

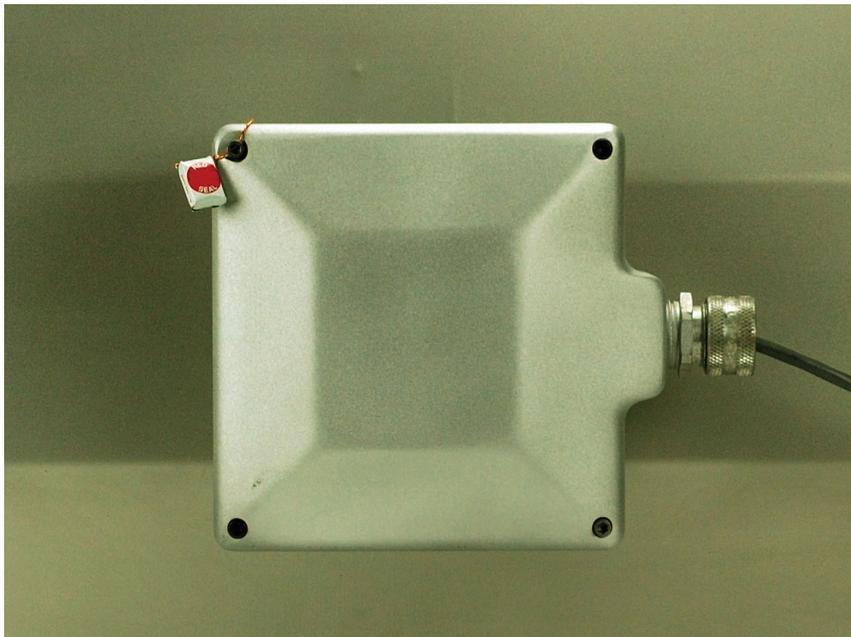


**RED SEAL
MEASUREMENT**

M-621
Rev. H

NexGen SFT200

Operating and Maintenance Manual



IMPORTANT: To assure proper installation of this product, thoroughly review the information in this revision of the manual. Information is subject to change as new features are implemented. Failure to follow instructions may result in system malfunction.

www.redsealmeasurement.com

WARNINGS, CAUTIONS AND NOTES

Throughout this manual you will see **WARNINGS, CAUTIONS** and **NOTES**. They are here for your benefit and warrant attention. By paying careful attention to them you can prevent injury and possible equipment damage.

Below are examples:

WARNINGS: **INFORM THE READER OF POSSIBLE BODILY INJURY IF PROCEDURES ARE NOT FOLLOWED EXACTLY.**

CAUTIONS: **Alert the reader to possible equipment damage if procedures are not followed correctly.**

NOTES: **Inform the reader of a general rule for a procedure or of exception to such a rule.**

NOTICE

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Power and input & output (I/O) wiring must be in accordance with Class I, Division II wiring methods, Article 501-4 (b), or the National Electrical Code, NFPA 70 for installations in the U.S., or as specified in Section 18-1J2 of the Canadian Electrical Code for installations within Canada, and in accordance with the authority having jurisdiction.



Caution - This electronic device is sensitive to damage from ESD (electrostatic discharge). Observe the following precautions when servicing this device.

Electronic devices with exposed connectors are highly susceptible to damage by electrostatic discharge (ESD). Anyone performing field service on Red Seal Measurement electronic devices must observe the following precautions.

1. Always use a static-dissipative wrist strap. Connect the strap to a grounded, conductive surface or to the metal chassis of the equipment under repair. Use only wrist straps that incorporate a resistor for user safety. The resistance between the user and ground should be between 800K ohms to 10M ohms. Do not wear a wrist strap around exposed electrical hazards of more than 250 volts.
2. If a wrist strap is not available, ground yourself before touching electronics by touching the metal chassis of the equipment or another grounded surface. Repeat frequently while working.
3. If available, use a static-dissipative work mat. Connect the mat to ground and the wrist strap to the mat.
4. Avoid contacting the connectors or any exposed electronic component.
5. Work away from materials that may contribute to the generation of static electricity, such as synthetic carpeting.
6. Minimize your movements to avoid building up static charge.
7. Avoid working on electronics in areas with very low humidity.
8. Do not work on electronics during periods of lightning activity.
9. Do not ship or store this device near strong electrostatic, electromagnetic, magnetic, or radioactive fields.

Caution - This electronic device (SFT200) is sensitive to water or moisture. Observe the following precautions when installing and/or servicing the unit.

When terminating the meter cable always make sure to observe local electrical regulations. In order to prevent damage to the electronics, tighten the strain relief nut with cable gland securely. If using a conduit to route the cable, properly terminate the ends to prevent collecting water and/or moisture that can damage the electronics.

Special precaution should also be observed when re-installing the SFT200 cover. Properly install the cover gasket and the “O” rings on the cover screws to ensure no moisture will enter the unit.

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1. Overview

This manual explains how to install, start up, troubleshoot and program the NexGen SFT200 mass flow transmitter for use with Red Seal Measurement mass flow transducers. For more information about the Red Seal Measurement transducer, consult the transducer installation guide, M-600.

The Nexgen SFT200 can be mounted directly to the case of the transducer, or remotely mounted when operating conditions are not conducive to integral mounting. Field connections to the unit are made through an 8 position terminal strip with 14 - 18 AWG wires. The wiring cable is run through the unit's connector and secured with a cable gland or conduit. Remote mounting requires an additional cable between the NexGen SFT200 and the transducer adapter.

