



IDE20 Series

Loop-Powered Feet & Inches Meter



IDE20-H-HB Hazardous Area Only
IDE20-G-HB Ordinary Location Only



All Models

User Manual

Warnings, Warranty, and IDE20 Configuration Software

Disclaimer

The information contained in this document is subject to change without notice. NOSHOK makes no representations or warranties with respect to the contents hereof and specifically disclaims any implied warranties of merchantability or fitness for a particular purpose. See Warranty Information and Terms & Conditions on www.noshok.com for complete details.



CAUTION

Read complete instructions prior to installation and operation of the meter.



WARNINGS

Risk of electric shock or personal injury.

This product is not recommended for life support applications or applications where malfunctioning could result in personal injury or property loss. Anyone using this product for such applications does so at his/her own risk. NOSHOK shall not be held liable for damages resulting from such improper use.

 **WARNING** Cancer and Reproductive Harm - www.P65Warnings.ca.gov

Limited Warranty

NOSHOK warrants this product against defects in material or workmanship for the specified period under "Specifications" from the date of shipment from the factory. NOSHOK's liability under this limited warranty shall not exceed the purchase value, repair, or replacement of the defective unit. See Warranty Information and Terms & Conditions on www.noshok.com/support/warranty-information for complete details.

Registered Trademarks

All trademarks mentioned in this document are the property of their respective owners.

© 2026 NOSHOK. All rights reserved.

Table of Contents

FREE IDE20 Configuration Software

The meter can be powered from the USB connection.

The easiest and quickest way to program your IDE20 meter is to use the FREE IDE20 Configuration Software available to download to your PC from www.noshok.com. The meter can be connected to your PC with a Micro B USB cable.

The IDE20 Configuration Software is intuitive, and most customers can get their meter programmed as they like without even looking in the manual.

Once your meter is programmed the way you want it, you can wire it up for your application per the instructions in this manual and install it. If you find that you need to make adjustments to the programming after the meter is installed, you can use the front panel buttons and the instructions in this manual to do so.



Table of Contents

Introduction.....	9
Key Features	10
Informative Display	10
Alarm Indication	11
Feet & Inches Display with Bargraph	12
14-Segment Characters	13
Predefined and Custom Units	13
Password Protection.....	13
Multiple Outputs	13
Ordering Information.....	14
General Purpose Instruments	14
Hazardous Area Instruments	14
Specifications	15
Display	15
General.....	16
Input	18
Common Open Collector & Relay (Alarm) Specifications	19
Open Collector Output.....	20
Solid State Relays	20
4-20 mA Transmitter Output.....	21
On-Board Digital Input.....	21
IDE20 Configuration Software.....	22
General Compliance Information	23
Electromagnetic Compatibility.....	23
IDE20-G-HB Compliance Information	24
Ordinary Location Approvals.....	24
IDEH20-H-HB Compliance Information	24
Hazardous Area Approvals	24

Table of Contents

EU Declaration of Conformity	28
Safety Information	29
Installation	30
Unpacking	30
Panel Mounting Instructions	31
IDE20 Configuration Software	34
IDE20 Configuration Software Installation	35
Connecting to the Computer	36
Specifications	36
Dimensions	37
Connections	39
Connectors Labeling	40
Wiring Diagrams	42
Safe Area Current Loop (4-20 mA) Connections	42
Safe Area Digital Input Connections	43
Safe Area 4-20 mA Output Connections	44
Safe Area Solid State Relay Connections	45
Safe Area Open Collector Output Connections	46
Remote Operation of Meter	47
Setup and Programming	48
Overview	48
IDE20 Configuration Software	49
Front Panel Buttons and Status LCD Indicators	50
Display Functions & Messages	52
Main Menu	62
Setting Numeric Values	63
Scaling the 4-20 mA Input (INPUT)	64
Available Unit Classes and Units	65

Table of Contents

Setting Custom Units (CUSTOM).....	68
Scaling Example	69
Setting the Display Features (DISPLAY)	70
Changing the Engineering Units (UNITS)	70
Changing the Decimal Point (DECP)	71
Enabling or Disabling Commas on the Bottom Display (COMMA)	71
Display Capabilities Optimization (BOTTOM)	72
Configuring the Display (BOTTOM)	73
Programming the Bargraph (BARGRAPH).....	74
Programming the Outputs (OUTPUT)	75
Open Collector Outputs (OPEN COLLECTR)	76
Solid State Relay Outputs (RELAY)	84
Isolated 4-20 mA Output (4-20 mA)	97
Output Manual Control (CONTROL)	98
Advanced Features Menu (ADVANCE).....	99
Advanced Process Variable Setup (ADV PV SETUP).....	100
Advanced Scaling and Calibration (SCALECAL)	105
Low-Height Cutoff (CUTOFF)	107
Noise Filter (FILTER)	107
Noise Filter Bypass (BYPAS).....	107
Enabling Password Protection (PASSWORD)	108
Programmable Function Keys User Menu (USER)	109
Tare (TARE)	110
Changing System Settings (SYSTEM).....	114
Meter Operation	119
Front Panel Buttons Operation	120
Function Keys Operation.....	120
Digital Input Operation.....	120
Maximum/Minimum Readings	121

Table of Contents

Runtime & Cycle Count (INF)	122
Changing PV2 Engineering Units	123
Troubleshooting	124
Reset Meter to Factory Defaults	125
Determining Software Version	126
Factory Default Settings	127
Troubleshooting Tips	133

Table of Figures

Figure 1. 1/8 DIN Panel Cutout Dimensions	32
Figure 2. Panel Mounting Details	33
Figure 3. Meter Dimensions - Side View.....	37
Figure 4. Meter Dimensions - Front View	38
Figure 5. Connector Labeling for IDE20-#-D(B)-0	40
Figure 6. Connector Labeling for IDE20-#-D(B)-1	40
Figure 7. Connector Labeling for IDE20-#-D(B)-2	41
Figure 8. Connector Labeling for IDE20-#-D(B)-3	41
Figure 9. 4-20 mA Input Connection without Backlight	42
Figure 10. 4-20 mA Input Connection with Backlight.....	43
Figure 11. Digital Input Connections	43
Figure 12. 4-20 mA Output Connections	44
Figure 13. Solid State Relay Connections.....	45
Figure 14. Open Collector Output Connections	46
Figure 15. Control Station Connected to IDE20-G-DB	47

Introduction

Introduction

These loop-powered 1/8 DIN digital panel meters can be installed virtually anywhere to provide convenient and informative display of any 4-20 mA signal. One of the most convenient features of these instruments is their dual line display. The top line is used to display level in feet and inches while the 8-digit alphanumeric bottom line may be used to display a tag custom message. Another common setup is to display the input in feet and inches on the top line and in another scale on the bottom line (such as the volume in gallons).

Further enhancing the display on these instruments is a 20-segment bargraph that also includes a numeric value of the percentage the bargraph represents.

These loop-powered meters can be installed virtually anywhere because they get their power from the 4-20 mA loop and therefore require no separate power source. And they only drop 1.5 V (4.5 V with backlight), so they add very little burden to the loop. Additional features that allow these instruments to be installed virtually anywhere include a Type 4X, NEMA 4X, IP65 front panel, an operating temperature range of -40 to 167°F (-40 to 75°C) (for safe area products), conformally coated PCBs, and a backlit LCD that can be read in bright sunlight or dimly lit areas. Finally, there are intrinsically safe and nonincendive versions of these instruments that can be installed in hazardous areas.

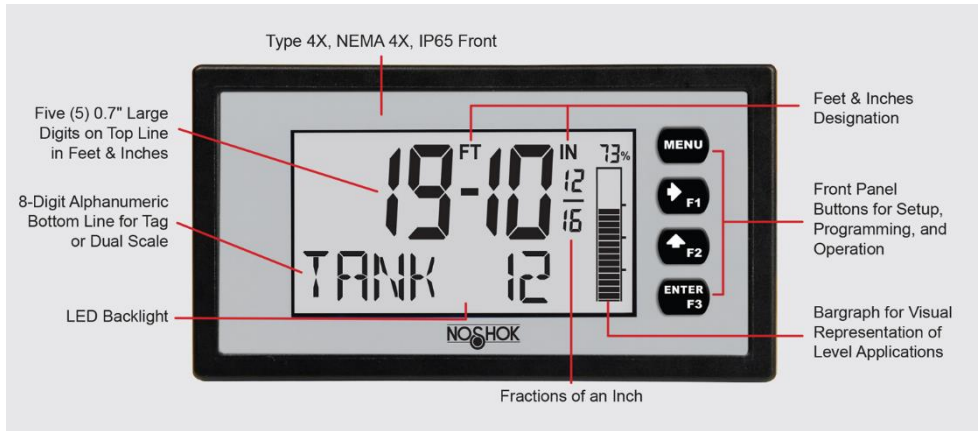
Free IDE20 Configuration Software connects via a Micro B USB cable for meter setup and programming. Download the latest version at www.noshok.com.

All models come equipped with two open collector outputs and a digital input. There are also models available with two solid state relays and isolated 4-20 mA analog output options. The open collector outputs are useful for alarm indication. The digital input can be used to acknowledge the relays, to start/stop a timer/stopwatch, and more. The relays can be programmed for alarm indication, on/off control, or pump alternation.

