

M-620  
Rev. H  
NexGen

# RED SEAL MEASUREMENT

## NexGen® Operating & Maintenance Manual



## **WARNINGS, CAUTIONS, 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 personal injury and possible equipment damage. Below are examples:

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

**CAUTION: 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 exceptions to such a rule.***

***Refer to page 33 for start-up instructions for NexGen.***

# Table of Contents

<b>SECTION 1: WHAT YOU NEED TO USE THIS MANUAL .....</b>	<b>1</b>
1.1 Introduction to the NexGen® RSM Coriolis Flow Transmitter .....	1
1.2 About This Manual .....	1
1.3 Terminology .....	1
1.4 Principle of Operation .....	1
1.5 Optional LCD .....	1
<b>SECTION 2: READ THIS FIRST .....</b>	<b>5</b>
2.1 Transmitter Area Classification .....	5
2.2 Orientation and Mounting .....	5
2.3 Temperature, EMI/RFI, Humidity, Vibration and Mechanical Shocks .....	5
2.4 Transmitters Approved for Custody Transfer (optional) .....	6
<b>SECTION 3: TRANSMITTER INSTALLATION .....</b>	<b>8</b>
3.1 Mounting Location Guidelines .....	8
3.2 Mounting to a Wall .....	9
3.3 Mounting to a Pole .....	9
3.4 Guidelines for Conduit .....	12
3.5 Transducer Cable Connections .....	12
3.6 Guidelines for Explosion Proof Cover .....	12
<b>SECTION 4: POWER SUPPLY WIRING .....</b>	<b>15</b>
4.1 Wiring Guidelines .....	15
4.2 Grounding .....	15
4.3 Power Supply Wiring Connections .....	16
<b>SECTION 5: INPUT/OUTPUT WIRING .....</b>	<b>22</b>
5.1 General Guidelines .....	22
5.2 4-20mA Output .....	22
5.3 Pulse Output .....	23
5.4 Alarm Output .....	24
5.5 Flow Direction Output (Quadrature Pulse) .....	25
5.6 RS-485 Wiring Connections .....	26
5.7 RS-485/RS-232 Converter Connections .....	27
5.8 Hart® (Option Card) Wiring Connections .....	28
5.9 Hart® Communicator Connections .....	29
5.10 NexGen to Bestrac Wiring Connections .....	29
<b>SECTION 6: BATCH WIRING .....</b>	<b>30</b>
6.1 Guidelines .....	30
6.2 Batch Wiring Connections .....	31
6.3 Remote Start/Stop Wiring Connections .....	32
<b>SECTION 7: STARTUP .....</b>	<b>33</b>
7.1 Power .....	33
7.2 Startup with NexLink PC Software .....	33
7.3 Optional LCD .....	34
7.4 Flow Meter Zeroing .....	35
7.4.1 Automatic Zeroing Procedure .....	35
7.5 Ready for Process Measurement .....	35

7.6	Ready for Batch Operation (optional).....	36
7.6.1	Running a Batch.....	36
7.6.2	Beginning a Batch.....	36
7.6.3	Interrupting a Batch.....	36
7.6.4	Restarting a Batch.....	36
7.6.5	Terminating a Batch.....	37
7.6.6	Starting a New Batch.....	37
7.6.7	Totalizer Reset.....	37
7.7	Viewing Other Process Variables (optional LCD required).....	37
7.8	Concentration (% , Brix and Baume).....	37
7.9	API.....	39
7.10	Actual/Standard Volume.....	40
7.11	Net Oil and Well Testing (Optional).....	41
<b>SECTION 8: TROUBLESHOOTING.....</b>		<b>43</b>
8.1	Customer Service.....	43
8.2	General Guidelines.....	44
8.3	Transmitter Diagnostic Messages.....	45
8.4	Power Supply.....	46
8.5	Wiring.....	46
8.5.1	Cable Check.....	46
8.5.2	Output Board and Communications Test.....	46
8.6	Transducer Resistances Nominal Value.....	47
8.6.1	Transducer Tube Drive Test.....	48
8.6.2	Diagnostic Alarm Matrix.....	48
8.7	Slug Flow Inhibit.....	50
8.8	Transmitter Power Failure.....	50
<b>SECTION 9: PROGRAMMING WITH OPTIONAL LCD.....</b>		<b>51</b>
9.1	General Guidelines & Menu Tree.....	51
9.2	Main Menu (Operational Mode).....	55
9.3	Well Testing.....	57
9.4	Program Mode.....	59
9.5	Calibration Menu.....	62
9.5.1	Zero Calibration.....	62
9.5.2	Temperature Calibration.....	65
9.5.3	Density Calibration.....	66
9.5.4	Mass Calibration.....	68
9.5.5	Analog Output Calibration.....	70
9.6	Diagnostic Menu.....	72
9.6.1	Self Test.....	72
9.6.2	Alarm Test.....	73
9.6.3	Batch Relay Test.....	74
9.6.4	Analog Test.....	75
9.6.5	Pulse Test.....	76
9.6.6	RS485 Communication Test.....	76
9.6.7	Tube Drive Test.....	77
9.6.8	Buttons Test.....	78
9.6.9	LCD Test.....	79
9.7	Configuration Menu.....	85
9.7.1	Batch Setup Configuration.....	85
9.7.2	Device Information.....	87
9.7.3	Alarm Setup Configuration.....	89
9.7.4	Display Setup Configuration.....	90
9.7.5	Transmitter Variables Configuration.....	91
9.7.6	Analog/Pulse/RS485 Output Configuration.....	98

9.7.7	Totalizer Reset .....	100
9.7.8	Characterize Meter Configuration .....	101
9.8	System Menu .....	106
9.8.1	Set Date and Time .....	106
9.8.2	Password Configuration.....	106
9.8.3	Dbase File Management .....	107
<b>SECTION 9A: PROGRAMMING WITH HAND HELD COMMUNICATOR .....</b>		<b>109</b>
9A.1	Hart HHC Online Menu .....	113
<b>SECTION 10: MODEL NUMBER DESIGNATION.....</b>		<b>117</b>
<b>SECTION 11: TRANSMITTER SPECIFICATIONS.....</b>		<b>118</b>

## Table of Tables

### TABLE LOCATIONS

8.6.2	Allowable Transducer Resistances .....	47
8.6.3	Connector Board Cable Connection Table.....	47

## Table of Figures

### FIGURE LOCATIONS

1.1	LCD Display Unit Component Highlights .....	2
1.2	Blind Unit Component Highlights .....	3
1.3	LCD Display Unit (Less Keys) Component Highlights .....	4
2.4.1	Custody Transfer LCD Display Unit (Less Keys) Component Highlights.....	7
3.2.1	Dimensional Data .....	10
3.3.1	Mounting to an Instrument Pole .....	11
3.5.1	Transducer Cable Connections .....	13
3.5.2	Transmitter Terminals.....	14
4.3.1	Power Supply Wiring Location and Connections.....	17
5.2.1	4-20mA Output Wiring Connections .....	22
5.3.1	Pulse Output Wiring Connections .....	23
5.4.1	Field Connections for Alarm Devices Without an External Voltage Source .....	24
5.4.2	Field Connections for Alarm Devices With an External Voltage Source.....	24
5.5.1	Connection to Remote Totalizer for Net Total.....	25
5.6.1	RS485 Wiring Connections .....	26
5.7.1	HART® Network Wiring .....	27
5.8.1	HART® Communicator Connections .....	28
5.9.1	RS485/RS232 Converter Connections.....	29
5.10.1	Bestrac to NexGen Wiring Connections.....	29
6.2.1	Field Connections for Batch Devices That Do Not Require Pilot Relays .....	31
6.2.2	Field Connections for Batch Devices That Require Pilot Relays.....	31
6.3.1	Remote Start/Stop Connection .....	32
7.3.1	Location of LED, Zero Button and Optional LCD .....	34

8.6.1	Transducer Terminal Designation .....	47
8.6.2	M300 Transducer Terminal Designation .....	47
9.2	Main Menu Tree .....	55
9.5	Calibration Menu Tree.....	62
9.6	Diagnostic Menu Tree.....	72
9.7	Configuration Menu Tree .....	85
9.8	System Menu Tree.....	106

## Table of Drawings

### DRAWING LOCATIONS

Installation Drawing for CSA I.S. with XP NexGen .....	18 & 19
Installation Drawing for LCIE with NexGen .....	20 & 21

## SECTION 1: WHAT YOU NEED TO USE THIS MANUAL

### 1.1 Introduction to the NexGen® RSM Coriolis Flow Transmitter

RSM and its employees would like to express our thanks for purchasing the NexGen RSM Flow Transmitter SFT100™.

The NexGen is the most advanced Coriolis Flow Transmitter available. It is the first transmitter with an open architecture platform and to employ Digital Signal Processing (DSP), full software configuration and optional batching capabilities from an explosion proof enclosure.

### 1.2 About This Manual

This instruction manual explains how to install, start up, troubleshoot and program the NexGen SFT100 for use with the RSM Coriolis Force Flow meters. For more information about the RSM transducer, consult the Transducer Installation Guide (M-600).

**CAUTION: Improper installation could cause error in measurement or failure of transmitter.**

For safety purposes, please follow all instructions and adhere to all precautions outlines in this manual to assure the best operation of the SFT100.

### 1.3 Terminology

The term *transducer* or *sensor* refers to an RSM Coriolis Force Flow Meter (CFF™). The term *transmitter* refers to a NexGen RSM Flow Transmitter (SFT100™).

### 1.4 Principle of Operation

The principle of operation applies directly to the transducer. For a complete explanation, please consult the RSM Mass Flow Transducer Installation Guide (M-600).

### 1.5 Optional LCD

The NexGen transmitter is available with an optional Liquid Crystal Display (LCD). The LCD displays all functions of the transmitter and is fully configurable from the unit.

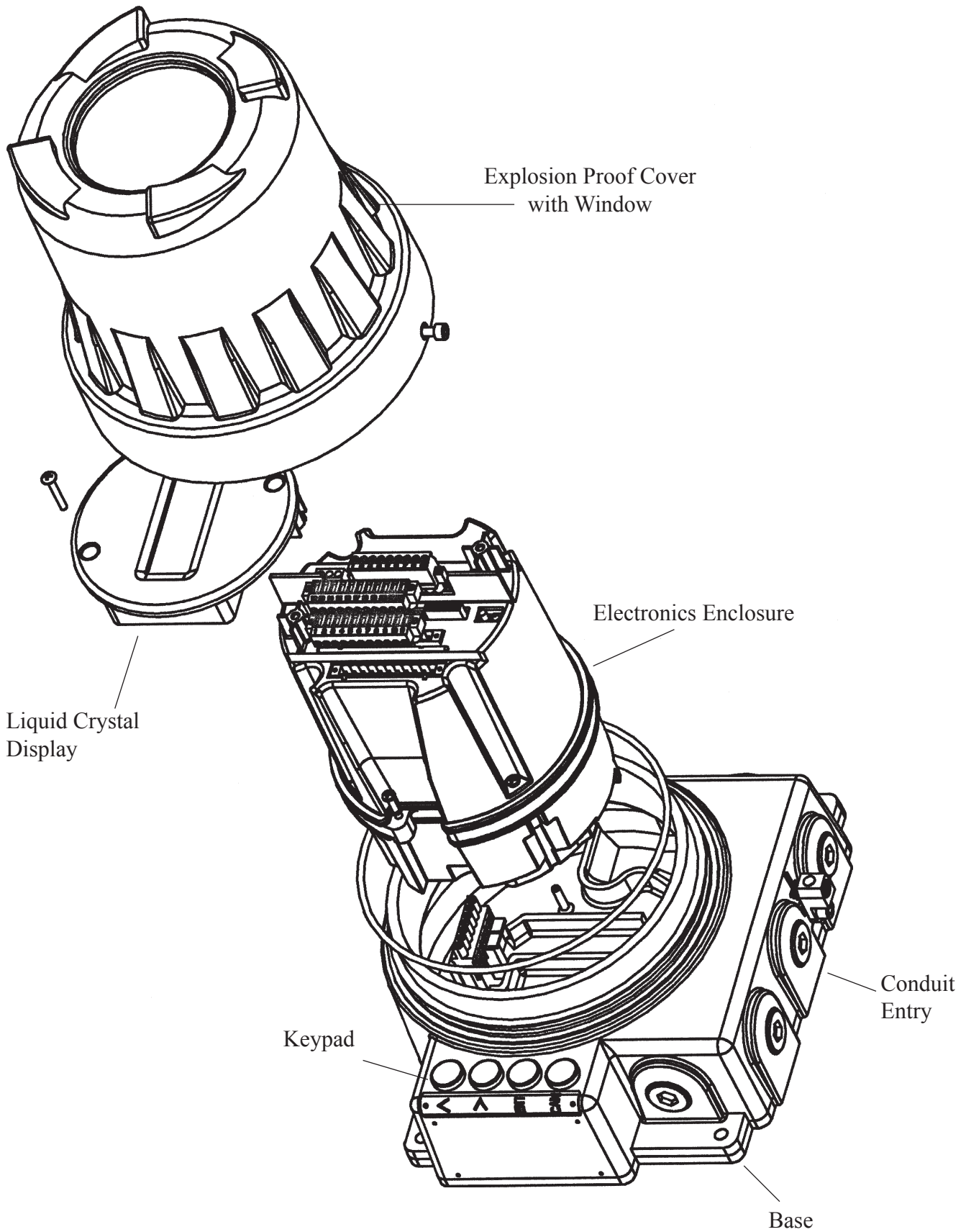


Figure 1.1: LCD Display Unit Component Highlights



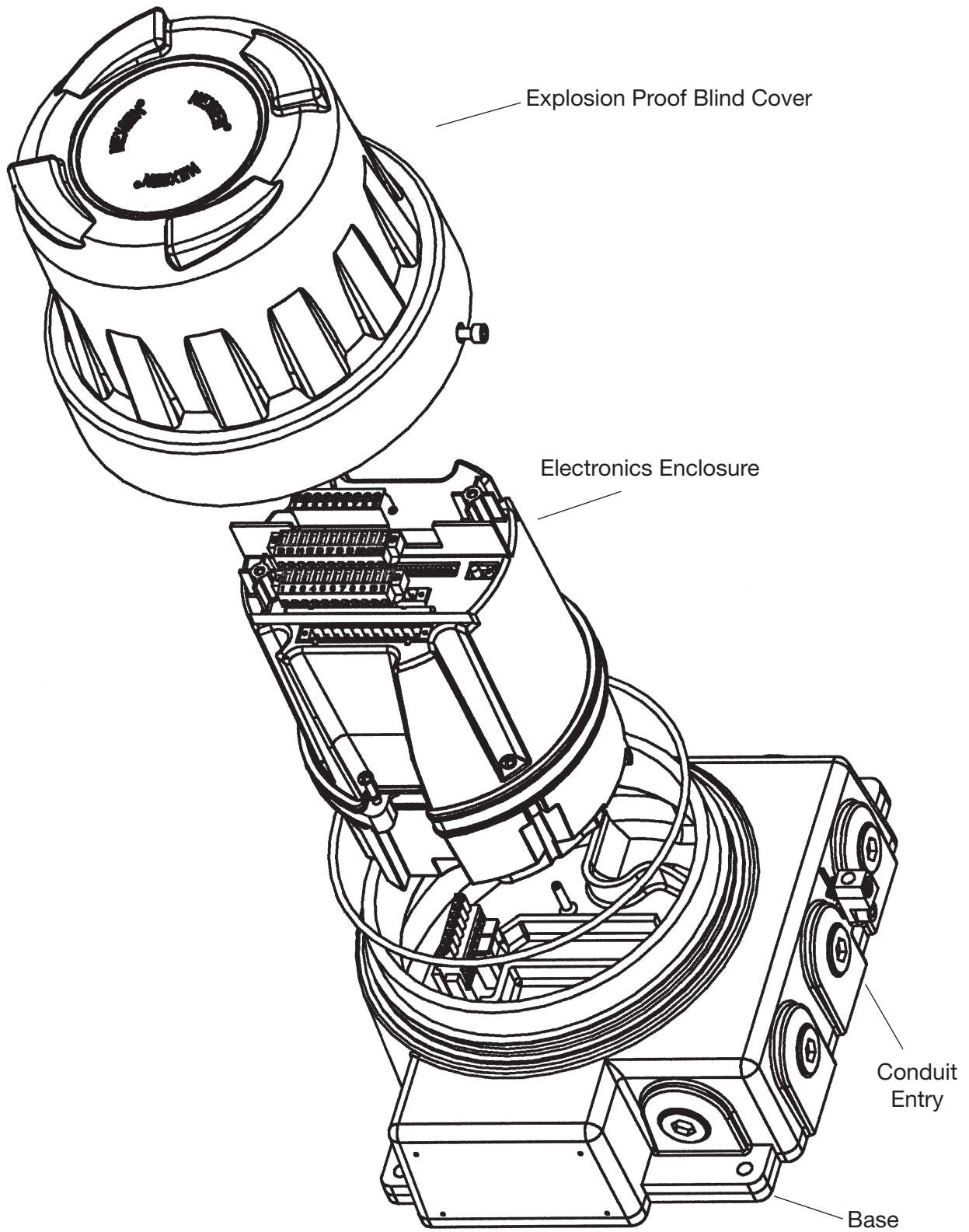


Figure 1.2: Blind Unit Component Highlights

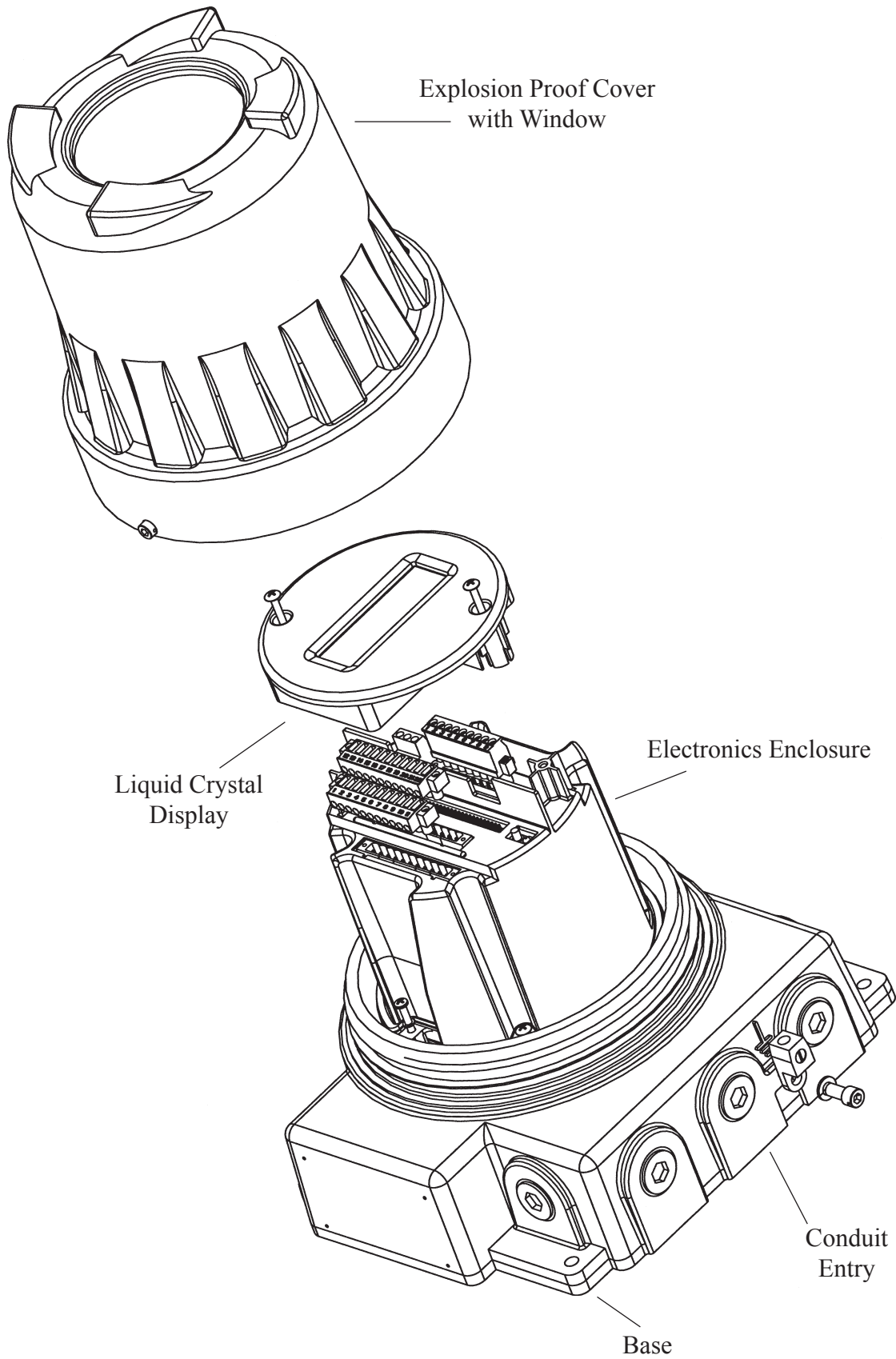


Figure 1.3: LCD Display Unit (Less Keys) Component Highlights

## SECTION 2: READ THIS FIRST

### 2.1 Transmitter Area Classification

**WARNING: IMPROPER INSTALLATION IN A HAZARDOUS ENVIRONMENT COULD CAUSE AN EXPLOSION. INSTALL THE NEXGEN IN AN AREA COMPATIBLE WITH THE HAZARDOUS ENVIRONMENT SPECIFIED ON THE APPROVALS TAG.**

When properly installed with an RSM Coriolis Force Flow meter, the NexGen RSM Flow Transmitter can be installed in the following areas:

CSA	Class I, II, and III Div I, Groups C, D, E, F & G, Div II, Group A, B, C, D, E, F, G explosion proof when installed with approved conduit seals
LCIE	Flame proof: Zones 1 & 2, Group IIB, T6
CE	The NexGen transmitter is in compliance with the following requirements, when input and output wiring from enclosure is installed in conduit EN55011: 1991 Group I Class A ISM Emissions Requirements (EU) EN50082-2: 1995 EMC Heavy Industrial Generic Immunity Standard

For intrinsically safe installations, install the transmitter in an environment that complies with the applicable agency drawing and with the area specified on the approvals tag. To comply with all agency requirements, install approved conduit seals on all conduit openings.

### 2.2 Orientation and Mounting

Orient the transmitter so that the enclosure cover and the conduit openings are easily accessible.

### 2.3 Temperature, EMI/RFI, Humidity, Vibration and Mechanical Shocks

The specified limits for the transmitter are as follows:

- Ambient temperature (with optional LCD) -4 to 140°F (-20 to 60°C)
- Ambient temperature (with optional LCD) -22 to 140°F (-30 to 60°C) Custody Transfer option
- Ambient temperature (without optional LCD) -40 to 140°F (-40 to 60°C)
- EMI/RFI Class A digital device, pursuant to Part 15 of the FCC Rules
- Humidity: 10 to 100% condensing
- Vibration [Nonoperating 5g, 3 Axis, 10 sweeps from 10-800 Hz]  
[Operating 2.5g, 3 Axis, 10 sweeps from 10-800 Hz]
- Mechanical Shocks [Nonoperating 100 shocks up to 30g/11ms]  
[Operating 100 shocks up to 15g/11ms]

## 2.4 Transmitters Approved for Custody Transfer (optional)

**WARNING: TRANSMITTERS APPROVED FOR CUSTODY TRANSFER HAVE SPECIAL REQUIREMENTS FOR THE OPTIONAL LCD AND THE METHOD OF SEALING.**

The Custody Transfer NexGen (blind and display less keys) transmitters are approved by Weights and Measures for use in custody transfer applications.

The specifications for the Custody Transfer NexGen transmitter are:

- Ambient Temperature (with optional LCD) -22 to 140°F (-30 to 60°C)
- Ambient Temperature (without optional LCD) -40 to 140°F (-40 to 60°C)

The Custody Transfer NexGen transmitter has provisions for seal wire on the base, and the ground terminal screw of the unit. (See Figure 2.4.1)

**NOTE: If the NexGen (blind or display less keys) transmitter is in use in a custody transfer application ALL CONNECTIONS to terminals 7 and 8 (RS485), and terminals 4 and 5 (HART) shall be removed prior to the sealing of the unit by a Weights and Measures official.**

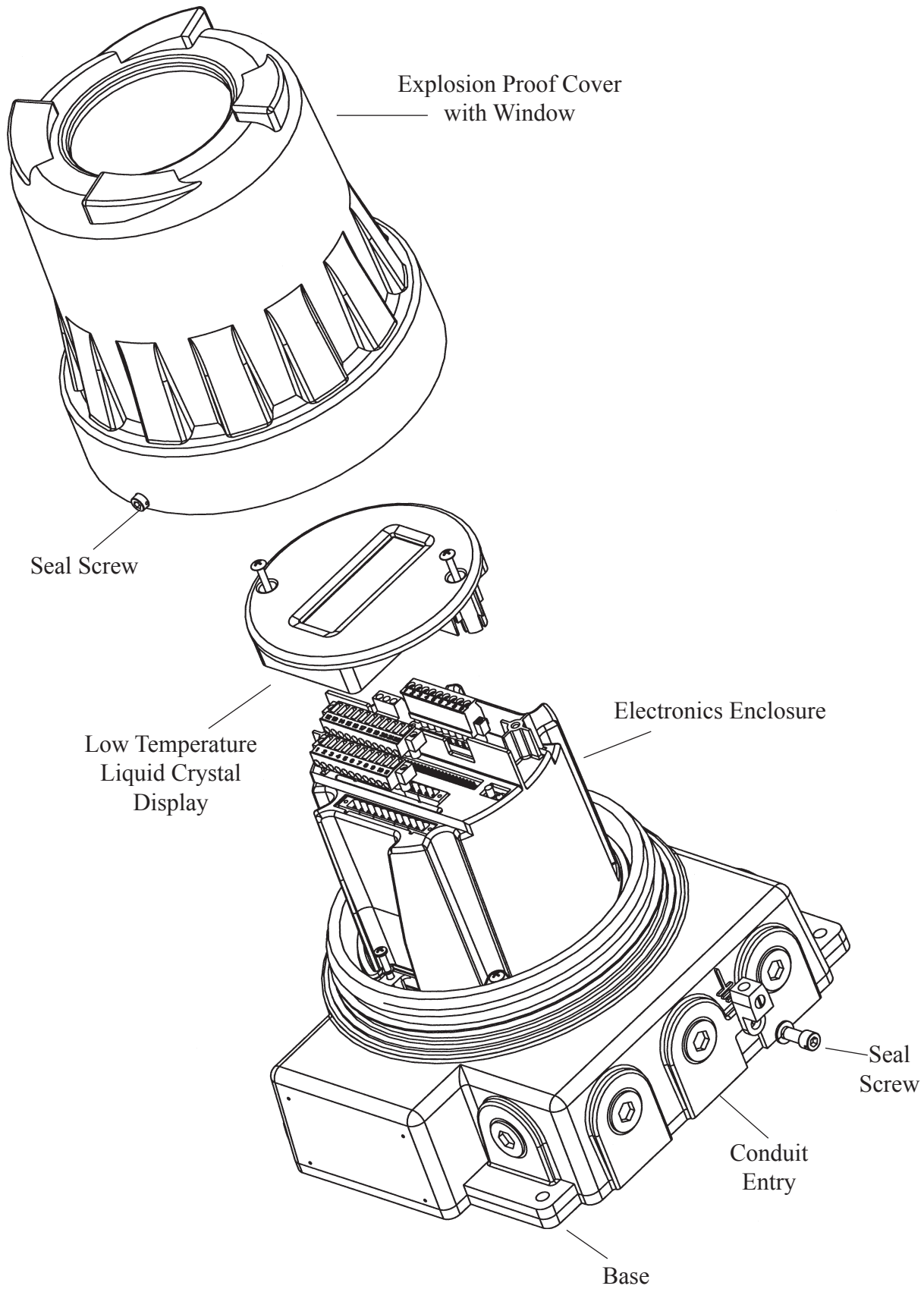


Figure 2.4.1: Custody Transfer LCD Display Unit (Less Keys) Component Highlights

## SECTION 3: TRANSMITTER INSTALLATION

### 3.1 Mounting Location Guidelines

When mounting the NexGen SFT100, perform the following:

- locate the transmitter where it is accessible
- in a hazardous area, install the transmitter as per Section 2.1
- maximum length of cable between the transmitter and the transducer must not exceed 1000 feet (300 meters)
- mount the transmitter to a stable surface or instrument pole that will minimize vibration

***NOTE: NexGen transmitter requires 18 inches (450 mm) of clearance for removal of the cover. The seal screw on the base of the NexGen transmitter requires a 5mm allen key in order to remove the explosion proof cover.***

The base of the transmitter has five 3/4-inch NPT female conduit openings. These conduit openings must remain sealed. Each conduit opening is designated for specific cabling. (See agency drawings in Section 4.3). In order to keep the transmitter watertight and explosion proof, perform the following:

- install conduit that allows a complete seal with the conduit openings
- orient the transmitter with the conduit openings pointed downward. If this is not possible seal the conduit to prevent condensation and other moisture from entering the housing.
- install approved explosion-proof conduit seals on all conduit openings in order to comply with requirements for explosion-proof installations approved by LCIE and CSA.

### 3.2 Mounting to a Wall

Refer to Figure 3.2.1 to mount the NexGen SFT100 transmitter to a wall or other flat rigid surface:

- Use four 1/4-inch or M6 bolts and nuts to mount the transmitter to a wall or other flat surface. Use bolts and nuts that can withstand the process environment. RSM does not supply the bolts or nuts.
- To minimize stress on the housing, secure all four mounting bolts to the same structure, which should be flat and should not vibrate or move excessively. Do not secure bolts to separate beams, girders, or wall studs which can move independently.
- Use washers to shim the housing if the mounting surface is not flat. Apply equal torque to all bolts to ensure the transmitter is firmly mounted. RSM does not supply washers.