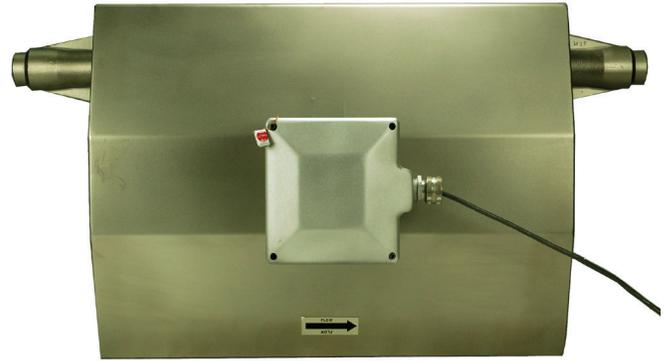


Figure 1.1
Nexgen SFT200 Mounted to Transducer

The NexGen SFT200 output is MODBUS protocol via RS-485, communicating at standard speeds up to 56.6 K baud. Pulse output is also available. All other functions are handled by external monitoring and control software applications. The electronics are potted in a plastic enclosure inside the aluminum case. The electronics module is not repairable, but can be removed for replacement or to reorient the unit. The only accessible components are the terminal strip, zeroing key and LED indicator.

The NexGen SFT200 is housed in an aluminum case rated to IP55/NEMA 4X. The lid is secured by four screws and sealed with a flat gasket. A means of security sealing is provided by a hole on one corner of the housing and a drilled socket head screw. Seal wire is passed through these openings and secured with a metal seal. When the unit is properly sealed, a ridge on the case prevents the lid from being rotated out of position.



Figure 1.2 Security Seal

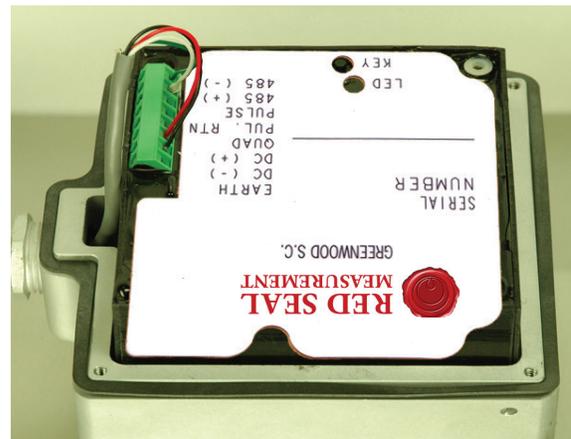


Figure 1.3 Electronics Module

2. Specifications

Power Requirements:

- 12.5-30 VDC
- 500 mA, startup; 30mA, running
- <10 W power consumption

Output:

- RS-485 MODBUS
- Single Pulse
- Quadrature Pulse

Baud Rates, Half Duplex:

- 1200, 2400, 4800, 9600, 19200, 38400, 57600

Size:

- 5.5 in x 5 in x 3.5 in (140 mm x 127 mm x 89 mm)

Weight:

- 4 lbs (1.8 kg)

Operating Temperature Range:

- -40 °F to 140 °F (-40 °C to 60 °C)

Enclosure Rating:

- IP55, NEMA 4X

Terminal Size:

- 14-18 AWG

Hazardous Area Approval:

- Pending

3. Mechanical Installation

Before performing any procedures in this section, please read the precautions on page 3 for handling ESD sensitive components.

3.1 Integral Mounting (attached to the transducer)

3.1.1 Delivered Configuration

When delivered as an integrally mounted component of a Red Seal Measurement mass flow transducer, the NexGen SFT200 is oriented with the cable port facing to the right, as shown in Figure 3-1.

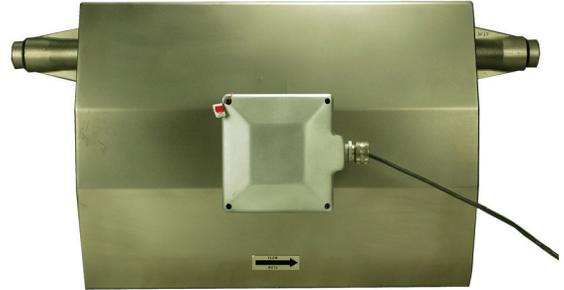


Fig. 3.1 Delivered Configuration

3.1.2 Changing the Connector Orientation

If it is necessary to change the orientation of the cable port, the housing may be rotated in 90 degree increments as follows:

1. Clip the seal wire from the corner of the housing. Remove the four screws and cover (Figure 3-2).
2. If electrical connections have been made, disconnect the cable from the connector.
3. Remove the four screws holding the electronics module.
4. Using the straps on the sides of the electronics module, pull the module out of the housing and set aside carefully (Figure 3-3).



Fig. 3.2 Removing the Cover

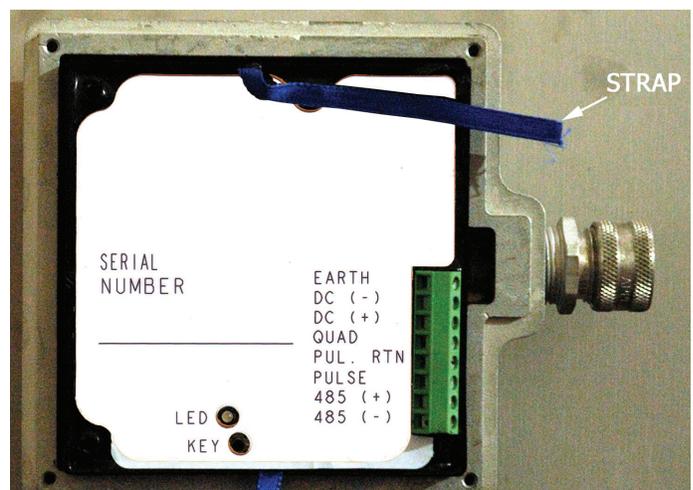


Fig. 3.3 Removing Electronics Module

5. Remove the four allen head screws at the base of the housing. These screws secure the housing to the transducer (Figure 3-4).
6. The housing may now be rotated to one of four positions. Lift the housing from the pedestal. Turn to best accommodate the entering cable. Then reattach it to the mounting pedestal (Figure 3-5).
7. Reverse steps 1 to 5 to reassemble. Do not exceed the torque specifications listed below.