Key Features

Key Features

IDE20-G-HB / IDE20-H-HB Feet & Inches Level Meter



Informative Display

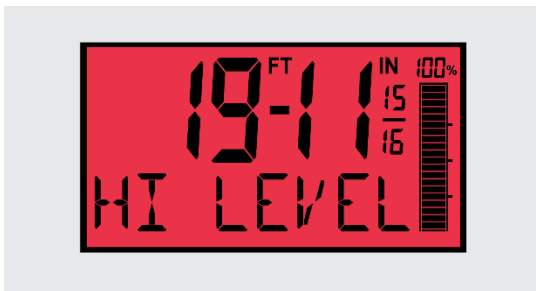
The IDE20's display provides multiple ways to help users understand and keep track of their processes. The most obvious is the dual line which allows the user to display a numeric value of the process variable in feet & inches on the top line and units and/or a tag on the bottom line. There is also a bargraph that includes a numeric value of the percentage the bargraph represents.

Predefined display units give users even more display flexibility. Plus, the high contrast backlit LCD display is readable from far away and under various lighting conditions.

Key Features

Alarm Indication

When an alarm occurs, the IDE20's display can be programmed to turn red. It may also be set up to flash an alarm message along with the process variable. The flashing red alarm message can be activated even if no relay or open collector is connected.



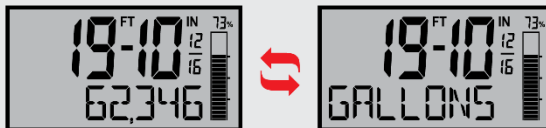
Key Features

Feet & Inches Display with Bargraph

The IDE20-G-HB and IDE20-H-HB is designed for users that prefer to see their level displayed in feet & inches instead of decimal format. The IDE20 can display level to 999FT 11IN & 15/16 on the top display. The bottom display can toggle between a tag and units or if dual scale mode is used, can display the input in a different scale such as volume.



Level in Feet & Inches with tag and bargraph



Same meter with bottom line toggling between tag, volume (19 FT-10 IN & 12/16) and units (Gallons)

Key Features

14-Segment Characters

Notice how much better letters like “T”, “N” and “K” appear as 14-segment characters on the IDE20 vs 7-segment characters found on many other meters.



Predefined and Custom Units

The meter has six available preprogrammed unit classes: volume, height, temperature, pressure, weight, and rate. When the desired unit class or unit of measure within a class is not available, a custom unit may be programmed.

Password Protection

A password can be set up for programming security to prevent unauthorized changes to the programmed parameter settings.

Multiple Outputs

- Two open collector outputs (standard)
- Two solid state relays (optional)
- One 4-20 mA output (optional)

The open collector outputs and relays generally operate in the same manner, with the major exception being the open collectors are not available for pump alternation, and the relays are not available with pulse features. The open collectors and relays can be controlled either automatically or manually.

The isolated analog output signal can be configured to represent the process variable (PV1, PV2, or retransmit). It can also be reverse scaled such that the meter's high calibration value outputs 4 mA and the meter's low calibration outputs 20 mA.

Ordering Information

Ordering Information

General Purpose Instruments

IDE20-G-HB • Feet & Inches Models – General Purpose	
Model	Description
IDE20-G-HB-0	Loop-Powered, General Purpose, Feet & Inches, No Options
IDE20-G-HB-1	Loop-Powered, General Purpose, Feet & Inches, Two Solid State Relays
IDE20-G-HB-2	Loop-Powered, General Purpose, Feet & Inches, 4-20 mA Analog Output
IDE20-G-HB-3	Loop-Powered, General Purpose, Feet & Inches, Two Solid State Relays and 4-20 mA Analog Output

Hazardous Area Instruments

IDE20-H-HB • Feet & Inches Models – Hazardous Area	
Model	Description
IDE20-H-HB-0	Loop-Powered, Hazardous Area, Feet & Inches, No Options
IDE20-H-HB-1	Loop-Powered, Hazardous Area, Feet & Inches, Two Solid State Relays
IDE20-H-HB-2	Loop-Powered, Hazardous Area, Feet & Inches, 4-20 mA Analog Output
IDE20-H-HB-3	Loop-Powered, Hazardous Area, Feet & Inches, Two Solid State Relays and 4-20 mA Analog Output

Notes:

1. All models come with two open collector outputs and one digital input standard.
2. General purpose instruments (IDE20-G-HB) are UL Listed for general electrical safety only.
3. Hazardous area instruments (IDEH20-H-HB) are UL Listed for hazardous areas.
4. All instruments are CE marked.

Specifications

Specifications

Except where noted all specifications apply to operation at +25°C.

Display

Display	Dual-line LCD with backlight. Top: 0.7" (17.8 mm), 5 digits 7-segment, FT-IN & fractions. Bottom: 0.4" (10.2 mm), 8 alphanumeric 14-segment characters. Display may be programmed to turn red and flash a user-defined message on alarm condition.
Backlight	Powered by 4-20 mA loop Intensity varies with signal level
Top Line	-99FT 11IN 15/16 to 999FT 11IN 15/16
Top Line Fractions	FT – IN/*: Automatically reducing fractions to the lowest denominator. FT-IN/16, FT-IN/8, FT-IN/4, FT-IN/2, FT-IN
Bottom Line	8 digits (-9,999,999 to 99,999,999; separated by commas) or 8 characters (all capital & most lower-case letters)
Bargraph	20 segments, numeric percent indication at the top of the bargraph
Decimal Point	Up to seven decimal places on bottom line
Commas	Commas to indicate 1000s (e.g. 88,987,628) on bottom line
Dual-Scale Feature	The input can be displayed in different scales on the top and bottom lines. For instance, the top line could display the input in height and the bottom line could display that same input in volume.
Alarm Indication	Red backlight, flashing display. Bargraph segment flashes on alarm.

Specifications

Alarm Message	On or Off; user programmable, 8 characters maximum. Displayed every 10 seconds for 1 second on bottom line.
Display Update Rate	Ambient > -10°C: 1 Update/Second Ambient = -20°C: 1 Update/2 Seconds From -20°C to -40°C the update rate slows down 1 second for every -2°C (e.g. at -24°C, 1 update/4 seconds).
Overrange	Top: 999 11 15/16; Bottom: 99,999,999 (flashing)
Underrange	Top: -99 11 15/16; Bottom: -9,999,999 (flashing)

General

Programming Method	Front panel & Free PC-based USB programming software
Enclosure & Materials	Enclosure: 1/8 DIN, IP65, Type 4X, NEMA 4X front panel, high impact plastic, NORYL® polyphenylene ether & polystyrene blend (PPE PS) resin, UL 94V-0, Color: gray Gasket: Silicone Rubber Faceplate: LEXAN® polycarbonate (PC) Film Buttons: Silicone rubber; Color: black
Environmental	<i>Operating temperature range:</i> -40 to 75°C for safe area products -40 to 70°C for hazardous area products <i>Storage temperature range:</i> -40 to 85°C <i>Relative humidity:</i> 0 to 90% non-condensing; Printed circuit boards are conformally coated.
Noise Filter	Averages the input signal over a period of time between 1 and 16 seconds to dampen the effects of a noisy signal that causes a jumpy display.
Filter Bypass	0.0 to 99.9% of full scale. Input signal changes greater than bypass value are displayed immediately.

Specifications

Recalibration	Recalibration is recommended at least every 12 months.
Max/Min Display	Max/min readings reached by the process are stored until reset by the user or until power to the meter is turned off.
Tare	Tare function zeros out PV1 to accommodate for unwanted height or zeros out PV2 for weight of a container. Tare function can be assigned to a function key or a digital input.
Password	Programmable password restricts modification of programmed settings.
Non-Volatile Memory	All programmed settings are stored in non-volatile memory for a minimum of ten years if power is lost.
Normal Mode Rejection	64 dB at 50/60 Hz
Connections	Removable screw terminals accept 12 to 22 AWG wire
Tightening Torque	<i>Screw terminal connectors:</i> 4.5 lb-in (0.5 Nm) <i>Mounting screws:</i> 8.0 lb-in max. (0.9 Nm)
Overall Dimensions	4.68" x 2.45" x 3.79" (119 mm x 62 mm x 96 mm) (W x H x D)
Weight	8.7 oz (247g) with option board
Warranty	3 years parts and labor. See Warranty Information and Terms & Conditions on www.noshok.com for complete details.

Specifications

Input

Input	4-20 mA
Accuracy	±0.02% of span ±1 count
Voltage Drop	Without Backlight: 1.5 V maximum, With backlight: 4.5 V maximum
Equivalent Resistance	With backlight off: 75 Ω @ 20 mA With backlight on: 225 Ω @ 20 mA
Input Overload	Over current protection to 1 A maximum Over voltage protection to 30 VDC max (between mA+ and mA-/BL-)
Temperature Drift	25 PPM/°C from -40 to 75°C ambient
Function	PV1: Linear (2-32 points) PV2: Linear (2-32 points) or Round Horizontal Tank
Low-Height Cutoff	1/16 to 999 FT 11 IN 15/16 or disable. Point below at which the display always shows zero.
HART Transparency	The meter does not interfere with existing HART communications; it displays the 4-20 mA primary variable and it allows the HART communications to pass through without interruption. The meter is not affected if a HART communicator is connected to the loop. The meter does not display secondary HART variables.