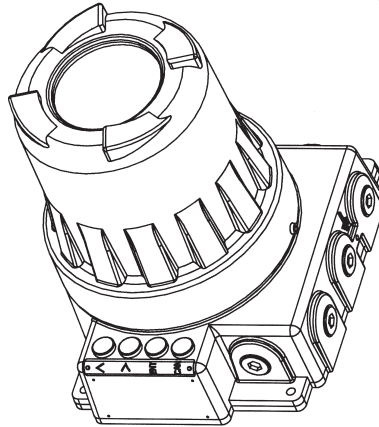
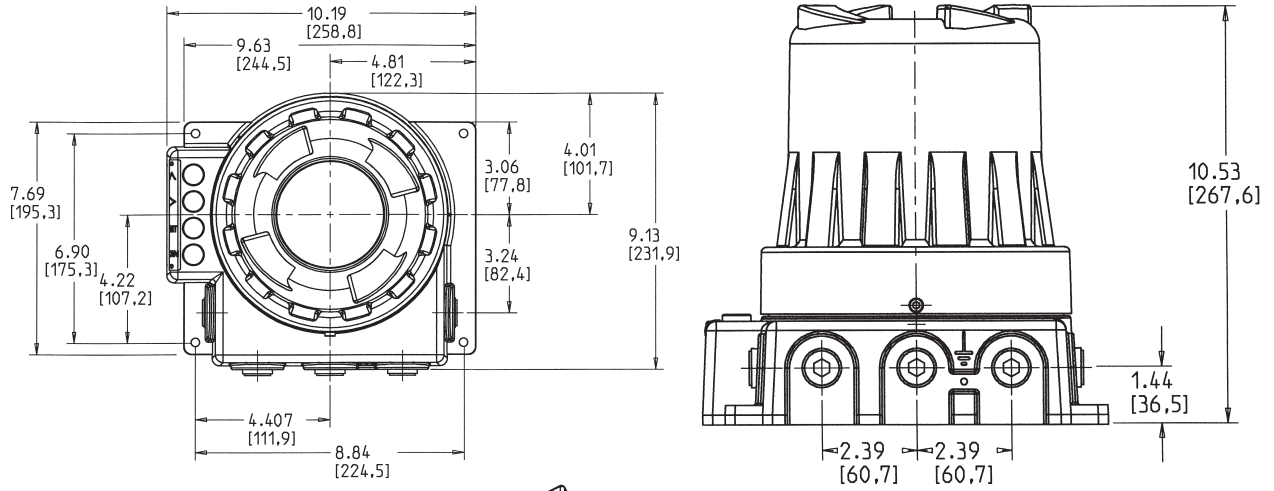
### 3.3 Mounting to a Pole

Refer to Figure 3.3.1 to mount the NexGen SFT100 transmitter to an instrument pole:

- Use two 5/16-inch U-bolts for 2-inch pipe, four matching nuts, and two aluminum (or compatible metal) 1-inch square stock with a length of 9.6 inches with two 3/8-inch holes in the square stock located 2.415 inches about the center and two 3/8-inch holes located 4.435 inches about the center of the square stock
- The instrument pole should extend at least 12 inches (305mm) from an immobile base, and be no more than 2-inch (50.8mm) pipe in diameter.
- Apply equal torque to all bolts to ensure transmitter is firmly mounted.

Dimensions are inches (mm)

**LCD DISPLAY UNIT**



**BLIND UNIT**

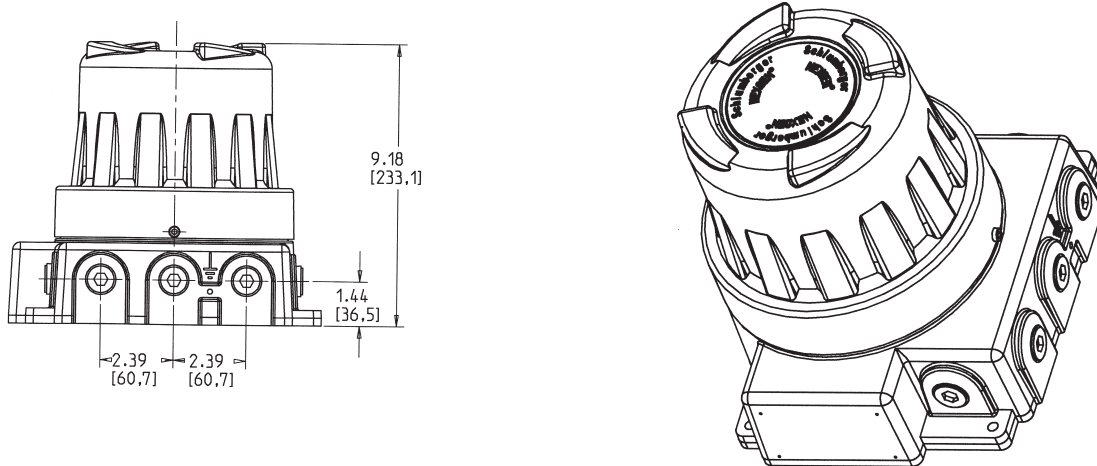


Figure 3.2.1: Dimensional Data



Dimensions are inches (mm)

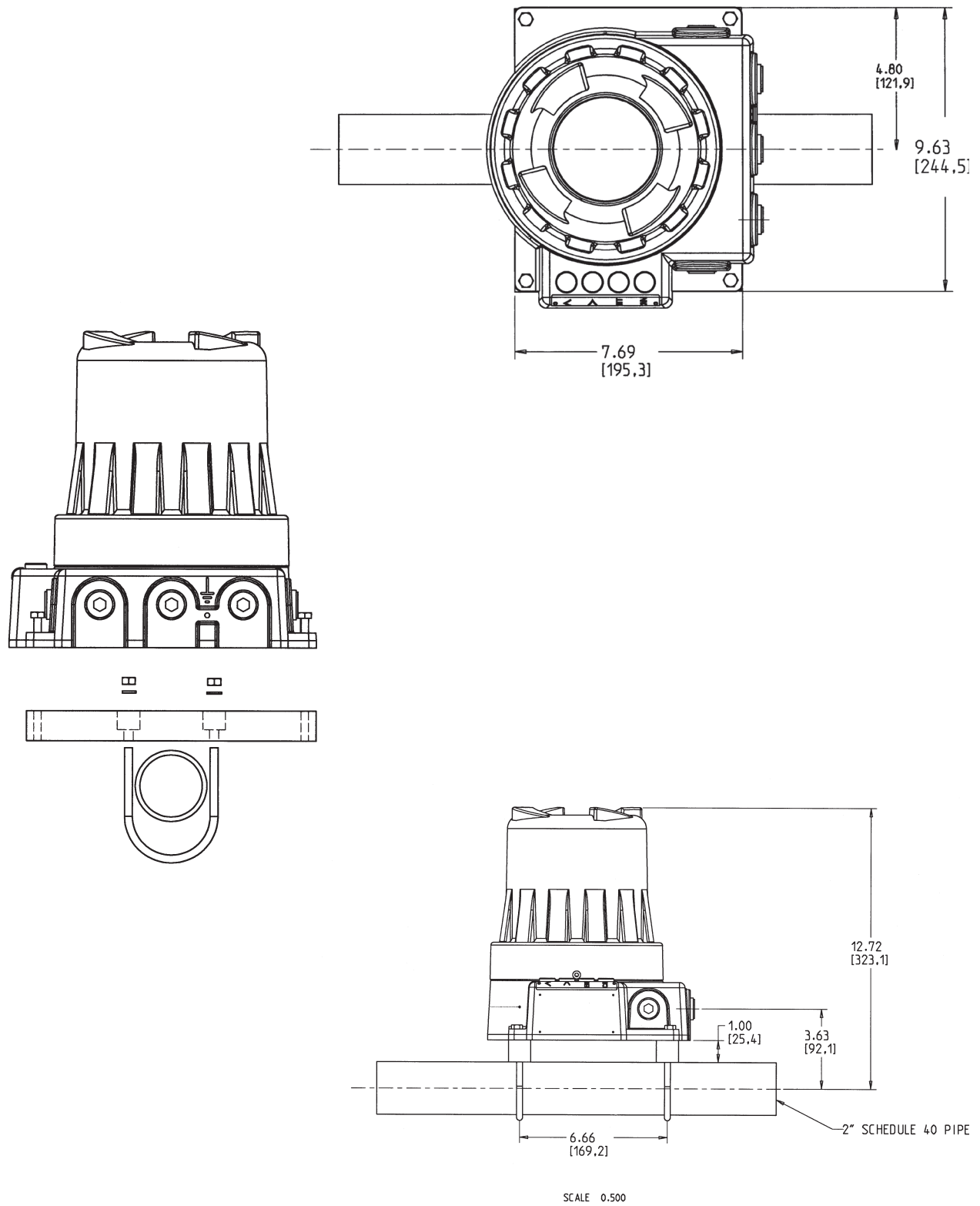


Figure 3.3.1: Mounting to an Instrument Pole

### 3.4 Guidelines for Conduit

Install a drip leg in conduit to prevent liquids from entering the junction connector.

### 3.5 Transducer Cable Connections

1. Attach the transducer cable connector to the threaded male connector on the transducer.
2. If input/output cables requires connection to the NexGen transmitter terminals, See Figure 3.5.2.

The Belden 89892 cable is an 8 conductor cable. It consists of four individually twisted pairs and a shield.

The maximum length of cable between the transducer and transmitter is not to exceed 1000 feet (300 meters).

Splicing the cable is **not recommended**. If the length of cable does not meet your requirements, contact your local RSM representative for a replacement.

**Do not install the Belden 89892 cable in the same conduit or cable tray as power cables.**

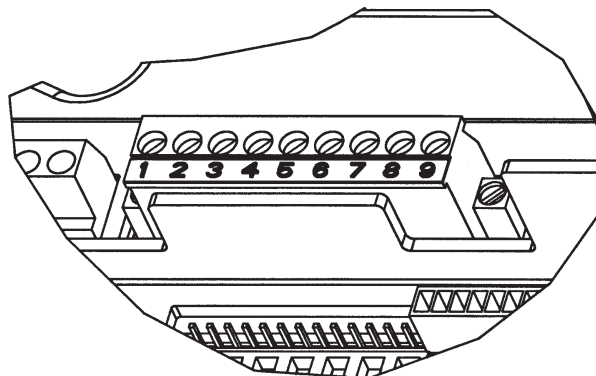
Install weather-tight connectors and drip legs in conduits or cables to prevent moisture from entering the transmitter housing.

***NOTE: If the transducer cable requires connection to the NexGen transmitter terminals, see Figure 3.5.1.***

### 3.6 Guidelines for Explosion Proof Cover

To properly secure the NexGen explosion proof cover to the base, turn down the cover hand tight, then a quarter turn. This will provide adequate clearance to insert the seal screw into the cover and base.

- |   |              |        |
|---|--------------|--------|
| 1 | GND          | SHIELD |
| 2 | TUBE DRIVE   | RED    |
| 3 | DRIVE RETURN | BLACK  |
| 4 | +RTD E       | GRAY   |
| 5 | +RTD S       | YELLOW |
| 6 | -RTD S       | GREEN  |
| 7 | -RTD E       | WHITE  |
| 8 | SENSOR A     | BLUE   |
| 9 | SENSOR B     | ORANGE |



SEE DETAIL

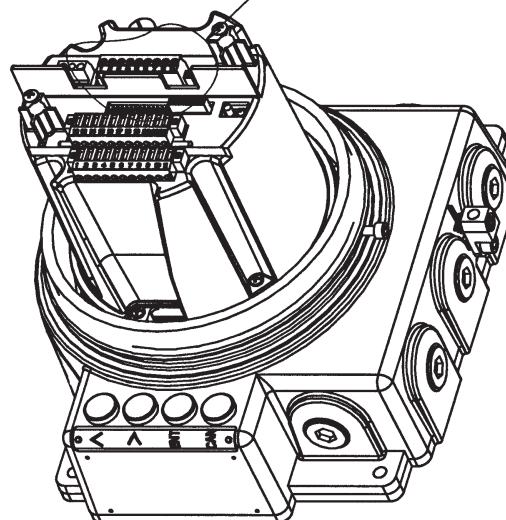


Figure 3.5.1: Transducer Cable Connections

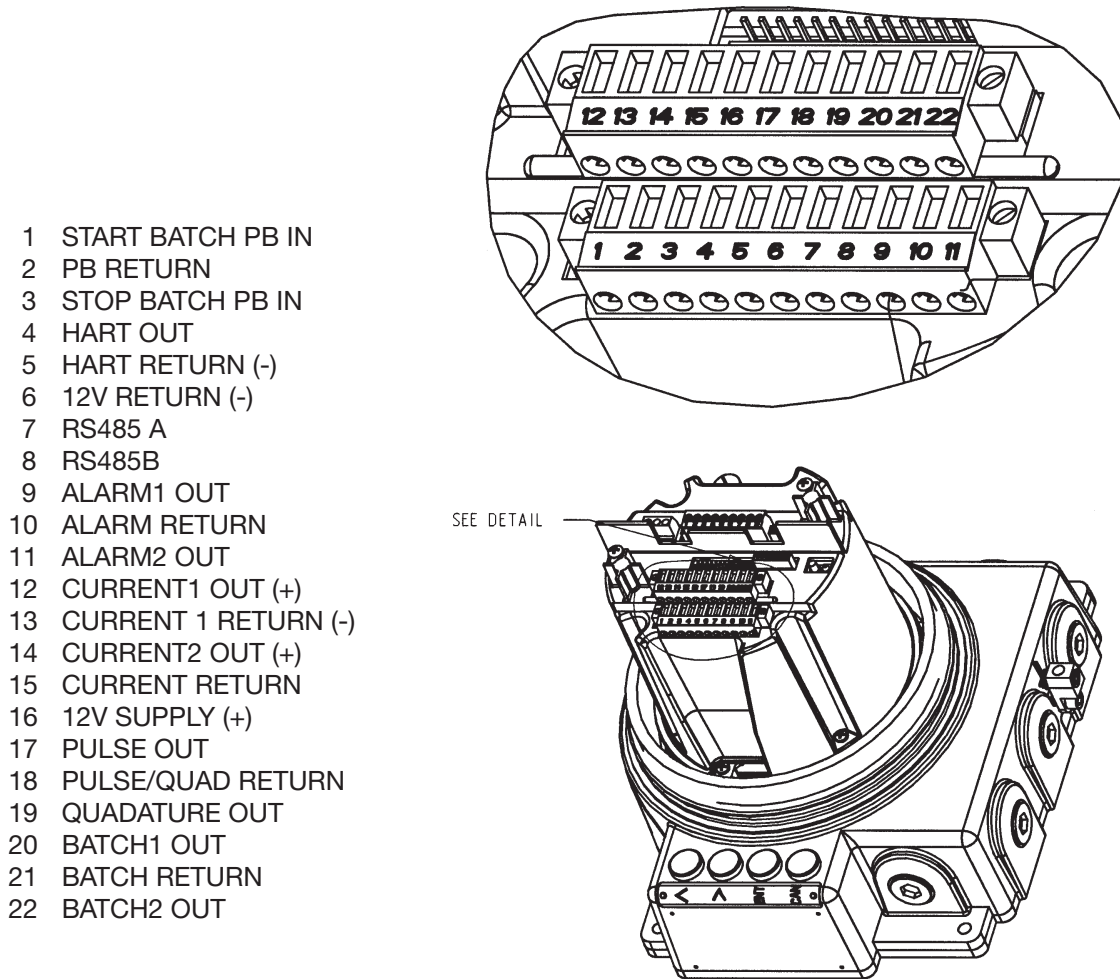


Figure 3.5.2: Transmitter Terminals

## SECTION 4: POWER SUPPLY WIRING

### 4.1 Wiring Guidelines

**WARNING: IMPROPER INSTALLATION IN A HAZARDOUS AREA COULD CAUSE AN EXPLOSION.**

For intrinsically safe installations:

- Do not wire the transmitter until all electrical power to the transmitter has been shut off
- Follow the appropriate approval agency installation drawing (i.e., LCIE or CSA).
- Install cable and wiring as per local code requirements
- Do not connect pumps, motors, transformers, solenoid valves and other high voltage equipment to the same circuit breaker as the transmitter
- Allow 18 inches (450mm) clearance for removal of the NexGen transmitter cover
- Ensure the seal screw on the base of the NexGen transmitter housing is secured.

### 4.2 Grounding

Both the transmitter and transducer must be grounded for optimum performance. In safe area installations the power circuit ground from the power supply should be connected to the ground J2 on the barrier board and the transducer should be connected the same.

### 4.3 Power Supply Wiring Connections

**CAUTION: Incorrect voltage or installation with power supply on will cause transmitter damage or failure.**

- Match power supply voltage with the correct terminals (Refer to Figure 4.3.1)
- Shut off power before wiring transmitter

The NexGen transmitter has 12 to 36 VDC, 115/230 VAC  $\pm$  10%, 13 VA power inputs. Figure 4.3.1 shows the power supply wiring terminals in the base of the transmitter housing.

**WARNING: BOTH THE TRANSMITTER AND TRANSDUCER MUST BE GROUNDED FOR OPTIMUM PERFORMANCE. IN SAFE AREA INSTALLATIONS THE POWER CIRCUIT GROUND FROM THE POWER SUPPLY SHOULD BE CONNECTED TO THE GROUND J2 ON THE BARRIER BOARD AND THE TRANSDUCER SHOULD BE CONNECTED TO THE SAME.**

***NOTE: The power supply wiring terminals are accessed by removing the electronics enclosure assembly from the transmitter base. This assembly is held in place by two (2) screws. Refer to Figure 4.3.1***

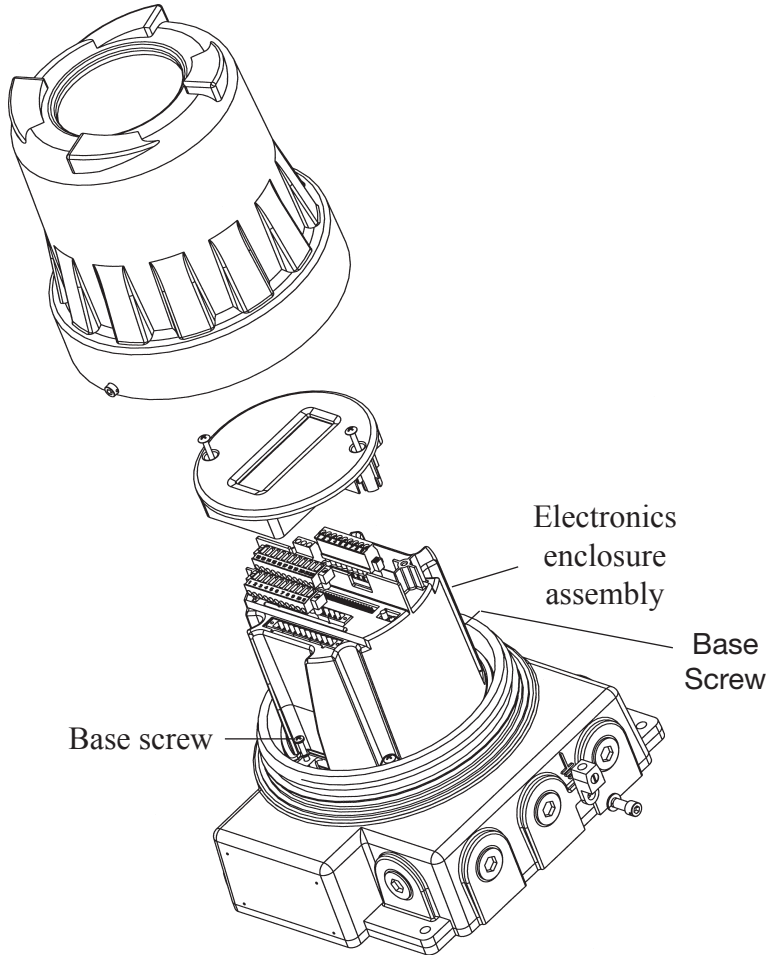
Step 1. Remove the two (2) base screws securing the electronics enclosure assembly located at approximately 10 and 2 o'clock positions.

Step 2. Lift the electronics enclosure assembly from the transmitter base revealing the power supply connector.

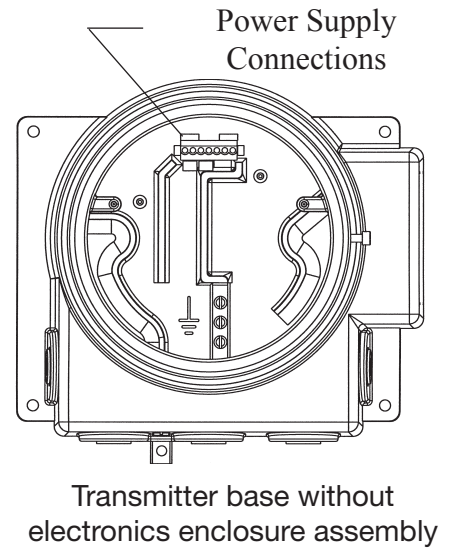
***NOTE: The power supply connector will be attached to the base of the transmitter as shown, or attached to the bottom of the electronics enclosure assembly.***

Step 3. Remove power supply connector and terminate power supply connections. Please be sure to place jumpers in the correct location.

**STEP 1.**

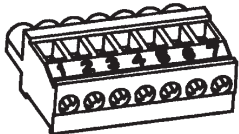


**STEP 2.**



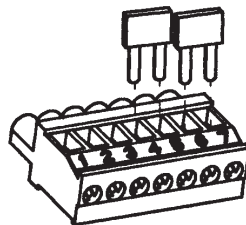
**STEP 3.**

DC POWER SUPPLY



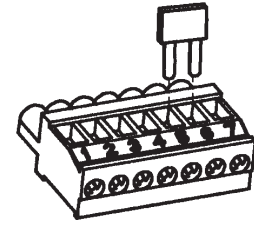
1	12-36 VDC (-)
2	12-36 VDC (+)
3	CHASSIS GROUND

115 VAC



3	CHASSIS GROUND
4	NEUTRAL
5	JUMP TO 4
6	JUMP TO 7
7	LINE

230 VAC



3	CHASSIS GROUND
4	NEUTRAL
5	JUMP TO 6
6	JUMP TO 5
7	LINE

Figure 4.3.1: Power Supply Wiring Location and Connections

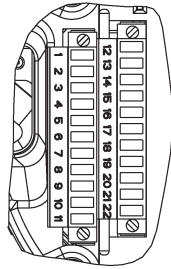
# NONHAZARDOUS OR HAZARDOUS

NEXGEN<sup>®</sup> CORIOLIS FLOW TRANSMITTER SFT100

J2

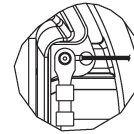
1	START BATCH PB IN
2	PB RETURN
3	STOP BATCH PB IN
4	HART OUT
5	HART IN
6	12V RETURN (-)
7	RS485 A
8	RS485 B
9	ALARM1 OUT
10	ALARM RETURN
11	ALARM2 OUT
12	CURRENT1 OUT (+)
13	CURRENT1 RETURN (-)
14	CURRENT2 OUT (+)
15	CURRENT2 RETURN
16	12V SUPPLY (+)
17	PULSE OUT
18	PULSE/QUAD RETURN
19	QUADATURE OUT
20	BATCH1 OUT
21	BATCH RETURN
22	BATCH2 OUT

PROCESS CONTROL I/O  
DETAIL A



CLASS I, DIVISION 1, GROUPS C & D  
CLASS II, DIVISION 1, GROUPS E, F & G  
CLASS III, DIVISION 1  
CLASS I, DIVISION 2, GROUPS A, B, C, & D

PROVIDES INTRINSICALLY SAFE CONNECTIONS TO ACTARIS  
MODEL M CORIOLIS MASS FLOWMETERS LOCATED:  
CLASS I, DIVISION 1, GROUPS C & D  
CLASS II, DIVISION 1, GROUPS E, F, & G  
CLASS III, DIVISION 1

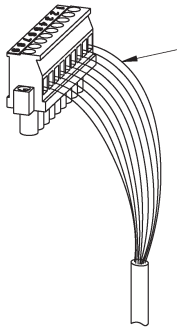
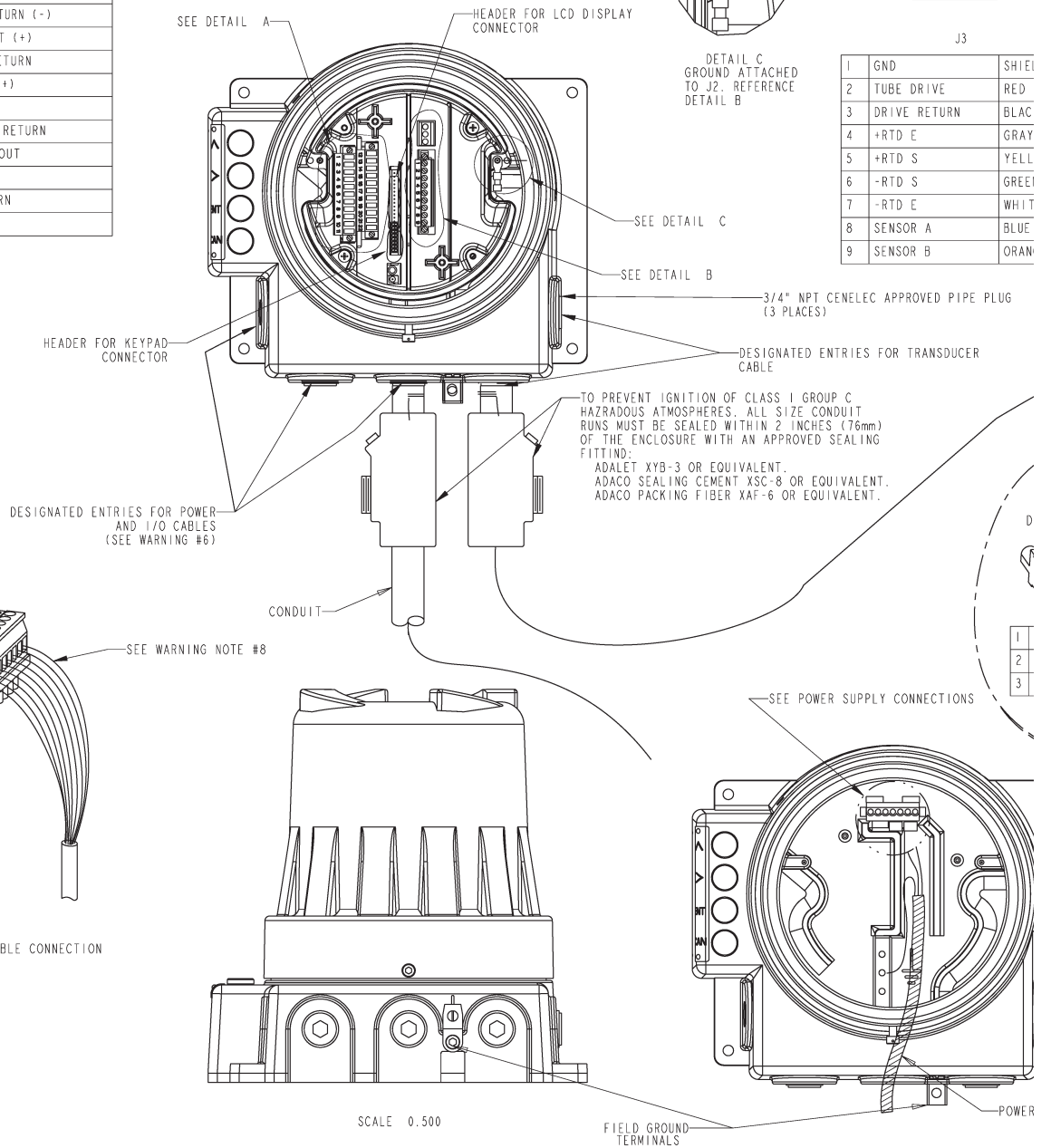


J2

1	IS
2	GROUNDS
3	

J3

1	GND	SHIELD
2	TUBE DRIVE	RED
3	DRIVE RETURN	BLAC
4	+RTD E	GRAY
5	+RTD S	YELL
6	-RTD S	GREEN
7	-RTD E	WHIT
8	SENSOR A	BLUE
9	SENSOR B	ORAN



SEE WARNING NOTE #8

CONDUIT

DESIGNATED ENTRIES FOR POWER AND I/O CABLES (SEE WARNING #6)

HEADER FOR KEYPAD CONNECTOR

SEE DETAIL A

HEADER FOR LCD DISPLAY CONNECTOR

DETAIL C  
GROUND ATTACHED TO J2. REFERENCE DETAIL B

SEE DETAIL C

3/4" NPT CENELEC APPROVED PIPE PLUG (3 PLACES)

DESIGNATED ENTRIES FOR TRANSDUCER CABLE

SEE POWER SUPPLY CONNECTIONS

SCALE 0.500

FIELD GROUND TERMINALS

POWER



REA

LTR	REVISION	DATE	ECN	BY	APPD
D	ADDED NOTE #10	10/16/98	N25278	TAS	SHERPA
E	ADDED M300 TO NOTE	1/31/03	00080452	RC	MFGPRO

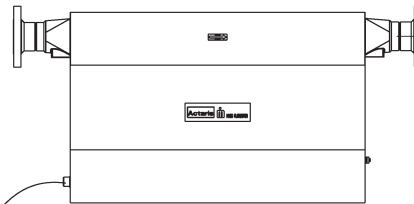
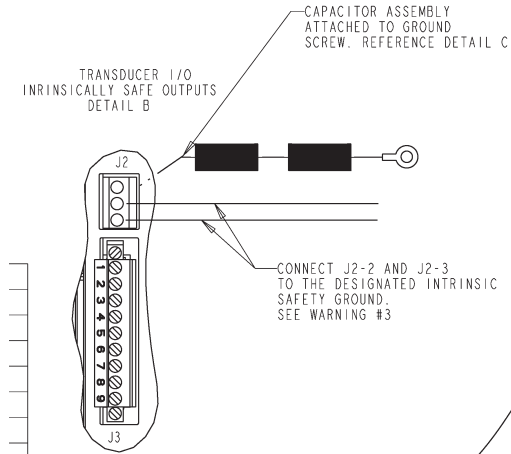
# HAZARDOUS AREA

CLASS I, II, III, DIVISION I, GROUPS C, D, E, F, G

MODEL mA - XXX2X

WHERE:

- A = BASE METER 012, 025, 050, 100, 200, 300, 400
- X = DOES NOT AFFECT HAZARDOUS AREA APPROVAL.