Fig. 3.4 Removing the screws at the base of the housing

3.1.3 Torque Specifications

Housing to pedestal: 10-12 in-lbs

Electronics module to housing: 3-4 in-lbs

Cover to housing: 10-12 in-lbs



Fig. 3.5 Reoriented housing

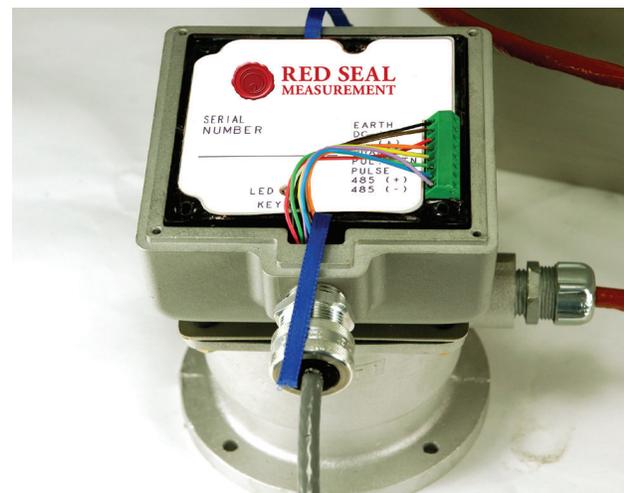


Fig. 3.6 NexGen SFT200 on Pedestal

3.2 Remote Mounting

In some circumstances (e.g. high temperature applications), it may not be desirable to mount the transmitter directly on the transducer case. A remote mounting kit is available for these applications.

In the remote mounting configuration, the NexGen SFT200 transmitter mounts to a pedestal which can be attached to a wall or other surface. (Figure 3.6) A cable connects the pedestal to the connector of the transducer. The outputs of the transmitter are connected to the monitoring systems as usual.

3.2.1 Remote Mounting with End Connector on Transducer

When the transmitter is mounted remotely to an older transducer, with the connector on the end panel, the cable connector plugs directly into the connector on the transducer. (Figure 3.7).

3.2.2 Remote Mounting with Side Connector on Transducer

When the transmitter is mounted remotely to a transducer, with the connector on the side, an intermediate housing is mounted to the transducer, to provide an interface between the transducer connector and the cable to the pedestal. (Figure 3.8)

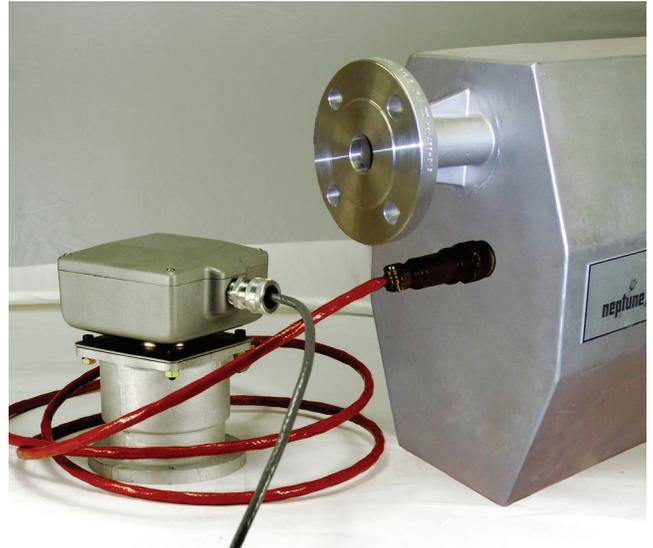


Fig. 3.7 Remote mounting with end connector on transducer

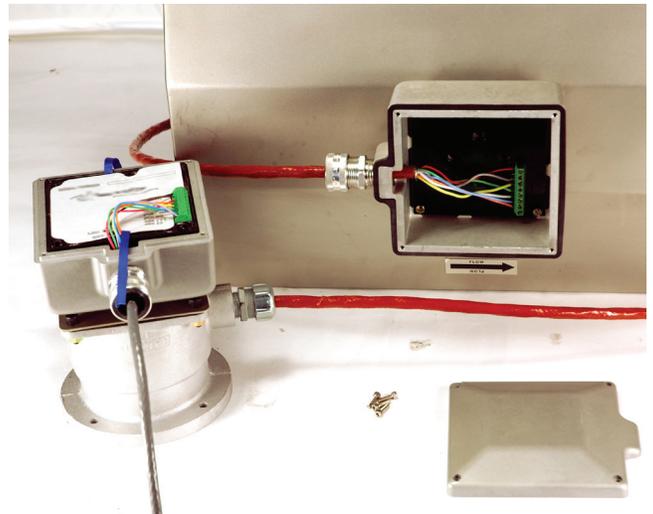


Fig.3.8 Remote mounting with side connector on transducer

4. Electrical Installation

Before performing any procedures in this section, please read the precautions on page 3 for handling ESD sensitive components.

4.1 Installing the Cable

Route the cable with the appropriate number of conductors through the port on the side of the case. Use a cable gland to secure the cable and seal the opening, or use conduit to route the cable to the unit.

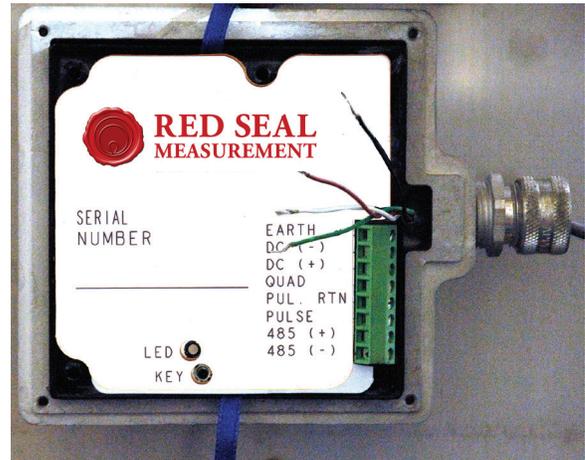


Fig. 4.1 Installing the Cable

4.2 Wiring the Terminal Strip

Connect the cable wires to the terminal strip as appropriate. The terminal strip pinout is as follows.