Specifications

Common Open Collector & Relay (Alarm) Specifications

Number	Two open collectors & two relays
High or Low Alarm	User programmable for high or low alarm
Alarm Deadband	0-100% FS, user programmable
Output Assignment	Pulse, Alarm, Timer, Stopwatch, or Disable
Alarm Output Source	Assign to PV (PV1, PV2) or Digital Input
On & Off Time Delay	0 to 9,999 seconds
Fail-Safe Operation	Independent for each open collector and relay. Fail-safe on, the output is on under normal conditions. Fail-safe off, the output is on under alarm conditions.
Alarm Operation	Automatic, automatic with manual override, latching (manual reset anytime), latching with reset after cleared (manual reset only after alarm has cleared)
Alarm Indication	Programmable: red backlight, flashing display, alarm message. Bargraph segment flashes on alarm.
Alarm Message	Programmable: 8 characters maximum; displayed every 10 sec for 1 sec on bottom line. May be turned off.
Alarm Acknowledge	Front panel ACK button or external digital input resets output and screen indication.
Auto Initialization	When power is applied to the meter, open collectors and relays will reflect the state of the input to the meter.
Timer Output	One-shot or Continuous Off Time Delay: 1 sec to 99:59:59 (hrs:min:sec) On Time: 1 sec to 99:59:59 (hrs:min:sec)
Stopwatch	Output turns on when started and off when stopped.

Specifications

Open Collector Output

Rating	Isolated open collector, sinking NPN 5-30 VDC @ 150 mA maximum
Output Assignment	Pulse, Alarm, Timer, Stopwatch on/off, or Disable
Pulse Output Source	PV (PV1, PV2) or Test Frequency
Pulse Output Factor	0.000001 to 999,999.9
Pulse Width	0.5 ms @ 1 kHz; 500 ms @ 1 Hz; 50% duty cycle
Pulse Output Frequency	1,000 Hz maximum
Quadrature Pulse Output	Available for Output 2 (90° behind Output 1)
Alarm Output Source	Assign to PV (PV1, PV2) or Digital Input

Solid State Relays

Rating	250 VAC/VDC @ 1A resistive 75VA; 250VAC; 0.6A pilot duty (inductive) – UL Code D300 25VA; 250VDC; 0.6A pilot duty (inductive) – UL Code R300
Noise Suppression	Metal oxide varistors across outputs
Relay Assignment	Pump Alternation, Alarm, Timer, Stopwatch on/off, or Disable
Alarm Output Source	Assign to PV (PV1, PV2) or Digital Input
Pump Alternation	Relays may be programmed to alternate with each pump cycle with an elapsed time override where the pumps will alternate regardless of level. Pump alternation time can be programmed for 0 to 999:59 (hrs:min)
Relay (Pump) Runtime	Meter will keep track of how long each relay (pump) has operated and display this information
Relay (Pump) Cycles	Meter will keep track of how many times the relays (pumps) have cycled and display this information

Specifications

4-20 mA Transmitter Output

Accuracy	$\pm 0.05\%$ FS ± 0.001 mA
Output Source	PV1, PV2, re-transmit; reverse scaling allowed
Scaling Range	1.00 to 23.0 mA
Disable	High impedance state, less than 1 mA
Calibration	Factory calibrated 4.00 to 20.00 mA
Underrange	1.0 mA, 3.5 mA, or 3.8 mA (If input < 3.5 mA); or Off; user selectable
Overrange	20.5 mA, 20.8 mA, or 23.0 mA (If input > 20.5 mA); or Off; user selectable
Isolation	500 V input-to-output
Temperature Drift	0.5 μ A/ $^{\circ}$ C max from -40 to 75 $^{\circ}$ C ambient
External Loop Power Supply	7.0 VDC to 30.0 VDC maximum
Output Loop Resistance	10-750 Ω @ 24 VDC; 10-1100 Ω @ 30 VDC

On-Board Digital Input

Function	Remote operation of front-panel buttons, acknowledge/reset relays, reset max/min values, etc. See User section of <i>Display Functions & Messages</i> on page 52 for a complete list of capabilities.
Contacts	2.1 VDC on contact. Connect normally open contacts across DI+ and DI-
Logic Levels	Logic High: 2.4 to 30 VDC (max) Logic Low: 0 to 0.9 VDC

Specifications

IDE20 Configuration Software

Availability	Free download from www.noshok.com
System Requirements	Microsoft® Windows® 10/11
Communications	USB 2.0 (Standard USB A to Micro USB B)
Configuration	Configure all parameters on the meter. Configure meters one at a time.
Configuration Files	Generate with or without meter connected; Save to file for later use.
USB Power Connection	Meter is powered by USB connection during programming, if 4-20 mA loop is not connected.



WARNING

The meter should only be connected to a computer while it is located in a safe area.



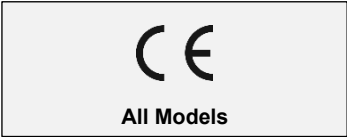
To download the Configuration programming software, visit noshok.com.

General Compliance Information

General Compliance Information

Electromagnetic Compatibility

EMC Emissions	• CFR 47 FCC Part 15 Subpart B Class A emissions requirements (USA) • AS/NZS CISPR 11 Class A ISM emissions requirements (Australia) • EN 55011 Group 1 Class A ISM emissions requirements (EU) • ICES-001 Issue 4 ISM emissions requirements (Canada)
EMC Emissions and Immunity	EN 61326-1 EMC requirements for Electrical equipment for measurement, control, and laboratory use – Industrial Use



IDE20-G-HB & IDE20-H-HB Compliance Information

IDE20-G-HB Compliance Information

Ordinary Location Approvals

UL & C-UL Listed	UL File Number: E493885 USA & Canada UL 61010-1 CAN/CSA-C22.2 No. 61010-1-12
Front Panel	UL Type 4X, NEMA 4X, IP65; panel gasket provided
Low Voltage Directive	IEC 61010-1 Safety requirements for electrical equipment for measurement, control, and laboratory use.
Additional Standards	UL 50E

IDEH20-H-HB Compliance Information

Hazardous Area Approvals

UL & C-UL	UL File Number: E549633  Class I, Division 1, Groups A, B, C and D T4 Class I, Division 2, Groups A, B, C and D T4 Ex ia IIC T4 (Canada); Class I Zone 0, Zone 1, AEx ia IIC T4 (U.S.); Class I Zone 2, Group IIC T4 (U.S.) UL Type 4X, IP65 PROCESS CONTROL EQUIPMENT FOR USE IN HAZARDOUS LOCATIONS
----------------------	---

IDE20-G-HB & IDE20-H-HB Compliance Information

UL Assessment Standards

United States Standards	Canadian National Standards
UL 913, Eighth Edition UL 60079-0, Sixth Edition UL 60079-11, Sixth Edition Standard No. UL 121201, 9th Edition	CSA C22.2 No. 60079-0:15 CSA C22.2 No. 60079-11:14 CAN/CSA C22.2 No. 213-17



IDE20-H-HB Hazardous Area Only
IDE20-G-HB Ordinary Location Only

IDE20-G-HB & IDE20-H-HB Compliance Information

UL/C-UL Special Conditions for Safe Use

- Associated apparatus may be in a Division 2 or Zone location if so approved.
- Under certain extreme circumstances, the non-metallic parts incorporated in the enclosure of this equipment may generate an ignition-capable level of electrostatic charge. Therefore, the equipment shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. This is particularly important if the equipment is installed in a zone 0 location. In addition, the equipment shall only be cleaned with a damp cloth.
- The equipment shall be installed in a tool secured enclosure which provides a minimum degree of protection of IP20 for the equipment connections.
- Entity parameters must meet the following requirements:
U_i: 30 V; I_i: 175 mA; C_i: 0 μF; L_i: 0 μH; P_i: 1.0 W

I.S. Equipment Entity Parameters	Required Relationship Between Entity Parameters	I.S. Barrier Entity Parameters
V max (or U _i)	≥	Voc or Vt (or U _o)
I max (or I _i)	≥	Isc or It (or I _o)
P max, P _i	≥	P _o
C _i + C _{cable}	≤	Ca (or C _o)
L _i + L _{cable}	≤	La (or L _o)

- **For Division 2 and Zone 2 Applications:** Division 2 and Zone 2 installations do NOT require the use of an intrinsically safe barrier or intrinsically safe entity parameters. Class I, Division 2, Groups A, B, C, and D T4 and Class I, Zone 2, Group IIC T4, -40C ≤ Ta ≤ +70C. Ratings: V = 30 V dc, I = 30 mA; Relay Ratings: 250V ac/dc 1A

IDE20-G-HB & IDE20-H-HB Compliance Information

For North American Community:

Installation and service of this device and/or associated apparatus (barrier) should be performed only by trained service personnel and must be installed in accordance with the manufacturer's control drawing, Article 504 of the National Electric Code (ANSI/NFPA 70) for installation in the United States, or Section 18 of the Canadian Electrical Code for installations in Canada.



EXPLOSION HAZARD – Do not disconnect equipment unless power has been removed or the area is known to be non-hazardous.

RISQUE D'EXPLOSION – NE PAS BRANCHER NI DÉBRANCHER SOUS TENSION.

Year of Construction

This information is contained within the serial number with the first four digits representing the year and month in the YYMM format.

EU Declaration of Conformity

EU Declaration of Conformity

For reference, the EU Declarations of Conformity for the IDE20-G-HB and IDE20-H-HB are available at www.noshok.com.

