10 to 840 inH <sub>2</sub> O	(2.5 to 210 kPa)	30 to 3000 psi	(0.21 to 21 MPa)
<b><u>Low Profile Sensor</u></b>				
U	0.5 to 30 inH <sub>2</sub> O	(0.12 to 7.5 kPa)	1 to 100 psi	(0.007 to 0.7 MPa)
V	2 to 200 inH <sub>2</sub> O	0.50 to 50 kPa)	3 to 300 psi	(0.021 to 2.1 MPa)

W	10 to 840 inH2O	(2.5 to 210 kPa)	3 to 300 psi	(0.021 to 2.1 MPa)
X	2 to 200 inH2O	(0.50 to 50 kPa)	30 to 1500 psi	(0.21 to 10 MPa)
Z	3 to 300 inH2O	(0.75 to 75 kPa)	30 to 1500 psi	(0.21 to 10 MPa)
Y	10 to 840 inH2O	(2.5 to 210 kPa)	30 to 1500 psi	(0.21 to 10 MPa)
M	2 to 200 inH2O	(0.50 to 50 kPa)	30 to 3000 psi	(0.21 to 21 MPa)
P	3 to 300 inH2O	(0.75 to 75 kPa)	30 to 3000 psi	(0.21 to 21 MPa)
R	10 to 840 inH2O	(2.5 to 210 kPa)	30 to 3000 psi	(0.21 to 21 MPa)

### Maximum Differential Pressure (DP) Over Range

The 4102 and 4032 transmitters can withstand a DP pressure over-range on the high side or low side up to 1.5 times the AP upper range limit without damage.

The DP will begin to slowly degrade in accuracy when the DP URL is exceeded up to approximately 2 times the specified accuracy near its cutoff point. The cutoff value is 1.5 times the DP URL for 200, 300 and 400 inch H2O ranges and 1.25 times DP URL for the 840 inches H2O range. The cut off value is approximate because it is based on a raw sensor output prior to compensation. There is a 5% hysteresis intentionally built into the cutoff point so that the FAULT condition won't be constantly bouncing on and off if the DP value dwelled near the cutoff point.

The AP is measured on the high side and is co-located with the DP sensor, so when the DP protection mechanism kicks in, the AP is protected as well, even though it doesn't need the protection. Therefore the AP reading is not valid beyond the DP cutoff point and a fault flag is set.

### Maximum Static Pressure, Working Pressure (MWP), and Overrange Pressure

Span Code	Sensor URL (DP and AP)		Maximum Static		Maximum Working (MWP)		Maximum Overrange	
	DP	AP	Mpa	psi	Mpa	Psi	Mpa	psi
A	30 inH2O (7.5 kPa)	100 psia	0.7	100	0.7	100	1.0	150
B	200 inH2O (50 kPa)	300 psia	2.1	300	2.1	300	3.1	450
C	840 inH2O (210 kPa)	300 psia	2.1	300	2.1	300	3.1	450
D	200 inH2O (50 kPa)	1500 psia	10	1500	10	1500	15	2250
F	300 inH2O (75 kPa)	1500 psia	10	1500	10	1500	15	2250
E	840 inH2O (210 kPa)	1500 psia	10	1500	10	1500	15	2250
J	2 to 200 inH2O	3000 psia	21	3000	21	3000	30	4500
K	3 to 300 inH2O	3000 psia	21	3000	21	3000	30	4500
L	10 to 840 inH2O	3000 psia	21	3000	21	3000	30	4500
U	0.5 to 30 inH2O	100 psia	0.7	100	0.7	100	1.0	150
V	2 to 200 inH2O	300 psia	2.1	300	2.1	300	3.1	450
W	10 to 840 inH2O	300 psia	2.1	300	2.1	300	3.1	450