1. Earth Ground
2. Electrical Ground
3. +12.5-30 VDC
4. Pulse B (Quadrature)
5. Pulse Return
6. Pulse A (Primary)
7. RS-485 +
8. RS-485 -

Reseat the electronics module into the housing, dress the cable, and reinstall cover.

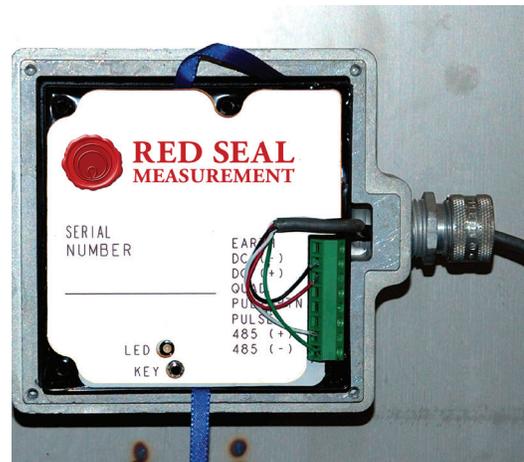


Fig. 4.2 Wiring the Terminal Strip

4.3 Wiring the Remote Mount Interface Board

The remote mount interface board is located in the housing attached to the transducer.

Terminal Number	Wire Color
1	Red
2	Blk
3	Gry
4	Yel
5	Grn
6	Wht
7	Org
8	Blu



Figure 4.3 SFT-200 Remote Wiring

4.4 Pulse Output

The SFT200 provides two externally powered pulse output channels for single or quadrature pulse applications. Pulses are generated through open-collector NPN transistors which are galvanically isolated by 2.5KV opto-couplers with 100 ohm ON resistance. The pulse can represent any variable and has a range up to 10,000 Hertz.

Pin 4: Pulse Channel A (Primary)

Pin 5: Pulse Return

Pin 6: Pulse Channel B (Quadrature)

The maximum input voltage is 26.5 VDC, and the maximum current is 10mA.

CAUTION: Exceeding 10mA through the pulse output circuit will damage the transmitter. Select the pull-up resistor R_P to ensure that the current through the pulse output circuit does not exceed 10mA.

$$(R_P \geq V_{\text{supply}}/0.01)$$

4.4.1 Single Pulse Applications

Pins 4 and 5 on the SFT200 connector are used for single pulse generation.

Single Pulse Output Connections (Externally Powered)

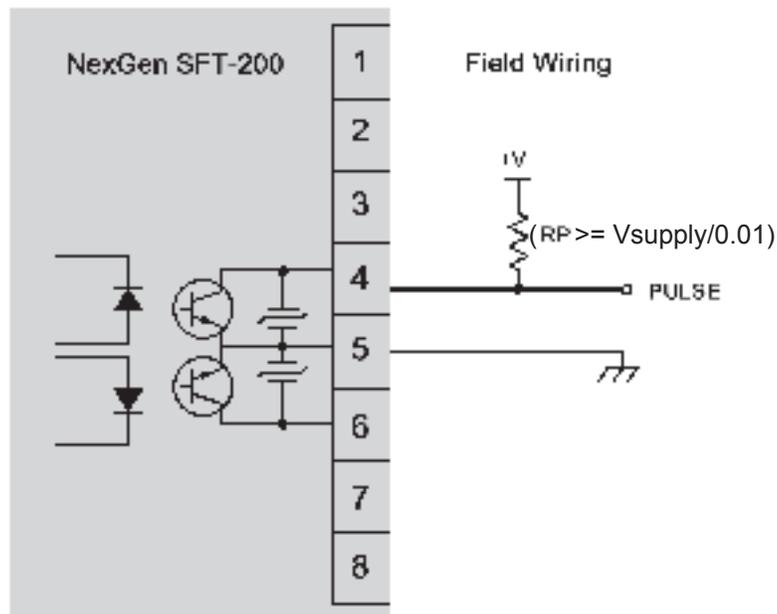


Figure 4.4
Wiring, Externally Powered Single Pulse Output

Single Pulse Output for Sinking Counter (Voltage Switched to Zero)

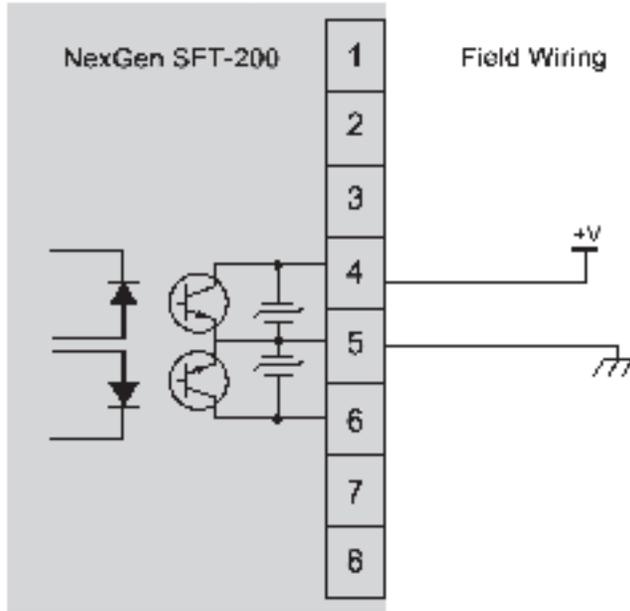


Figure 4.4 Wiring, Single Pulse Output for Sinking Counter

4.3.2 Quadrature Pulse Applications (Flow Direction Indication)

The SFT200 transmitter can indicate direction of flow through the two channel quadrature pulse output. The two channels produces identical pulse signals that are 90 degrees out of phase. When flow is in the normal direction, the primary channel (pulse A) leads the quadrature channel (pulse B) by 90 degrees. If the direction of flow is reversed, the quadrature channel leads the primary channel by 90 degrees.

The quadrature channel can also be used to verify the validity of the primary channel.