**m** MODEL M CORIOLIS MASS FLOWMETER  
 Model M012, M025, M050, M100, M200, M300, M400

MAXIMUM FLOWMETER CABLE INDUCTANCE & CAPACITANCE

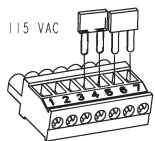
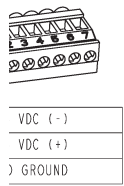
GROUP	C CABLE (uF)	L CABLE (mH) OR L/R CABLE (uH/Ω)
A, B (DIV 2)	9.3	25
C, E (DIV 1)	10.3	2.48
D, F, G (DIV 1)	41.0	17.4

ⓐ

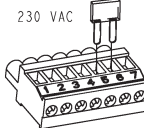
BELDEN #89892 or EQUAL  
(4) PAIR CABLE

POWER SUPPLY INPUT CONNECTIONS

POWER SUPPLY



3	FIELD GROUND
4	NEUTRAL: JUMP TO 5
5	NEUTRAL: JUMP TO 4
6	LINE: JUMP TO 7
7	LINE: JUMP TO 6



3	FIELD GROUND
4	NEUTRAL
5	JUMP TO 6
6	JUMP TO 5
7	LINE

WARNING:

- SUBSTITUTION OF NEXGEN COMPONENTS MAY IMPAIR INTRINSIC SAFETY OF TRANSDUCER.
- NEXGEN COVER MUST BE CLOSED WHILE CIRCUITS ARE ALIVE.
- RESISTANCE BETWEEN INT. SAFE GND. AND EARTH GROUND MUST BE LESS THAN 1 OHM.
- CONTROL EQUIPMENT CONNECTED TO NEXGEN MUST NOT USE OR GENERATE MORE THAN 250 Vrms OR Vdc.
- NO REVISION TO THIS DRAWING WITHOUT PRIOR CSA APPROVAL.
- TO PREVENT IGNITION OF CLASS I GROUP C HAZARDOUS ATMOSPHERES. ALL SIZE CONDUIT RUNS MUST BE SEALED WITHIN 2 INCHES (50 mm) OF ENCLOSURE WITH CERTIFIED SEALING FITTING. ALL NON-INTRINSICALLY SAFE CABLING MUST BE RUN THROUGH CONDUIT WITH CERTIFIED SEALING FITTINGS.
- INSTALLATION OF INTRINSICALLY SAFE SYSTEMS FOR HAZARDOUS (CLASSIFIED) LOCATIONS SHOULD BE IN ACCORDANCE WITH CCEC PT. I, SEC. 18, APPENDIX F.
- TRANSDUCER CABLE TO BE STRIPPED NO MORE THAN 6.0".
- GROUND THE NEXGEN'S ENCLOSURE USING THE MECHANICAL GROUND LUG LOCATED BETWEEN THE 3/4" CONDUIT ENTRIES ON THE BOTTOM OF THE ENCLOSURE. USE A 14 AWG COPPER CONDUCTOR FOR THIS GROUND.
- AN INTRINSIC SAFETY GROUND IS PROVIDED FROM TERMINAL NUMBER 3 ON THE BARRIER BOARD CONNECTOR THROUGH THE BLACK CONDUCTOR TO PIN "J" ON THE TRANSDUCER CONNECTOR. AN EXTERNAL INTRINSIC SAFETY GROUND IS NOT REQUIRED.

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MATERIAL

HEAT TREAT

FINISH SPECIFICATION

UNLESS OTHERWISE SPECIFIED

BREAK EDGES .005/.015  
SURFACE FINISH 125

FRACTIONS	DECIMALS	ANGLES
±1/64	2 PL .01 3 PL .005	±1°

DO NOT SCALE DRAWING

DWG.

RC

SHEET

1/1

SCALE

NTS

TITLE INSTALLATION DRAWING FOR CANADIAN STANDARDS ASSOCIATION (CSA) APPROVED INTRINSICALLY SAFE MODEL M CORIOLIS MASS FLOWMETER WITH EXPLOSTION PROOF NEXGEN ASSEMBLY

**RED SEAL MEASUREMENT**

NO.

D70500-007

REV.

E

GREENWOOD, SOUTH CAROLINA

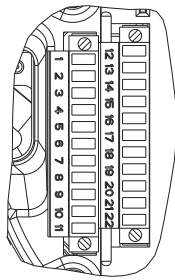
PLY CONNECTION

# NONHAZARDOUS OR HAZARDOUS AREA

J2

1	START BATCH PB IN
2	PB RETURN
3	STOP BATCH PB IN
4	HART OUT
5	HART IN
6	12V RETURN (-)
7	RS485 A
8	RS485 B
9	ALARM1 OUT
10	ALARM RETURN
11	ALARM2 OUT
12	CURRENT1 OUT (+)
13	CURRENT1 RETURN (-)
14	CURRENT2 OUT (+)
15	CURRENT2 RETURN
16	12V SUPPLY (+)
17	PULSE OUT
18	PULSE/QUAD RETURN
19	QUADATURE OUT
20	BATCH1 OUT
21	BATCH RETURN
22	BATCH2 OUT

PROCESS CONTROL I/O  
DETAIL A



NEXGEN CORIOLIS FLOW TRANSMITTER SFT100

Ex d [ia] IIB T6  
LCIE 05 ATEX 6018 X

**II 2 G**

OPERATING TEMPERATURE -20°C TO +65°C

Barriere du canal

Excitatio

Mesure/Sonde:  
Senso

TRANSDUCER I/O  
INTRINSICALLY SAFE OUTPUTS  
DETAIL B

J2

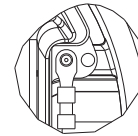
1	IS
2	GROUND
3	GROUND

J3

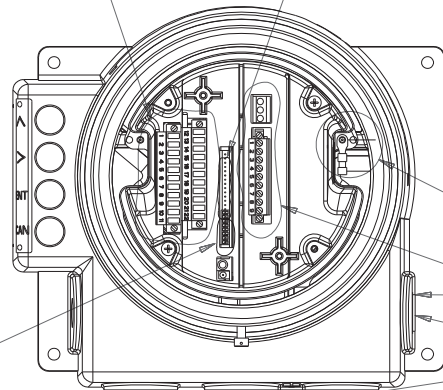
1	GND	SHIELD
2	TUBE DRIVE	RED
3	DRIVE RETURN	BLACK
4	+RTD E	GRAY
5	+RTD S	YELLOW
6	-RTD S	GREEN
7	-RTD E	WHITE
8	SENSOR A	BLUE
9	SENSOR B	ORANGE

SEE DETAIL A

HEADER FOR LCD DISPLAY  
CONNECTOR



DETAIL C  
GROUND ATTACHED  
TO J2. REFERENCE  
DETAIL B



SEE DETAIL C

SEE DETAIL B

3/4" NPT CENELEC APPROVED PIPE PLUG  
(3 PLACES)

HEADER FOR KEYPAD  
CONNECTOR

DESIGNATED ENTRIES FOR TRANSDUCER  
CABLE  
(SEE WARNING #6)

TO PREVENT IGNITION OF CLASS IIB  
HAZARDOUS ATMOSPHERES, ALL SIZE CONDUIT  
RUNS MUST BE SEALED WITHIN 2 INCHES (50mm)  
OF THE ENCLOSURE WITH AN APPROVED SEALING  
FITTING:  
ADALET XYB-3 OR EQUIVALENT.  
ADACO SEALING CEMENT XSC-8 OR EQUIVALENT.  
ADACO PACKING FIBER XAF-6 OR EQUIVALENT.

DESIGNATED ENTRIES FOR POWER  
AND I/O CABLES  
(SEE WARNING #6)

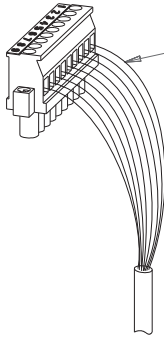
CONDUIT

DC POWER



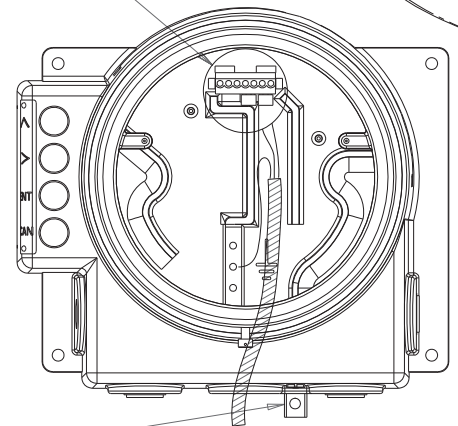
1	12-36 VDC
2	12-36 VDC
3	FIELD GR

SEE WARNING NOTE #8



TRANSDUCER CABLE CONNECTION

SEE POWER SUPPLY CONNECTIONS



FIELD GROUND  
TERMINALS

POWER SUPPLY CON

SCALE 0.500

Vérifié et Certifié conforme à l'exécution

C

LTR	REVISION	DATE	ECN	BY	APPD
B	REDRAWN IN CAD; REVISED ATEX NOTES	6/29/05	00081635	RC	R. SMITH
C	REVISED NOTE 5; ADDED FRENCH APPROVAL NOTE	8/29/05	00090062	RC	R. SMITH
D	ADDED CHARTS	1/3/08	00090786	RC	R. SMITH

# HAZARDOUS AREA

/ Barrier channel	$U_o$ (V) $\leq$	$I_o$ (mA) $\leq$	$P_o$ (W) $\leq$	$C_o$ ( $\mu$ F) $\leq$	$L_o$ ( $\mu$ H) $\leq$
n / drive	$\pm 11.7$	170	0.5	10	5.5
s temperature r/RTD	5.2	119	0.15	1000	11.5

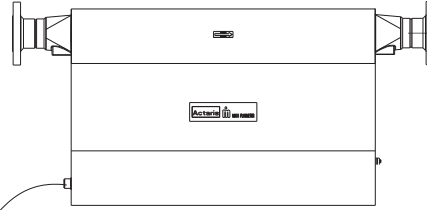
MASS FLOWMETER  
 LCIE 05 ATEX 6027X  
 Ex Ia 11B T5, T4 OR T2  
 -20°C  $\leq$  TAMB  $\leq$  +40°C FOR T5  
 +40°C  $\leq$  TAMB  $\leq$  +60°C FOR T4  
 +60°C  $\leq$  TAMB  $\leq$  +200°C FOR T2

**II G**

ZONES 0, 1, 2



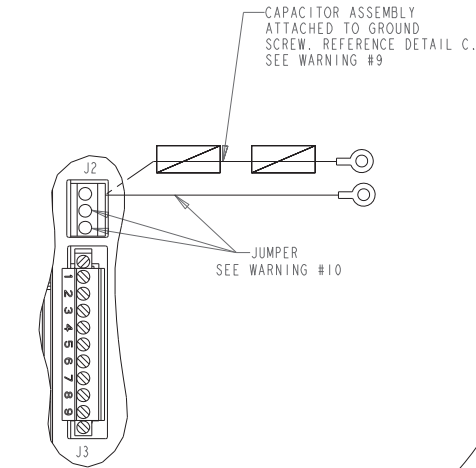
(B)



**m** MODEL M CORIOLIS MASS FLOWMETER

TABLE 1 CABLE PARAMETERS

GROUP	CAPACITANCE ( $\mu$ F)	INDUCTANCE (mH) OR L/R RATIO ( $\mu$ H/ $\Omega$ )
11B	10.3	2.48
11A	41.0	17.4



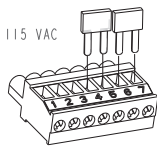
BELDEN #8982 or EQUAL (4) PAIR CABLE

Models M012, M025 M050, M100, M200	$U_i$ (V) $\leq$	$I_i$ (mA) $\leq$	$P_i$ (W) $\leq$	$C_i$ $\leq$	$L_i$ (mH) $\leq$	L/R ( $\mu$ H/ $\Omega$ ) $\leq$
Drive coil	30	107	0.7	0	16.7	281
Sense coil and RTD	30	84	0.7	0	20.8	130
Model M300						
Drive coil	$\pm 12.4$	121	0.56	0	10	303
Sense coil and RTD	11.1	17.3	0.036	0	20.8	133
Model M400						
Drive coil	30	116	0.7	0	10.8	290
Sense coil and RTD	30	84	0.7	0	20.8	130

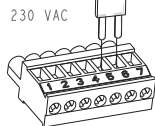
(D)

POWER SUPPLY INPUT CONNECTIONS

SUPPLY



3	FIELD GROUND
4	NEUTRAL: JUMP TO 5
5	NEUTRAL: JUMP TO 4
6	LINE: JUMP TO 7
7	LINE: JUMP TO 6



3	FIELD GROUND
4	NEUTRAL
5	JUMP TO 6
6	JUMP TO 5
7	LINE

WARNING:

- SUBSTITUTION OF NEXGEN COMPONENTS MAY IMPAIR INTRINSIC SAFETY OF TRANSDUCER.
- NEXGEN COVER MUST BE CLOSED WHILE CIRCUITS ARE ALIVE.
- RESISTANCE BETWEEN INT. SAFE GND. AND EARTH GROUND MUST BE LESS THAN 1 OHM.
- CONTROL EQUIPMENT CONNECTED TO NEXGEN MUST NOT USE OR GENERATE MORE THAN 250 Vrms OR Vdc.
- ATEX SCHEDULE DRAWING NO MODIFICATIONS PERMITTED WITHOUT REFERENCE TO LCIE
- TO PREVENT IGNITION OF 11B HAZARDOUS ATMOSPHERES, ALL SIZE CONDUIT RUNS MUST BE SEALED WITHIN 2 INCHES (50 mm) OF ENCLOSURE WITH CERTIFIED SEALING FITTING. ALL NON-INTRINSICALLY SAFE CABLING MUST BE RUN THROUGH CONDUIT WITH CERTIFIED SEALING FITTINGS.
- THE INSTALLATION MUST COMPLY WITH THE REQUIREMENTS OF THE COUNTRY OF USE.
- TRANSDUCER CABLE TO BE STRIPPED NO MORE THAN 6.0".
- REMOVE CAPACITOR ASSEMBLY IF INSTALLATION HAS AN EQUIPOTENTIAL GROUND SYSTEM.
- REMOVE JUMPER IF INSTALLATION DOES NOT HAVE AN EQUIPOTENTIAL GROUND SYSTEM, AND CONNECT J2-2 AND J2-3 TO THE DESIGNATED INTRINSIC SAFETY GROUND.
- GROUND THE NEXGEN'S ENCLOSURE USING THE MECHANICAL GROUND LUG. LOCATED BETWEEN THE 3/4" CONDUIT ENTRIES ON THE BOTTOM OF THE ENCLOSURE. USE A 14 AWG COPPER CONDUCTOR FOR THIS GROUND.

(C)

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	HEAT TREAT	FRACTIONS DECIMALS ANGLES	SHEET 1/1	INSTALLATION DRAWING FOR INTRINSICALLY SAFE FLOWMETERS WITH LCIE APPROVED NEXGEN ASSEMBLY
	FINISH SPECIFICATION	$\pm 1/64$ 2 PL $\pm .01$ 3 PL $\pm .005$	$\pm 1^\circ$	SCALE NOTED
SECTION	DO NOT SCALE DRAWING		<b>RED SEAL MEASUREMENT</b> GREENWOOD, SOUTH CAROLINA	

## SECTION 5: INPUT/OUTPUT WIRING

### 5.1 General Guidelines

The NexGen SFT100 provides up to three (3) 4-20mA outputs (with HART option), and one (1) quadrature pulse output. (Refer to Figure 3.5.2 for Input/Output Cable Connections.)

**CAUTION: NEVER install or remove any board with the NexGen transmitter power on.**

**WARNINGS:**

- **INCORRECT WIRING OF INPUT/OUTPUT CONNECTIONS IN A HAZARDOUS AREA COULD RESULT IN AN EXPLOSION.**
- **WIRING FROM INPUT/OUTPUT CONNECTIONS IS NOT INTRINSICALLY SAFE.**
- **INPUT/OUTPUT WIRING AND TRANSDUCER SIGNAL WIRING SHOULD BE SEPARATED.**
- **ALL INPUT/OUTPUT CONNECTION DRAWINGS SHOULD BE FOLLOWED TO ENSURE CORRECT OPERATION.**

### 5.2 4-20mA Output

The 4-20mA output is an active output that can represent any of the measured or calculated variables except totals. The 4-20mA output does not require external power and is galvanically isolated to 2.5 Kv from earth ground.

**NOTE: The analog return (negative) terminal is common to all of the 4-20mA outputs and can be grounded together. If the output communicates via HART® protocol, the analog return (negative) terminal should be grounded for optimal performance.**

If the analog outputs are not used, a 500 ohm resistor can be placed from each output terminal to its RTN (12 – 13, 14 – 15 and 4 – 5 if option card is installed) to inhibit alarms.

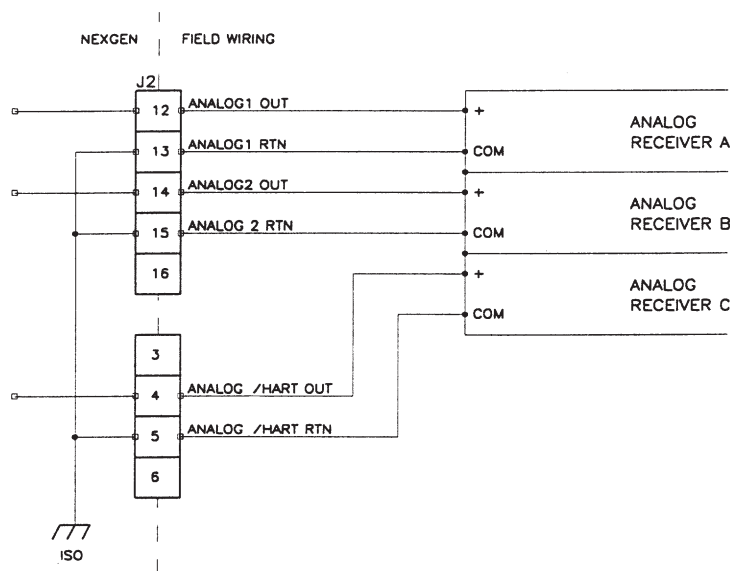


Figure 5.2.1: 4-20mA Output Wiring Connections

### 5.3 Pulse Output

The totalizer pulse output is a two channel quadrature pulse from open-collector NPN transistors. Galvanically isolated to 2.5Kv, opto-coupler with 100 ohm ON resistance. Maximum Voltage 26.5 VDC. Maximum Current 10mA. At maximum flow, the output has a range up to 10,000 Hertz, which can represent any variable.

**CAUTION: Exceeding the specified current limit through the pulse output circuit will damage the transmitter.**

Select the pull-up resistor RP to ensure that the current through the pulse output circuit does not exceed 10mA.

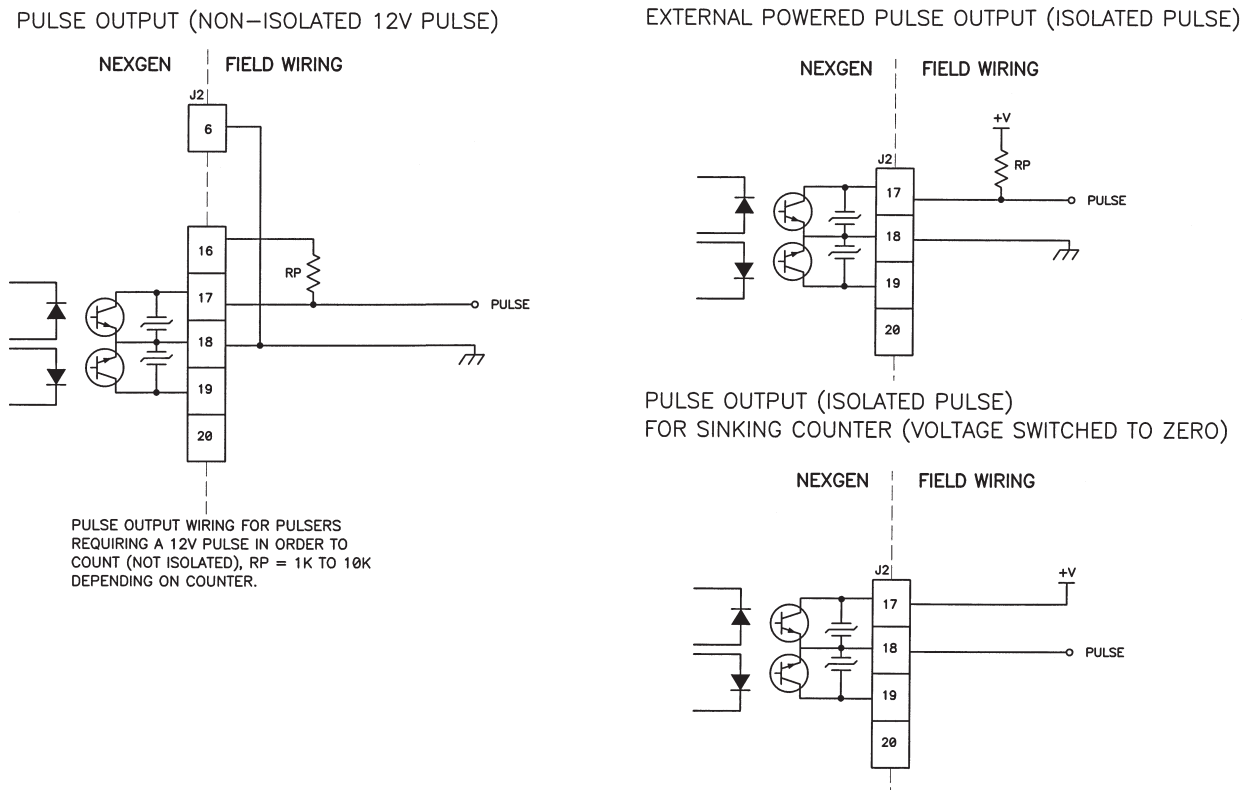


Figure 5.3.1: Pulse Output Wiring Connections

### 5.4 Alarm Output

The NexGen SFT100 Coriolis Flow Transmitter provides two solid-state relays (SSR) outputs for alarm outputs. These can be programmed for activation from measurement values and system warnings. The SSRs are galvanically isolated to 3.75 Kv. The maximum load voltage and currents are 230 VDC/AC and 100mADC/AC.

The SSRs function as switches to make or break power to the alarm devices. The SSR outputs are not connected to a voltage source internally in the NexGen. Figure 5.4.1 shows the connections for alarm devices that sense an open or closed contact.

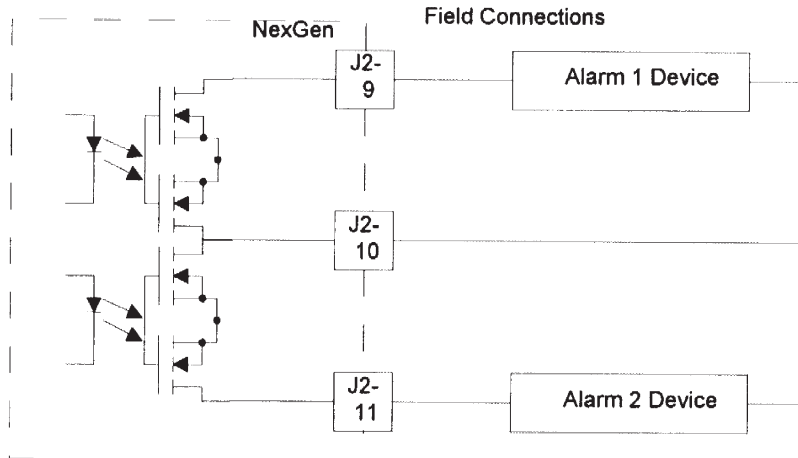


Figure 5.4.1: Field Connections for Alarm Devices without an External Voltage Source

For alarm devices that require a switched voltage, the user must make the connections required to switch voltage to the alarm devices as shown in Figure 5.4.2.

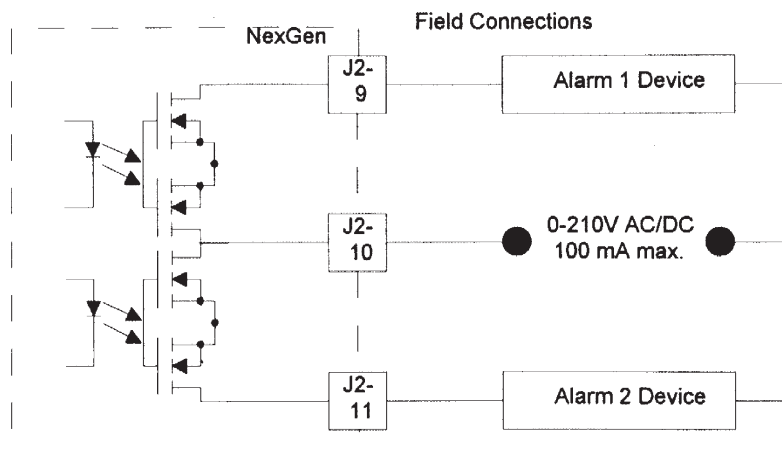


Figure 5.4.2: Field Connections for Alarm Devices with an External Voltage Source

### 5.5 Flow Direction Output (Quadrature Pulse)

The NexGen SFT100 transmitter can indicate direction of flow on the optional LCD display and through the two channel pulse output and 4-20mA output. The two channel pulse output produces two identical pulse signals. When flow is in the normal direction, the primary channel leads the quadrature channel 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. The optional LCD also shows the direction of flow in the reverse direction by showing negative flow rates when the flow direction is programmed to forward. The 4-20mA output signal from the NexGen permits the user to configure the output to represent positive or negative measurement ranges.

Select the pull-up resistor RP to ensure that the current through the pulse output circuit does not exceed 10mA.

#### PULSE OUTPUTS (NON-ISOLATED 12V PULSE)

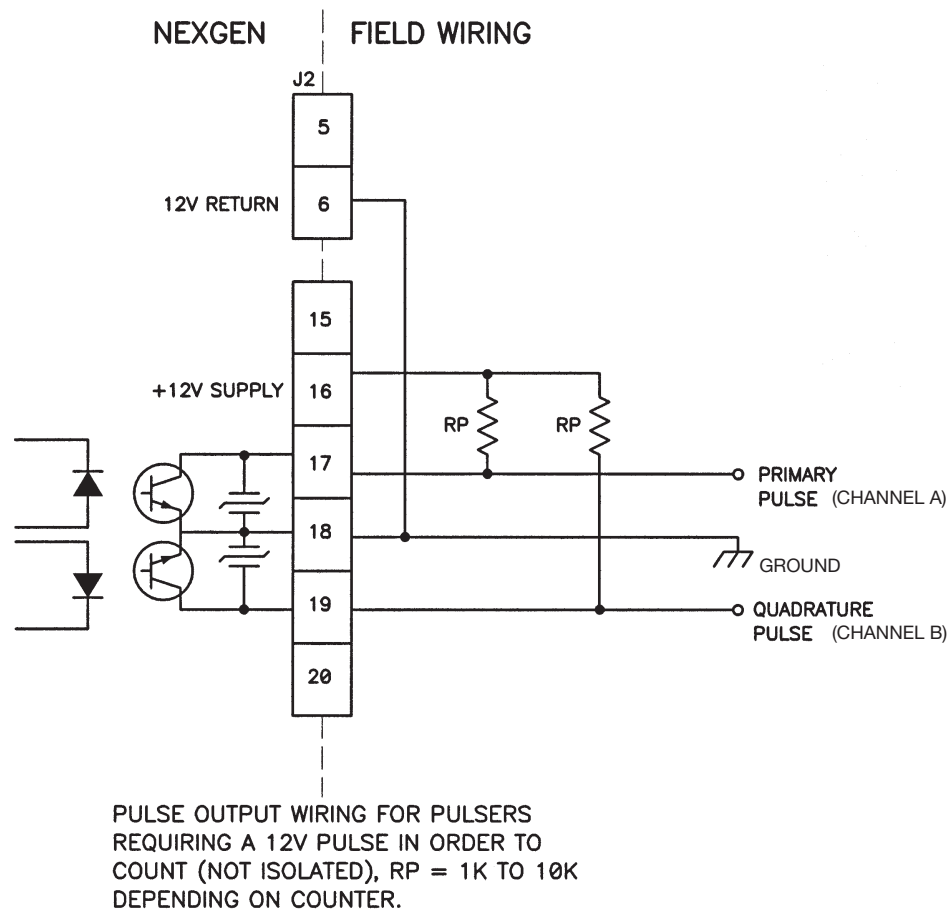
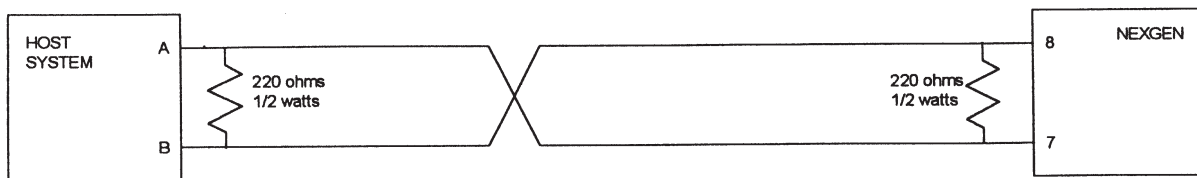


Figure 5.5.1: Connection to Remote Totalizer for Net Total

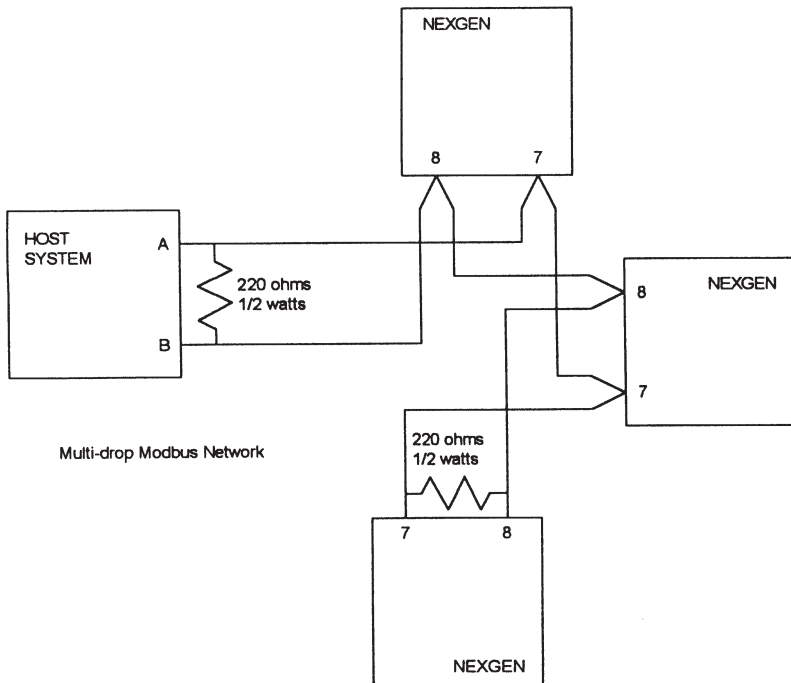
## 5.6 RS-485 Wiring Connections

The NexGen SFT100 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 and send commands necessary to configure: batching, alarms, outputs, etc., and to read all measured variables.