Span Code	Sensor URL (DP and AP)		Maximum Static		Maximum Working (MWP)		Maximum Overrange	
X	2 to 200 inH2O	1500 psia	10	1500	10	1500	15	2250
Z	3 to 300 inH2O	1500 psia	10	1500	10	1500	15	2250
Y	10 to 840 inH2O	1500 psia	10	1500	10	1500	15	2250
M	2 to 200 inH2O	3000 psia	21	3000	21	3000	30	4500
P	3 to 300 inH2O	3000 psia	21	3000	21	3000	30	4500
R	10 to 840 inH2O	3000 psia	21	3000	21	3000	30	4500

### Measured and Transmitted Outputs

- Absolute Pressure (Configurable for Gauge Pressure; PGP = PAP - Patm)
- Differential Pressure
- Process Temperature (from External RTD)

### Process Temperature Measurement and Limits

Measurement

DIN/IEC, 2-, 3-, or 4-wire, 100 ohm, Platinum

Resistance-Temperature-Detector (RTD)

Span Limits

10 and 538°C (50 and 1000°F)

Range Limits

-40 and +649°C (-40 and +1200°F)

### Adjustable Damping

The transmitter response time is normally 1.0 s, or the electronically adjustable setting of 0.00 (none), 0.50, 1, 2, 4, 8, 16, or 32 seconds, whichever is greater, for a 90% recovery from an 80% input step as defined in ANSI/ISA S51.1.

### Suppressed Zero and Elevated Zero

Suppressed or elevated zero ranges acceptable as long as Span and Range Limits are not exceeded.

### Minimum Allowable Pressure

With Silicone Fill Fluid

Full vacuum: up to 121 °C (250 °F)

## Transmitter Temperature Specifications

### Sensor Body

Reference conditions	24 +/- 2 o C (75 +/- o F)
Normal operating conditions	-29 to 82 o C (-20 to 180 o F)
Operative limits	-46 to 121 o C (-50 to 250 o F)
Storage and transportation limits	N/A

### Sensor Electronics

Reference conditions	24 +/- 2 o C (75 +/- o F)
Normal operating conditions	-29 to 82 o C (-20 to 180 o F)
Operative limits	-40 to 85 o C (-40 to 185 o F)
Storage and transportation limits	-54 to 85 o C (-65 to 185 o F)

### LCD Display

Reference conditions	24 +/- 2 o C (75 +/- o F)
Normal operating conditions	-29 to 82 o C (-20 to 180 o F)
Operative limits	-29 to 85 o C (-20 to 185 o F)
Storage and transportation limits	-54 to 85 o C (-65 to 185 o F)

Although the LCD will not be damaged at any temperature within the Storage and Transportation Limits updates will be slowed and readability will be decreased at temperatures outside the Normal Operating Conditions.

## Transmitter Performance Specifications

Zero-Based Calibrations; Stainless Steel Sensor with Silicone Fluid; Under Reference Operating Conditions unless otherwise specified; URL=Upper Range Limit and Span=Calibrated Span.

Calibrated Span is equal to URL on all 4203 or 4102 transmitters, unless a special order has been placed for special calibration over a smaller span.

### Accuracy

Accuracy stated includes the effects of Linearity, Hysteresis, and Repeatability.

Differential and Absolute Pressure

For gauge pressure accuracy, add anticipated variation from user-entered barometric pressure.

Digital output accuracy:

±0.05% of Span for spans > or = 10% of URL

Digital Output Accuracy for spans of <10% URL:

$\pm(0.005)X(\text{URL} / \text{Span})$  % of Span

Process Temperature

$\pm 0.15^{\circ}\text{C}$  ( $\pm 0.27^{\circ}\text{F}$ ) for the SCADAPack 4203 DR transmitter. This does not include RTD uncertainties, which are additive.

### Stability

Long-Term Drift less than  $\pm 0.05\%$  of URL per year over a 5-year period.

### Power-up Time

Less than 10 seconds for output to reach first valid measurement.