Quadrature Pulse Output Connections (Externally Powered)

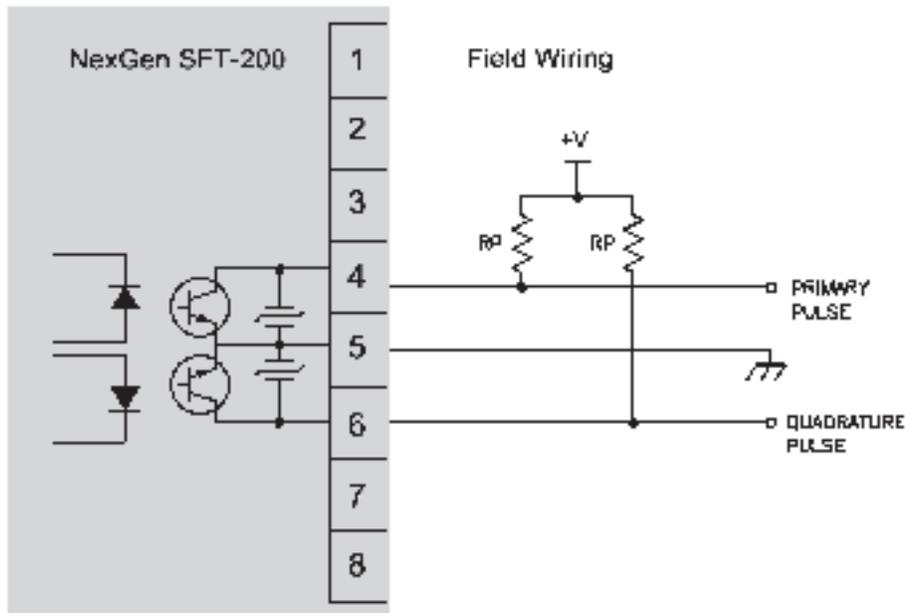


Figure 4.5 Wiring, Externally Powered Quadrature Pulse Output

4.4 RS-485 Wiring Connections

The NexGen SFT200 transmitter is equipped with an RS-485 asynchronous serial interface that uses MODBUS®. MODBUS allows a computer or a handheld communicator to communicate directly with up to 248 NexGen transmitters, sending commands to configure batching, alarms, outputs, etc., and to read all measured variables.

NOTE: If the NexGen SFT200 transmitter is in use in a Custody Transfer application, **ALL CONNECTIONS** to Terminals 7 and 8 (RS-485) shall be removed prior to the sealing of the unit by a Weights and Measures official.

4.4.1 Single Drop Modbus Systems

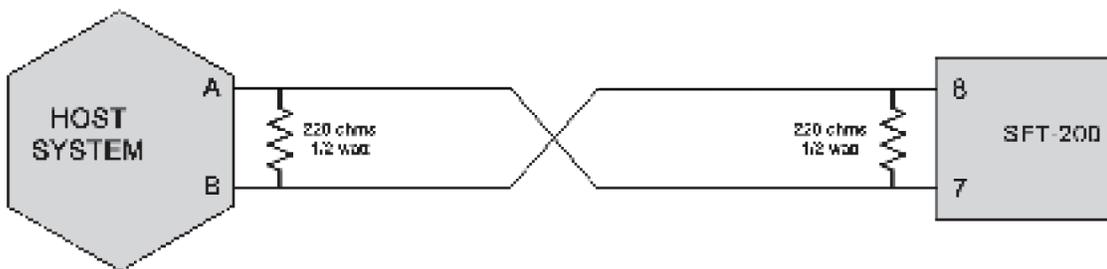


Figure 4.6 RS-485 Wiring, Single Drop

4.4.2 Multiple Drop Modbus Systems

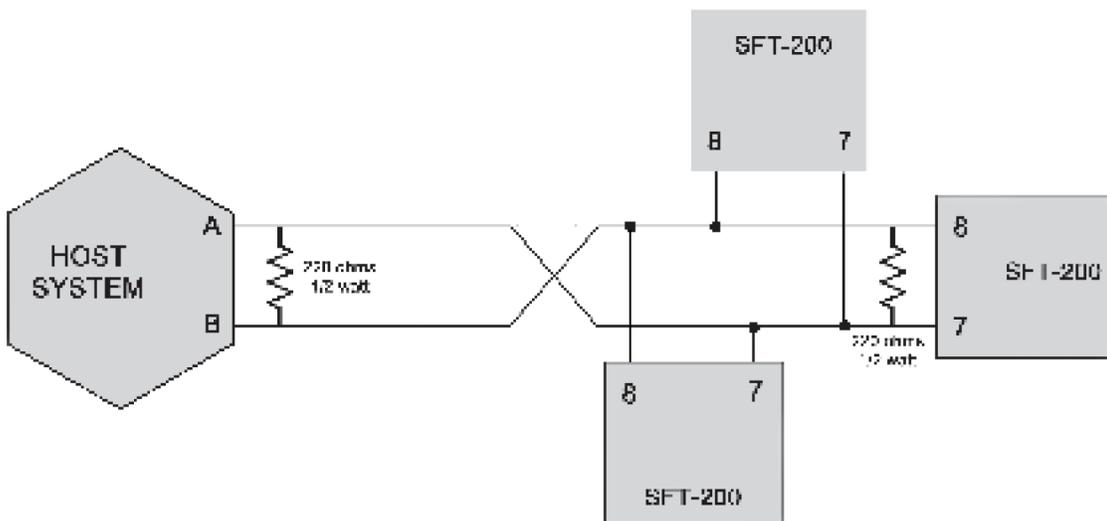


Figure 4.7 RS-485 Wiring, Multiple Drop

4.5 RS-485 Converter Connections (for use with Nexlink Software)

A USB to RS-485 can be used to communicate with the SFT200 from a PC running the NexLink software provided by Red Seal Measurement. NexLink enables the user to set the unit's configuration, monitor process variables and perform calibration procedures. A typical converter is shown in Figure 4.8.