**NOTE: If the NexGen (blind or display less keys) transmitter is in use in a Custody Transfer application, ALL CONNECTIONS to Terminals 7 and 8 (RS485) and Terminals 4 and 5 (HART) shall be removed prior to the sealing of the unit by a Weights and Measures official.**



Single-drop Modbus Network



Multi-drop Modbus Network

Figure 5.6.1: RS-485 Wiring Connections



### 5.7 RS485/RS232 Converter Connections

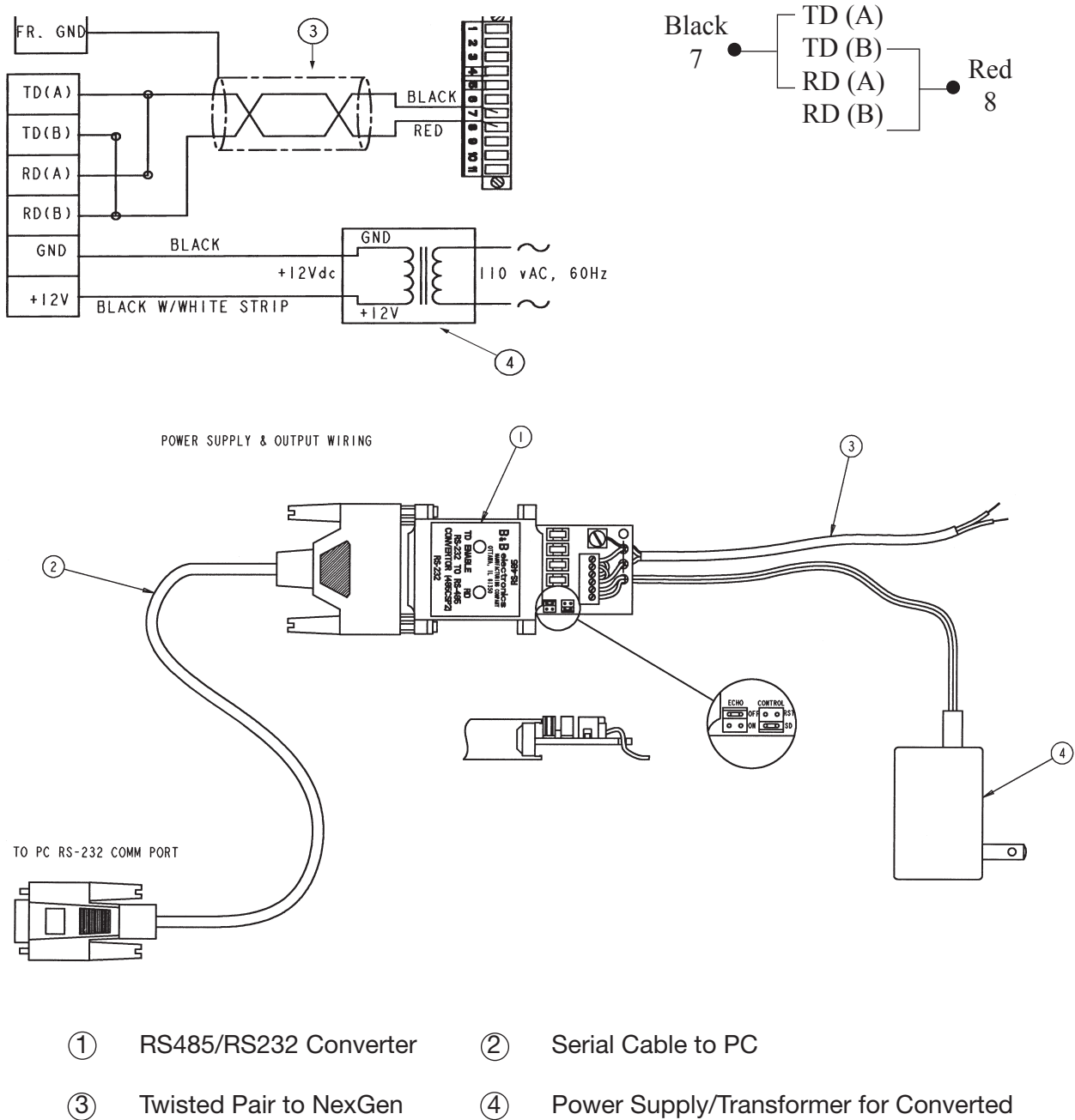


Figure 5.7.1: RS485/RS232 Converter Connections

### 5.8 HART® (Option Card) Wiring Connections

- Up to 10 transmitters can be connected into a HART multi-drop network.
- Using multiple transmitters in a HART® compatible network requires assigning a unique address of 1 to 15 to each transmitter
- Assigning an address of 1 to 15 to the transmitter causes the primary 4-20mA output to remain at a constant 4mA level
- The primary 4-20mA output MUST produce a 4-20mA current for the HART physical layer

**NOTE: If the NexGen (blind or display less keys) transmitter is in use in a Custody Transfer application, ALL CONNECTIONS to Terminals 7 and 8 (RS485) and Terminals 4 and 5 (HART) shall be removed prior to the sealing of the unit by a Weights and Measures official.**

Figure 5.8.1 shows how to connect wiring for a HART® compatible network. Connect the 4-20mA outputs from each transmitter together so they terminate at a common load resistor, installed in series, with approximately 250 ohms impedance. Figure 5.9.1 illustrates the handheld communicator connections for configuring the NexGen SFT100 via HART.

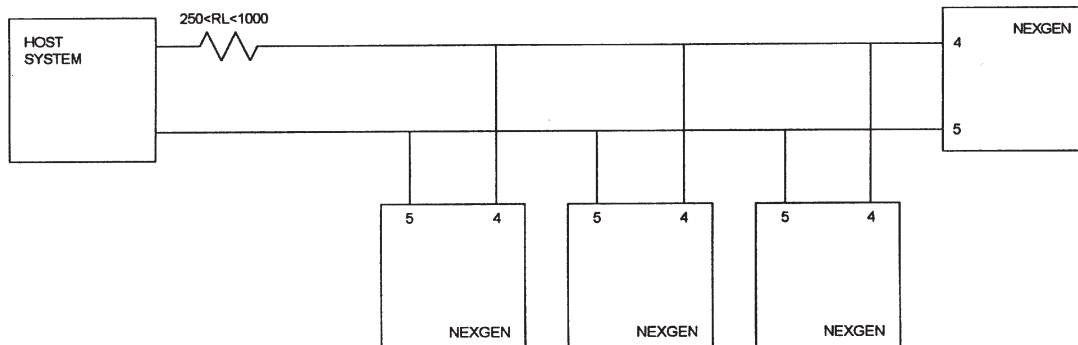


Figure 5.8.1: HART® Network Wiring

### 5.9 Hart® Communicator Connections

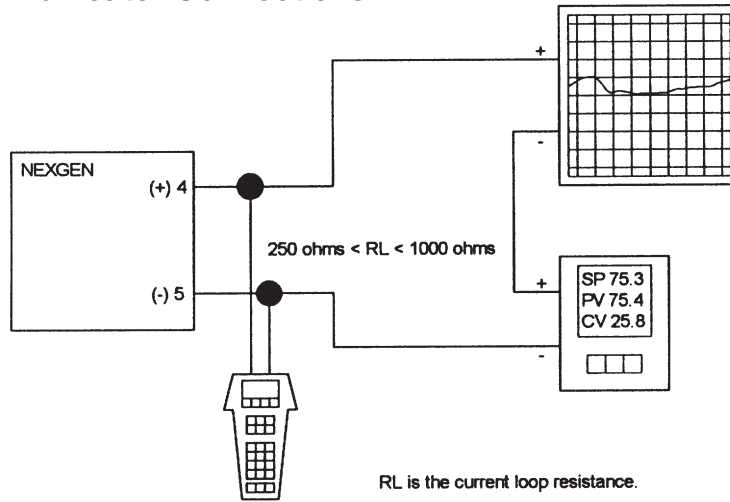


Figure 5.9.1: HART Communicator Connections

### 5.10 NexGen® to Bestrac™ Wiring Connections

The Bestrac™ SMI 2000 is an electronic transaction monitoring system that interfaces with the RSM line of mass flow meters to automate invoicing during the delivery of liquid products. The Bestrac SMI 2000 comes equipped with solenoid lockout valve, junction box, printer, optional electronic ATC and interconnect cables, including the pulse cable between the SMI and the NexGen transmitter. Figure 5.10.1 outlines the NexGen to Bestrac wiring connection.

When interfacing the NexGen to the Bestrac System, the maximum pulse input frequency from the NexGen transmitter to the Bestrac SMI 2000 shall not exceed 200 Hz. This is based on the full scale frequency equation:  $[(\text{Max. Flow Rate per minute} / 60) \times \text{Pulses/unit.}]$  Typical pulse per unit values for each meter size are as follows:  $\frac{1}{4}$ " (m025) - 100 (max. 150);  $\frac{1}{2}$ " (m050) - 10 (max. 40); 1" (m100) - 10 (max. 10); 2" (m200) - 1 (max. 3).

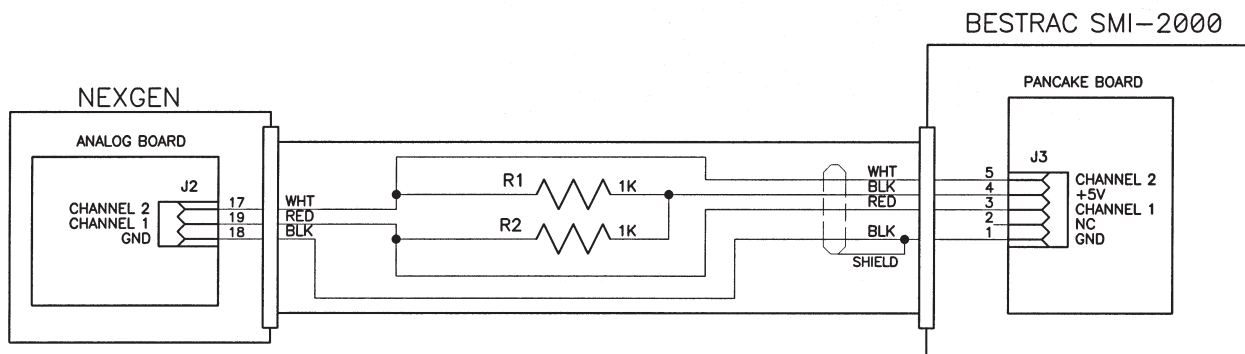


Figure 5.10.1: NexGen to Bestrac Wiring Connections

## **SECTION 6: BATCH WIRING**

### **6.1 Guidelines**

The NexGen transmitter has an optional two stage batch controller. When connected to an optional start/stop batch station, it provides the user with a full featured preset batching system.

**WARNING: GOOD PRACTICE DICTATES THAT A MANUAL METHOD (EMERGENCY STOP) OF DISCONNECTING ALL POWER TO THE BATCH CONTROL CIRCUITS BE INCLUDED IN THE USER'S BATCHING SYSTEM.**

**CAUTION: The NexGen power circuit should not be used as the power circuit for the batch control devices (e.g., motors, relays, solenoids, etc.). If this is not possible, a power line conditioner (constant voltage transformer) should be installed to isolate the NexGen transmitter from the voltage transients created by the batch control devices.**

## 6.2 Batch Wiring Connections

The NexGen SFT100 Coriolis Flow Transmitter provides two solid-state relays (SSR) outputs for batch control. The SSRs are galvanically isolated to 3.75 Kv. The maximum voltage and current are 230 VDC/AC and 100mADC/AC respectively.

The SSRs function as a switch to make or break power to the batch control devices. The SR outputs are not connected to a voltage source internally in the NexGen. The user must make the connections required to switch voltage to the batch control devices (see Figure 6.2.1).

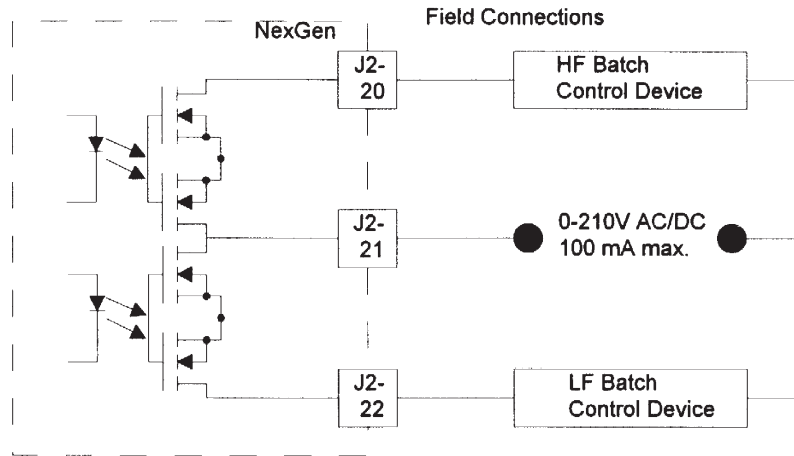


Figure 6.2.1: Field Connections for Batch Devices that do not Require Pilot Relays

In installations where the batch control devices require more than 100mA of current, it will be necessary to use pilot (interposing) relays of the proper rating for the batch control devices chosen by the end-user (see Figure 6.2.2).

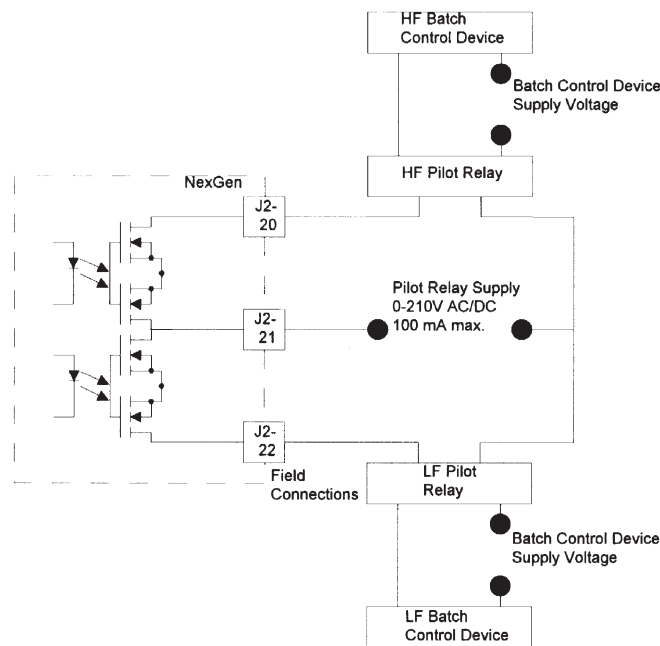


Figure 6.2.2.: Field Connections for Batch Devices that Require Pilot Relays

If SSRs with SCR or TRIAC outputs are used for pilot relays, the off-state current may be large enough to activate some high impedance devices (e.g., computer interfaces, PLC inputs, sensitive electro-magnetic relays, etc.). If this problem is encountered, connect a 1000 ohm, 1 watt resistor across the input of the batch control devices.

For single-stage batching, use either the HF, LF, or both relays to control the batch control device(s). Both relays will close when a START signal is received.

For two-stage batching the HF relay controls the first stage (trickle point) control devices and the LF relay controls the second stage (batch size) device. When the START signal is received, both relays will close. When the first stage point is reached, the HF relay will open. When the batch size is reached, the LF relay will open. Both relays will open when a STOP signal is received.

### 6.3 Remote Start/Stop Wiring Connections

The NexGen SFT100 transmitter features an optional batch controller. The start and stop of the batch must be operated from remote start/stop push button inputs for batch control. These push buttons should be of the normally-open, momentary-contact type. Figure 6.3.1 outlines the remote start/stop connector.

## BATCH START/STOP INPUTS

THE BATCH START/STOP INPUTS REQUIRE A MOMENTARY INPUT FROM A N.O. DRY (FORM C) CONTACT.

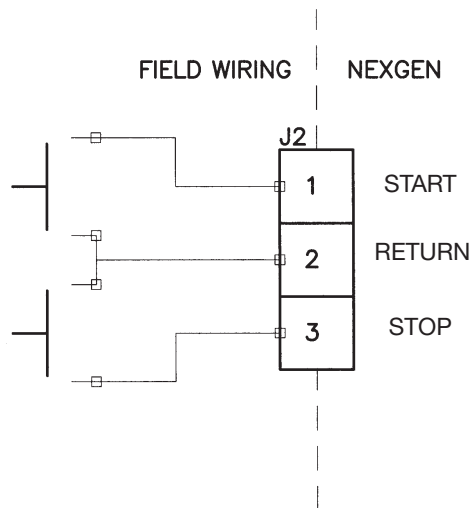


Figure 6.3.1: Remote Start/Stop Connection

**NOTE:** These remote start/stop inputs can be activated by the open-collector NPN transistor, such as the NexGen transmitter alarm outputs.

## SECTION 7: STARTUP

### 7.1 Power

**NOTE:** Access to field wiring and circuit board terminals is not required during flow meter start-up or zeroing.

After wiring connections have been made (Section 3.5), power can be supplied to the NexGen transmitter.

**Start-up Mode:** During start-up and initialization, the following start-up indicators can be observed:

- 4-20mA and pulse outputs go to undefined fallback levels
- The optional LCD on the cover reads for two seconds, “RSM Coriolis Flow Transmitter”
- The display on the HART® Communicator reads “Field device warming up”
- Alarm outputs are active

**Operating Mode:** After startup, the optional LCD display will indicate process measurements.

### 7.2 Startup with NexLink PC Software

Using Figure 5.6.1, complete wiring connections between the NexGen SFT100 transmitter and an IBM compatible PC with RS485 serial interface.

At the NexGen using the following MENU TREE enter Comm Ports

From the Main Display press <Enter>, <3. Program>, <1. View Measurements>, <3. Program>, <3. Configuration>, <6. Outputs>, <5. Comm Ports>

Under Comm Ports select the following: Comm Port: 1-4, Baud Rate: 9600, Parity: None, Data Bits: 8, Stop Bits: 1, Protocol: Modbus, Modbus Mode: ASCII, Unit ID: Select any number between 1-247.

**NOTE:** All NexGen SFT100 transmitters in the blind configuration are pre-programmed from the factory with ID number “247.” Any change to the Unit ID or protocol, power to the NexGen is to be recycled for the change to be acknowledged. The default password for NexLink: User ID: admin, Password: admin

To change the Unit ID for a blind unit, within the NexLink PC software in the Configuration menu select <Outputs> and <Comm Port>.

Within the NexLink PC software, select the Comm Port pull-down menu from the Main Menu and configure the setting to match the NexGen SFT100 transmitter settings. When all settings match, reboot the NexGen SFT100 transmitter.

Within NexLink open up the “Comm Port” menu using the displayed icon, select View Measurements under the “Process Variables” pull down menu. If the NexLink is communicating with the NexGen, the displayed measurement values will correspond to the NexGen display. If no communication exists, the NexLink PC software will respond with “Closing Comm Port.” If this occurs, re-check wiring and communication settings.

### 7.3 Optional LCD

The NexGen transmitter is approved as explosion-proof (flameproof), and is available with an optional LCD, as shown in Figure 7.3.1. The 4 x 20 digit four line display indicates all process measurements and any alarm warnings.

- For information about using the LCD during flow meter zeroing, see Section 7.4.
- For information about using the LCD for flow meter troubleshooting, see Section 8.

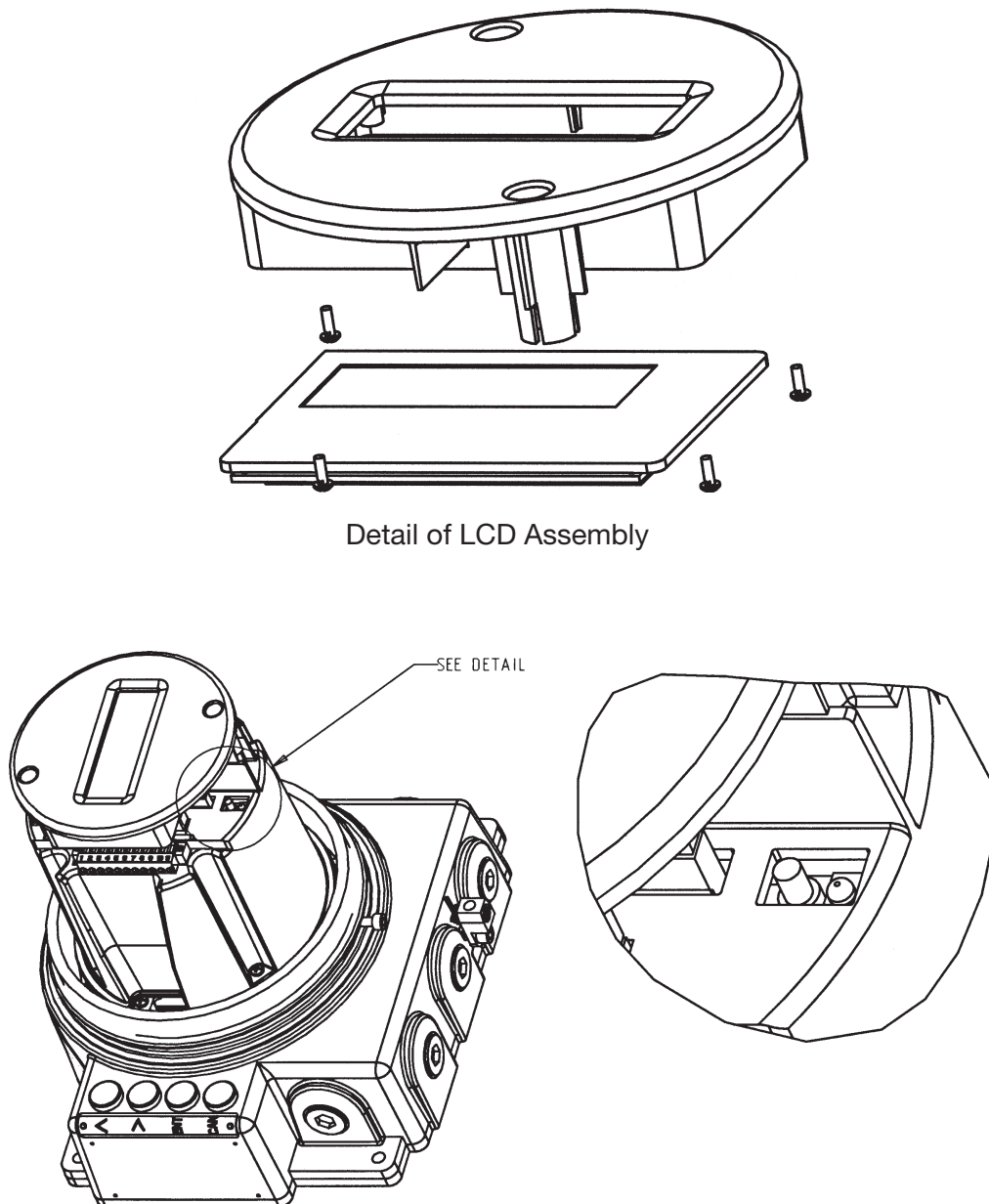


Figure 7.3.1: Location of LED, Zero Button and Optional LCD



## 7.4 Flow Meter Zeroing

**CAUTION: Failure to zero the flow meter at initial startup will cause the transmitter to produce inaccurate pulse and analog output signals and on the optional LCD display may indicate flow registration under no flow conditions.**

To ensure accurate measurements, zero the flow meter before putting the flow meter in operation.

Flow meter zeroing establishes the flow meter response to zero flow and sets the zero baseline for flow measurement.

### 7.4.1 Automatic Zeroing Procedure

1. Install the transducer according to the transducer installation guide (M-600).
2. Fill the transducer completely with the process fluid.
3. Shutoff the downstream valve after the transducer. 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. Initiate flow meter zeroing in either of the following ways:
  1. Press and hold the ZERO button until the LED remains on continuously. Figure 7.3.1 shows the location of the ZERO button and LED in the transducer wiring compartment.
  2. Initiate a zero command from the optional key buttons on the NexGen unit or
  3. Initiate a zero command from a remote IBM-compatible computer with the NexLink software or a handheld HART Communicator.

The LED remains on continuously or the optional LCD reads “Zeroing” for 1-2 minutes during zeroing. After the zeroing procedure has been completed, the LED will go off. The optional LCD will again indicate the flow rate.

To abort at any time during the zeroing procedure, recycle power to the transmitter or press the CANCEL key on the NexGen enclosure if equipped.

## 7.5 Ready for Process Measurement

**WARNING: OPERATING TRANSMITTER WITHOUT HOUSING IN PLACE EXPOSES ELECTRICAL HAZARDS THAT CAN CAUSE PROPERTY DAMAGE, INJURY OR DEATH.**

After flow meter zeroing has been completed as described in Section 7.4 the NexGen transmitter is ready for process measurement.

## 7.6 Ready for Batch Operation (optional)

**WARNING: OPERATING TRANSMITTER WITHOUT HOUSING IN PLACE EXPOSES ELECTRICAL HAZARDS THAT CAN CAUSE PROPERTY DAMAGE, INJURY OR DEATH.**

The NexGen LCD transmitter with keypad when connected to an external start/stop station is a full featured two-stage batch controller. For accurate and repeatable batching, batch size should be large enough to allow the flow meter to run one (1) minute for each batch. If proper programming (Section 9) of the transmitter has been completed, the following procedures will allow you to control a batch with the NexGen.

### 7.6.1 Running a Batch

Monitor the progress of the batching process. Configure the display to show the batch total.

You may see in the display the mass flow rate go to the fallback value. This indicates that the measured density of the process liquid is above or below the Low or High Density Cutoff respectively from that which is programmed in the DENSITY menu. When this message is displayed, the meter may no longer correctly measure flow and is assuming the fallback value as the flow rate. The mass flow rate will return to the measured flow rate when the liquid density is above or below the Low or High Density Cutoff respectively, **OR** when you disable the Slug Flow Feature by selecting Zero.

### 7.6.2 Beginning a Batch

You have programmed as Section 9.6.1 the transmitter to either allow the operator to change batch sizes before each batch (Run Mode Edit On), or run repeated batches of the same size (Run Mode Edit Off). In the event of a sensor error during a batch and the Batch Jog is enabled (YES), the transmitter can be programmed to allow the operator to be able to override the effect of the sensor error by depressing and holding down the start button, energizing the batch relays until the sensor error has cleared. This feature can be turned off (Batch Jog NO). If you programmed it to allow different size batches, press the remote START button. The display will show you the Batch Cutoff Point. This is the batch size. If you want to change the batch size, use the UP (^) and the across (>) keys to change the batch size, then press ENTER. When you have entered the correct batch size, press START again and the batch will begin. If you programmed the NexGen to run repeated batches of the same size, press START to begin the batch.

### 7.6.3 Interrupting a Batch

In the event you have to interrupt a batch, press STOP using the remote STOP button.

### 7.6.4 Restarting a Batch

To continue a batch after interrupting it, press START using the remote START button.

### 7.6.5 Terminating a Batch

To terminate a batch after interrupting it, press the remote STOP button again.

### 7.6.6 Starting a New Batch

After a batch has finished, the NexGen will display the amount of liquid delivered if a line of display has been set to BATCH TOTAL. If Run Mode Edit is Off, the pressing of the remote START button will start a new batch. If Run Mode Edit is On, press START twice to run the same size batch, or press START once, then enter the new batch size and press START again to run a batch of a different size.

### 7.6.7 Totalizer Reset

The NexGen transmitter totalizers cannot be reset in the Main Menu (operational mode). To reset the totalizers, enter the PROGRAM mode. In the Configuration Menu, under Totalizers, the resetting of any or all totalizers can be accomplished.

## 7.7 Viewing Other Process Variables (optional LCD required)

While you program the NexGen display to default to three process variables while in the RUN mode, it is possible to view other process variables while in the RUN mode. From the main display press <ENTER>, <ENTER>. You will be given a list of measurement variables that can be scrolled through under view measurement. By pressing the UP (^), ACROSS (>), or the ENTER key, four (4) process variables can be viewed at any time. Press CANCEL to return, until the Main Display is being viewed.

## 7.8 Concentration (% , Brix and Baume)

The NexGen transmitter may be programmed to calculate Concentration in different units like Percent, degrees Brix and degrees Baume using the measured temperature, density, and mass flow variables. The percent concentration is the percent by mass of one component in the process stream. Concentration Flow can be measured as well for % and Brix to indicate the flow rate in mass units of the target fraction.

Note that the term “target fraction” is used to denote the component of interest in a two-component process stream. That component may actually be solid (e.g. clay slurry), the dissolved solute of a solution (e.g. brine solution) or it could be a liquid (e.g. alcohol/water mixture). The software will work equally well in all cases. The term “carrier fraction” denotes the second (other) component of a two component stream.

Because the concentration is not measured directly, this function uses several assumptions in its calculations. They are the following:

1. Both the temperature and density measurements functions are correctly calibrated. If these calibrations are unsure, confirm them with the procedures outlined in the Calibration menu (See Section 9.4.2 & 9.4.3).
2. The process stream must act as a two-component system. A slurry of brine and sand cannot be handled by this software because it acts as a three-component system. For example, the amount of sand in the slurry will cause errors in the calculation of the salt concentration in the brine. On the other hand, measuring the amount of sand lifted from the ocean is possible because the salt in the ocean water is relatively constant.

3. There are no phase changes (solids - liquids - gas) taking place in the process stream. This can be a particular problem when the process temperature changes because such changes can often induce precipitates or cause additional solid to dissolve. For instance, a salt-brine slurry would allow extra salt to go into solution when it is heated; thus, giving a false percent solids reading. In general, errors can be expected when soluble precipitates and/or saturated solutions are present and the process temperature is not stable.
4. Except for changes due to temperature, the densities of the target and the carrier fractions must be constant and may not change from that used to set up the software.
5. If the process operates over a wide temperature range, ensure that the concentration table is set up at the normal process operating temperature ( $T_3$ ) and two temperatures below ( $T_1$  &  $T_2$ ) and above ( $T_4$  &  $T_5$ ) the normal process operating temperature. The temperatures and densities that define the limits of the table should bracket the anticipated operating extreme for the process.

Before programming the concentration table, the user must determine a set of concentration and density pairs for at least two different temperatures. These pairs are entered into a table for up to 5 temperatures. From 2 to 14 pairs may be entered for each temperature.

6. Concentration calculation requires the temperatures and densities to be entered sorted from the lower to the higher value, i.e.  $T_1 < T_2 < T_3 < T_4 < T_5$  and  $D_{i,1} < D_{i,2} < D_{i,3} < \dots < D_{i,12} < D_{i,13} < D_{i,14}$ ; where  $T_i$  is the temperature for the column  $i$ ;  $D_{i,j}$  is the density for the row  $j$  at the temperature  $i$  and  $C_{i,j}$  is the concentration for the density  $j$  at the temperature  $i$ .
7. The expected range of process temperatures, densities and concentrations should be enveloped by the values entered into the tables.

If the measured process temperature goes outside the range of temperatures given in the concentration table, the concentration will go to its fallback value. The fallback value will be used for all calculation using concentration.

If the measured process density is outside the range of the values given in the concentration table, 0 will be used if the measured density is low and 100 will be used if the density is high.

$T_1$	$T_2$	$T_3$	$T_4$	$T_5$
$D_{1,1} ; C_{1,1}$	$D_{2,1} ; C_{2,1}$	...	...	$D_{5,1} ; C_{5,1}$
$D_{1,2} ; C_{1,2}$	$D_{2,2} ; C_{2,2}$	...	...	$D_{5,2} ; C_{5,2}$
...	...	...	...	...
...	...	...	...	...
$D_{1,14} ; C_{1,14}$	$D_{2,14} ; C_{2,14}$	...	...	$D_{5,14} ; C_{5,14}$

## 7.9 API

NexGen allows to measure density in degrees API. API gravity measures the relative density of liquid petroleum products, where 10°API is equivalent to the specific gravity of water. In order to provide these measurements, NexGen contains Volume Correction Factor (VCF) tables<sup>1</sup> for several petroleum products as well as a custom table that the user can load. The API correction tables provided are for 5 different petroleum products at two different temperature references: 60°F and 15°C. The custom table allows to input a maximum of 100 pairs of Temperature and VCF.