Installation and Unpacking

Safety Information



CAUTION

Read complete instructions prior to installation and operation of the meter.



WARNINGS

Hazardous voltages exist within enclosure. Installation and service should be performed only by trained service personnel.

Service requiring replacement of internal components must be performed at the factory.

Control room equipment must not use or generate more than 250 VRMS or VDC.

Hazardous location installation instructions for associated apparatus (barrier) must be followed when installing this equipment.

IDE20-G-HB / IDE20-H-HB Series Loop-Powered meters do not add capacitance or inductance to the loop under normal or fault conditions.

Substitution of components may impair hazardous location safety.

Equipment contains non-metallic materials and therefore special care and consideration should be made to the performance of these materials with respect to chemicals which may be present in a hazardous environment.

Installation and Unpacking

Installation

There is no need to remove the meter from its case to complete the installation, wiring, and setup of the meter for most applications.



WARNING

IDE20-H-HB installation must be performed in accordance with Control Drawing LIM6600-2NS in order to meet agency approval ratings.

Unpacking

Remove the meter from box. Inspect the packaging and contents for damage. Report damages, if any, to the carrier.

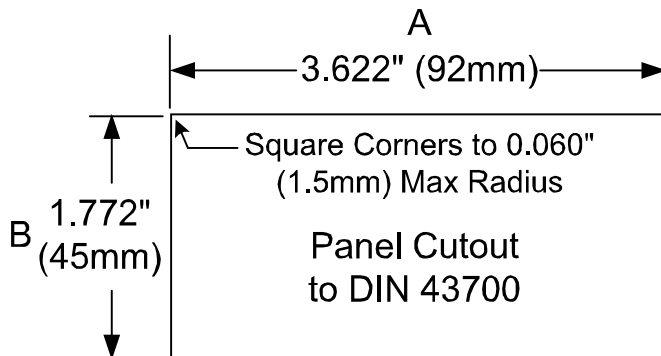
If any part is missing or the meter malfunctions, please contact your supplier or the factory for assistance.

Installation and Unpacking

Panel Mounting Instructions

- Prepare a standard 1/8 DIN panel cutout – 3.622" x 1.772" (92 mm x 45 mm). Refer to *Figure 1* and *Figure 2* below, for more details.
- Clearance: allow at least 4.0" (102 mm) behind the panel for wiring.
- Panel thickness: 0.04" - 0.25" (1.0 mm - 6.4 mm). Recommended minimum panel thickness to maintain Type 4X rating: 0.06" (1.5 mm) steel panel, 0.16" (4.1 mm) plastic panel.
- Remove the two mounting brackets provided with the meter (back-off the two screws so that there is 1/4" (6.4 mm) or less through the bracket. Slide the bracket toward the front of the case and remove).
- Insert meter into the panel cutout.
- Install mounting brackets and tighten the screws against the panel. To achieve a proper seal, tighten the mounting bracket screws evenly until meter is snug to the panel along its short side. DO NOT OVER TIGHTEN, as the rear of the panel may be damaged.

Installation and Unpacking



Tolerances:

A: +0.032 (+0.8mm)
-0.000 (-0.0mm)

B: +0.024 (+0.6mm)
-0.000 (-0.0mm)

Figure 1. 1/8 DIN Panel Cutout Dimensions

Installation and Unpacking

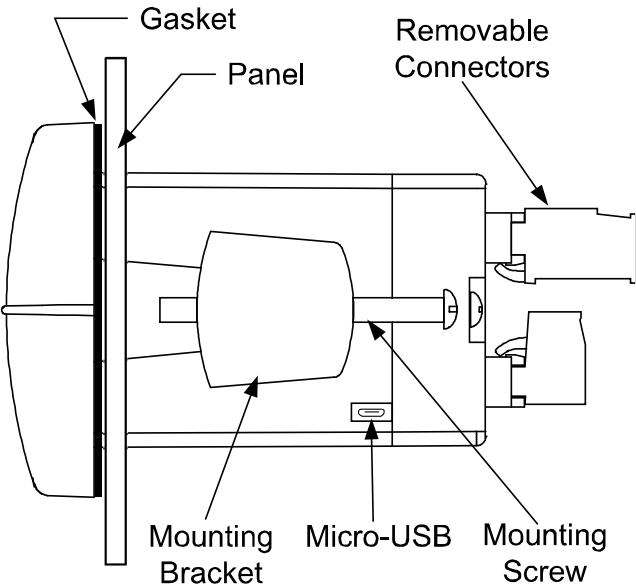


Figure 2. Panel Mounting Details

Installation and Unpacking

IDE20 Configuration Software



Free, PC-based, IDE20 Configuration Software that connects to the meter via a USB cable is available for programming and setup of the meters. This software greatly simplifies the programming process and allows the user to save configuration files for later use. The meter will also be powered by the USB connection so no additional power is needed during programming.

- Free PC-Based USB Programming Software
- Easy Programming of Feature-Packed Product
- USB Connection Provides Power to the Meter During Programming
- Save & Print Configuration Files without Meter Connected
- PC Data Logging for One or Multiple Variables

Installation and Unpacking

IDE20 Configuration Software Installation



WARNING

The meter should only be connected to a computer while it is located in a safe area.



IMPORTANT

Please uninstall previous versions of this software prior to downloading, installing, and running the latest version.

1. Download the installation file to your PC by going to www.noshok.com
2. Locate the IDE20 Configuration Software zipped folder on your PC and double-click to extract and open:
3. Double-click the Windows Installer Package file to open:
4. The Setup Wizard window will appear. Click “Next” to start the installation process.
5. The License Agreement window appears next. Select “I agree” and click “Next” to continue the installation process.
6. Choose the folder location where you would like the software to be installed to and select options for use. Then click “Next” to continue.
7. Confirmation window will appear. Click “Next” to confirm the installation.
8. The User Account Control message is displayed. Click “Yes” to proceed with the installation.
9. Finally, the Installation Complete window will appear. Click “Close” to exit.

Now you are ready to open the configuration software to begin programming your IDE20 meter.

Installation and Unpacking

Connecting to the Computer

IDE20 series meters may be connected to any Windows 10 or 11 PC via a Micro B USB cable by following these steps:

1. Open the IDE20 Configuration Software.
2. Connect the IDE20 meter to the PC with a Micro B USB cable.
3. The software will ask if you would like to read the meter. Click OK.

Specifications

Availability	Free download from www.noshok.com
System Requirements	Microsoft® Windows® 10/11
Communications	USB 2.0 (Standard USB A to USB B)
Configuration	Configure all parameters on the meter. Configure meters one at a time.
Configuration Files	Generate with or without meter connected; Save to file for later use.
USB Power Connection	Meter is powered by USB connection during programming, if 4-20 mA loop is not connected.

Dimensions

Dimensions

All units: inches (mm)

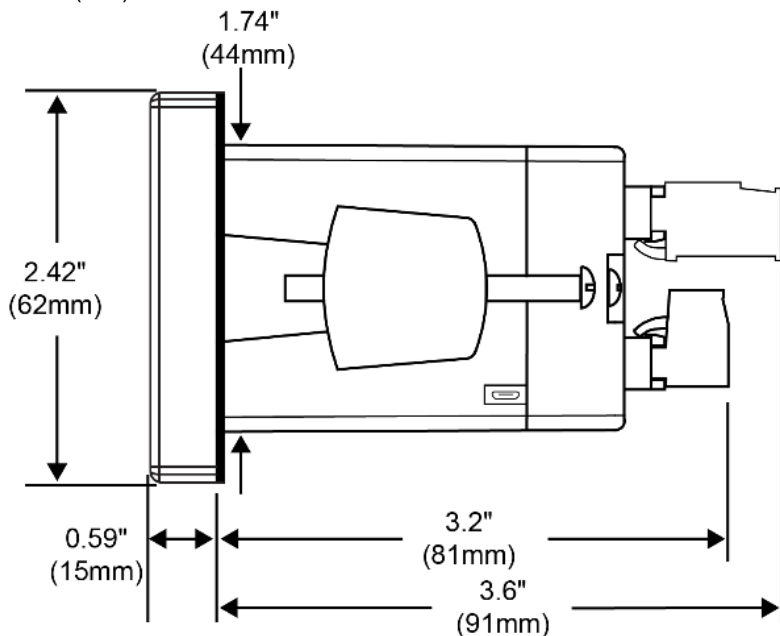


Figure 3. Meter Dimensions - Side View

Dimensions

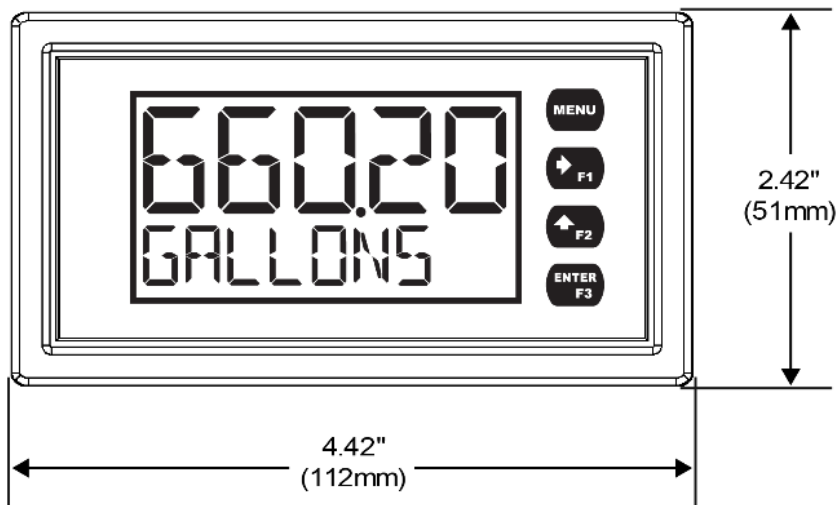


Figure 4. Meter Dimensions - Front View



CAUTION

- Use copper wire with 60°C or 60/75°C insulation for all line voltage connections. Observe all safety regulations. Electrical wiring should be performed in accordance with all applicable national, state, and local codes to prevent damage to the meter and ensure personnel safety.