### Vibration Effect

$\pm 0.2\%$  of URL per "g" for vibrations in the range of 5 to 500 Hz; with double amplitudes of 6.3 mm (0.25 in) in the range of 5 to 15 Hz, or accelerations of 3 "g" in the range of 15 to 500 Hz, whichever is smaller, for transmitter with aluminum housing; and with double amplitudes of 6.3 mm (0.25 in) in the range of 5 to 9 Hz, or accelerations of 1 "g" in the range of 9 to 500 Hz, whichever is smaller, for transmitter with 316 ss housing.

### Supply Voltage Effect

Output changes less than 0.005% of span for each 1 V change within the specified supply voltage requirements.

### Static Pressure Effect on Differential Pressure

The zero and span shift for a 0.7 MPa, (100 psi), change in static pressure is:

#### ZERO SHIFT

Span Code	Zero shift for a 0.7 Mpa (100 psi) change:
A and U	$\pm 0.050$
B and V	$\pm 0.007$
C and W	$\pm 0.002$
D and X	$\pm 0.010$
F and Z	$\pm 0.007$
E and Y	$\pm 0.004$
J and M	$\pm 0.010$
K and P	$\pm 0.007$
L and R	$\pm 0.004$

#### SPAN SHIFT

$\pm 0.01\%$  of Reading

**Position Effect**

Transmitter may be mounted in any position. Any zero effect caused by mounting position can be removed by re-zeroing. There is no span effect.

**Ambient Temperature Effect**

Total effect for a 28°C (50°F) change within Normal Operating Condition limits for both absolute and differential pressure measurements is:

DIGITAL OUTPUT:  $\pm(0.03\% \text{ URL} + 0.06\% \text{ Span})$ .

For Span Codes A and L:

DIGITAL OUTPUT:  $\pm(0.18\% \text{ URL} + 0.025\% \text{ Span})$ .

**Switching and Indirect Lightning Transients**

The transmitter can withstand a transient surge up 2000 V common mode or 1000 V normal mode without permanent damage. Output shift is <1.0%.

**Transmitter Physical Specifications****Process Cover and Connector Material (Process Wetted)**

316 ss or Hastelloy C, as specified.

**Process Cover and Process Connection Gaskets**

Glass filled ptfе (Chemloy)

**Process Cover Bolts and Nuts**

ASTM A193, Grade B7 high strength alloy steel for bolts, and ASTM A194 Grade 2H high strength alloy steel for nuts are standard. Options include NACE Class B7M bolting, 17-4 ss bolting, and 316 ss bolting.

**Sensor Material (Process Wetted)**

316 L ss or Hastelloy C, as specified

**Sensor Fill Fluids**

Silicone Oil

**Environmental Protection**

Transmitter is dust tight and weather proof per IEC IP66 and provides the environmental and corrosion resistant protection of NEMA Type 4X.

**Electronics Housing and Housing Covers**

Housing has two compartments to separate the electronics from the field connections. The housing and covers are made from low copper, die-cast aluminum alloy with an epoxy finish, or from 316 ss. Buna-N O-ring seals are used to seal the threaded housing covers, housing neck, and terminal block.

**Electrical Connections**

Field wiring enters through 1/2" NPT threaded entrances on either side of the electronics housing. Wires terminate in removable terminal blocks for ease of installation and calibration.

**Mounting Position**

The transmitter may be mounted in any orientation.