Fuel Oil (840) @ 60°F	Fuel Oil (840) @ 15°C
LPG (505) @ 60°F	LPG (510) @ 15°C
Gasoline (730) @ 60°F	Gasoline (730) @ 15°C
Kerosene (820.1) @ 60°F	Kerosene (820.1) @ 15°C
Light Lube Oil (878) @ 60°F	Light Lube Oil (878) @ 15°C
Custom Table	

The standard temperature, i.e. the temperature at which the density of water is taken as the reference to calculate specific gravity, will depend on the temperature unit selected in the temperature configuration menu. If the temperature selected is °F, the standard temperature will be 60°F and the reference density used will be 0.999042 g/cc. If the temperature selected is °C, the standard temperature will be 15°C and the reference density used will be 0.999129 g/cc.

**NOTE: It is important to be consistent in selecting the correct temperature unit that matches the Volume Correction Factor table. For example, if the temperature unit is °F, but the VCF table selected is “Fuel Oil 840@15°C,” the degrees API and Standard Volume measurements will not be correct.**

If the measured process temperature is outside the range of the values given in the correction table for the selected product class, the correction factor for the nearest temperature in the table will be used.

Temperature	Correction Factor
$T_1$	$VCF_1$
$T_2$	$VCF_2$
...	...
$T_{99}$	$VCF_{99}$
$T_{100}$	$VCF_{100}$

<sup>1</sup> API Standard 2540 (1980).

## 7.10 Actual/Standard Volume

The NexGen calculates actual gross volume and standard volume flow rates and totals. The actual volume is obtained directly dividing the measured mass by the measured density. Whereas the standard volume is the equivalent volume at a standard condition, obtained dividing the measured mass by density of the fluid under the standard conditions (Standard Density).

**NOTE: Standard Volume configuration can be skipped if you wish to use the measured density to calculate the actual volume or if you will not be using a volume value in the application.**

Brix and Baume are concentration units, but they can be used to calculate standard volume since they can be related to specific gravity (See equations 7.10.1, 7.10.2 & 7.10.3). Therefore a standard density for the fluid at 60°F can be derived from the density vs. concentration tables.

If Brix or Baume is selected as the standard density unit, there is no need to input the Standard Density value granted the correct density vs. concentration tables were input in the NexGen (See Section 7.8).

$$\text{Equation 7.10.1} \quad \text{BRIX} = 318.906 + \frac{66.1086}{\text{SG}^2} - \frac{384.341}{\text{SG}}$$

$$\text{Equation 7.10.2} \quad \text{Be Lt} = \frac{140}{\text{SG}} - 130 \quad \text{for liquids lighter than water (SG < 1.00)}$$

$$\text{Equation 7.10.3} \quad \text{Be Hv} = 145 - \frac{145}{\text{SG}} \quad \text{for liquids heavier than water (SG ≥ 1.00)}$$

Standard Volume can also be obtained using API calculations. In this case it will be obtained by multiplying the actual volume to the Volume Correction Factor for the fluid at process temperature. The Volume Correction Factor is found in the look-up table provided for different petroleum products or the custom table that the user can load (See Section 7.9).

## 7.11 Net Oil and Well Testing (Optional)

The NexGen, when purchased with the Net Oil and Well Testing option, calculates the net oil and net water (or saline water) present in an emulsion stream, utilizing Chevron's patented algorithm. This allows the user to integrate into one device the capabilities of a Coriolis Transmitter and a Net Oil Computer.

Mass flow rate, density and temperature are obtained directly from the Coriolis sensor. The standard NexGen will provide these direct measurements as well as volume and concentration flow. Adding the Net Oil and Well Testing option allows to obtain Water Cut, i.e., the volume fraction of water in the crude oil and water mixture at metering conditions, Net Oil rate and total (mass or volume of the crude oil corrected to standard temperature) and Net Water rate and total (mass or volume of the water or brine corrected to standard temperature).

Water cut determination is based on the principle that Crude Oil and Saline Water have different densities. Using the pre-determined, known densities of dry crude oil and produced saline water at standard temperature, the NexGen will adjust them for temperature effect and use them along with the measured density to obtain the volume fraction of the produced water.

The net oil mass rate is obtained by multiplying the mass fraction of crude oil times the mass flow of the emulsion stream, times the shrinkage factor<sup>1</sup>. Net oil volume rate is achieved using the previous value divided by the density of the crude oil at the reference temperature. Similar computations are performed for the net water rate.

To use the Net Oil functions, the user will have to set up the Well Data and Shrinkage Factor. NexGen can store data for up to 30 Wells, saving for each one of these the density of dry crude oil and density of produced water at the selectable reference temperature of 60°F or 15°C.

The Wells Testing feature works with the Net Oil measurements and provides the tool to run a *potential test* for a well. This test measures the largest amount of oil a well can produce over a 24-hour period under certain fixed conditions. Basically, the test involves allowing the well to produce for a given period of time and accurately measuring the production. Lease operators perform *potential tests* both when first producing the well (after completion) and again several times during its life.

To perform a well test, the user must input the information required to set up the Net Oil feature plus the selected well number to use for the testing, type of purge (none, elapsed time or dumps) and the time it will take for the test (0, 4, 8, 12, 20 or 24 hours).

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<sup>1</sup> At the allocation measurement point, a hydrocarbon liquid is normally at its bubble point (equilibrium vapor pressure) condition. When this liquid is discharged to a stock tank at atmospheric condition, the light components in the hydrocarbon evaporate, causing a reduction in liquid mass and volume. Therefore, a correction term called *shrinkage factor* may need to be applied to correct the measured liquid volume from metering condition to stock tank condition.

While running the well test, NexGen will provide the following real time measurement:

- Elapsed test time.
- Net Oil Rate, instant and average value during the elapsed time of the test.
- Net Oil Total during the elapsed time of the test.
- Net Water Rate, instant and average value during the elapsed time of the test.
- Net Water Total during the elapsed time of the test.
- Water Cut, instant and average value during the elapsed time of the test.
- Net Flow Rate, instant rate of the oil/water emulsion stream.



## SECTION 8: TROUBLESHOOTING

### 8.1 Customer Service

***NOTE: Make sure you have the model number and serial number of the transmitter and the transducer prior to contacting your RSM Representative.***

For local Customer Service assistance, contact your local RSM Representative or Distributor. You may also contact RSM directly at the address listed below.

Red Seal Measurement  
1310 Emerald Road  
Greenwood, SC 29646  
Voice: Toll-Free 1-800-833-3357 or 1-864-223-1212 or  
Fax: 1-864-223-0341

## 8.2 General Guidelines

**WARNING: DO NOT REMOVE THE COVER OF THE NEXGEN TRANSMITTER TO TROUBLESHOOT THE UNIT IN A HAZARDOUS ENVIRONMENT.**

Troubleshooting a NexGen transmitter is performed in the following two parts:

1. Tests of wiring circuit integrity
2. Observation of the transmitters diagnostic tools, which includes the diagnostic software and LCD, digital diagnostic messages, and fault output levels.

**CAUTION: During troubleshooting, the transmitter could produce inaccurate flow signals.**

For personal and system safety, make sure the control devices are set for manual operation before you troubleshoot the flow meter.

Before beginning the diagnostic process, become familiar with this instruction manual and with the installation guide of the transducer.

When troubleshooting, leave the transducer in place whenever possible. Problems often result from the specific operating environment of the transducer.

Check all signals under both flow and no-flow conditions.

In some situations, troubleshooting requires use of the transmitter's diagnostic tools, which are included in the software and diagnostic messages displayed on the optional LCD.

## 8.3 Transmitter Diagnostic Messages

The NexGen transmitter provides a large number of diagnostic messages, which can be viewed on the optional LCD display or in the NexLink software program.

### Alarms

#### DSP Failure Alarm

- The NexGen digital signal processor has temporarily lost communication synchronization

#### RTD Failure Alarm

- The transducer RTD is not functioning
- Incorrect wiring at transmitter

#### Sensor Error Alarm

Indicates that one of the sensor voltages is less than 60 mVrms

- The transducer sensors are defective
- Incorrect wiring at transmitter

#### Temperature Alarm

- The maximum process temperature for the transducer has exceeded the set point or transducer maximum temperature

#### Tubes Not Vibrating Alarm

This alarm is displayed when both sensor signals are less than 60 mVrms. Some conditions that may cause this are:

- Flow meter tubes are not full
- NexGen Barrier board defective
- Check cable for continuity
- Density stratification of the process fluid

### Errors

#### 4-20mA Failure/Analog Fault (1, 2 or 4) Error

- The output current is incorrect. Possible causes: loop resistances greater than 1000 ohms and improper wiring.

#### DCM Error

- Data Code Memory has been corrupted. Recycle power to the NexGen.

#### DSP Lost Event Error

- Internal communications failure, missing calculations event

#### DSP PLL Not Locked Error

- Unable to track tube frequencies or phase shift due to low sensor voltages

#### Pulse Output Buffer Overflow Error

- The buffer for storage of pulses has exceeded capacity

## 8.4 Power Supply

Check for specified power at the transmitter's terminals. If the transmitter has a nominal:

- 115 VAC, 50/60 Hz power source board, the line terminal is labeled '7' and the neutral terminal is labeled '4'. Place jumper on terminal on '4' & '5' and '6' & '7'.
- 230 VAC, 50/60 Hz power source board, the line terminal is labeled '7' and the neutral terminal is labeled '4'. Place jumper on terminals on '5' and '6'.
- 12-36 VDC power select board, the positive terminal is labeled '2' and the negative terminal is labeled '1'.

## 8.5 Wiring

For detailed wiring instructions, refer to Chapters 4, 5, and 6. Wiring problems are often incorrectly diagnosed as a faulty transducer. At initial startup of the transmitter, **ALWAYS** perform the following:

1. Check the proper cable and use of shielded pairs.
2. Check the proper wire termination by performing the following:
  - a) Make sure the wires are on the correct terminals.
  - b) Make sure the wires are making good connections with the terminal strip.
  - c) Make sure the transducer cable connector is connected at the transducer terminals.

### 8.5.1 Cable Check

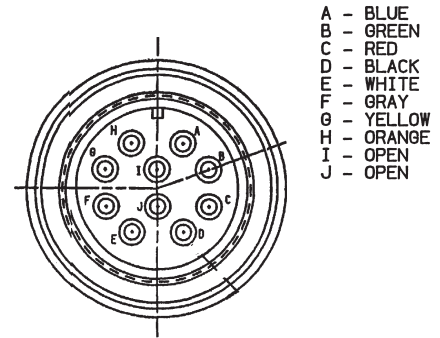
The cable and connector can easily be checked using a digital multimeter (DMM). The resistance of any conductor in this cable should be less than 1 ohm. Cables for CSA approved transducers will have a jumper between pins E-B and G-F for some cable configurations. In addition, the resistance between the shield (the non-insulated conductor) and any other conductor or the connector shell must be greater than 100 Mohms.

### 8.5.2 Output Board and Communications Test

To check all output and communications, use the diagnostic menu (Section 9.5) to simulate the appropriate output test. Use a DMM to check pulse/4-20mA outputs, and a remote communications device (e.g., computer) to test communications.

### 8.6 Transducer Resistances Nominal Value

Figure 8.6.1 lists the transducer pin designations for the RSM transducers.



To check integrity of wiring circuits, complete the following steps:

1. Disconnect the transmitter's power supply.
2. Disconnect the transducer wiring from the transmitter's intrinsically safe terminal block in the transducer wiring area.
3. Use a digital multimeter (DMM) to measure resistance and voltage between wire pairs, as indicated in Table 8.6.2.
4. Use Table 8.6.3 to verify correct wiring at the NexGen transmitter terminals.
5. If the transmitter is remotely mounted from the transducer, repeat the measurements at the transducer cable connector on the transducer to distinguish cable failure from transducer failure. The model m300 transducer may be tested at the proper terminals on the terminal PCB.

Allowable Transducer Resistances by Circuit and Transducer Size (ins.)									
Conductor Color	Transducer Pin-pairs	Circuit	m012 (1/8)	m025 (1/4)	m050 (1/2)	m100 (1)	m200 (2)	m300 (3)	m400 (4)
Red-Black	C-D	Drive	72-88	80-96	74-90	46-55	46-55	33-39	33-39
White-Blue	E-A	Sensor A	128-144	80-96	10-12	10-12	10-12	78-94	78-96
White-Orange	E-H	Sensor B	128-144	80-96	10-12	10-12	10-12	78-94	80-96
Green -Yellow	B-G	RTD Sense + to -	RTD - About 108 ohms at room temperature - all transducer sizes						
Black - CASE	J-CASE	Drive Return to transducer case	Less than 1 ohm - all transducer sizes						
	Any other combination		Over 100 megohms - all transducer sizes						
			From NexGen			At Transducer			
Gray -Yellow	F-G	RTD Excite to Sense +	Less than 1 ohm - all transducer sizes			Over 100 megohms - all transducer sizes			
White-Green	E-B	RTD Excite to Sense -							

Table 8.6.2: Allowable Transducer Resistances

Connector Board Cable Connection Table

Terminal Block	Pin Number	Label	Conductor Color	Transducer Connector Pin	Function
J2	1	SHLD	Bare	None	Ground
J2	2	RED	Red	C	Tube Drive
J2	3	BLK	Black	D	Drive Return
J2	4	GRY	Gray	F	RTD Excite +
J2	5	YEL	Yellow	G	RTD Sense +
J2	6	GRN	Green	B	RTD Sense -
J2	7	WHT	White	E	RTD Excite -/ Sensor Common
J2	8	BLU	Blue	A	Sensor A
J2	9	ORG	Orange	H	Sensor B

Table 8.6.3: Connector Board Cable Connection Table

### 8.6.1 Transducer Tube Drive Test

The NexGen SFT100 Coriolis Flow Transmitter incorporates a digital multimeter to provide diagnostic information on the transducer. This display permits the user to view four (4) diagnostic measurements from the transducer.

These measurements are

1. Drive Current (the measured AC current to the drive coil)
2. Sensor A voltage (the measured AC voltage from Sensor A)  
Sensor voltages for transducer sizes 1/8" (m012) to 2" (m200) should be in the range of  $200\text{mV} \pm 5\text{mVrms}$ . For 3" (m300) and 4" (m400) transducers this value should be  $140\text{mV} \pm 5\text{mVrms}$ .
3. Sensor B voltage (the measured AC voltage from Sensor B)  
Sensor voltages for transducer sizes 1/8" (m012) to 2" (m200) should be in the range of  $200\text{mV} \pm 10\text{mV}$ . For 3" (m300) and 4" (m400) transducers this value should be  $140\text{mV} \pm 5\text{mVrm}$ .
4. Drive Efficiency (a calculated value for determining drive efficiency)

If any value is out of range, it may suggest that the transducer tube driver is experiencing difficulties in maintaining the sensor voltages and/or the setpoint for the sensor voltages was not set to the optimum level as noted above.

### 8.6.2 Diagnostic Alarm Matrix

The diagnostic alarm matrix is highlighted in the following chart.

# ALARM MATRIX

	Measurements in Fallback							Alarms Declared												Errors Declared							
	Mass Rate	Volume Rate	Standard Volume Rate	Concentration rate	% Concentration	Density	Temperature	Sensor Error	RTD Failure	Tubes not Vibrating	Mass Rate	Volume Rate	Standard Volume Rate	Concentration rate	% Concentration	Density	Temperature	RTD Failure	DSP Failure	4-20 Failure	RTD Failure	DSP Lost Event	DSP PLL Not Locked	Analog Fault - 1	Analog Fault - 2	Analog Fault - 4	
Sensor Error																											
Blue	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Orange	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Tubes not Vibrating	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
RTD Failure																											
Open																											
Gray	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Yellow	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Green	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
White	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Shorted																											
White to																											
Gray	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Yellow	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Green																											
Green to																											
Gray	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Yellow	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Yellow to																											
Gray																											
Analog Output																											
Rloop> 1050 ohms																											
Analog 1																											
Analog 2																											
Analog 4																											

## 8.7 Slug Flow Inhibit

The flow meter will resume normal operation when the density measurement level is above the low density cutoff value and below the high density cutoff value. The slug flow inhibit feature is intended to detect process changes due to density that may affect the meter operation. This feature works by monitoring the process density. When the process density goes above or below the slug flow setpoints, the mass rate defaults to the programmed fallback value. As recommended in the Mass Flow Installation Guide (M-600), RSM recommends process piping that prevents large air slugs from mixing with the process liquid. However, if this is unavoidable, the effects of air slugs may be minimized using the Slug Inhibit software feature. The software feature works by looking for an increase or decrease in measured density. An increase or decrease in measured density occurs when air or gas becomes mixed with the process fluid. When the concentrations of gas become significant, air slugs develop and cause the indicated flow rate to fluctuate erratically. When the process density moves above or below the setpoints, the software feature causes the NexGen transmitter to ignore the erratic flow signal and to substitute it with a fallback value. This fallback value is based on the programmed fallback values for mass and volume flow (See Section 9.6.5). Typically fallback values are selected to either lock into the last measured mass or volume flow rate prior to the increase or decrease in density, **OR** drop the flow rate to zero. Consequently, whenever the software feature is engaged, an active measurement of the flow in the tubes is no longer in effect.

A slug flow condition causes the following to occur:

- pulse output will hold at the fallback value frequency
- 4-20mA output will hold at the fallback current

## 8.8 Transmitter Power Failure

If the NexGen transmitter power fails, the following will occur:

- transmitter pulse outputs will go to 0 Hz
- transmitter 4-20mA outputs will go to 0mA

If the Nexgen fails as a result of a “Tube Not Vibrating” or “Sensor Error,” the following will occur:

- transmitter pulse outputs will go to the fallback value
- transmitter 4-20mA outputs will go to the fallback value

**NOTE:** If the remote system requires a fallback value lower or higher than the respective 4-20mA output signal, set the fallback (positive or negative) to a value at least 12.5% lower or higher than the 4-20mA span. This will drive the current output to a minimum value of 2mA or a maximum value of 22mA. (Example: If your 4-20mA flow range represents 0 to 1000 lbs/min, then by setting the fallback to a value greater than 1125 or less than -125, the analog output will be driven to 22mA or 2mA respectively.)



## SECTION 9: PROGRAMMING WITH OPTIONAL LCD

### 9.1 General Guidelines & Menu Tree

The NexGen SFT100 is programmed and configured via the NexLink software (included with the unit), or by using menu driven user-interface and the four keys on its enclosure.

The four keys are:

^	Up Arrow
>	Right Arrow
ENT	Enter, and
CAN	Cancel.

#### Navigation

To configure the NexGen the user must navigate to the desired parameter (menu item) and then enter the required data. The menu tree is laid out in rows and columns. Navigation through the menus is accomplished as follows:

The ENT key is pressed to enter the menu tree.

The ^ and > keys move the user across a row to the right. At the end of a row, pressing one of these keys takes the user to the left most position of the same row.

ENT allows the user access to the selected menu. In most cases, this can be thought of as moving down through the menus. Pressing ENT from any row position will take the user down one level at the current row position. Additional ENTs will take the user further down the column. Most new levels offer new rows with more levels. The one exception to the rule that ENT goes down is when the menu item is EXIT. Pressing ENT at EXIT will take the user up one level of the menu tree.

CAN closes the current menu and takes the user up one level of the menu tree.

#### Data Entry

There are two forms of data entry: free form and selection from a list. Free form data is numbers and/or text that cannot be restricted to a few items that can be easily fit into a list. The scaling factor for the pulse output or an instrument ID number are examples of free form data. Upon reaching the desired data entry menu, entry of free form data is performed as follows:

Data is entered at the location of the cursor left most digit first. (e.g., if 1234 is to be entered, start with the one.)

Use the ^ key to increment the first digit/character. Continue incrementing the required digit/character is reached. (Letters and punctuation characters are available only when non-numeric characters are allowed in the selected field. Signs, decimal points, and exponent indicators are available for numeric fields.)

When the correct digit/character is displayed, press > to move the cursor to the next position to the right.

Repeat these two steps until all of the desired data has been entered.

**MAIN MENU**

---> (1) View Process Variables  
Sect. 9.2

---> 1. View Measurements  
Sect. 9.2

- > Mass Rate value (MRAT)
- Mass Total value (MTOT)
- Mass Total Forward value (MTOF)
- Mass Total Reverse value (MTOR)
- > Volume Rate value (VRAT)
- Volume Total value (VTOT)
- Volume Total Forward value (VTOF)
- Volume Total Reverse value (VTOR)
- > Spcl Vol Rate value (SVRA)
- Spcl Vol Total value (SVTO)
- Spcl Vol Total Forward value (SVTF)
- Spcl Vol Total Reverse value (SVTR)
- > Batch Size value (BSIZ)
- Batch Total value (BTOT)
- % Concentration value (CONC)
- Conc Rate value (CORA)
- > Conc Total value (COTO)
- Conc Total Forward value (COTF)
- Conc Total Reverse value (COTR)
- Water Cut (NOWC)
- > Net Oil Rate (NORA)
- Net Oil Total (NOTO)
- Net Oil Total Forward value (NOTF)
- Net Oil Total Reverse value (NOTR)
- > Net Water Rate (NWRA)
- Net Water Total (NWTO)
- Net Water Total Forward value (NWTF)
- Net Water Total Reverse value (NWTR)
- > Density value (DENS)
- Temperature value (TEMP)
- Frequency value (FREQ)
- Phase value (PHAS)

2. View Outputs  
Sect. 9.2

- > 1. View Analog 1
  - > Process Variable Name
  - Current Value
  - % Range Value
- > 2. View Analog 2
  - > Process Variable Name
  - > Current Value
  - > % Range Value
- > 3. View Pulse
  - > Process Variable Name
  - Current Value
  - Current Frequency
  - % Range Value
- > 4. View Analog 4
  - > Process Variable Name
  - Current Value
  - % Range Value
- > 5. Exit

MAIN MENU (continued)

---> (1) View Process Variables  
Sect. 9.2

---> 3. Well Test Data  
Sect. 9.2

---> Well# XX Testing  
Oil R:  
Oil A:  
Oil T:  
---> Well# XX Testing  
Water R:  
Water A:  
Water T:  
---> Well# XX Testing  
Water Cut:  
Net Flow:  
Well# XX Testing  
---> Temp:  
Dens:  
Elapsed

---> 4. Exit

---> 2. View Alarm Status  
Sect. 9.2

---> 1. View Status  
---> 2. View Error Log  
---> 3. Clear Error Log  
---> 4. Exit

---> 1. Well Number (1-30)  
---> 2. Purge Type  
---> 3. Purge Time/Dumps  
---> 4. Test Time  
---> 5. Enter to Continue

---> Well# XX Purging  
VRAT:  
Time/Dumps  
Remaining  
---> Well# XX Testing  
Oil R:  
Oil A:  
Oil T:  
---> Well# XX Testing  
Water R:  
Water A:  
Water T:  
---> Well# XX Testing  
Water Cut:  
NetFlow:  
---> Well# XX Testing  
Temp:  
Dens:  
Elapsed:

**MAIN MENU (continued)**

<p>---&gt; 4. Program <b>Sect. 9.3</b></p>	<p>---&gt; Enter Password [ ]</p>	<p>---&gt; 1. Calibration <b>Sect. 9.4</b></p>	<p>---&gt; 1. Zero menu (<b>Sect. 9.4.1</b>) 2. Temperature (<b>Sect. 9.4.2</b>) 3. Density (<b>Sect. 9.4.3</b>) 4. Mass (<b>Sect. 9.4.4</b>) 5. Analog Outputs (<b>Sect. 9.4.5</b>) 6. Exit</p>
		<p>---&gt; 2. Diagnostics <b>Sect. 9.5</b></p>	<p>---&gt; 1. Self Test (<b>Sect. 9.5.1</b>) ---&gt; 2. Alarm Test (<b>Sect. 9.5.2.</b>) ---&gt; Batch Relay Test (<b>Sect. 9.5.3</b>) ---&gt; 4. Analog Test (<b>Sect. 9.5.4</b>) ---&gt; 5. Pulse Test (<b>Sect. 9.5.5</b>) ---&gt; 6. Comm Test (<b>Sect. 9.5.6</b>) ---&gt; 7. Tube Drive Test (<b>Sect. 9.5.7</b>) ---&gt; 8. Buttons Test (<b>Sect. 9.5.8</b>) ---&gt; 9. LCD Test (<b>Sect. 9.5.9</b>) ---&gt; A. Exit</p>
		<p>---&gt; 3. Configuration <b>Sect. 9.6</b></p>	<p>---&gt; 1. Batch (<b>Sect. 9.6.1</b>) ---&gt; 2. Device Info (<b>Sect. 9.6.2</b>) ---&gt; 3. Alarms (<b>Sect. 9.6.3</b>) ---&gt; 4. Display (<b>Sect. 9.6.4</b>) ---&gt; 5. Xmit Variables (<b>Sect. 9.6.5</b>) ---&gt; 6. Outputs (<b>Sect. 9.6.6</b>) ---&gt; 7. Totalizers (<b>Sect. 9.6.7</b>) ---&gt; 8. Characterize Meter (<b>Sect. 9.6.8</b>) ---&gt; 9. Exit</p>
		<p>---&gt; 4. System <b>Sect. 9.7</b></p>	<p>---&gt; 1. Set Date (<b>Sect. 9.7.1</b>) ---&gt; 2. Set Time (<b>Sect. 9.7.2</b>) ---&gt; 3. Display Date/Time (<b>Sect. 9.7.3</b>) ---&gt; 4. Password (<b>Sect. 9.7.4</b>) ---&gt; 5. Dbase/File Mgmt (<b>Sect. 9.7.5</b>) ---&gt; 6. Exit</p>
		<p>---&gt; 5. Exit</p>	

## 9.2 Main Menu (Operational Mode)

The main menu is the normal operational mode of the NexGen transmitter. In the main menu, all process measurements, outputs, alarms and error log can be viewed. In addition the error log can be cleared. Access to the Program mode is also available through the use of a password. Using the MAIN MENU TREE enter MAIN MENU.

Menu or Display	Description
Default Display	The NexGen presents the default display after initialization at power up. The first three lines will display the process parameters selected by the user. The default parameters will be Mass Rate, Temperature, and Density. The fourth line prompts the menus enter keying and announces alarms. Pressing ENTER brings up the Main Menu. The word ALARM will be displayed when View Alarm Status (see below) list is not empty. ALARM will flash when a new alarm event is added to the View Status list until it is acknowledged by review
Main Menu	Allows the user to select between the Process Variables, View Alarm, and Program menus. Choices from the Main Menu are View Process Variable, View Alarm Status, Program and Exit.
Main Menu 1. View Process Variable	This menu allows the user to review the current value of the process variables, and/or the analog and pulse outputs. Choices from View Process Variable are View Measurements, View Outputs and Exit.
View Process Variable 1. View Measurements	This menu displays the current value of the process variables four at a time. Pressing ENTER, ^, or > will display the next four process variables.
View Process Variable 2. View Outputs	Allows the user to verify the current analog or pulse output value. Choices are View Analog X, View Pulse and Exit.
View Process Variables 3. Well Test Data	Displays the data obtained in the last well test performed
View Outputs 1. View Analog 1	Displays the process variable name and current value, the output current value, and the % of range for the analog output for the following: Mass Flow, Volume Flow, Density and Temperature.
View Outputs 2. View Analog 2	Displays the process variable name and current value, the output current value, and the % of range for the analog output for the following: Mass Flow, Volume Flow, Density and Temperature.
View Outputs 3. View Pulse Output	Displays the process variable name and current value, the output frequency, and the % of range for the analog output for the following: Mass Flow, Volume Flow, Density and Temperature. Displays the process variable name and current value, the pulses per unit of measure, and # of pulses sent for the following: Mass Total, Volume Total, Standard Volume Total, Concentration Total and Batch Total.
View Outputs 4. View Analog 4	Displays the process variable name and current value, the output current value, and the % of range for the analog output for the following: Mass Flow, Volume Flow, Density and Temperature.

<b>Menu or Display</b>	<b>Description</b>
Main Menu 2. View Alarm Status	This menu allows the user to review a list of parameters and diagnostics that are out of limits. The list is organized as last-in first-out. This will make the last event the first seen by the user. Events in this list will be removed from the list when they return to normal after they have been acknowledged.
View Alarm Status 1. View Status	List of the process variables that are currently in alarm. This list is empty when the Default Display does not have the 'ALARM' prompt displayed. Reviewing this list acknowledges any new alarms.
View Alarm Status 2. View Error Log	List of the internal errors that have occurred. This list is empty when the Default Display does not have the 'ALARM' prompt displayed. Reviewing this list acknowledges any new alarms.
View Alarm Status 3. Clear Error Log	Clears the View Error Log and sets counters to zero.



	<p>The third screen shows instant water cut (Water Cut) and average net flow rate (NetFlow) during the elapsed time of the test.</p> <p><b>Well# XX Testing</b> <b>Water Cut: XX.X</b> <b>NetFlow:XXXXXXXX</b></p> <p>The last screen shows instant temperature (Temp), density (Dens) and the elapsed time of the test (Elapsed).</p> <p><b>Well# XX Testing</b> <b>Temp:XX.X</b> <b>Dens:X.XXXX</b> <b>Elapsed: XX:XX:XX</b></p> <p>If the CANCEL key is pressed while running the test, NexGen will prompt if the user wants to stop the test. Pressing CANCEL will stop the test and the average net oil rate, net water rate and water cut as well as the net oil and the net water total will be saved in memory.</p> <p><b>Test in Progress</b> <b>Finished Testing?</b> <b>ENTER to Continue</b> <b>CANCEL to Exit</b></p>
--	--



## 9.4 Program Mode

The program mode for the NexGen transmitter provides access to the user based on the password level. A clear explanation of access to the program mode and the password levels is listed below.