Connections

Connections

All connections are made to removable screw terminal connectors located at the rear of the meter.

This section is only intended for IDE20-G-HB and IDE20-G-HB safe area installations.



WARNING

IDE20-H-HB installation must be performed in accordance with Control Drawing LIM6600-2NS in order to meet agency approval ratings.

Connections

Connectors Labeling

The graphics below show the location of all connectors available with requested configuration.

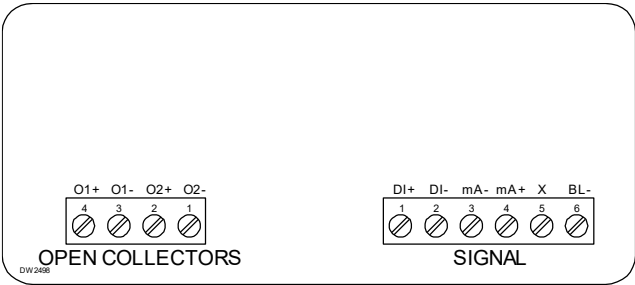


Figure 5. Connector Labeling for IDE20-#-HB-0

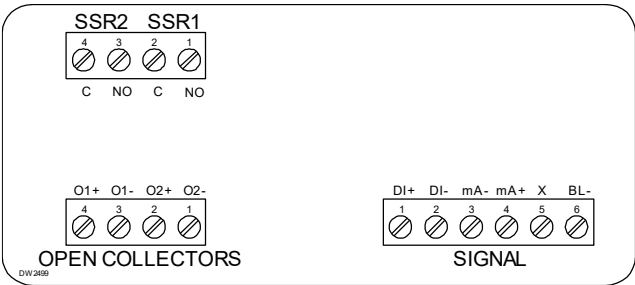


Figure 6. Connector Labeling for IDE20-#- HB -1

Connections

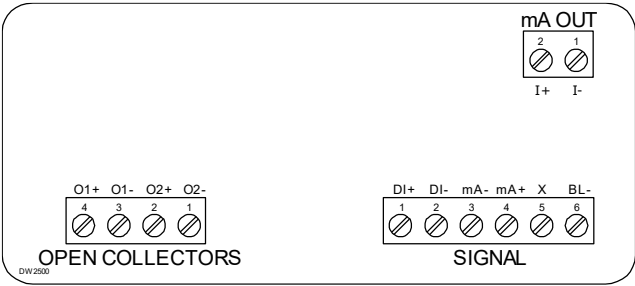


Figure 7. Connector Labeling for IDE20-#HB -2

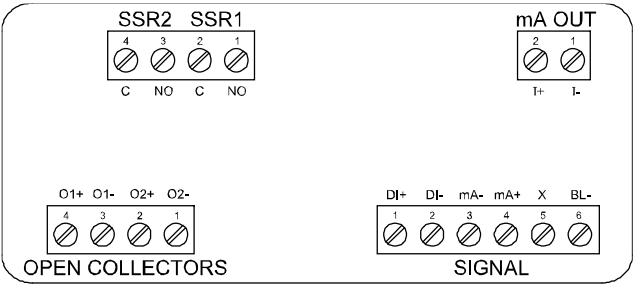


Figure 8. Connector Labeling for IDE20-#HB -3

Wiring Diagrams

Wiring Diagrams

Safe Area Current Loop (4-20 mA) Connections



WARNING

IDE20-H-HB installation must be performed in accordance with Control Drawing LIM6600-2NS in order to meet agency approval ratings.

Signal connections are made to a six-terminal connector labeled SIGNAL. See *Connectors Labeling* on page 40. The following figures show a 4-20 mA current loop connected to the meter. *Figure 9* shows the connection without the backlight and *Figure 10* shows the connection with the backlight (the backlight can be disabled/enabled in the **SYSTEM** menu). The meter is powered by the 4-20 mA current loop.

There are no switches or jumpers to set up for the input. Setup and programming is performed through the front panel buttons or PC-based software.

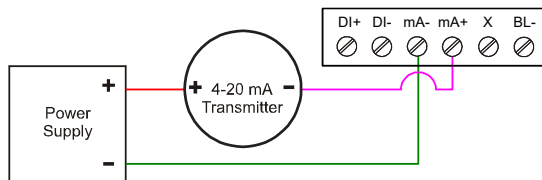


Figure 9. 4-20 mA Input Connection without Backlight

Wiring Diagrams

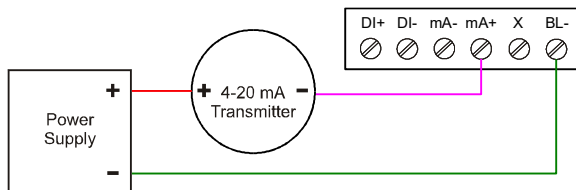


Figure 10. 4-20 mA Input Connection with Backlight

The current input is protected against current overload up to 1 amp. The display may or may not show a fault condition depending on the nature of the overload.

Safe Area Digital Input Connections

A digital input is standard on the meter. This digital input is connected with a normally open contact across DI+ and DI-, or with an active low signal applied to DI+ and DI-.

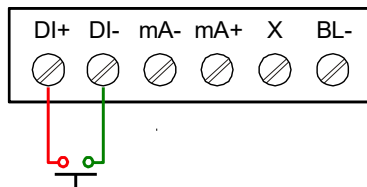


Figure 11. Digital Input Connections

Wiring Diagrams

Safe Area 4-20 mA Output Connections

Connections for the 4-20 mA transmitter output are made to the connector terminals labeled mA OUT. The 4-20 mA output must be powered from an external power supply.

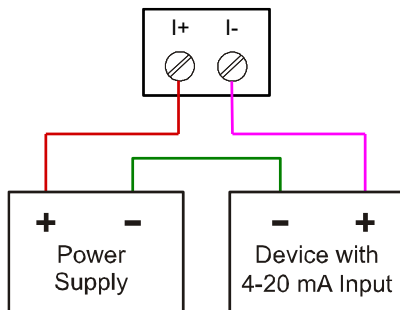


Figure 12. 4-20 mA Output Connections

Wiring Diagrams

Safe Area Solid State Relay Connections

Relay connections are made to a four-terminal connector labeled SSR1 and SSR2 on *Figure 6. Connector Labeling for* and *Figure 8. Connector Labeling for* on page 40. Each relay's C terminal is common only to the normally open (NO) contact of the corresponding relay.

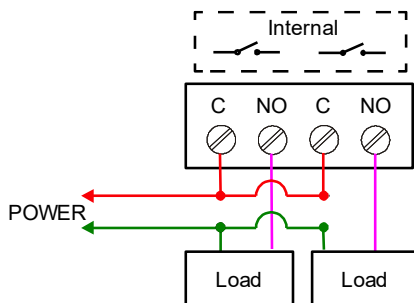


Figure 13. Solid State Relay Connections

Wiring Diagrams

Safe Area Open Collector Output Connections

Open collector output 1 and 2 connections are made to terminals labeled O1+ and O1-, and O2+ and O2-. Connect the alarm or pulse input device as shown below.

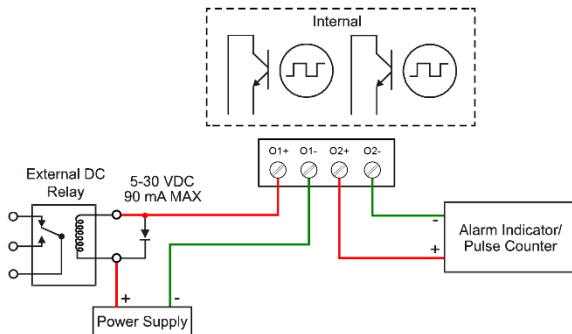


Figure 14. Open Collector Output Connections

Wiring Diagrams

Remote Operation of Meter

The meter is equipped with a digital input that can be programmed to perform various functions. Common uses for this digital input would be for resetting the meter's relays or open collectors, starting and stopping timers, and displaying max/min values. The digital input could be connected to a single button remote control station as illustrated in *Figure 15*. For a complete list of Digital Input settings, see *Function Keys & Digital Input Available Settings* on page 111.

Note:

Control stations may not carry hazardous area approvals and may not be suitable for location in hazardous areas. The use of additional protective devices may allow them to be installed in a safe area and connected to a device in a hazardous area. User should consult a professional engineer to determine suitability of these products for their specific application.