**Figure 4.8 USB to RS-485 Converter
(Red Seal Measurement part #600934-001)**

Plug the converter into a USB port and install the drivers. (The device driver installation procedure varies with different versions of Windows. Follow the instructions provided by the converter manufacturer.) When the computer recognizes the converter and indicates that it is ready to use, check the Windows Device Manager to determine which comm port number has been assigned. You will need to set the NexLink program to the same value in order to communicate.

Connect the converter to the SFT200's terminal strip as shown in Figure 4.9. **Note: Identification of the data lines on RS-485 converters varies among manufacturers. If communication with the SFT-200 fails, switch the data lines to terminals 7 & 8 and retry. (Reversed data lines will not harm the SFT-200.)**

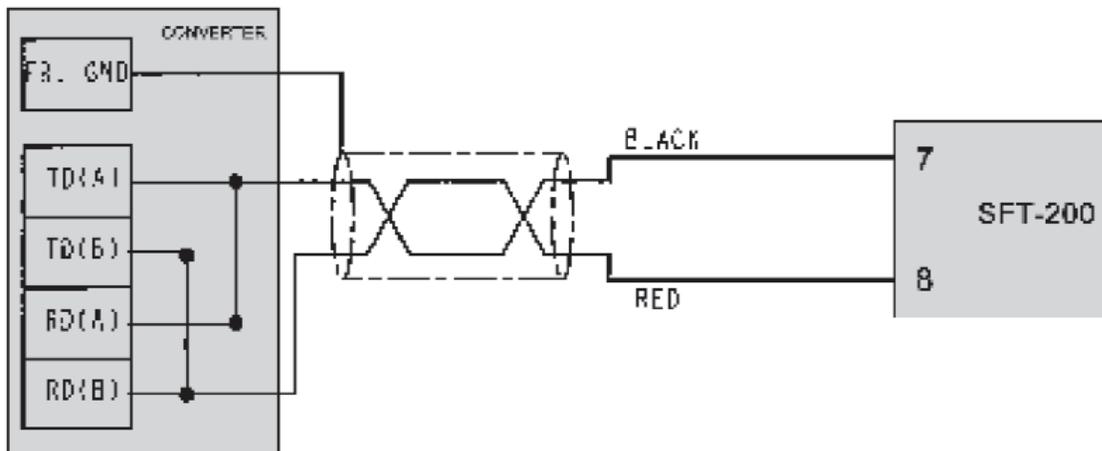


Figure 4.9 Connecting the RS-485 Converter to the SFT-200

5. Startup and Operation

Before performing any procedures in this section, please read the precautions on page 3 for handling ESD sensitive components.

5.1 Communicating with the SFT200 using NexLink

1. Attach the RS-485 converter per section 4.5. Install the NexLink communication software. Power the SFT200 and launch NexLink.
2. On the NexLink main screen, "Comm Port" in the top menu. The following dialog box will appear, which allows configuration of the communication port.
3. Ensure that the proper comm port, on which the RS-485 line is attached to the PC, has been selected.
4. Ensure that the remaining parameters are set to values shown above, which are the default values for

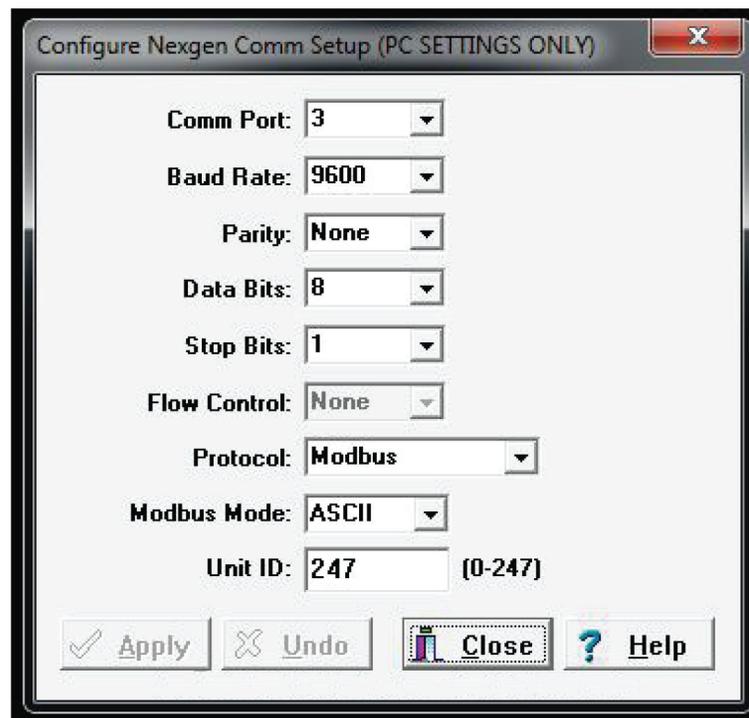


Figure 5.1 Comm Port Setup

a new SFT200. (If the unit is not new, these settings must correspond to any changes that have been made to the unit's communication port configuration. For example, the SFT200's Unit ID=247 may be set to any value between zero and 247.) Note: Changing the values on this screen only affects the communication port setup. It does not reconfigure the settings in the SFT200.

5. Click 'Apply'.
6. Click the button to open the PC's comm port. When the comm port is open, the red X will disappear. It will reappear if NexLink cannot communicate with the unit, or if the comm port is closed for any reason. If the port does not remain open, check the adapter wiring, power connection and NexLink communication port settings.



**Com Port
Button**

5.2 Configuring the SFT200

Before the SFT200 is calibrated, it has to be configured for its transducer (meter type). Perform the following steps to configure the system.