Menu or Display	Description
Main Menu	<p>This menu gives the user the ability to view and program the NexGen based on his/her password 'level.' When ENTER is pressed 'ENTER PASSWORD' is displayed. The password is then entered with the ^ and &gt; keys in a manner similar to that used to enter free form data.</p> <p>The major difference when entering the password is that an asterisk is displayed by the NexGen instead of an incrementing digit or character. The password is a count of the number of times the ^ is pressed in a given location. So when the password is 22 the user would press ^, ^, &gt;, ^, ^, ENT. For 123 the user would press ^, &gt;, ^, ^, &gt;, ^, ^, ^, ENT. Zero is used to represent 10 ^s. So, if the password is 10 press: ^, &gt;, ^, ^, ^, ^, ^, ^, ^, ^, ^, ^, ENT.</p> <p>Entering the proper 'level' password allows access to configuration and programming features.</p> <p>The default passwords are:            11 for levels 0 and 1, and            22 for level 2.</p> <p>Level 0 and 1 passwords (11) only allow reviewing the configuration and programming data.</p> <p>Level 2 passwords (22) allow changing the user/application configuration and programming</p>

**CALIBRATION MENU**

---> Main Menu 4. Program	---> Enter Password [ ]	---> Program 1. Calibration			
---> 1. Calibration <b>Sect. 9.5</b>	---> 1. Zero <b>Sect. 9.5.1</b>	---> Electronics Zero	---> 1. Elec Zero Params	---> Electronics Zero ---> StdDev	
			---> 2. Zero Electronics	---> Zero: SDev: Enter to Calibrate	
			---> 3. Exit		
		---> 2. Transducer Zero	---> Transducer Zero		
		---> 3. System Zero	---> 1. Syst Zero Params	---> System Zero ---> StdDev	
			---> 2. Zero System	---> Zero: SDev: Enter to Calibrate	
			---> 3. Exit		
		---> 4. Exit			
		---> 2. Temperature <b>Sect. 9.5.2</b>	---> 1. Temp Calib Param	---> RTD Offset	
			---> 2. Calibrate Temp	---> Temp: RTDRes: Enter to Calibrate	---> Actual Temperature
			---> 3. Exit		
		---> 3. Density <b>Sect. 9.5.3</b>	---> 1. Density Params	---> C1 ---> C2 ---> Air Frequency ---> Air Temperature	
			---> 2. Calibrate Density	---> Dens: Enter to Calibrate	---> Air Frequency ---> Air Temperature ---> Actual Density
			---> 3. Exit		
		---> 4. Mass <b>Sect. 9.5.4</b>	---> 1. Mass Params	---> Mass Scalar	
			---> 2. Dump Calib Mass	---> Scalar: Enter to Calibrate	---> MTOT: MRAT: Flow must=0 to start
	---> 3. Batch Calib Mass		---> Scalar: Enter to Calibrate	---> Batch Cutoff Qty ---> Trickle Offset Pt ---> MTOT: MRAT: Press START to begin	
	---> 4. Exit				

...continued on next page

**CALIBRATION MENU (continued)**

---> Main Menu 4. Program	---> Enter Password [        ]	---> Program 1. Calibration		
---> 1. Calibration <b>Sect. 9.5</b>	---> 5. Analog Outputs <b>Sect. 9.5.5</b>	---> 1. Analog 1	---> 1. Analog 1 Params	---> Gain ---> Offset
			---> 2. Calibrate Analog 1	---> Actual Current 4mA ---> Actual Current 19mA
			---> 3. Exit	
		---> 2. Analog 2	---> 1. Analog 2 Params	---> Gain ---> Offset
			---> 2. Calibrate Analog 2	---> Actual Current 4mA ---> Actual Current 19mA
			---> 3. Exit	
		---> 3. Analog 4	---> 1. Analog 4 Params	---> Gain ---> Offset
			---> f2. Calibrate Analog 4	---> Actual Current 4mA ---> Actual Current 19mA
			---> 3. Exit	
	---> 6. Exit	---> 4. Exit		

## 9.5 Calibration Menu

The calibration menu provides menus for calibration of the following:

- zeroing the flow meter
- temperature
- density
- mass
- analog outputs

The pulse output only requires configuration. For pulse output configuration see Section 9.6.6.

### 9.5.1. Zero Calibration

**NOTE: Correctly zeroing the mass flow meter is critical for accurate mass flow measurement.**

The NexGen transmitter allows the user to review and modify the electronic zero, transducer zero and the system zero.

**Automatic Zero Procedure - See Section 7.4.**

#### Manual Zero Procedure

To complete a Manual Zero, use the following menu and description chart to perform the following:

- Set the SYSTEM ZERO to “0” DEG
- EXIT out to the MAIN MENU
- From the MAIN MEASUREMENT DISPLAY, press ENTER until PHAS DEG is displayed on the LCD
- Under no flow conditions record the maximum PHAS DEG value
- Enter the recorded value into the SYSTEM ZERO

The procedure for zeroing the flow meter is as follows:

Menu or Display	Description
Program 2. Zero	This menu allow the user to review and modify the Electronic, Transducer and System zeroes. Choices from this menu are Electronics Zero, Transducer Zero , System Zero, and Exit. The Transducer zero is the phase measurement offset of the transducer when there is on flow. The transducer zero cannot be measured directly and is defined as the difference between the System zero and the Electronic zero.
Zero 1. Electronic Zero	This menu allows the user to review and modify the Electronic zero of the NexGen. The electronic zero is the zero offset contribution due to the electronics and is determined by zeroing the electronics with the sensor inputs shorted together. Choices from this menu are Elec. Zero Params, Zero Electronics, and Exit.

Menu or Display	Description
Electronic Zero 1. Elec. Zero Params	<p>Displays the current electronic zero and the standard deviation for the last automatic zero. With the correct access (level 2) the user can modify the displayed ZERO value with the ^ and &gt; keys.</p> <p>Electronics Zero [ SX.XXXeSXX] DEG</p> <p>Pressing ENTER will display the standard deviation (StdDev) of the last automatic zero. The StdDev cannot be modified by the user.</p> <p>StdDev [ SX.XXXeSXX] DEG</p>
Electronic Zero 2. Zero Electronics	<p>Displays the current zero and the standard deviation for the zero.</p> <p>ZERO: SX.XXXeSXX DEG SDEV: X.XXXeSXX DEG ENTER to Calibrate CANCEL to Exit</p> <p>Choices from this menu are ENTER to re-zero and CANCEL to exit. While the Zero is performed the display will read:</p> <p>Zeroing</p> <p>When Zeroing is complete the new zero and the standard deviation is displayed:</p> <p>ZERO: SX.XXXeSXX DEG SDEV: X.XXXeSXX DEG CANCEL to Exit</p> <p>Press CANCEL to Exit and remove any jumper at the input of the NexGen</p>
Zero 2. Transducer Zero	<p>Displays the current transducer zero. The transducer zero is the zero offset contribution of the transducer and installation. The transducer zero is determined by subtracting the electronic zero from the system zero. Press ENTER to review and/or modify the transducer zero.</p>
Transducer Zero	<p>With the correct access (level 2) the user can modify the displayed ZERO value with the ^ and &gt; keys.</p> <p>Transducer Zero [SX.XXXeSXX] DEG</p>
Zero 3. System Zero	<p>This menu allows the user to review and modify the System zero of the NexGen.</p> <p>The System zero is the combined zero offset of the electronics, transducer and the installation when there is no flow.</p> <p>Choices from this menu are Syst Zero Params, Zero System, and Exit.</p>
System Zero 1. Syst Zero Params	<p>Displays the current system zero and the standard deviation for the last automatic zero. Neither value can be modified from this menu</p> <p>System Zero [ SX.XXXeSXX] DEG</p> <p>Pressing ENTER will display the standard deviation (StdDev) of the last automatic zero. The StdDev cannot be modified by the user.</p> <p>StdDev [ SX.XXXeSXX] DEG</p>

Menu or Display	Description
<p>System Zero 2. Zero System</p>	<p>Displays the current system zero and the standard deviation for the zero.                      ZERO: SX.XXXeSXX DEG                      SDEV: X.XXXeSXX DEG                      ENTER to Calibrate                      CANCEL to Exit</p> <p>Choices from this menu are ENTER to re-zero and CANCEL to exit.                      While the Zero is performed the display will read:                      Zeroing                      When Zeroing is complete the new zero and the standard deviation is displayed:                      ZERO: SX.XXXeSXX DEG                      SDEV: X.XXXeSXX DEG                      CANCEL to Exit                      Press CANCEL to Exit</p>

### 9.5.2 Temperature Calibration

The NexGen transmitter temperature measurement is factory calibrated.

**NOTE: The temperature calibration if changed will affect the density measurement. After re-calibrating the temperature, the density measurement will require calibration.**

To calibrate the temperature measurement, use the following menu and description chart to perform the following:

1. Enter Calibrate Temperature.
2. Press Enter until the temperature measured is displayed.
3. If incorrect, insert the correct temperature and press ENTER.

If the temperature is re-calibrated the temperature calibration factor (RTD offset) will change. Record the new values on the calibration sheet.

To view or re-enter these values 1) Enter Temp Calib Params, 2) Press enter until the RefRes constants are displayed, 3) View or Enter the RefRes values.

Using the CALIBRATION MENU TREE enter Temperature Calibration.

The procedures for calibrating the temperature measurement is as follows:

Menu or Display	Description
Calibrate Temp  1. Temp Calib Params	Allows for the manual entry of predetermined temperature calibration factors. Pressing enter brings: RTDOffset [ 0.0000] OHMS
Calibrate Temp 2. Calibrate Temp	Automatic determination of the temperature calibration factors is performed from this menu. Temp: XX.XXX DEG C RTDRes: XXX.XX OHMS ENTER to Calibrate Reference Resistor Pressing ENTER brings: Stabilizing  Actual Temperature [ xx.xx] DEG X  Enter the correct temperature. Temp: XX.XXX DEG X RTDRes: XXX.XX OHMS ENTER to repeat Reference Resistor

### 9.5.3 Density Calibration

**NOTE: The density calibration is dependent on accurate temperature measurement. Prior to re-calibrating the density, the temperature calibration should be verified. See Section 9.5.2 for the temperature calibration procedure.**

The NexGen transmitter density calibration is factory calibrated. To calibrate the density measurement, use the following menu and description chart to perform the following:

1. Enter Calibrate Density.
2. Press Enter until the measured density is displayed.
3. If not correct, press ENTER, and enter a) tube in air frequency, b) tube temperature, c) actual density of the fluid inside the tubes.

If the density is re-calibrated, the density calibration constants C1 and C2 will change. Record the new values on the calibration sheet.

To view or re-enter these values, perform the following:

1. Enter Density Params
2. Press enter until the C1 and C2 constants are displayed
3. View or Enter the C1 and C2 values.

Using the CALIBRATION MENU TREE enter DENSITY MENU. The procedure for calibrating the density measurement is as follows:

Menu or Display	Description
Calibration 4. Density	
Calibrate Density 1. Density Params	From this menu the operator can view and modify the density calibration factors C1 and C2. Pressing ENTER displays the C1 Factor: C1 [_X.XXXXX]  C2 [_X.XXXXX]  Air Frequency [_XX.XXXX] HZ  Air Temperature [_XX.XXXX] DEG C



Menu or Display	Description
Calibrate Density 2. Calibrate Density	<p>Allows the operator to re-calculate the density factors C1 and C2.</p> <p>Pressing ENTER            Displays the current density:            DENS: X.XXXX           g/cc</p> <p>ENTER to Calibrate            CANCEL to Exit            Pressing ENTER brings up:            Air Frequency            [_XX.XXXX]       HZ</p> <p>Pressing ENTER to accept the Air Frequency when correct.            Air Temperature            [_XX.XXXX]       DEG C</p> <p>Press Enter to accept the Air Temperature when correct.            Actual Density            [_X.XXXXX]       g/cc</p> <p>Press ENTER to accept the Actual Density when correct.            DENS: X.XXXX           g/cc            ENTER to Calibrate            CANCEL to Exit</p>

### 9.5.4 Mass Calibration

**NOTE: The mass calibration is dependent on accurate temperature measurement. Prior to re-calibrating the mass, the temperature measurement calibration should be verified. See Section 9.5.2 for the temperature calibration procedure.**

The NexGen transmitter mass calibration is factory calibrated and traceable to NIST standards. To calibrate the mass measurement use the following menu and description chart to perform the following:

- Enter Calibrate Mass
- Select Dump (manual batching) or Batch (automatic batching) calibration
- Tare an empty drum or tank.
- Open the downstream valve (Dump Mode) or Press the Remote Start (Batch Mode) and run product fluid into the container for a minimum of 1 minute
- Weigh the drum or tank and compare the reading to that of the NexGen transmitter LCD
- Enter the correct mass from the scale into the transmitter

If the mass is re-calibrated, then the mass calibration scaler will change. Record the new values on the calibration sheet.

To view or re-enter these values perform the following steps:

1. Enter Mass Calib Params.
2. Press enter until the Scaler constant is displayed.
3. View or Enter the Scale values.

Using the CALIBRATION MENU TREE enter MASS MENU. The procedure for calibrating the mass measurement is as follows:

Menu or Display	Description
Calibrate 5. Mass	From this menu the user can change the mass calibration factor (scaler) either manually or automatically. An automatic calibration may be done using external (dump mode) or internal (batch) flow control. Choices from this menu are Mass Params, Dump Calib Mass, Batch Calib Mass, and Exit.
Calibrate Mass 1. Mass Params	From the Mass Params menu the scaler can be modified directly. This method of calibration when entering the calibration factor of a new transducer or when it is desired to adjust the scaler by some percentage. Mass Scaler [_X.XXXXX]

Menu or Display	Description
Calibrate Mass 2. Dump Calib Mass	<p>The dump calibration mode is used when the NexGen is not going to control the process flow with its batch control outputs. Pressing ENTER will display the current scaler:</p> <p>Scaler: XX.XXXeSXX            ENTER to Calibrate            CANCEL to Exit</p> <p>Pressing ENTER brings up:            MTOT: 0.000 UUU            MRAT: 0.000 UUUU</p> <p>Start the flow of liquid through the transducer, and stop the flow when the desired test quantity is delivered. When the NexGen detects that the flow has stopped the user enters the correct value for the mass delivered.</p> <p>Actual Mass            [_ 0.0000] UUUU</p> <p>Next the entered mass value is displayed for approval.            Actual Mass            [ XXXXXX.XX] UUUU</p> <p>Finally press ENTER, new Scaler is displayed            Scaler:X.XXXeSXX</p> <p>ENTER to Calibrate            CANCEL to Exit</p>
Calibrate Mass 3. Batch Calib Mass	<p>The batch calibration mode is used when the NexGen's batching outputs are to be used to control the flow of the process flow.</p> <p>Pressing Enter displays:            &lt;Batch Calibration&gt; Scaler: X.XXXXXX</p> <p>ENTER to Calibrate            CANCEL to Exit</p> <p>Pressing ENTER Brings up.            Batch Cutoff Amt            [ X.XXXXXX] UUU</p> <p>Use the ^ and &gt; keys to enter the qty required for the calibration. Pressing ENTER twice brings up.            Trickle Offset Pt            [ X.XXXXXX] UUU</p> <p>Use the ^ and &gt; keys to enter the qty to flow between the closure of the trickle relay and the final batch cutoff. Pressing ENTER twice brings up.            MTOT: 0.000 UUU            MRAT: 0.000 UUU</p> <p>Press START to begin            Press STOP to stop</p> <p>By pressing CANCEL the batch calibration will be aborted            MTOT: XXX.XXXX UUU            MRAT: XXX.XXXX UUU            CALIBRATION ABORTED ENTER to Continued</p>

### 9.5.5 Analog Output Calibration

**NOTE: None of the analog outputs will function until they are programmed.**

Using the CALIBRATION MENU TREE enter ANALOG OUTPUT MENU

The procedure for the programming of the analog outputs is as follows:

Menu or Display	Description
Calibration 6. Analog Outputs	From this menu the calibration factors for the analog (4-20 mA) outputs can be viewed and modified. Choices from this menu: Analog 1, Analog 2, Analog 4, & Exit.
Analog Outputs 1. Analog 1	Choices from this menu are Analog 1 Params, Calibrate Analog 1, and Exit.
Calibrate Analog 1 1. Analog 1 Params	From the Analog 1 Params menus the user can view and manually change (with level 2 access) analog 1's calibration factors. Pressing ENTER displays the Gain factor Gain [ _X.XXXeSXX] Offset [ _X.XXXeSXX] Press CANCEL to Exit when complete.
Calibrate Analog 1. Calibrate 1 Analog	From this menu the NexGen will re-determine the calibration factors with the assistance of the user. The user is required to measure and enter the output current when directed. Pressing Enter will bring up: Cal Current 1 = 4.000 mA Enter current measured at Analog Output 1 [ _X.XXX] mA  Cal Current 2 = 19.000 mA Enter current measured at Analog Output 1 [ _XX.XXX] mA  Gain [ _X.XXXeSXX] Offset [ _X.XXXeSXX]
Analog Outputs 2. Analog 2	See Analog Outputs 1. Analog 1 above.
Calibrate Analog 2 1. Analog 2 Params	See Calibrate Analog 1 1. Analog 1 Params above.
Calibrate Analog 2 2. Calibrate Analog 1	See Calibrate Analog 1 1. Calibrate Analog 1 above
Analog Outputs 3. Analog 4	See Analog Outputs 1. Analog 1 above.
Calibrate Analog 4 1. Analog 4 Params	See Calibrate Analog 1 1. Analog 1 Params above.
Calibrate Analog 4 2. Calibrate Analog 1	See Calibrate Analog 1 1. Calibrate Analog 1 above
Calibration 7. Exit	

## DIAGNOSTICS MENU

---> Main Menu	--->Enter Password	---> Program	
4. Program	[       ]	<b>2. Diagnostics</b>	
2. Diagnostics	---> 1. Self Test	---> Task List <ok>	
<b>Sect. 9.6</b>	<b>Sect. 9.6.1</b>		
	---> 2. Alarm Test	---> 1. Alarm 1 Test	
	<b>Sect. 9.6.2</b>	---> 2. Alarm 2 Test	
		---> 3. Exit	
	---> 3. Batch Relay Test	---> 1. Batch 1 HF	
	<b>Sect. 9.6.3</b>	---> 2. Batch 2 LF	
		---> 3. Exit	
	---> 4. Analog Test	---> 1. Analog 1 Test	---> Output Current
	<b>Sect. 9.6.4</b>	---> 2. Analog 2 Test	---> Output Current
		---> 3. Analog 4 Test	---> Output Current
		---> 4. Exit	
	---> 5. Pulse Test	---> Output Frequency	
	<b>Sect. 9.6.5</b>	---> Output Number of Pulses	
	---> 6. Comm Test	---> Displays & Echoes	
	<b>Sect. 9.6.6</b>	Data Recv on Comm	
	---> 7. Tube Drive Test	---> Current:	
	<b>Sect. 9.6.7</b>	Sensor A:	
		Sensor B:	
		Drift Eff:	
	---> 8. Buttons Test	---> Press Any Button	
	<b>Sect. 9.6.8</b>		
	---> 9. LCD Test	---> Press Enter Key to	
	<b>Sect. 9.6.9</b>	Toggle Pixels On/Off	
	---> A. Exit		

## 9.6 Diagnostic Menu

### 9.6.1 Self Test

Using the DIAGNOSTIC MENU TREE enter the self test function.

The diagnostic menu provides test menus for the following:

1. Self Test
2. Alarm Test
3. Batch Relay Test
4. Analog Test
5. Pulse Test
6. RS485 Test
7. Tube Drive Test
8. Buttons Test
9. LCD Test

The following chart highlights the self test feature.

Menu or Display	Description
Program 2. Diagnostics	From this menu the user can perform a series of tests on various internal software and hardware items. Choices from this point are: Self Test, Alarm Test, Batch Relay Test, Analog Test, Pulse Test, Comm Test, Tube Drive Test, Button Test, LCD Test, and Exit.
Diagnostics 1. Self Test	The self test diagnostic reports the status of various software subsystems in the NexGen. Pressing ENTER brings up: KPIF <EMBEDDED> QUAD <EMBEDDED> DSP <EMBEDDED> MENU <EMBEDDED> ENTER again brings RTD <EMBEDDED> BELV <EMBEDDED> MOD <EMBEDDED> RAPH <EMBEDDED> ENTER again brings SCHL <EMBEDDED> STAT <EMBEDDED> 420 <EMBEDDED> DISPLAYTXT <EMBEDDED> ENTER again brings LIBRARY <EMBEDDED>  All items should be 'EMBEDDED'.

## 9.6.2 Alarm Test

Using the DIAGNOSTIC MENU TREE enter the Alarm Test.

The following chart highlights the Alarm Test feature.

Menu or Display	Description
Diagnostics 2. Alarm Test	The alarm test can be used to force the alarm outputs open and closed one at a time in order to test external wiring. Choices from this menu are: Alarm Test 1, Alarm Test 2, and Exit.
Alarm Test 1. Alarm 1 Test	Pressing Enter will close the output and bring up this display. Alarm Output 1 Test Output is CLOSED CANCEL to Exit Pressing ^ will change the state of the output and the display. Alarm Output 1 Test Output is OPEN CANCEL to Exit The output and display will change each time the ^ key is pressed.
Alarm Test 2. Alarm 2 Test	See Alarm Test 1. Alarm 1 Test above.

**9.6.3 Batch Relay Test**

Using the DIAGNOSTIC MENU TREE enter the Batch Relay Test.

The following chart highlights the Batch Relay Test.

<b>Menu or Display</b>	<b>Description</b>
Diagnostics 3. Batch Relay Test	The batch relay test can be used to force the batch relay outputs open and closed one at a time in order to test external wiring. Choices from this menu are: Batch 1 HF Test, Batch 2 LF Test , and Exit.
Batch Relay Test 1. Batch 1 HF Test	Pressing Enter will close the output and bring up this display. HF Batch Relay1 Test Output is CLOSED CANCEL to Exit Pressing ENTER will change the state of the output and the display. HF Batch Relay1 Test Output is OPEN CANCEL to Exit The output and display will change each time the ENTER key is pressed.
Batch Relay Test 2. Batch 2 LF Test	See Batch Relay Test 1. Batch 1 HF Test above



### 9.6.4 Analog Test

Using the DIAGNOSTIC MENU TREE enter the Analog Test.

The following chart highlights the Analog Test.

Menu or Display	Description
Diagnostics 4. Analog Test	The analog output tests may be used to provide a test current for testing equipment and wiring of 4-20 mA current loops. Choices from this menu are Analog 1 Test, Analog 2 Test, Analog 4 Test, and Test.
Analog Test 1. Analog 1 Test	From this menu the user sets the magnitude of the output current. The value of the current may be changed as often as necessary. Output Current [ _ XX.XXX] mA  When ENTER is pressed the magnitude of the output current will be displayed Output Current [ _ XX.XXX] mA  Output is [XX.XXX] mA
Analog Test 2. Analog 2 Test	See Analog Test 1. Analog 1 Test above.
Analog Test 3. Analog 4 Test	See Analog Test 1. Analog 1 Test above.

### 9.6.5 Pulse Test

Using the DIAGNOSTIC MENU TREE enter the Pulse Test.

The following chart highlights the Pulse Test.

Menu or Display	Description
Diagnostics 5. Pulse Test	The pulse output test is provides pulses to enable the user to test external wiring and hardware.
Pulse Test	<p>Pressing ENTER brings the following display: Output Frequency [ _ XX.XX]Hz</p> <p>Enter the desired output frequency (between 0 and 10,000 Hz) with the ^ and &gt; keys. Press ENTER twice to confirm.</p> <p>Output Num Pulses [ _ XXXXXX]</p> <p>Enter the number of pulses that the NexGen is to send (between 0 and 65000) with the ^ and &gt; keys. When 0 is entered, pulses will be transmitted continuously until the CANCEL key is pressed. Press ENTER twice to confirm.</p> <p>Generating Pulses FREQ: XXX.XXXX HZ PULS: XXXXXX CANCEL to Exit</p>

### 9.6.6 RS485 Communication Test

The RS485 Communication Test allows the user to test the external wiring, configuration and hardware of the serial communications ports. In this test the NexGen transmitter will echo all correct serial data received during the test.

Using the DIAGNOSTIC MENU TREE enter the RS485 Communication Test.

The following chart highlights the RS485 Communication Test.

Menu or Display	Description
Diagnostics 6. Comm Test	The comm (communication) test allows the user to test the external wiring, configuration, and hardware of the serial communications ports. In this mode the NexGen will echo and display all correct serial data received during the test.

### 9.6.7 Tube Drive Test

The tube drive test calculates the drive efficiency of the transducer and process.

Using the DIAGNOSTIC MENU TREE enter the Tube Drive Test.

The following chart highlights the Tube Drive Test.

Menu or Display	Description
Diagnostics 7. Tube Drive Test	The tube drive test calculates the drive efficiency of the transducer and process. Drive efficiency is defined as the ratio of sensor voltage to drive current. Pressing ENTER will display the following data: Current: XXX.X mA Sensor A: XXX.XX mV Sensor B: XXX.XX mV DRVEFF: XX.XXX

### 9.6.8 Buttons Test

The buttons test allows the user to confirm the operation of the NexGen keys and the remote Start/Stop inputs.

Using the DIAGNOSTIC MENU TREE enter the Buttons Test.

The following chart highlights the Buttons Test.

Menu or Display	Description
Diagnostics 8. Button Test	<p>The button test allows the user to confirm the operation of the NEXGEN's keys as well as the remote START/STOP inputs. Press to start the test and the following will be displayed.                      Press any Button</p> <p>When a button or input is activated one at a time a message the indicated message will appear.                      When ^ is pressed the following message will be displayed                      Press any Button                      UP</p> <p>When &gt; is pressed the display will change to:                      Press any Button                      RIGHT</p> <p>When ENTER is pressed the display will change to:                      Press any Button                      ENTER</p> <p>When the Batch Start input is activated:                      Press any Button                      Batch Start</p> <p>When the Batch Stop input is activated:                      Press any Button                      Batch Stop</p> <p>When the Zero button is pressed, the display will change to:                      Press any Button                      Zero</p> <p>When CANCEL is pressed the display will change to:                      Press any Button                      CANCEL</p> <p>CANCEL to Exit                      To exit the Button Test press CANCEL from the above menu.</p>

**9.6.9 LCD Test**

Using the DIAGNOSTIC MENU TREE enter the LCD Test.

The following chart highlights the LCD Test.

Menu or Display	Description
Diagnostics 9. LCD TEST	<p>Allows the user to test the display by alternately setting all pixel dark and light and displaying upper case letters. Press ENTER to start.</p> <p>Press ENTER Key to                      Toggle Pixels ON/OFF                      ENTER to Continue                      Cancel to Exit</p> <p>Pressing ENTER will turn on all pixels in the display.</p> <p>Pressing ENTER again will turn off all pixels in the display.</p> <p>Continuing to press ENTER will toggle the pixels between off and on.                      Pressing CANCEL will fill the display with all the upper case letters from A to Z one letter at a time. Each letter will be displayed for about 3/4 a second.</p> <p>AAAAAAAAAAAAAAAAAAAAA                      AAAAAAAAAAAAAAAAAAAAAA                      AAAAAAAAAAAAAAAAAAAAAA                      AAAAAAAAAAAAAAAAAAAAAA                      AAAAAAAAAAAAAAAAAAAAAA</p> <p>Pressing CANCEL will stop will stop the test.</p>

**CONFIGURATION MENU**

---> Main Menu 4. Program	---> Enter Password [            ]	---> Program 3. Configuration
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---> 3. Configuration <b>Sect. 9.7</b>	---> 1. Batch <b>Sect. 9.7.1</b>	<ul style="list-style-type: none"> <li>---&gt; Parameter</li> <li>---&gt; Unit</li> <li>---&gt; Batch Cutoff Qty</li> <li>---&gt; Trickle Offset Pt</li> <li>---&gt; Low Alarm Offset</li> <li>---&gt; Hi Alarm Offset</li> <li>---&gt; System Response Time</li> <li>---&gt; Auto Restart Delay</li> <li>---&gt; Runmode Edit?</li> <li>---&gt; Batch Jog?</li> </ul>
	---> 2. Device Info <b>Sect. 9.7.2</b>	<ul style="list-style-type: none"> <li>---&gt; 1. Misc Device Info                             <ul style="list-style-type: none"> <li>---&gt; Tag</li> <li>---&gt; Descriptor</li> <li>---&gt; Message</li> <li>---&gt; Date</li> <li>---&gt; Device ID</li> </ul> </li> <li>---&gt; 2. Configuration Menu                             <ul style="list-style-type: none"> <li>---&gt; Trans Model Num</li> <li>---&gt; Trans Serial Num</li> <li>---&gt; Elec Model Num</li> <li>---&gt; Elec Serial Num</li> <li>---&gt; Final Assy Num</li> <li>---&gt; Wetted Materials</li> <li>---&gt; Connection Size</li> <li>---&gt; Connection Rating</li> <li>---&gt; Electrical Class</li> </ul> </li> <li>---&gt; 3. Revisions Number                             <ul style="list-style-type: none"> <li>---&gt; Boot Rev</li> <li>---&gt; OS Rev</li> <li>---&gt; App Rev</li> <li>---&gt; Elec Rev</li> <li>---&gt; Hart Rev</li> </ul> </li> <li>---&gt; 4. Exit</li> </ul>
	---> 3. Alarms <b>Sect. 9.7.3</b>	<ul style="list-style-type: none"> <li>---&gt; 1. Alarm 1                             <ul style="list-style-type: none"> <li>---&gt; Alarm</li> <li>---&gt; Alarm Type</li> <li>---&gt; Low Alarm SetPnt</li> <li>---&gt; Hi Alarm SetPnt</li> </ul> </li> <li>---&gt; 2. Alarm 2                             <ul style="list-style-type: none"> <li>---&gt; Alarm</li> <li>---&gt; Alarm Type</li> <li>---&gt; Low Alarm SetPnt</li> <li>---&gt; Hi Alarm SetPnt</li> </ul> </li> <li>---&gt; 3. Startup Delay</li> <li>---&gt; 4. Exit</li> </ul>

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**CONFIGURATION MENU - continued**

---> Main Menu 4. Program	---> Enter Password [                    ]	---> Program 3. Configuration			
---> 3. Configuration <b>Sect. 9.7</b>	---> 4. Display <b>Sect. 9.7.4</b>	---> Line 1 ---> Line 2 ---> Line 3			
	---> 5. Xmit Variables <b>Sect. 9.7.5</b>	---> 1. Flow Variables	---> 1. Mass Flow	---> Unit ---> Fallback ---> Low Alarm Setpnt ---> Hi Alarm Setpnt ---> Hi Alarm Setpnt ---> LF Cutoff ---> Noise Damp Factor ---> Rate Damp Factor ---> Damp Thrshld 1-100	
			---> 2. Volume Flow	---> Unit ---> Fallback ---> Low Alarm Setpnt ---> Hi Alarm Setpnt ---> LF Cutoff ---> Noise Damp Factor ---> Rate Damp Factor ---> Damp Thrshld 1-100	
			---> 3. Standard Vol Flow	---> Unit ---> Fallback ---> Low Alarm Setpnt ---> Hi Alarm Setpnt ---> LF Cutoff ---> Std Density Unit	
			---> 4. Concen Flow	---> Unit ---> Fallback ---> Low Alarm Setpnt ---> Hi Alarm Setpnt ---> LF Cutoff	
			---> 5. Net Oil Flow	---> Net Mass or Volume ---> Use Data from Well ---> Net Oil Parameter ---> Unit ---> Fallback ---> Low Alarm Setpnt ---> Hi Alarm Setpnt ---> LF Cutoff ---> Shrinkage Factor	
			---> 6. Special Mass	---> Base Rate ---> Flow Factor ---> Flow Text	

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**CONFIGURATION MENU - continued**

---> Main Menu 4. Program	---> Enter Password [ ]	---> Program 3. Configuration			
---> 3. Configuration <b>Sect. 9.7</b>	---> 5. Xmit Variables <b>Sect. 9.7.4</b>	---> 1. Flow Variables	---> 6. Special Mass	---> Totalizer Factor ---> Totalizer Text	
			---> 7. Special Volume	---> Base Rate ---> Flow Factor ---> Flow Text ---> Totalizer Factor ---> Totalizer Text	
	---> 5. Xmit Variables <b>Sect. 9.7.5</b>	---> 1. Flow Variables	---> 8. Flow Direction		
			---> 9. Exit		
		---> 2. Temperature	---> Unit		
			---> Fallback		
			---> Low Alarm Setpnt		
			---> Hi Alarm Setpnt		
		---> 3. Density	---> Unit		
			---> Fallback		
---> Low Alarm Setpnt					
---> Hi Alarm Setpnt					
---> Slug Low Limit					
---> Slug Hi Limit					
---> 4. Concent./Solids	---> Slug Delay Time				
	---> Damp Factor				
	---> Unit				
	---> Fallback				
	---> Low Alarm Setpnt				
---> 5. Well Data	---> Hi Alarm Setpnt				
	---> Clear Entire Table				
	---> Ref Temperature 1..5				
	---> Measured Density 1..14				
	---> Concert./Solids 1..14				
---> 6. Exit	---> Unit				
	---> Std Temperature				
---> (4.3.6) Outputs <b>Sect. 9.7.6</b>	---> Clear Well Data				
	---> Well Number (1-30)				
	---> Oil Density ?				
	---> Water Density ?				
	---> 1. Analog	---> Parameter			
	---> Lower Range				
	---> Upper Range				
	---> Cutoff				
	---> Min. Span				

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**CONFIGURATION MENU - continued**

---> Main Menu 4. Program	---> Enter Password [        ]	---> Program 3. Configuration			
---> 3. Configuration <b>Sect. 9.7</b>	---> 6. Outputs <b>Sect. 9.7.6</b>	---> 2. Analog	---> Parameter		
			---> Lower Range		
			---> Upper Range		
			---> Cutoff		
			---> Min. Span		
			---> 3. Pulse	---> Parameter	
				---> Lower Range	
				---> Upper Range	
				---> Min. Span	
				---> Max Output Freq.	
			---> 4. Analog 4	---> Parameter	
				---> Lower Range	
				---> Upper Range	
				---> Cutoff	
				---> Min. Span	
	---> 5. Comm Port	---> Baud			
		---> Parity			
		---> Data bits			
		---> Stop bits			
		---> Protocol			
		---> Address (1-247)			
		---> Transmission Mode			
	---> 6. Option Card	---> Hart menu			
		---> Poll Address			
	---> 7. Exit				
	(3.3.7) Totalizers <b>Sect. 9.7.7</b>	---> Reset Totalizer			
	(3.3.8) Characterize Me <b>Sect. 9.7.8</b>	---> 1. Sensor	---> 1. Sensor Err Delay	---> Sensor Error Delay	
		---> 2. Calibrate Sensor	---> Sensor A:		
			---> SensorB:		
			---> Sensor Set Point		
			---> Gain Control		
		---> 3. Exit			
	---> 2. Zero	---> 1. Electronics Zero	---> Electronics Zero		
			---> StdDev		
		---> 2. Transducer Zero	---> Transducer Zero		
		---> 3. System Zero	---> System Zero		
			---> Std Dev		
		---> 4. Exit			

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**CONFIGURATION MENU - continued**

---> Main Menu 4. Program	---> Enter Password { }	---> Program 3. Configuration		
---> 3. Configuration <b>Sect. 9.7</b>	---> 8. Characterize Meter <b>Sect. 9.7.8</b>	---> 3. Temp Calib Param	---> RTD Offset	
		---> 4. Density Params	---> C1	
			---> C2	
			---> Air Frequency	
			---> Air Temperature	
		---> 5. Mass Params	---> Mass Scalar	
		---> 6. Analog Outputs	---> 1. Analog 1	---> Gain
				---> Offset
			---> 2. Analog 2	---> Gain edit
				---> Offset edit
			---> 3. Analog 4	---> Gain edit
				---> Offset edit
		---> 7. Exit	---> 4. Exit	
	9. Exit			

## 9.7 Configuration Menu

The configuration menu provides menus for the configuration of the following:

- Batch Setup
- Device Information
- Alarm Setup
- Display Setup
- Transmitter Variables
- Pulse / 4-20mA / RS485
- Totalizer Reset
- Characterize Menu

### 9.7.1 Batch Setup Configuration

The NexGen transmitter has the option of a two stage batch controller with remote start stop feature. In this menu the batch control is configured.