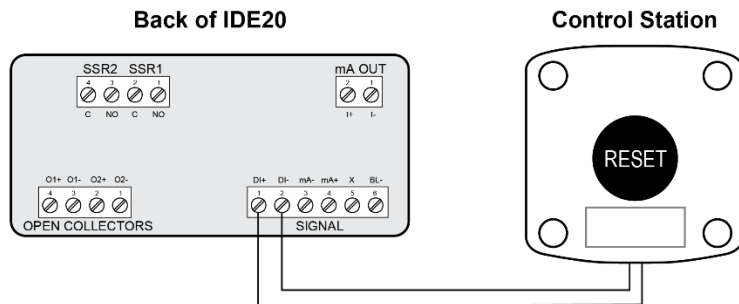


Figure 15. Control Station Connected to IDE20-G-DB

Setup and Programming

Setup and Programming

The meter is factory calibrated prior to shipment to display 0.00 to 100.00, which corresponds to the 4-20 mA input. The calibration equipment is traceable to NIST standards.

Overview

There are no jumpers to set; setup and programming is done through the front panel buttons or PC-based software.

The meter may be powered via the micro-USB connection located on the right side of the meter for the purposes of programming only. The backlight will not work while the meter is powered via the USB connection.

Setup and Programming

IDE20 Configuration Software

The fastest and easiest way to program the meter is using the free IDE20 Configuration Software. This software greatly simplifies the programming process and allows the user to save configuration files for later use.

The meter connects to the PC via a Micro B USB cable and is powered by the USB connection, so no additional power is needed during programming.

To download the IDE20 Configuration Software, visit noshok.com.



WARNING

The meter should only be connected to a computer while it is located in a safe area.



CAUTION

Care should be exercised to avoid ground loops when connecting the USB to an active loop (e.g. power supply, transmitter, loop-powered meter, etc.). It is recommended to connect the (mA+) terminal of the meter to the (-) terminal of a two-wire transmitter and the (mA-) to the (+) of the next device in the loop or to the (-) terminal of the power supply.

Setup and Programming

Front Panel Buttons and Status LCD Indicators



IDE20-G-HB/IDE20-H-HB

Setup and Programming

Button Symbol	Description
	Menu
	Right-Arrow/F1
	Up-Arrow/F2
	Enter/F3

LCD	Status
FT	Feet Designation
IN	Inches Designation
	PV Bargraph

1. Press the **Menu** button to enter or exit the Programming Mode at any time.
2. Press or hold the **Right-Arrow** button to scroll forward through the menus, select digits during numeric programming, select characters during text programming, or decrement the value of a digit or character selected with the **Up-Arrow** button.
3. Press and hold the **Right-Arrow** button to zero or clear digits/characters while in data-entry mode.
4. Press or hold the **Up-Arrow** button to scroll backwards through the menus or to increment the value of a digit or character.
5. Press the **Enter** button to access a menu or to accept a setting or programmed digit/character value.

Setup and Programming

Display Functions & Messages

The meter displays various functions and messages during setup, programming, and operation. The following table shows the main menu functions and messages in the order they appear in the menu.

Parameter	Action/Setting Description
INPUT (PV 1 and PV 2)	Program the meter 4-20 mA input (two menus, PV 1 and PV 2, are available if in dual-scale mode; see PV 2 under advanced features menu)
UNITS	Set the scaling units. PV/PV1: The meter can be scaled in any height units but will always be displayed in feet and inches. The value will automatically be converted to feet and inches. PV2: See <i>Available Unit Classes and Units</i> on page 65.
INCH	Inches
FEET	Feet
FT-IN	Feet & Inches
YARD	Yards
CM	Centimeters
M	Meters
INPUT 1	Program input 1 value
DISP 1	Program display 1 value
INPUT 2	Program input 2 value (up to 32 points)
DISP 2	Program display 2 value (up to 32 points)
SAVE?	Press <i>Enter</i> to save programmed units, input, and display values. Press <i>Menu</i> to cancel.

Setup and Programming

Parameter	Action/Setting Description
OUTPUT	Program the meter's available outputs
OPEN COLLECTOR	Program the meter's available outputs
OUTPUT 1	Open collector 1 setup
OUTPUT 2	Open collector 2 setup
DISABLE	Disable the open collector
PULSE	Program the open collector for pulse output
ALARM	Program the open collector for alarm output
TIMER	Program the open collector as a timer
STPWATCH	Program the open collector to turn on while the stopwatch is running
RELAY	Program the meter's relay outputs
RELAY 1	Relay 1 setup
RELAY 2	Relay 2 setup
DISABLE	Disable the relay
ALARM	Program relay for alarm functionality
PUMPCTRL	Program relay for pump control application
TIMER	Program relay as a timer
STPWATCH	Program relay to turn on while the stopwatch is running
RELAY INFO	View relay run time and cycle count
4-20 mA	Program the meter's 4-20 mA output
PV	Program a range to transmit based on the display value
RETRANS	Retransmit the 4-20 mA input signal

Setup and Programming

Parameter	Action/Setting Description
DISABLE	Disable the 4-20 mA output
CONTROL	Program manual or automatic operation for the outputs
OC1	Open collector 1
OC2	Open collector 2
RELAY1	Relay 1
RELAY2	Relay 2
4-20 mA	4-20 mA output
AUTO	Set selected output to automatic operation
MANUAL	Manually control selected output operation
ADVANCED	Program the meter's advanced features
ADV PV (PV1 and PV2)	Advanced 4-20 mA input programming (two menus, PV1 and PV2, are available if in dual-scale mode; see PV2 under advanced features menu)
SOURCE	Select PV2 source (dual-scale only; see PV2 under advanced features menu)
4-20 mA	Source PV2 from the 4-20 mA input
PV1	Source PV2 from PV1
FUNCTION	Select linear or round horizontal tank (PV2 only)
LINEAR	Set meter for linear function and select number of linearization points
RH TANK	Round horizontal tank (dual-scale only; see PV2 under advanced features menu)
SCALECAL	Scale or calibrate the 4-20 mA input
SCALE PV (1 or 2)	Scale the input

Setup and Programming

Parameter	Action/Setting Description
CAL PV (1 or 2)	Calibrate the input
CUTOFF	Set low-flow cutoff
DISABLE	Disable low-flow cutoff
ENABLE	Enable low-flow cutoff
FILTER	Set noise filter value
10 SEC	1 second
20 SEC	2 seconds
40 SEC	4 seconds
80 SEC	8 seconds
160 SEC	16 seconds
OFF	Turn filter off
BYPASS	Set filter bypass (0.0 to 99.9% FS)
PASSWD	Set a password for the meter
USER	Assign function keys and digital input
F1	Assign F1 function key
F2	Assign F2 function key
F3	Assign F3 function key
DI	Assign digital input
DISP FN	Set the function key or digital input to display a value
DISPLAY	Cycle max, min, and PV(s)

Setup and Programming

Parameter	Action/Setting Description
DISP PV	Display the PV
PCT PV	Display the PV's percentage of max (20 mA)
UNITS	Display the PV's units
TAG	Display the PV's tag
DISPMIN	Display the PV's minimum value
DISPMAX	Display the PV's maximum value
MIN MAX	Display the PV's minimum and maximum value
mA IN	Display the current mA input value
mAOUT	Display the current mA output value
MENU FN	Set the function key or digital input to access a menu
RLYINFO	Go to relay information menu (INFO)
MANCTRL	Go to output control menu (CONTROL)
TMR OC 1	Open collector 1 timer
TMR OC2	Open collector 2 timer
TIMER R 1	Relay 1 timer
TIMER R2	Relay 2 timer
TIMERFN	Set the function key or digital input to start or stop a timer
STARTALL	Start all timers
STOPALL	Stop all timers
SSTPALL	Start or stop all timers
OC 1	Start/stop open collector 1 timer

Setup and Programming

Parameter	Action/Setting Description
OC2	Start/stop open collector 2 timer
RLY 1	Start/stop relay 1 timer
RLY2	Start/stop relay 2 timer
START	Start the selected timer output
STOP	Stop the selected timer output
STR--STP	Start or stop the selected timer output
ALARMFN	Set the function key or digital input to acknowledge an alarm or access set points
ACK	Acknowledge all active alarms
SETPPOINT	Access all output set points
SETPTOC 1	Access open collector 1 set point
SETPTOC2	Access open collector 2 set point
SETPTR 1	Access relay 1 set point
SETPTR2	Access relay 2 set point
SWATCHFN	Set the function key or digital input to activate stopwatch
START	Start the stopwatch
STOP	Pause/Stop the stopwatch
STR--STP	Start or stop the stopwatch
TAREFN	Set the function key or digital input to tare the display
TARE	Tare the display value
RST TARE	Reset the display value
HOLD FN	Set the function key or digital input to hold an output

Setup and Programming

Parameter	Action/Setting Description
HOLD OUT	Hold all outputs
HL UNHLD	Hold or un-hold all outputs
OC 1+2	Hold/un-hold open collector outputs
RLY 1+2	Hold/un-hold relay outputs
m ROUT	Hold/un-hold 4-20 mA output
HOLD	Hold selected output
HL UNHLD	Hold or un-hold selected output
DISABLE	Disable the function key or digital input
RST FN	Set the function key or digital input to reset a value
RESET	Reset min, max, or max/min PV value
R MINMAX	Reset max and min PV value
HINT	Display hint text on first key press and execute action on second key press
OFF	Turn the hint function off
ON	Turn the hint function on
SYSTEM	Program system settings
ROUT CAL	Calibrate the analog output
DEFAULT	Reset meter to factory defaults
PV 2	Enable the meter to scale a second PV based on the same 4-20 mA input
DISABLE	Disable dual-scale feature (default)
ENABLE	Enable dual-scale feature