**Approximate Mass**

3.5 kg (7.8 lb) – without Process Connectors

4.2 kg (9.2 lb) – with Process Connectors

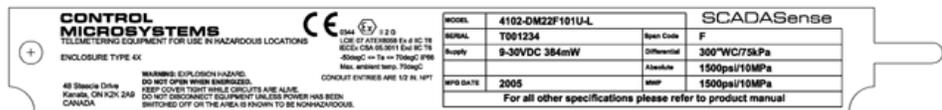
Add 1.1 kg (2.4 lb) – with 316 ss Housing

Add 0.2 kg (0.4 lb) – with LCD Indicator Option

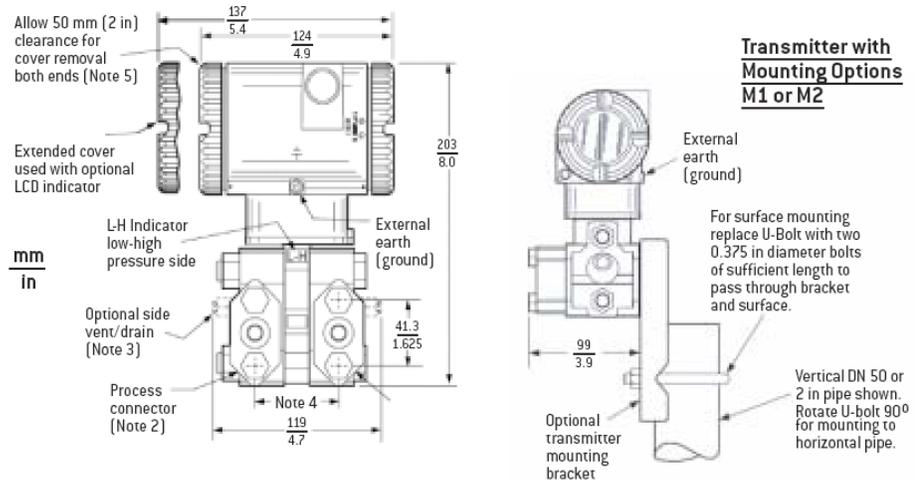
## Approvals and Certifications

<p><b>Safety</b></p>	<p>c(CSA)us Explosion proof. Class I, Div. 1 Groups B, C and D Hazardous Locations.                  c(CSA)us Class I, Div. 2 Groups A, B, C and D Hazardous Locations.                  Temperature code T5 at maximum ambient, 70°C.                  Provides non-incendive field circuits for RTD.</p> <hr/> <p>CSA certified to the following standards:                  CSA Std. C22.2 No. 213-M1987 - Class I, Division 2 Hazardous Locations                  CSA Std. C22.2 No. 142-M1987 - Process Control Equipment                  UL Std. No. 1604 - Class I and II, Division 2; Class III Hazardous (Classified) Locations                  UL Std No. 916 - Energy Management Equipment</p> <hr/> <p>LCIE 07 ATEX6058 Ex d IIC T6                  ATEX and IECEX                  Ex d IIC T6; -50°C ≤ Ta ≤ 70°C                  per IEC 60079-1, protection type d (Flameproof)</p>
<p><b>Digital Emissions</b></p>	<p>FCC Part 15, Subpart B, Class A Verification                  EN 61000-6-4: 2007                  Electromagnetic Compatibility                  Generic Emission Standard for Industrial Environments</p>
<p><b>Immunity</b></p>	<p>EN 61000-6-2; 2005                  Electromagnetic Compatibility                  Generic Standards Immunity For Industrial Environments</p>
<p><b>Declaration</b></p>	<p>This product conforms to the above Emissions and Immunity Standards and therefore conforms with the requirements of Council Directive 2004/108/EEC (as amended) relating to electromagnetic compatibility and is eligible to bear the CE mark.</p>

### ATEX/IECEX label



## Dimensions



### NOTES:

1. Conduit connection 1/2 NPT or PG 13.5, both sides: plug unused connection with metal plug (supplied)
2. Process connectors may be removed and connections made directly to process cover using 1/4 NPT internal thread in process cover
3. Process cover can be inverted making optional side vents or side drains
4. Process connectors can be inverted to give either 51, 54, or 57 mm (2.0, 2.125, or 2.25 in) center-to-center distance between high and low pressure connections
5. Topworks can be rotated to any position within one turn counterclockwise of the fully tightened position
6. Process cover end plugs are substituted for vent screws when optional side vents are specified