5.2.1 Device Configuration

1. On NexLink's lower menu row, click the 'CFG' button. Enter the user ID and password. (The default for both is 'admin'.) Click 'OK', and then 'OK' again at the next dialog box.
2. Click 'Device Info' in the top menu row and select 'Configuration' from the drop down menu. (If the 'Receive Failure' dialog box is displayed, check that the SFT200 and NexLink are both configured correctly as described in section 5.1. Reboot the SFT200 and try again.)
3. Type the transducer pick code into the 'Sensor Model' box. Do not use a capital M and drop the final 0 of the code. Drop 1st digit of the meter model. Example - M200-886300002S put in: M2008630
4. Enter the transducer serial number into the 'Sensor S/N' box (lower case).
5. Enter the SFT200's pick code into the 'Elect Model' box (lower case).
6. Finally enter the SFT200's serial number into the 'Elect S/N' box (lower case).
7. Click 'Apply' and 'Close'

m-Dot Size	Low Flow Cut-off (lb/min)
M012	0.1
M025	0.4
M050	1.5
M100	5.5
M200	16.0
M300	45.0
M400	75.0

5.2.2 Mass Flow Rate Low Flow Cutoff

1. Click 'Xmit Vars'.
2. Verify that the selected parameter is 'Mass Flow'.
3. Select 'lb/min' from the Unit drop down menu.
4. [TAB] down to Low Flow Cutoff.
5. Enter the correct mass flow rate low flow cutoff value from Table 1.
6. Click 'Apply' and 'Close'

Table 5.2 Low Flow Cutoff

5.2.3 Sensor Voltage Adjustment

1. Click 'Sensor'
2. Set the 'Sensor Amplitude Setpoint' and 'Control Gain' to the values indicated in Table 2.
3. Click 'Apply' and 'Close'
4. Click 'SYS' then 'Dbase/File Mgmt'
5. Select 'Reboot System'
6. Click 'OK' in the Reboot NexGen System box.
7. The green LED will turn off and a dialog box will appear stating "System Rebooted." Click 'OK'.
8. The unit will power back up and the LED will light green after about 20 seconds.

m-Dot Size	Sensor Amplitude Set Point (mVrms)	Control Gain
M012	200	16
M025	200	27
M050	200	45
M100	200	45
M200	200	45
M300	140	45
M400	140	45

Table 5.3 Sensor Voltage Adjustment

5.3 Zeroing the Flowmeter

Prior to use for measurement, a mass flow meter must be “zeroed” to remove the effects of installation environmental factors. Flow meter zeroing establishes the flow meter response to zero flow and sets the zero baseline for flow measurement. Zeroing is accomplished by use of the KEY and LED indicator located under the cover of the transmitter.

CAUTION: Failure to zero the flow meter at initial startup will cause it to produce inaccurate values for parameters accessed via the RS-485 serial port and/or pulse output.

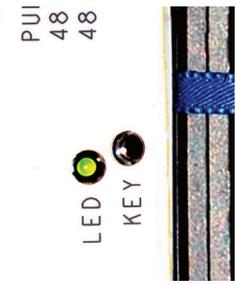


Fig. 5.4
KEY and LED

5.3.1 Zeroing Procedure using the Internal Key

1. Install the transducer according to the transducer installation guide (M-600).
2. Fill the transducer completely with the process fluid.
3. Close the downstream valve (and the upstream valve, if available) after the transducer is filled. Ensure there is no flow through the transducer. **CAUTION: Flow through the transducer during flow meter zeroing will result in an inaccurate zero setting. Make sure fluid through the transducer is completely stopped during flow meter zeroing.**
4. Clip the seal wire from the corner of the housing,
5. Remove the four socket head screws.
6. Remove the cover.
7. Press the KEY button once. (Figure 5.4)
8. The green LED indicator will go out and then begin to blink red. Press the button again before the LED blinks three times. The LED will glow red continuously (about 2 minutes) while zeroing is taking place (Figure 5.5). After zeroing is complete, the LED will again glow green.

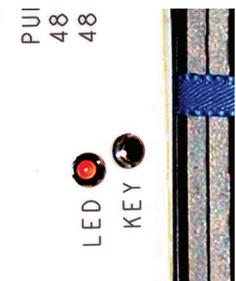


Fig. 5.5
The LED glows red during zeroing

5.3.2 Zeroing Procedure using Nexlink Communication Software

Alternatively, the zeroing command may be issued from a remote computer through the Nexlink software. This method does not require that the seal be broken, but a password is necessary to access this feature. See section 5.1 to set up communication through NexLink.

1. Install the transducer according to the transducer installation guide (M-600).
2. Fill the transducer completely with the process fluid.
3. Close the downstream valve (and the upstream valve, if available) after the transducer is filled. Ensure there is no flow through the transducer. **CAUTION: Flow through the transducer during flow meter zeroing will result in an inaccurate zero setting. Make sure fluid through the transducer is completely stopped during flow meter zeroing.**
4. From the NexLink Cal menu, click 'Zero' and select 'System' from the 'Zero' drop down menu.
5. Click 'Auto'.
6. Enter 12 in the '10 Sec Intervals' box.
7. Enter 1 in the 'Number of Zeros' box.
8. Click 'Apply' and wait for the 'Auto Cal Complete' message (about 2 minutes).
9. Wait for System 'Zero Value' and Std Dev' to update and verify the value is within limits.
10. Record 'Zero Value' and 'Std Dev' on the calibration data sheet.
11. Click 'Close'.

5.4 Calibration Procedures

5.4.1. Temperature Calibration:

1. Allow liquid to flow through the meter at full flow rate.
2. Use an electronic thermometer to monitor the temperature of the liquid flowing through the transducer.
3. In NexLink, click the 'CAL' button to access the calibration menu.
4. Click 'Temperature' to open the 'Temperature Calibration' window.
5. The 'Temperature' box will indicate the SFT200's temperature reading.
6. Wait until temperature readings on both the SFT200 and the monitoring thermometer have stabilized to +/- 0.2°C. (The two temperature indications do not have to be within 0.2°C of each other.)
7. After the two temperature indications stabilize, click 'Auto' and 'Apply'.
8. Wait for the 'Enter Actual Temperature' message and then enter the temperature indicated by the electronic thermometer into the 'Actual Temp' box.
9. Click 'Apply'
10. Wait for the 'RTD Offset' to update.
11. Record the 'RTD Offset' on the Calibration Data Sheet.
12. Click 'Close'.