Setup and Programming

Parameter	Action/Setting Description
BACKLITE	Enable or disable the display backlight
ENABLE	Enable the backlight (default)
DISABLE	Disable the backlight
INFO	View meter software version and model, and change the meter identifier tag
SFT	The software ID number
VER	The software version
MODEL	The meter hardware model number
IDTAG	The meter identifier tag Press <i>Enter</i> to edit tag
ICAL	Internal calibration used for scaling
DISPLAY	Program the meter's display
UNITS	Change the feet and inches display for PV (PV1) or PV2 units if enabled
FT-IN/16	Display feet and inches with automatically reducing denominator up to sixteenths of an inch
FT-IN/16	Display feet and inches with sixteenths of an inch
FT-IN/8	Display feet and inches with eighths of an inch
FT-IN/4	Display feet and inches with quarter inches
FT-IN/2	Display feet and inches with half inches
FT-IN	Display only feet and inches
DECP	Change the decimal point location (dual-scale only; see PV 2 under advanced features menu)

Setup and Programming

Parameter	Action/Setting Description
COMMA	Enable or disable the use of a comma (dual-scale only; see PV 2 under advanced features menu)
ENABLE	Enable comma (default)
DISABLE	Disable comma
BARGRAPH	Enable or display the use of the bargraph
ENABLE	Enable bargraph (default)
DISABLE	Disable bargraph
BOTTOM	Select what to display on the bottom line
TAG	Display the tag (default)
STOPWATCH	Display the stopwatch
TMR OC1	Display open collector 1 timer
TMR OC2	Display open collector 2 timer
TIMER R1	Display relay 1 timer
TIMER R2	Display relay 2 timer
OFF	Turn bottom line off
PV PCT (1 or 2)	Display the process variable percentage of full scale
mA IN	Display the current mA input value
mA OUT	Display the current mA output value
UNITS	Display the units
PV (1 or 2)	Display the process variable

Setup and Programming

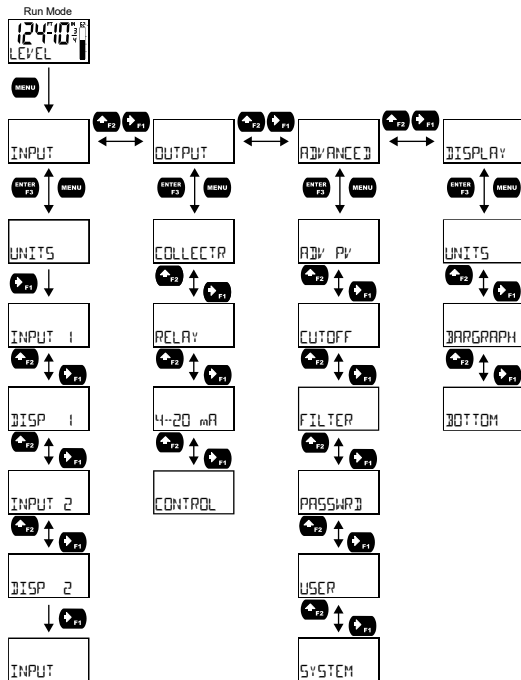
Parameter	Action/Setting Description
PV+UNIT (1 or 2)	Display the process variable and unit alternating
PV+TAG (1 or 2)	Display the process variable and tag alternating
TAG+UNIT	Display the tag and unit alternating
PV+U+TAG (1 or 2)	Display the process variable, unit, and tag alternating
PV 1+PV 2	Display both process variables (dual-scale only; see PV 2 under advanced features menu)

Setup and Programming

Main Menu

The main menu consists of all the meter's programmable functions: *Input*, *Output*, *Advanced*, and *Display*.

- Press **Menu** button to enter *Programming Mode* then press the **Right-Arrow** button to move forward through the menu and the **Up-Arrow** button to move back.
- Press **Menu** at any time to go back one level or press & hold to exit and return to *Run Mode*. Changes made to settings prior to pressing **Enter** are not saved.
- Changes to the settings are saved to memory only after pressing **Enter/F3** to confirm the setting or pressing **Enter/F3** at the **SAVE ?** screen when available.



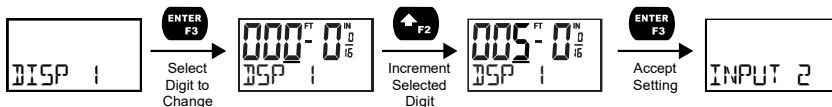
Setup and Programming

Setting Numeric Values

The numeric values are set using the **Right** and **Up-Arrow** buttons.

1. Press **Right-Arrow** to select next digit and **Up-Arrow** to increment digit value. The selected digit will flash.
2. Press and hold **Up-Arrow** to auto-increment the display value. If you have made a mistake or would like to enter a new value, select the left-most digit and press and hold the **Right-Arrow** button until all digits reset to zero.
3. Press the **Enter** button at any time to accept a setting or **Menu** button to exit without saving changes.

Note: the underscore in the graphic below is provided to show which digit would be flashing.

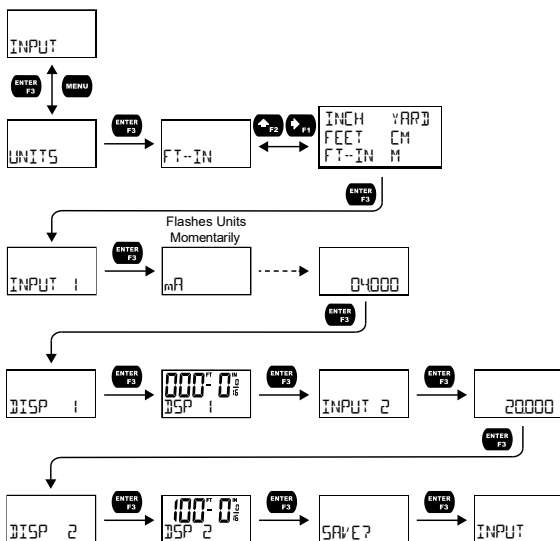


Setup and Programming

Scaling the 4-20 mA Input (INPUT)

It is **very important** to read the following information, before proceeding to program the meter:

- The meter is factory calibrated prior to shipment to display 0-100 feet, which corresponds to the 4-20 mA input. The calibration equipment is traceable to NIST standards.
- A calibrated signal source is not needed to scale the meter.
- The IDE20 is a single input meter with dual-scale capability.
- Enter the *Input* menu to scale the meter to display the 4-20 mA input. The input can accept any signal from 4 to 20 mA.



Setup and Programming

Available Unit Classes and Units

The process variable (PV) can be scaled in several different height units. No matter the scaling units, the scaled value will be converted to feet & inches for display. The available scaling units for the PV (or PV 1 in dual-scale mode) are:

INCH	Inches
FEET	Feet
FT-IN	Feet & Inches
YARD	Yards
CM	Centimeters
M	Meters

The meter has six available preprogrammed unit classes when programming PV2: *volume*, *height*, *temperature*, *pressure*, *weight*, and *rate*. These units are only available when the meter is in dual-scale mode and PV 2 is being programmed. PV 1 can only be programmed with height units.

Setup and Programming

Each unit class has the following available units to choose from:

Volume Units (VOLUME)	
GAL	Gallons
L	Liters
IGAL	Imperial Gallons
M3	Cubic Meters
BDL	Barrels
BUSH	Bushels
CUYD	Cubic Yards
CUFT	Cubic Feet
CUIN	Cubic Inches
L.BDL	Liquid barrels
BBBL	Beer barrels
HECTL	Hectoliter
AF	Acre-Foot
CUSTOM	Custom Unit

Temperature Units (TEMP)	
°F	Degrees Fahrenheit
°C	Degrees Celsius
K	Kelvin
°RA	Degrees Rankine

Height Units (HEIGHT)	
INCH	Inches
FEET	Feet
FT-IN	Feet & Inches
YARD	Yards
CM	Centimeters
M	Meters
CUSTOM	Custom unit

Setup and Programming

Pressure Units (PRESSURE)	
PSI	Pounds per square inch
InHg	Inches of mercury
InH ₂ O	Inches of water
mmHg	Millimeters of mercury
kg/cm ²	Kilograms per square centimeter
kg/m ²	Kilograms per square meter
mBar	Millibar
Bar	Bar
PA	Pascal
hPA	Hectopascal
kPA	Kilopascal
MPA	Megapascal
CUSTOM	Custom unit

Weight Units (WEIGHT)	
g _m	Grams
kg	Kilograms
tonne	Tonnes (metric)
oz	Ounces
lb	Pounds
ton	Tons
CUSTOM	Custom unit

Rate Time Bases (TIME)	
/SECOND	Units per second
/MINUTE	Units per minute
/HOUR	Units per hour
/DAY	Units per day

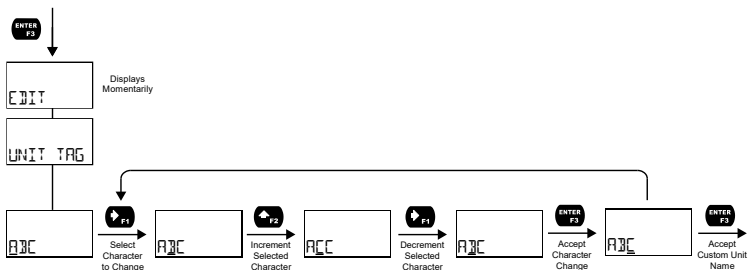
Rate Units (RATE)	
GAL / (T)	Gallons per time unit (T)
L / (T)	Liters per time unit (T)
IGAL / (T)	Imperial gallons per time unit (T)
M ³ / (T)	Cubic meters per time unit (T)
BBL / (T)	Barrels per time unit (T)
BUSH / (T)	Bushels per time unit (T)
cuY / (T)	Cubic Yards per time unit (T)
cuFt / (T)	Cubic Feet per time unit (T)
cuIn / (T)	Cubic Inches per time unit (T)
L BBL / (T)	Liquid barrels per time unit (T)
BBBL / (T)	Beer barrels per time unit (T)
HECLL / (T)	Hectoliter per time unit (T)
AF / (T)	Acre-Foot per time unit (T)
CUSTOM /	Custom unit per time unit (T)

Setup and Programming

Setting Custom Units (CUSTOM)

When the desired unit class or unit of measure within a class for PV 2 is not available, a custom unit may be programmed. Select the **CUSTOM** menu (or the **CUSTOM** unit within a unit class) to enter a custom unit name.