Using the CONFIGURATION MENU TREE enter Batch Setup Menu.

The following chart highlights the Batch Setup Menu.

Menu or Display	Description
Program 3. Configuration	

Menu or Display	Description
<p>Configuration 1. Batch</p>	<p>The Configuration Batch menu allows the user to setup the NexGen to batch. From here the user can select: the measurement used for batching, the units of the parameter, the Batch Cutoff Amt, the Trickle Offset Pt, High and low alarm setpoints, System response time, an Auto Restart Delay time, Run Mode Edit mode, and Batch Jog mode. Pressing ENTER bring up the Parameter selection display. Selection are made by using the ^ and &gt; keys to scroll through the choices: MASS TOTAL, VOLUME TOTAL, STD VOL TOTAL, and CONC. TOTAL.</p> <p>Parameter [MASS TOTAL     ]</p> <p>When the desired parameter is displayed press ENTER to confirm and move on. The following display indicates the engineering units of the selected parameter. Units are selected in the CONFIG/XMITTERVAR/FLOW VAR menu</p> <p>Units [UUU     ]</p> <p>Press ENTER to set the Batch Cutoff Amt (batch size). If all batches are to be the same size ENTER the desired amount here. If batches will be different sizes enable Run Mode Edit below. Use the ^ and &gt; keys to set the desired value.</p> <p>Batch Cutoff Amt [ XXXX.XX] UUU</p> <p>When two stage batching is desired the next menu is used to set the first stage cutoff point. The Trickle Offset is the difference between Batch Cutoff Amt and the first stage cutoff point. This value is determined by the dynamics of the pumps, valves, and the piping and should be the same regardless of the Batch Cutoff Amt. Use the ^ and &gt; keys to set the desired value.</p> <p>Trickle Offset Pt [ XXXX.XX] UUU</p> <p>Alarms can be programmed to alert the user to under or over sized batches. The offsets are the allowable differences between the Batch Size and the Batch Total. The low alarm does not activate unless the flow rate is zero.</p> <p>Low Alarm Offset [ XXXX.XX] UUU</p> <p>Hi Alarm Offset [ XXXX.XX] UUU</p> <p>The System Response Time is a feature the allows the NexGen to anticipate when to stop a batch if there is a significant time delay between the signal to stop flow and flow stopping. The default value is 0.0 seconds for no delay. The maximum delay is 60 seconds.</p> <p>System Response Time [ XXXX.XX] SEC</p> <p>When running many batches of the same size (like a manual container filling application) it may be desirable to automatically restart a batch after a pre-selected time. Maximum time: 600 seconds.</p> <p>Auto Restart Delay [ XXXX.XX] SEC</p> <p>If you want the operator to be able to change the size of a batch, press the ^ key until this value is YES.</p> <p>Run Mode Edit [NO     ]</p> <p>In the event of a system error during a batch, if you want the operator to be able to clear the error by depressing the start button, press the ^ key until this value is YES.</p> <p>Batch Jog [NO     ]</p>

### 9.7.2 Device Information

All information concerning the identification of the transmitter, transducer, and software revision is located in this menu.

Using the CONFIGURATION MENU TREE enter Device Information.

The following chart highlights the Device Information.

Menu or Display	Description
2. Device Information 1. Misc Device Info	<p>In this area Tag identification for the device is entered.                      Tag                      [ XXX XXXX ]</p> <p>The description of the device can be entered.                      Descriptor                      [ XXXXXXXXXXXX.XX]</p> <p>A special message concerning the device can be entered here.                      Descriptor                      [ XXXXXXXXXXXX.XX]</p> <p>The date that information concerning the device was last updated                      Date                      [ XX/XX/XX]</p> <p>Device ID number                      Device ID                      [ XXXXXXXXXXXXX]</p>
2. Configuration	<p>The transducer model number                      Trans Model Num                      [ XXXXXXXXXXXX]</p> <p>Transducer Serial Number                      Trans Serial Num                      [ XXXXXXXXXXXX.XX]</p>

Menu or Display	Description
2. Device Information 2. Configuration (continued)	Electronics Model Number Elec Model Num [XXXXXXX] ]  Electronics Serial Number Elec Model Num [XXXXXXXXX]  Final Assembly Number Descriptor [XXXXXXXXXXXX.XX]  Wetted Materials of the transducer Wetted Materials [XXXXXXXXXXXXXXXX]  Transducer Connection Size Connection Size [ XX XXXX]  Transducer Connection Rating Connection Rating [XXXXXXXXXXXX]  Transducer Electrical Class Electrical Class [XXXXXXXXXXXX.XX]
2. Device Information 3. Revision Numbers          4. Exit	The installed Software Revision Numbers are listed. BOOT REV: [Cxxxxxxx] OS REV: [VXX.XXXXX] OPP REV: [XXXX] ELEC REV: [XXX XX XX] HART REV: [XX]  Exit the Device Information Menu

### 9.7.3 Alarm Setup Configuration

The NexGen transmitter has two high and low external alarms. These alarms can be programmed to represent any variable and system alarm.

Using the CONFIGURATION MENU TREE enter the Alarm setup configuration.

The following chart highlights the Alarm Setup Configuration.

Menu or Display	Description
Configure Alarms 1. Alarm 1	If you wish to configure Alarm 1, press ENTER. Press the up arrow key to select the alarm function. High and low setpoints can be configured. Alarm [Select Alarm Output]
2. Alarm 2	If you wish to configure Alarm 2, press ENTER. Press the up arrow key to select the alarm function. Alarm [Select Alarm Output]
3. Startup Delay	If a delay is required for the startup of the alarm, press ENTER. Press the up and across keys to set the delay. Startup Delay [XXXXXXXXXX]
4. Exit	To exit Configuration Alarm menu press ENTER

### 9.7.4 Display Setup Configuration

Within this menu the display can be set up to display three variables at one time on the LCD display.

Using the CONFIGURATION MENU TREE enter the Display Setup Configuration.

The following chart highlights the Display Setup Configuration.

Menu or Display	Description
Configuration 4. Display	The NexGen will allow the user to program three variables as a default on the optional LCD display. If you wish to configure the display, press ENTER. Use the up arrow key to select the default variable for Line 1. Line 1 [XXXXXXXXXX]  If you wish to configure the display for Line 2 press ENTER Line 2 [XXXXXXXXXX]  If you wish to configure the display for Line 3, press ENTER Line 3 [XXXXXXXXXX]



### 9.7.5 Transmitter Variables Configuration

In this menu it is possible to set the Units, Fallback, Alarm Setpoints for each variable measured. Also the % Solids/Concentration, Brix or Baume table is entered here.

Using the CONFIGURATION MENU TREE enter the Transmitter Variable Configuration.

The following chart highlights the Transmitter Variable Configuration:

Menu or Display	Description
Configuration 5. Xmit Variables	Press ENTER in this menu to program the configuration of all measured variable. It will give access to the following options that can be scrolled using the up or across key: 1. Flow Variables 2. Temperature 3. Density 4. Concent./Solids 5. Exit
Configure Xmit Vars 1. Flow Variables	Press ENTER to configure the following Flow Variables: 1. Mass Flow 2. Volume Flow 3. Standard Vol Flow 4. Concen Flow 5. Net Oil Flow 6. Special Mass 7. Special Volume 8. Flow Direction 9. Exit
Configure Flow Vars 1. Mass Flow  or Configure Flow Vars 2. Volume Flow	Press ENTER to configure Mass Flow Variables or Volume Flow. Use the UP or ACROSS key to select engineering unit to display the measured variable. Unit [XXXX ] Use the UP or ACROSS key to set the fallback value in the event of a fault condition. Fallback [XXXXXXXXXXXXX] Use the UP or ACROSS key to set the visual Low Alarm Setpoint. Low Alarm SetPnt [XXXXXXXXXXXXX] Use the UP or ACROSS key to set the visual High Alarm Setpoint. Hi Alarm SetPnt [XXXXXXXXXXXXX] Use the UP or ACROSS key to set the Low Flow Cutoff point. Below this Flow rate the meter will not register. LF Cutoff [XXXXXXXXXXXXX] Use the UP or ACROSS key to adjust the dampening factors in whole seconds. Note: The Noise Damp Factor value must be larger than the Rate Damp Factor value. Noise Damp Factor: Enter a value from 0–256 to adjust the response time for the effects of signal noise. (Default = 0) A higher value will result in a slower response time. Rate Damp Factor: Enter a value from 0–256 to adjust the response time for the effects of incremental changes of flow rate. (Default =0) Damp Thrshld: The percent change in flow rate that will activate the Rate Damp as programmed.

Menu or Display	Description
<p>Configure Flow Vars 3. Standard Vol Flow</p>	<p>Press ENTER to configure Standard Volume Flow. Use the UP or ACROSS key to select unit. Unit [XXXX ]</p> <p>Use the UP or ACROSS key to set the fallback value in the event of a fault condition. Fallback [XXXXXXXXXXXXX]</p> <p>Use the UP or ACROSS key to set the visual Low Alarm Setpoint. Low Alarm SetPnt [XXXXXXXXXXXXX]</p> <p>Use the UP or ACROSS key to set the visual High Alarm Setpoint. Hi Alarm SetPnt [XXXXXXXXXXXXX]</p> <p>Use the UP or ACROSS key to set the Low Flow Cutoff point. Below this Mass Flow rate the meter will not register. LF Cutoff [XXXXXXXXXXXXX]</p> <p>A standard density unit or concentration unit can be selected, to correct the volume measurement to a referred density value for a given temperature. In the case of Concentration measurements using Brix or Baume (Be Lt or Be Hv), the density vs Brix table or density vs Baume table should be set first (please refer to the <i>Configure Xmit Vars, 4. Concent./Solids</i> menu found below). Std Density Unit [XXXX ]</p> <p>If API is selected an extra prompt will appear allowing to select the type of fluid measured. Please refer to the <i>Configure Xmit Vars, 3. Density</i> menu found below.</p> <p>The following menu will not display if the unit selected is Brix, Baume or API. Use the UP or ACROSS key to enter the value of the standard density. Standard Density [XXXXXXXXXXXXX]</p>
<p>Configure Flow Vars 4. Concen Flow</p>	<p>Press ENTER to configure Concentration Flow, i.e. the mass flow rate of the target fraction.</p> <p>Use the UP or ACROSS key to select unit. Unit [XXXX ]</p> <p>Use the UP or ACROSS key to set the fallback value in the event of a fault condition. Fallback [XXXXXXXXXXXXX]</p> <p>Use the UP or ACROSS key to set the visual Low Alarm Setpoint. Low Alarm SetPnt [XXXXXXXXXXXXX]</p> <p>Use the UP or ACROSS key to set the visual High Alarm Setpoint. Hi Alarm SetPnt [XXXXXXXXXXXXX]</p> <p>Use the UP or ACROSS key to set the Low Flow Cutoff point. Below this concentration flow rate the meter will not register. LF Cutoff [XXXXXXXXXXXXX]</p>

Menu or Display	Description
<p>Configure Flow Vars 5. Net Oil Flow</p>	<p>Press ENTER to configure Net Oil Functions. This menu will be active only if NexGen was purchased with the Net Oil and Well Testing option. It is important to input first the Well Data, before attempting to configure the Net Oil functions (please refer to the <i>Configure Xmit Vars, 5. Well Data</i> menu found below).</p> <p>Use the UP or ACROSS key to select if the flow rates and totals are going to be displayed and calculated in Mass or Volume units.</p> <p><b>Net Mass or Volume</b> [XXXXXXXXXX]</p> <p>Select the Well number that will be used, this will provide the density of dry crude oil and saline water used in the calculations.</p> <p><b>Use Data from Well</b> [XXX]</p> <p>To configure the Water Cut, Net Oil and Net Water measurement, select the corresponding option using the UP or ACROSS key and then pressing ENTER.</p> <p><b>Net Oil Parameter</b> [XXXXXXXXXXXXXXXXXXXXX]</p> <p>Use the UP or ACROSS key to select unit.</p> <p><b>Unit</b> [XXXX ]</p> <p>Use the UP or ACROSS key to set the fallback value in the event of a fault condition</p> <p><b>Fallback</b> [XXXXXXXXXXXXX]</p> <p>Use the UP or ACROSS key to set the visual Low Alarm Setpoint.</p> <p><b>Low Alarm SetPnt</b> [XXXXXXXXXXXXX]</p> <p>Use the UP or ACROSS key to set the visual High Alarm Setpoint.</p> <p><b>Hi Alarm SetPnt</b> [XXXXXXXXXXXXX]</p> <p>Only in the cases of Net Oil and Net Water parameter will be displayed the following prompt. Use the UP or ACROSS key to set the Low Flow Cutoff point. Below this value the meter will not register the flow rate.</p> <p><b>LF Cutoff</b> [XXXXXXXXXXXXX]</p> <p>Only in the case Net Oil is selected as a parameter, it is necessary to provide the following variable, the allowable range for this field is between 0.5 and 1.5. The factory default is 1.0 (please refer to the <i>chapter 7.11 Net Oil and Well Testing</i> for an explanation on the meaning of this field).</p> <p><b>Shrinkage Factor</b> [XXXXXXXXXXXXX]</p>

Menu or Display	Description
<p>Configure Flow Vars 6. Special Mass</p> <p>or</p> <p>Configure Flow Vars 7. Special Volume</p>	<p>The NexGen permits the user to create a special mass or volume unit measurement for rate and totalizer to be displayed. The special unit should be created by multiplying an existing unit (Base Rate) to a multiplier (Flow Factor).</p> <p>The base rate is the measurement from which you will create the special calculation for flow rate. Base Rate [XXXXXXXXXX]</p> <p>Use the UP or ACROSS key to set the Flow Factor. Flow Factor [XXXXXXXXXX]</p> <p>Enter the label that will describe the new flow rate unit, using the UP or ACROSS key. Flow Text [XXXX]</p> <p>The Totalizer Factor is the multiplier that is required to set the totalizer to the special mass or volume total. Totalizer Factor [XXXXXXXXXX]</p> <p>Enter the label that will describe the new volume or mass unit, using the UP or ACROSS key. Totalizer Text [XXXX]</p>
<p>Configure Flow Vars 8. Flow Direction</p>	<p>The NexGen can be configured for forward or reverse flow. Press the UP or ACROSS key to scroll the options and press ENTER to select</p>
<p>Configure Flow Vars 9. Exit</p>	<p>Exit the Configure Flow Variables Menu</p>
<p>Configure Xmit Vars 2. Temperature</p>	<p>Press ENTER to configure Temperature measurements. Use the UP or ACROSS key to select engineering unit to display the measured variable. Unit [XXXX ]</p> <p>Use the UP or ACROSS key to set the fallback value in the event of a fault condition. Fallback [XXXXXXXXXXXXX]</p> <p>Use the UP or ACROSS key to set the visual Low Alarm Setpoint. Low Alarm SetPnt [XXXXXXXXXXXXX]</p> <p>Use the UP or ACROSS key to set the visual High Alarm Setpoint. Hi Alarm SetPnt [XXXXXXXXXXXXX]</p>

Menu or Display	Description
<p>Configure Xmit Vars 3. Density</p>	<p>Press ENTER to configure Density measurements. Use the UP or ACROSS key to select engineering unit to display the measured variable. Unit [XXXX ] If API is selected an extra prompt will appear allowing to select the type of fluid measured. API Product Class [XXXXXXXXXXXXX] If the API Product Class “Special” is selected, it is necessary to input a Volume Correction Factor (VCF) Table and enter a label that will identify the new table for the specific fluid. Product Class Name [XXXXXXXXXXXXXXXXXXXXX] If a new table is being entered, RSM recommends that the old table be cleared by selecting <b>YES</b>. If a revision to a few of the entries in the existing table is all that is needed select <b>NO</b>. Clear Entire Table [XXX] The VCF Table will hold a maximum of 100 pairs of Temperature and VCFs. The following two menus will repeat in order until CANCEL is pressed or the maximum number of entries is reached. Use the UP or ACROSS key to set the temperature. XXXXXX VCF Table – Entry Point XXX - Temperature [XXXXXXXXXXXXX] Use the UP or ACROSS key to set the VCF of the corresponding Entry Point. XXXXXX VCF Table – Entry Point XXX - VCF [XXXXXXXXXXXXX]  Use the UP or ACROSS key to set the fallback value in the event of a fault condition. Fallback [XXXXXXXXXXXXX]  Use the UP or ACROSS key to set the visual Low Alarm Setpoint. Low Alarm SetPnt [XXXXXXXXXXXXX]  Use the UP or ACROSS key to set the visual High Alarm Setpoint. Hi Alarm SetPnt [XXXXXXXXXXXXX]  Use the UP or ACROSS key to set the Slug Low Limit. Below this density the meter will go to the density fallback value. Slug Low Limit [XXXXXXXXXXXXX]  Use the UP or ACROSS key to set the Slug High Limit. Above this density the meter will go to the density fallback value. Slug Hi Limit [XXXXXXXXXXXXX]  Use the UP or ACROSS key to set the maximum delay time in seconds for the slug limit to engage. Slug Delay Time [XXXXXXXXXXXXX]</p>

Menu or Display	Description
	<p>Use the UP or ACROSS key to adjust the response time of the measurement in seconds.                      Damp Factor                      [XXXXXXXXXXXX]</p>
<p>Configure Xmit Vars                      4. Concent./Solids</p>	<p>Press ENTER to configure Concentration, Brix or Baume Tables.</p> <p>Use the UP or ACROSS key to select engineering unit to display Concentration. The table that will be entered, should have the relation between temperature, density and the unit selected here (% , Brix, Be Lt or Be Hv).                      Unit                      [XXXX ]</p> <p>Use the UP or ACROSS key to set the fallback value in the event of a fault condition.                      Fallback                      [XXXXXXXXXXXX]</p> <p>Use the UP or ACROSS key to set the visual Low Alarm Setpoint.                      Low Alarm SetPnt                      [XXXXXXXXXXXX]</p> <p>Use the UP or ACROSS key to set the visual High Alarm Setpoint.                      Hi Alarm SetPnt                      [XXXXXXXXXXXX]</p> <p>If this is a new table it is recommended to clear the entire table before entering the new data. In the case only an edition of the table is needed select NO.                      Clear Entire Table                      [XXX]</p> <p>The Table will hold a maximum of 14 pairs of Density and Concentration for 5 different operating temperatures. The Ref Temperature menu will repeat, after the list of densities and concentrations is entered for the specific temperature, until the 5 different temperatures are set sorted by value. Use the UP or ACROSS key to set the temperature.                      Ref Temperature X                      [XXXXXXXXXXXX]</p> <p>The following two menus will repeat, until CANCEL is pressed or after 14 Density and Concentration pairs are entered. Use the UP or ACROSS key to set the Measured Density. The density should be entered sorted from the lower to the higher value.                      TMPX:X.X — Entry Point XX — Measured Density                      [XXXXXXXXXXXX]</p> <p>Use the UP or ACROSS key to set the corresponding Concentration for the above entered density.                      TMPX:X.X — Entry Point XX — Concent./Solids                      [XXXXXXXXXXXX]</p>

Menu or Display	Description
<p>Configure Xmit Vars 5. Well Data</p>	<p>Press ENTER to enter the data for each Well.</p> <p>It is important to input first the Well Data and then configure the Net Oil function, before attempting to run a Well Testing (please refer to the <i>Configure Xmit Vars, 5. Well Data and Configure Flow Vars, 5. Net Oil Flow</i> menus later in this manual).</p> <p>Use the UP or ACROSS key to select the engineering unit that will be used to enter the Density of crude oil and saline water.</p> <p><b>UNIT</b> [XXXXXXXXXX]</p> <p>Use the UP or ACROSS key to select the standard temperature used as the reference to measure the Density of crude oil and saline water.</p> <p><b>Std Temperature</b> [XXXXXXXXXX]</p> <p>Use the UP or ACROSS key to select if it is needed to delete the data for the complete table of wells. If this is a new table it is recommended to clear the entire table before entering the new data. In the case only an edition of the table is needed select NO.</p> <p><b>Clear Well Data</b> [XXX]</p> <p>Use the UP or ACROSS key to enter the number of the well which data will be entered or changed.</p> <p><b>Well Number (1-30)</b> [XXXXXXXXXXXXX]</p> <p>Use the UP or ACROSS key to enter the density, measured at the standard temperature, of pure crude oil recovered from the indicated Well.</p> <p><b>Well # XX</b> <b>Oil Density ?</b> [XXXXXXXXXXXXX]</p> <p>Use the UP or ACROSS key to enter the density, measured at the standard temperature, of the saline water extracted from the indicated Well.</p> <p><b>Well # XX</b> <b>Water Density ?</b> [XXXXXXXXXXXXX]</p> <p>The three menus above will repeat while the Well Number increase. That number can be changed at any time to edit an specific Well.</p>

### 9.7.6 Analog / Pulse / RS485 Output Configuration

Using the CONFIGURATION MENU TREE to enter the analog / pulse or RS485 output configuration.

The following chart highlights the configuration of the pulse / 4-20mA or RS485 outputs.

Menu or Display	Description
Configuration 6. Outputs	Configuration of the analog, pulse and communication outputs is completed in the Configuration menu. Configuration of Analog 1. Press ENTER to configure Analog 1
Configure Outputs 1. Analog 1	Use the UP or ACROSS key to select variable for Analog 1 Parameter [XXXXXX]  Use the UP and ACROSS key to set Lower Range Lower Range [XXXXXX]  Use the UP and ACROSS key to set Upper Range Upper Range [XXXXXX]  Press enter to display Cutoff [XXXXXX]  Press enter to display Min. Span [XXXXXX]
Configure Outputs 2. Analog 2	See Configure Outputs 1. Analog 1 above for non-total parameters.
Configure Output 3. Pulse	See Configure Outputs 1. Analog 1 above for non-total parameters. For total parameters Use ^ and > to select parameter Parameter [XXXXX]  Use ^ and > to select K-Factor (pulses/unit) [XXXX.XXX]  Use ^ and > to set max output frequency (max is 10,000 Hz) [XXXXX.XXX] Hz  Max Output Frequency [XXXXX] Hz
Configure Outputs 4. Analog 4	See Configure Outputs 1. Analog 1 above



Menu or Display	Description
<p>Configure Outputs 5. Comm Ports</p>	<p>Use the UP or ACROSS key to select baud rate Baud [XXXXXX]</p> <p>The parity odd or even is selected with the UP or ACROSS key. Parity [XXXX]</p> <p>Data bits value 7, 8 or 9 may be selected via the UP or ACROSS key Data Bits [X]</p> <p>Stop bits, value 1 or 2 may be selected via the UP or ACROSS key Stop Bits [X]</p> <p>The protocol to be used in communication with the NexGen can be selected with the UP or ACROSS key Protocol [XXXXXXXXXXXXXXXXXXXXX]</p>
<p>Configure Outputs 6. Option Card</p>	<p>If the optional card is installed in the NexGen, it can be configured</p>
<p>Configure Outputs 7. Exit</p>	<p>Exit the configure outputs menu</p>

**9.7.7 Totalizer Reset**

Using the CONFIGURATION MENU TREE enter the Totalizer Reset function.

The following chart highlights the resetting of the totalizer.

<b>Menu or Display</b>	<b>Description</b>
Configuration 7. Totalizers	When ENTER is pressed the UP OR ACROSS key can select all or the individual totalizer to be reset. When the totalizer variable(s) has been selected press ENTER to complete  Reset Totalizer [XXXXXXXXXXXXX]

### 9.7.8 Characterize Meter Configuration

Within this menu characterization of the transmitter and the transducer can be specially configured for the application.

Using the CONFIGURATION MENU TREE to enter the Characterization Meter Configuration.

The following chart highlights the Characterize Meter Configuration.