5.4.2. Density Calibration:

The NexGen density calculation is factory calibrated. Use the following procedure to re-calibrate for density. A proper temperature calibration is required prior to calibrating the meter for density. A record of the meter tube frequency in air at the temperature that the frequency was measured is required. This information will be stamped on the meter tag. The density calibration should be performed under flow conditions.

1. Maintain flow through the transducer until all air has been flushed and then shut the flow off by closing the downstream valve (and the upstream valve, if available).
2. In NexLink, click the 'CAL' button to access the calibration menu.
3. Click 'Density', 'Auto', and 'Apply'.
4. Wait for the 'Enter Air Freq, Air Temp, Actual Density' message to be displayed.
5. Enter the transducer's Air Frequency, and Air Temperature into the boxes provided.
6. Enter the process liquid density into the 'Actual Density' box and click 'Apply'.
7. Verify that the density displayed in the 'Density' box is correct.
8. Wait for 'C1' and 'C2' to update.
9. Record 'C1' and 'C2' on the Calibration Data Sheet.
10. Click 'Close'.

5.4.3 Mass Flow Calibration:

The NexGen SFT200 is factory calibrated for mass accuracy and traceable to NIST standards. Use the following procedure to re-calibrate for mass. A proper temperature calibration is required prior to calibrating the meter for mass.

1. In NexLink, click the 'CAL' button to access the calibration menu.
2. Click 'Mass', 'OK' in the 'Mass Calibration via NexLink' window.
3. Click 'Auto' in the 'Mass Calibration' window and select 'Dump' from the 'Method' drop down menu.
4. Select 'Dump' (manual batching) or 'Batch' (automatic batching).
5. Tare an empty drum or tank.
6. Click 'Apply' and open the downstream valve (Dump mode) or press the remote start switch (Batch mode) and run product into the container for a minimum of one minute.
7. Make a minimum of 3 runs to check for repeatability before changing the scaler.
8. Enter the scale weight of the liquid into the 'Mass Calibration' 'Actual Mass' box and click 'Apply'.
9. Wait for the 'Mass Scaler' to update.
10. Record the 'Mass Scaler' on the Calibration Data Sheet.
11. Click 'Close' and 'OK'.

5.5 Upgrading the Firmware

The operating firmware for the device can be upgraded through the NexLink software.

5.5.1 Firmware Upgrade Procedure

1. Clip the seal wire from the corner of the housing, remove the four socket head screws, and remove the cover.
2. Press the KEY button once.
3. The green LED will go out and then begin to blink red.
4. Press the key again after three blinks. The system will enter the Firmware Upgrade mode and the LED will blink red continuously.
5. Select "Download File as OS" in the Nexlink menu and select the appropriate file:
 - Boot Loader
(RZ_IMG_BOOT_170606_P1.B)
 - Linux OS (RZ_IMG_LINUX_170606_P1.B)
 - Application (RZ_IMG_APPL_170606_P1.B)

After the file download the SFT200 will spend a few minutes completing registration and activation of the new firmware and will restart with the new firmware (indicated by LED returning to green). The installation of the image will take several minutes; please wait for it to finish. If more than 15 minutes passes, there may have been a problem, and you should re-boot manually. The SFT200 will use the old firmware. Always confirm that the upgrade was successful by checking revisions with NexLink (menu path: CFG-Device Info-Revision Numbers).

5.6 Resetting the Communication Port Defaults

In some cases (for example, forgotten or corrupted communication port configuration) it may be necessary to restore the system's default communication port settings.

5.6.1 Communication Port Reset Procedure

1. Clip the seal wire from the corner of the housing, remove the four socket head screws, and remove the cover.
2. Press the KEY button once.
3. The LED will blink red three times and go dark. After about 15 seconds, the LED glows orange.
4. While the LED is orange, press KEY again to reset the communication port configuration. If the reset is successful the LED will blink orange three times, then return to green. If the second press of KEY does not occur within 20 seconds of the LED going dark, or the press is not accepted, the LED will not flash orange and the system will return to normal mode, indicated by the LED glowing green.

6. Introduction To Responsible Recycling (R2) Practices

The purpose of this section is to help you properly manage used and end-of-life NexGen SFT200 “R2 Focus Materials”, also known as FM’s. FM’s are materials in end-of-life electronic equipment that warrant greater care during recycling, refurbishing, materials recovery, energy recovery, incineration, and/or disposal due to their toxicity or other potential adverse worker health and safety, public health, or environmental effects that can arise if the materials are managed without safeguards.

The following are R2 Focus Materials:

1. Items containing polychlorinated biphenyls (PCB’s),
2. Items containing mercury,
3. Cathode Ray Tubes (CRT’s) and CRT glass,
4. Batteries, and
5. Whole and shredded circuit boards, except for whole and shredded circuit boards that do not contain lead solder, and have undergone safe and effective mechanical processing, or manual dismantling, to remove mercury and batteries.

The term recycling means the equipment is disassembled and the components – such as plastic, glass, and metals – are recovered and used to manufacture new products. Some organizations are involved in both reuse and recycling while others focus on one activity.

This manual is intended to present only general guidelines for recycling options. You may find it necessary or desirable to depart from these guidelines for convenience, to enhance productivity or safety in your organization’s working environment, or in order to comply with local, state, and federal guidelines.

Options

What should be done with old electronic products? Electronic equipment should NOT be disposed of with the regular garbage. Nonfunctioning electronic devices should be recycled by an organization equipped to handle them. A first step in properly managing electronic products at the end of their useful life is to look in your yellow pages under Computer Dealers-Used and Recycled; Environmental and Ecological Services; Recycling Equipment and Services; Scrap Metals; Waste Disposal-Hazardous; or Waste Disposal, Reduction and Recycling. Organizations that can provide recycling companies: International Association of Electronic Recyclers (IAER) at www.iaer.org and National Recycling Coalition (NRC) at www.nrc-recycle.org/Programs/electronics/index/htm .

Federal, state, and local regulations are subject to revision, so be sure to keep in touch with all agencies that regulate the disposal of this material so you will know if the regulations change.

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Specifications subject to change without prior notification