Menu or Display	Description
Characterize Meter 1. Sensor  Calibrate Sensor 1. Sensor Error Delay  2. Calibrate Sensor	This menu allow the user to modify and enter the calibration coefficients for the following: Sensor, Zero, Temp Calib Params, Density Params, Mass Params, and Analog Outputs.  With the NexGen you can enter the time in seconds before the transmitter goes into a sensor error delay. Maximum time: 30 seconds.  The NexGen allows the user to manually enter the sensor voltages which may be necessary in viscous applications. Sensor A [XXXX] mVrms Sensor B [XXXX] mVrms ENTER to Calibrate CANCEL to Exit If ENTER to calibrate is pressed, the transmitter will permit the user to set the Sensor voltage to be maintained Sensor Set Point [XXX] mVrms  If ENTER is pressed again, you can use the UP and ACROSS key to set the Gain Control. This value should not be changed. Gain Control [XXXXXX]
Characterize Meter 2. Zero Electronics	This menu allows the user to review and modify the Electronic zero of the NexGen. The electronic zero is the zero offset contribution due to the electronics and is determined by zeroing the electronics with the sensor inputs shorted together. Choices from this menu are Elec. Zero Params, Zero Electronics, and Exit.
Electronic Zero	Displays the current electronic zero and the standard deviation for the last automatic zero. With the correct access (level 2) the user can modify the displayed ZERO value with the ^ and > keys. Electronics Zero [ SX.XXXXeSXX]      DEG  Pressing ENTER will display the standard deviation (StdDev) of the last automatic zero. The StdDev cannot be modified by the user. StdDev [ SX.XXXXeSXX]      DEG

Menu or Display	Description
Zero 2. Transducer Zero	Displays the current transducer zero. The transducer zero is the zero offset contribution of the transducer and installation. The transducer zero is determined by subtracting the electronic zero from the system zero. Press ENTER to review and/or modify the transducer zero.
Transducer Zero	With the correct access (level 2) the user can modify the displayed ZERO value with the ^ and > keys. Transducer Zero [ SX.XXXeSXX] DEG
Zero 3. System Zero	This menu allows the user to review and modify the System zero of the NexGen. The System zero is the combined zero offset of the electronics, transducer and the installation when there is no flow. Choices from this menu are Syst Zero Params, Zero System, and Exit.
System Zero	Displays the current system zero and the standard deviation for the last automatic zero. With the correct access (level 2) the user can modify the displayed ZERO value with the ^ and > keys. System Zero [ SX.XXXeSXX] DEG  Pressing ENTER will display the standard deviation (StdDev) of the last automatic zero. The StdDev cannot be modified by the user. StdDev [ SX.XXXeSXX] DEG

Menu or Display	Description
Characterize Meter 3. Temp Calib Params	<p>This menu allows the user to review and modify the Temperature Gain Coefficient of the NexGen.</p> <p>RTD Offset [ RX.XXXXeRXX] OHMS</p>
4. Density Params	<p>The Density Calibration Coefficient C1 and C2 can be reviewed and modified by the user in this menu. The user can modify the displayed Density Coefficient value with the ^ and &gt; keys.</p> <p>C1 [ DX.XXXXeDXX]</p> <p>Pressing ENTER will display the C2 value. The C2 value can be modified by the user.</p> <p>C2 [ DX.XXXXeDXX]</p> <p>Pressing ENTER will display the Air Frequency. This value is located on the original transducer calibration sheet, and on the transducer nametag.</p> <p>Air Frequency [ SX.XXXXeSXX] HZ</p> <p>Pressing ENTER will display the Air Temperature. This value is located on the original calibration sheet, and on the transducer nametag.</p> <p>Air Temperature [ SX.XXXXeSXX] DEG C</p>
Characterize Meter 5. Mass Params	<p>Mass Parameters permits the user to manually enter the calibration scalar for the mass measurement.</p> <p>Mass Scalar [ SX.XXXXeSXX]</p>
Characterize Meter 6. Analog Outputs  1. Analog 1	<p>The NexGen allows the user to modify the three (3) 4-20mA output calibration by using the Gain for zero mA and the Offset for 20mA</p> <p>Gain [ GX.XXXXeGXX]</p> <p>Offset [ OX.XXXXeOXX]</p>
Characterize Meter 2. Analog 2 3. Analog 4	<p>See Analog Outputs 1. Analog 1</p>

Menu or Display	Description
Zero 2. Transducer Zero	Displays the current transducer zero. The transducer zero is the zero offset contribution of the transducer and installation. The transducer zero is determined by subtracting the electronic zero from the system zero. Press ENTER to review and/or modify the transducer zero.
Transducer Zero	With the correct access (level 2) the user can modify the displayed ZERO value with the ^ and > keys. Transducer Zero [ SX.XXXeSXX] DEG
Zero 3. System Zero	This menu allows the user to review and modify the System zero of the NexGen. The System zero is the combined zero offset of the electronics, transducer and the installation when there is no flow. Choices from this menu are Syst Zero Params, Zero System, and Exit.
System Zero	Displays the current system zero and the standard deviation for the last automatic zero. With the correct access (level 2) the user can modify the displayed ZERO value with the ^ and > keys. System Zero [ SX.XXX-e SXX] DEG  Pressing ENTER will display the standard deviation (StdDev) of the last automatic zero. The StdDev cannot be modified by the user. StdDev [ SX.XXX- eSXX ] DEG
4. Exit	

**SYSTEM MENU**

---> Main Menu 4. Program	---> Enter Password [            ]	---> Program 4. System
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---> 4. System <b>Section 9.8</b>	---> 1. Set Date <b>Sect. 9.8.1</b>	---> Date MM/DD/YY		
	---> 2. Set Time <b>Sect. 9.8.2</b>	---> Time HH:MM:SS		
	---> 3. Display Date/Time <b>Sect. 9.8.3</b>	---> MM/DD/YY HH:MM:SS CANCEL to Exit		
	---> 4. Password menu <b>Sect. 9.8.4</b>	---> 1. Change Password	---> Old Password	
		---> 2. View Password	---> New Password	
		---> 3. Exit	---> Password=[XXXXXXXXXX]	
---> 5. Dbase/File Mgmt <b>Sect. 9.8.5</b>	---> 1. File Directory			
	---> 2. File Delete			
	---> 3. File Information			
	---> 4. Reboot System			
	---> 5. Reset Fctry Dflts			
	---> 6. Download DSP File	---> DSP Download File edit		
	---> 7. Download AppIFile	---> ENTER to Download		
	---> 8. Download OS	---> ENTER to Download		
---> 6. Exit	---> 9. Exit			

## 9.8 System Menu

The system menu provides the user access to configuring the following:

- time
- date
- password
- database/file management.

### 9.8.1 Set Date and Time

This menu when selected will provide the user with options to change and display the date and/or time.

Using the SYSTEM MENU TREE enter Set Date or Set Time.

The following chart highlights the Set Date and Set Time feature.

Menu or Display	Description
System 1. Set Date	Set Date allows the user to confirm or set the Date. When ENTER is pressed the following will be displayed Set Date [mm/dd/yy]
2. Set Time	Set Time permits the user to confirm or set the NexGen to the time of day. When ENTER is pressed the following will be displayed Set Time [hr/min/sec]
3. Display Date/Time	Displays the system Date and Time, verifies the current time and date. When ENTER is pressed the following will be displayed. Time Date [hr/min/sec] [mm/dd/yy]

### 9.8.2 Password Configuration

This menu when selected will provide the user with the option to change the password for entry into the PROGRAM mode of the transmitter.

Using the SYSTEM MENU TREE enter the Password.

The following chart highlights the Password feature.

Menu or Display	Description
Password 1. Change Password	This menu allows the user to view and change the password to the PROGRAM menu When ENTER is pressed the following will be displayed Change Password [XXXXXXX]
2. View Password	Allows the user to view the password for the next lower access level. When ENTER is pressed the following will be displayed View Password [XXXXXX]



### 9.8.3 Dbase File Management

The Dbase File Management menu provides access to the following:

- File directory
- File Delete
- File Information
- Reboot System
- Reset to factory defaults
- Download DSP File
- Download Application File
- Download Operating System

Using the SYSTEM MENU TREE enter the Dbase File Management.

The following chart highlights the Dbase File Management menu.

Menu or Display	Description
Dbase/File Mgmt 1. File Directory	The current listing of the file directory is listed in this menu. When ENTER is pressed the name of any application files in RAM will be displayed [LIBRARY] [MENU] [DISPLAYTXT] [DSP] [RTD] [FUNC] [OUTPUTS] [BATCH] [STAT] [DIGITALPLL] [COMM]
2. File Delete	In this menu the user can delete any file listed in the File Directory. When ENTER is pressed the following message will be displayed File Delete [XXXXXXXX]
3. File Information	Information concerning the file listed in the file directory is listed. When ENTER is pressed the file directory listing will be displayed starting with the following: [LIBRARY] [XXXXX] [XXXX] LIB MM/DD/YY ENTER to Continue CANCEL to Exit
4. Reboot System	To reboot the system press ENTER. No programmed values will be lost The display will list the following options: To REBOOT the NexGen ENTER to Continue CANCEL to Exit
5. Reset Factory Defaults	To reset the software to factory defaults press ENTER The display will then list the following options: ENTER to Reset to the Factory Defaults  CANCEL to Exit

<b>Menu or Display</b>	<b>Description</b>
6. Download DSP File	To download DSP file press ENTER: DSP Download File (Not available with user password access) [DIGITALPLL]
7. Download AppIFile	To download Application File press ENTER: Download DSP File (Not available with user password access) ENTER to Continue CANCEL to Exit
8. Download O/S	To download the Operating System press ENTER Download O/S (Not available with user password access) ENTER to Continue CANCEL to Exit

## SECTION 9A: PROGRAMMING WITH THE HAND HELD COMMUNICATOR

### 9A. General Guidelines & Menu Tree

The NexGen SFT100 is programmed and configured using either the NexLink software package (included with the unit), via the four keys on the transmitter enclosure, or by using a hand held communicator using HART protocol.

#### NexLink

The NexLink software program is a Windows-based application that allows the user to program and view data through an easy to use point-and-click user interface. This application uses MODBUS protocol.

#### Integral Keypad

The ENTER key sends the NexGen into the displayed menu, locks in data choices made with the ^ and > keys, and confirms the selections, unless otherwise noted.

The CANCEL key sends the NexGen into the next higher menus level, unless otherwise noted. Pressing ENTER when Exit is the menu choice sends the NexGen to the next higher menu level, unless otherwise noted.

#### Hand Held Communicator

The NexGen may also be programmed using HART protocol via a Hand Held Communicator. The menus for using the HHC are nearly identical to those used on the integral NexGen display. Navigation through the HART menu is accomplished by using the standard keystrokes as described in the instructions accompanying the HHC and used with any HART device.

#### Hand Held Communicator Menu Navigation

- Menu selections are made by either pressing the corresponding number on the numeric keypad or by using the **←** and **→** keys to highlight the selected option and then use the **↵** key to select that menu option.
- When there are more menu options than can be displayed on a single screen, additional options can be displayed by using the **←** and **→** keys to scroll through the options.
- At various points in the menu structure, the four function keys will be activated to perform certain functions.
  - F1 HELP YES
  - F2 SAVE SEND
  - F3 HOME ABORT
  - F4 SEND NO
- After programming or configuration data has been edited on the HHC, the SEND (F2) function must be used to change the NexGen programming or configuration.

## Summary of HART Specific Programming Features and Functions

### Section 5.7 – HART (Option Card) Wiring Connections

Up to 15 transmitters can be connected into a HART multi-drop network.

### Section 9.2 - Main Menu (Operational Mode)

Default Display: The default display is not available on the HART communicator. The top level menu on the HHC when connecting to a unit is the Main Menu with options as listed.

#### Main Menu / 1. View Process Variable / 1. View Measurements

Five process variables are available for selection on the screen. Additional variables are available by scrolling through the variable list using the **←** and **→** keys. The value of the variable highlighted may be viewed by pressing the **Enter** key.

#### Main Menu / 1. View Process Variable / 2. View Outputs / 1. View Analog 1

#### Main Menu / 1. View Process Variable / 2. View Outputs / 2. View Analog 2

#### Main Menu / 1. View Process Variable / 2. View Outputs / 4. View Analog 4

The following information may be viewed from these menu options:

PV Process Var: (Primary Variable) The process variable that has been assigned to this output (Mass Rate, Volume Rate, Std Volume Rate, % Concentration, Concentration Rate, Density and Temperature)  
Process Var: Present value of the selected output  
AO1 current: The outputs present value in mA  
AO1 % Range: The present % of range for the selected output

#### Main Menu / 1. View Process Variable / 2. View Outputs / 3. View Pulse Output

The following information may be viewed from this menu option:

TV Process Var: (Tertiary Variable) The process variable that has been assigned to this output (Mass Total, Mass Forward, Mass Reverse, Volume Total, Volume Forward, Volume Reverse, Std Volume Total, Std Volume Forward, Std Volume Reverse, Concentration Total, Concentration Forward, Concentration Reverse.  
Unit Total: The present value of the output  
Pulses/Unit: Pulses per unit of measure  
Pulses Out: The number of pulses sent out.

**OR**

If a rate (mass, volume, standard volume or solids), temperature or density is assigned to the pulse output, the following information may be viewed:

TV Process Var:	(Tertiary Variable) The process variable that has been assigned to this output (Mass Rate, Volume Rate, Std Volume Rate, % Concentration, Concentration Rate, Density and Temperature)
Process Var:	Present value of the selected output
Frequency:	The outputs present frequency value
% Range:	The present % of range for the selected output

### Main Menu / 2. View Status / 1. View Status

List the process variables that are currently in alarm. This list is empty when no alarms are active. Reviewing the list acknowledges any new alarms. Acknowledged alarms are automatically removed from the list when they return to normal.

### Main Menu / 2. View Status / 2. View Error Log

List internal NexGen errors that have occurred. **Reviewing this list does not acknowledge the errors. The Clear Error Log must be performed.**

## Section 9.4 – Program Mode

### Main Menu / 3. Program

Selection of this menu gives the user the option of entering the user Password or of going directly to the Program menu. If the Program menu is selected without first entering the correct password, the configuration data will be displayed but cannot be changed. If an attempt is made to change any configuration data, the error message “In Write Protect Mode” will appear.

***NOTE: This password is a 7-digit code that is independent of the password entered into the NexGen via the keypad or NexLink. When using the HHC, the configuration and programming data may be changed using only this password and is not protected by the password entered into the NexGen.***

THE DEFAULT PASSWORD IS “111111”.

If an incorrect password is used, the message “Password entered is incorrect” is displayed and the menu entry is exited. The “Enter Password” option must be reselected to input the correct password. When the correct password is entered, the menu will return to the previous selections. Enter “Program” at this point and data may be edited.

***NOTE: If the NexGen has been put in write protect mode via the keypad or NexLink, even though a correct password has been entered, the configuration of the device will not be changed. If this***

**occurs, the message “In Write Protect Mode” will appear.** (See Configuration Menu / Outputs / HART menu)

### Paragraph 9.6 – Diagnostic Menu

The Diagnostic Menu provides test menus for the following:

- Self Test
- Alarm Test
- Batch Relay Test
- Analog Test
- Pulse Test
- Tube Drive Test

The following tests are not available via the HART interface and must be performed from the NexGen keypad.

- Comm Test
- Buttons Test
- LCD Test

#### Program / 2. Diagnostics / 1. Self Test

The Self Test diagnostic reports the status of various software subsystems in the NexGen. All items should be “EMBEDDED”.

#### Program / 2. Diagnostics / 2. Alarm Test / 1. Alarm 1 Test

#### Program / 2. Diagnostics / 2. Alarm Test / 1. Alarm 2 Test

#### Program / 2. Diagnostics / 3. Batch Relay Test / 1. Batch 1 HF Test

#### Program / 2. Diagnostics / 3. Batch Relay Test / 1. Batch 2 LF Test

When performing the above self tests, the user will be prompted to toggle the relay contacts. When “Yes” is selected, the relay will be toggled to the opposite state and the user is prompted to continue or exit. The relays will return to their original condition when the test is exited.

### Paragraph 9.8 – System Menu

The System Menu provides access to configure the following:

- Time
- Date
- Password

#### Program / 4. System / 4. Password

The user may use this menu to change or view the **HHC password**. This is not the same password that is used to access the PROGRAM menu from the NexGen keypad.

**NOTE: The Database/File Management menu option is not available via the HART interface.**

## 9A.1 HART HHC Online Menu

The main menu is the normal operational mode of the NexGen transmitter. Unlike viewing the menus from the NexGen display, the available program features are arranged slightly different when using the Hand Held Configurator. Instead of all programming functions being centered around the Main Menu, they are instead accessible from the “**Online**” menu. From the HART **Online** menus, all process measurements, outputs, alarms and error log can be viewed. The error log may also be cleared from the Main Menu. Access to the Program mode is also available through the use of a password.

Menu or Display	Description
Default Display  1. <b>Offline</b> 2. <b>Online</b> 3. <b>Frequency Device</b> 4. <b>Utility</b>	The default display will appear on the HHC display when it is powered up and connected to a HART device. The HHC will connect to a device if one is present (connected). If several devices are connected, the HHC will poll as directed in the <b>Utility/Configure Communication/Polling Menu</b> .
<b>Online Menu</b>  1. <b>View Process Vars</b> 2. <b>View Status</b> 3. <b>Program</b>	1. <b>View Process Vars</b> allows the user to review the present value of the process variables and/or the analog and pulse outputs. 2. <b>View Status</b> allows the user to review a list of parameters and diagnostics that are out of limits. The list is organized as last-in first-out. This will make the last event the first seen by the user. Events will be removed from the list when they return to normal after they have been acknowledge. 3. <b>Program</b> gives the user the ability to view and program the NexGen. Entering the proper password allows access to configuration and programming data.
1. <b>View Process Vars</b>	1. <b>View Measurements</b> allows the user to view the present value of the process variables five at a time. All variables may be viewed by using the up/down arrow keys. The value of the variable highlighted may be viewed by selecting the right arrow key. 2. <b>View Outputs</b> allows the user to view the present analog or pulse output value.
2. <b>View Outputs</b>  1. Analog 1 2. Analog 2 3. Pulse Output 4. Analog 4	1. <b>Analog 1 / 2. Analog 2 / 4. Analog 4</b> displays the process variable name, present value, output current value and % of range for the output.  3. <b>Pulse Output</b> displays the process variable name, present value, output frequency and % of range for the output when a rate, density or temperature is assigned to the output. When a totalizer is assigned to the output, the process variable name, present value, pulses per unit of measure and number of pulses sent out will be displayed.

Menu or Display	Description
<p><b>1. Analog 1 / 2. Analog 2 / 4. Analog 4</b></p> <ol style="list-style-type: none"> <li>1. PV/SV/QV Process Variable</li> <li>2. Process Var</li> <li>3. AO1 Current</li> <li>4. AO1 % Range</li> </ol>	<ol style="list-style-type: none"> <li>1. <b>PV (Primary Variable), SV (Secondary Variable), or QV (Quad Variable).</b> Process variable assigned to this output. Selections are Mass Rate, Volume Rate, Std Volume Rate, % Concentration, Concentration Rate, Density and Temperature.</li> <li>2. Present value of selected output.</li> <li>3. Output current of selected output.</li> <li>4. Percent of range of selected output.</li> </ol>
<p><b>3. Pulse Output</b></p> <p><b>(Rate Variables)</b></p> <ol style="list-style-type: none"> <li>1. TV Process Var</li> <li>2. Process Var</li> <li>3. Frequency</li> <li>4. % Range</li> </ol> <p><b>(Total Variables)</b></p> <ol style="list-style-type: none"> <li>1. TV Process Var</li> <li>2. Unit Total</li> <li>3. Pulses/Unit</li> <li>4. Pulses Out</li> </ol>	<ol style="list-style-type: none"> <li>1. <b>TV (Tertiary Variable).</b> Process variable assigned to this output. Selections are Mass Total, Mass Forward, Mass Reverse, Volume Total, Volume Forward, Volume Reverse, Concentration Total, Concentration Forward, Concentration Reverse, and Batch Total</li> <li>2. <b>Process Var:</b> Present value of selected output.</li> <li>3. <b>Frequency:</b> Output frequency of selected output.</li> <li>4. <b>% Range:</b> Percent of range for selected output.</li> </ol> <ol style="list-style-type: none"> <li>1. <b>TV (Tertiary Variable):</b> Same as above.</li> <li>2. <b>Unit Total:</b> Present value of the output.</li> <li>3. <b>Pulses/Unit:</b> Pulses per unit of measure.</li> <li>4. <b>Pulses Out:</b> Number of pulses sent out.</li> </ol>
<p>2. View Status</p> <ol style="list-style-type: none"> <li>1. View Status</li> <li>2. View Error Log</li> <li>3. Clear Error Log</li> </ol>	<ol style="list-style-type: none"> <li>1. <b>View Status</b> list the process variables that are currently in alarm. This list is empty when no alarms are active. Reviewing this list acknowledges any new alarms.</li> <li>2. <b>View Error</b> Log list the internal errors that have occurred. Reviewing this list <b>does not</b> acknowledge the errors. The Clear Error Log must be performed.</li> <li>3. <b>Clear Error</b> Log clears the View Error Log and sets the counter to zero.</li> </ol>
<p>3. Program (Section 9.3A)</p> <ol style="list-style-type: none"> <li>1. Enter Password</li> <li>2. Program</li> </ol> <p><b>NOTE:</b></p>	<ol style="list-style-type: none"> <li>1. <b>Enter Password</b> allows the user to enter a password that will allow configuration data to be changed. If the entered password is incorrect, the message "Password entered is incorrect" will be displayed and the menu entry is exited. The entry must be reselected to input the correct password. <p><b>This password is a 7-digit code that is independent of the password entered into the NexGen via the keypad or NexLink. When using the HHC, the configuration and programming data may be changed using only this password and is not protected by the password entered into the NexGen. Default is "1111111".</b></p> <p><b>When the correct password is entered, the menu will return to the previous selections. Enter "Program" at this point and data may be edited.</b></p> </li> <li>2. <b>Program</b> will allow the user to view the configuration data but no changes can be made unless the correct password has first been entered. After the correct password has been entered, this selection is used to access the configuration and programming menus. <p><b>NOTE: If the NexGen has been put in write protect mode via the keypad or NexLink, even though a correct password has been entered, the configuration of the device will not be changed. If this occurs, the message "In Write Protect Mode" will appear.</b></p> </li> </ol>



Menu or Display	Description
<p><b>2. Program</b></p> <ol style="list-style-type: none"> <li>1. Calibration</li> <li>2. Diagnostics</li> <li>3. Configuration</li> <li>4. System</li> </ol>	<ol style="list-style-type: none"> <li>1. <b>Calibration</b> allows the user to perform the following calibration functions: Zero, Temperature, Density, Mass and Analog Outputs.</li> <li>2. <b>Diagnostics</b> allows the user to perform the following diagnostic tests: Self Test, Alarm Test, Batch Relay Test and Analog Test. <b>NOTE: The following tests are not available via the HART interface: Comm Test, Buttons Test and LCD Test.</b></li> <li>3. <b>Configuration</b> provides the following menus for programming the unit: Batch, Misc Device Information, Alarms, Display, Xmitter Variables, Outputs, Totalizers and Char'ze Meter.</li> <li>4. <b>System</b> provides access to the following menus: Set Date, Set Time, Display Time/Date, and Password.</li> </ol>
<p><b>1. Calibration</b></p> <ol style="list-style-type: none"> <li>1. Zero</li> <li>2. Temperature</li> <li>3. Density</li> <li>4. Mass</li> <li>5. Analog Outputs</li> </ol>	<ol style="list-style-type: none"> <li>1. <b>Zero</b> provides menus that are used to zero the electronics, the transducer, and the system.</li> <li>2. <b>Temperature</b> provides menus to view the temperature calibration constants and to calibrate the unit's temperature measurement.</li> <li>3. <b>Density</b> provides menus that are used to view the density calibration constants and to calibrate the unit's density measurement.</li> <li>4. <b>Mass</b> provides menus that are used to view the mass calibration constants and to calibrate the unit's mass measurement.</li> <li>5. <b>Analog Outputs</b> provides menus that are used to view the analog outputs' calibration constants and to calibrate the selected output.</li> </ol>
<p><b>1. Zero</b></p> <ol style="list-style-type: none"> <li>1. Electronics Zero</li> <li>2. Transducer Zero</li> <li>3. System Zero</li> </ol>	<ol style="list-style-type: none"> <li>1. <b>Electronics Zero</b> is the zero offset contribution due to the electronics and is determined by zeroing the electronics with the sensor inputs shorted together.</li> <li>2. <b>Transducer Zero</b> is the zero offset contribution of the transducer and the installation. This is determined by subtracting the electronic zero from the system zero.</li> <li>3. <b>System Zero</b> is the combined zero offset of the electronics, transducer and the installation when there is flow.</li> </ol>
<p><b>2. Temperature</b></p> <ol style="list-style-type: none"> <li>1. Temp Cal Params</li> <li>2. Perform Cal</li> </ol>	<ol style="list-style-type: none"> <li>1. <b>Temp Cal Params</b> allows viewing and manual entry of the temperature calibration constants.</li> <li>2. <b>Perform Cal</b> initiates the temperature calibration routine.</li> </ol>
<p><b>3. Density</b></p> <ol style="list-style-type: none"> <li>1. Dens Cal Params</li> <li>2. Perform Cal</li> </ol>	<ol style="list-style-type: none"> <li>1. <b>Dens Cal Params</b> allows viewing and manual entry of the density calibration constants.</li> <li>2. <b>Perform Cal</b> initiates the density calibration routine.</li> </ol>
<p><b>4. Mass</b></p> <ol style="list-style-type: none"> <li>1. Mass Cal Params</li> <li>2. Perform Dump Cal</li> <li>3. Perform Batch Cal</li> </ol>	<ol style="list-style-type: none"> <li>1. <b>Mass Cal Params</b> allows viewing and manual entry of the mass flow scaler. The scaler may also be directly modified.</li> <li>2. <b>Perform Dump Cal</b> is used when the NexGen is not controlling the flow with its batch control outputs.</li> <li>3. <b>Perform Batch Cal</b> is used when the NexGen's batching outputs via batch controller are used to control (start/stop) the flow.</li> </ol>
<p><b>5. Analog Outputs</b></p> <ol style="list-style-type: none"> <li>1. Analog 1</li> <li>2. Analog 2</li> <li>3. Analog 4</li> </ol>	<ol style="list-style-type: none"> <li>1. <b>Analog 1 / 2. Analog 2 / 3. Analog 4</b> Allows the user to edit the selected outputs Gain and Offset or to perform a calibration procedure on the selected output.</li> </ol>

Menu or Display	Description
<p><b>2. Diagnostics</b></p>	<ol style="list-style-type: none"> <li>1. <b>Self Test</b> reports the status of various software subsystems. All items should be "EMBEDDED".</li> <li>2. <b>Alarm Test</b> is used to force the alarm outputs open and closed in order to test external wiring.</li> <li>3. <b>Batch Relay Test</b> is used to force the batch relay outputs open and closed in order to test external Wiring. <b>WARNING: THIS TEST WILL OPEN/ENERGIZE ANY DEVICE ATTACHED TO THE BATCH OUTPUTS.</b></li> <li>4. <b>Analog Test</b> is used to provide a test current for testing equipment and wiring of 4-20mA current loops.</li> <li>5. <b>Pulse Test</b> provides pulses to enable the user to test external wiring and hardware.</li> <li>6. <b>Tube Drive Test</b> calculates the efficiency of the transducer and process defined as the ratio of sensor voltage to drive current.</li> </ol>
<p><b>3. Configuration</b></p> <ol style="list-style-type: none"> <li>1. Batch</li> <li>2. Misc Device Info</li> <li>3. Alarms</li> <li>4. Display</li> <li>5. Xmit Variables</li> <li>6. Outputs</li> <li>7. Totalizers</li> <li>8. Char'ze Meter</li> </ol>	<ol style="list-style-type: none"> <li>1. <b>Batch</b> allows the user to program all batch control data.</li> <li>2. <b>Misc Device Info</b> allows the user to enter or view identification information concerning the transmitter, transducer and software revision level.</li> <li>3. <b>Alarms</b> allows the user to program the two external alarms and an alarm start-up delay.</li> <li>4. <b>Display</b> allows the user to select three variables that will be displayed on the LCD display.</li> <li>5. <b>Xmit Variables</b> allows the user to enter the fallback and alarm setpoints for each flow variable, enter the % Solids/Concentration table, and program special flow units.</li> <li>6. <b>Outputs</b> allows the user to configure the analog, pulse and HART outputs.</li> <li>7. <b>Totalizers</b> allows the user to reset the NexGen totalizers.</li> <li>8. <b>Char'ze Meter</b> may be used to configure/modify the transmitter and transducer characterization.</li> </ol>
<p><b>4. System</b></p> <ol style="list-style-type: none"> <li>1. Set Date</li> <li>2. Set Time</li> <li>3. Display Time/Date</li> <li>4. Password</li> </ol>	<ol style="list-style-type: none"> <li>1. <b>Set Date</b> allows the user to set or confirm the date.</li> <li>2. <b>Set Time</b> allows the user to set or confirm the system time.</li> <li>3. <b>Display Time/Date</b> displays the current system time and date.</li> <li>4. <b>Password</b> permits the user to change or view the HHC password. <b>This is not the same password that is used to access the PROGRAM menu from the NexGen keypad.</b></li> </ol>

## SECTION 10: MODEL NUMBER DESIGNATION

MODEL NUMBER		DESCRIPTION
<b>SFT100</b>	<b>X X X X</b>	
	0	<b>Display</b> Blind - No Display
	1	LCD Display with Function Keys <sup>1</sup>
	2	LCD Display without Function Keys
		<b>Hazardous Approval Agency</b>
	0	None
	2	CSA
	3	LCIE
		<b>Option-Card</b>
	01	4-20 mA output
	00	None
		<b>Software</b>
	000	None
	100	Weights and Measures <sup>2</sup>
	200	Net Oil

**Note**

1. This model is not approved by W & M for custody transfer applications.
2. For Canadian and Non-NTEP state applications only.

**HART Accessories**

PART NUMBER	DESCRIPTION
C0000012	Model 275 HART Hand Held Communicator w/ 4MB Memory
99999-700	Installation of NexGen HART Device Description on customer supplied Hand Held Communicator

## SECTION 11: TRANSMITTER SPECIFICATIONS

### NEXGEN SFT100 Transmitter

Housing: Ex-Proof Temperature Limitations <sup>1</sup> Housing: Blind LCD Display LCD Display (CT) Power Max. Length of Signal Cable between transducer & NexGen	Aluminum, NEMA 4, 7, 9 [10kg (22lbs)]  -40 to 60C (-40 to 140F) -20 to 60C (-4 to 140F) -30 to 60C (-22 to 140F) 12-36 VDC, 120/240 VAC, 50/60 Hz 20 VA 300m (1000ft) Belden 89892, 8 conductor, 4 shielded twisted pairs
Hazardous Area Approvals	CSA - Explosionproof: Class I, II, III, Div. 1, Groups C, D, E, F, G, Div. II, Groups C, D, E, F, G. Suitable for Class I, Div. 2, Groups A, B, C, D. LCIE - Flameproof: Zones 1&2, Group IIB, T6; compliance EN55011; EN50082-2, EN60079-0, EN60079-1, EN60079-11
Operator Interface	4 Key Front panel keypad Modbus, HART Communications RS485 Serial Communications
Configuration (via keypad or Modbus HART, RS485, NexLink Software	Display format, engineering units, system constants, scaling factors, output ranges, alarm set points, serial communication parameters, batch presets
Function commands	Display, interrogate, run, program, zero, calibrate, reset totalizers, clear alarms, initiate measurement
Local Display  Flow Range Density Range Data Retention Fault Diagnosis: Blind LCD Display High and Low Alarms  Serial Communications  Digital Communications	4-line, 40-character alphanumeric, displays mass, and volume, flow, flow rate and totals, density, temperature, solids/concentration & solids/conc flow rate Complements the Schlumberger Mass Flow Transducer 0 to 3.0 g/cc Battery-backed RAM for 10 years in absence of power  NexLink Software Error Message display and/or alarm outputs Two user-configured, open collector, 50 VDC, and 100mA maximum, programmable for all variables, plus batch total and diagnostics RS-485 selectable: baud rate; 1200, 2400, 4800, 9600, 10800, 12000, 13200 parity, even, odd or none. Modbus, HART(optional)
Outputs (Standard)  Mass Flow Rate Mass Flow Total Volume Flow Rate Volume Total Standard Volume Flow Density Temperature Percent Solids/Conc Two-stage batch control Remote Start/Stop Inputs	Two 4-20mA, isolated, 1000 ohms load (max) Quadrature Pulse output, two channel 90 degrees out of phase phase 0.0025 to 10,000 Hz Full Scale g, kg, oz, lb, Ton, Spec, in time, units of seconds, minutes or hours g, kg, oz, lb, Ton, Spec cc,li, m3, usgpm, barrels, special cc, li, m3, gal, barrels, special cc,li, m3, usgpm, igpm, bb, special g/cc, lb/ft3, kg/m3, brix, baume, API deg C, deg F % Dual N.O solid state relays, 120VDC/AC, 100 mA Independent Momentary Contact
Manufacturer Instrument Model Number	RSM SFT100-XXXXXXX

RSM pursues a policy of continuous development and product improvement. The specifications above may thereof be changed without notice.

1 Ambient Temperature Limits for Hazardous Locations  
CSA            -20 to +65°C  
LCIE           -20 to +65°C

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Specifications subject to change without prior notification.

# **RED SEAL MEASUREMENT**