Text values are set using the **Right** and **Up-Arrow** buttons. Press **Right-Arrow** to select next character and **Up-Arrow** to increment character value. The selected character will flash. Press and hold the **Up** or **Right-Arrow** buttons to auto-increment or decrement the character. Press **Enter** to accept the character.



Notes:

- Press and hold the **Right-Arrow** while no character is being edited to erase all characters to the right of the flashing character
- Press and hold **Up** or **Right-Arrow** to auto-increment or decrement a selected character.
- All text values, including tags and alarm messages, are set in a similar fashion.

Setup and Programming

Scaling Example

The 4-20 mA input can be scaled to the appropriate values for a given application. The 4 mA input (input 1) should have a corresponding display value (display 1) which represents the low end of the process value range being measured by the transmitter. Likewise, the 20 mA input (input 2) should have a display value (display 2) which represents the high end of the process value range.

For example: If the meter is used to display the level of a 100 ft tall tank, the transmitter should send a 4 mA signal when the tank is empty and a 20 mA signal when the tank is full. The meter should be programmed to interpret these inputs on a display range of 0-100, so that at 4 mA the meter will display 0 and at 20 mA the meter will display 100.

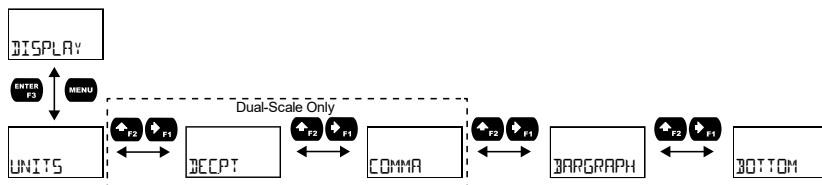
Processes which require a non-linear scale can be accommodated using multi-point linearization (`LINEAR`) and round horizontal tank (`RH TANK`) functions available in the Advanced menu. See *Input Signal Conditioning Functions (FUNCTION)*, page 101.

A signal source is not needed to scale the meter; simply program the inputs and corresponding display values.

Setup and Programming

Setting the Display Features (DISPLAY)

The meter's display functions may be programmed using the *Display* menu. This menu consists of the following submenus: *Units*, *Decimal Point*, *Comma*, *Bargraph*, *Top*, and *Bottom*.



Changing the Engineering Units (UNITS)

The **UNITS** menu is used to change how fractional inches are represented. The options are automatically reducing, 1/16, 1/8, 1/4, 1/2 of an inch, or no fractions. The default setting (**F T--IN/°**) automatically reduces the fraction to the lowest denominator.

When in dual-scale mode, it is possible to change the PV 2 display units within the selected unit class without the need to re-scale the meter. When selecting a new unit from within the **DISPLAY** menu (e.g. changing from gallons (**GAL**) to liters (**L**)), the meter will automatically convert the display values to display the new unit. Enter the **UNITS** menu, select a new unit of measure from the list of predefined units, and press the **Enter** button. If entering a custom unit (**CUSTOM**), the input must be scaled using the custom unit.

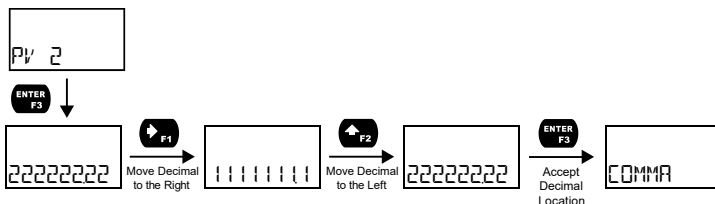
Setup and Programming

Changing the Decimal Point (DECPT)

The decimal point may be set with up to seven decimal places or with no decimal point at all.

Pressing the **Right-Arrow** moves the decimal point one place to the right until no decimal point is displayed, and then it moves to the leftmost position. Pressing the **Up-Arrow** moves the decimal point one place to the left.

If the dual-scale level feature is selected, the decimal point selection for PV2 is enabled.



Enabling or Disabling Commas on the Bottom Display (COMMA)

The bottom display is set to show a comma separating the thousands and millions place by default if a numeric value is being displayed. This feature can be disabled or enabled using the *Comma* menu.

Note: This menu is only available if the meter is in dual-scale mode.



Setup and Programming

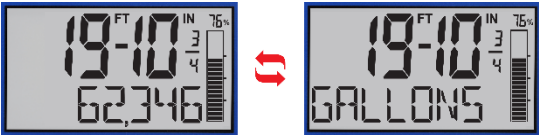
Display Capabilities Optimization (BOTTOM)

Display Configuration Examples

The bottom line can toggle between a tag and units or if dual-scale mode is used, can display the input in a different scale such as volume. The following graphics show typical configurations:

Top Line: Process Variable

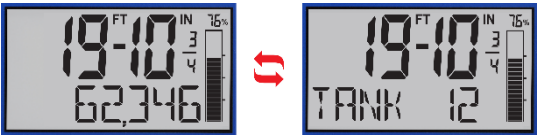
Bottom Line: Toggling Between Volume and Units



Note: To display units as GALLONS, select custom units and enter the desired text.

Top Line: Process Variable

Bottom Line: Toggling Between Volume and Tag



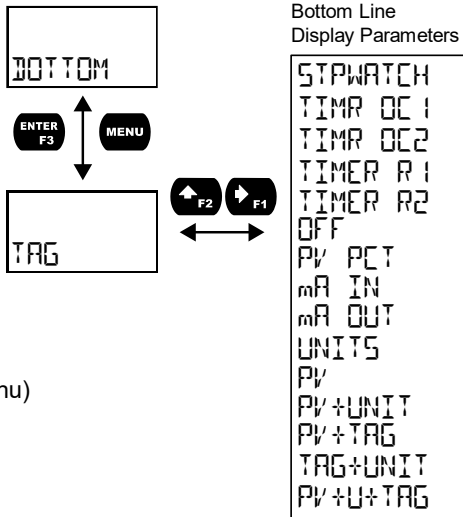
Setup and Programming

Configuring the Display (BOTTOM)

The bottom display line (BOTTOM) can be programmed to display different values. Use the BOTTOM menu to make these changes. If PV2 is enabled, additional options are available for displaying the second PV on the bottom display.

The bottom line (BOTTOM) can be programmed to display:

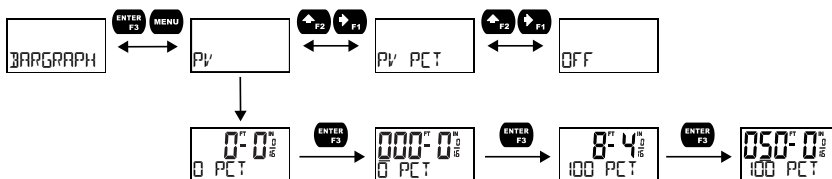
- Tag (default)
- Stopwatch
- Open Collector 1 or 2 Timer
- Relay 1 or 2 Timer
- Off (Blank)
- PV's Percentage of Full Scale
- The mA Input
- The mA Output
- Units
- Process Value (PV)
- Process Value 2 (dual-scale only; see PV 2 under advanced features menu)
- Alternating PV and Units
- Alternating PV and Tag
- Alternating Tag and Units
- Alternating PV, Units, and Tag



Setup and Programming

Programming the Bargraph (BARGRAPH)

The meter comes equipped with a bargraph display for applications where a visual representation of the process variable's percentage of full scale is desirable. This feature can be enabled or disabled using the *Bargraph* menu (BARGRAPH). The value displayed on the bargraph can be the percentage of the full scale (PV PCT) or the percentage of a user-programmable range (PV). If the meter is in dual-scale mode, the bargraph can be assigned to display either PV1 or PV2 using this menu.



Setup and Programming

Open Collector Outputs (OPEN COLLECTR)

The meter is equipped with two NPN open collector outputs as a standard feature that may be set up for pulse outputs, alarms, timed pulses, or disabled.

Pulse outputs can be set to transmit the PV value (PV1 or PV2 if meter is in dual-scale mode). Output 2 may be used to generate a quadrature output based on the other open collector output. An output test mode is also selectable to generate pulses at a constant programmable frequency.

Alarms are available based on the PV value or the digital input. The alarm status will show on the display even if the output is not wired.

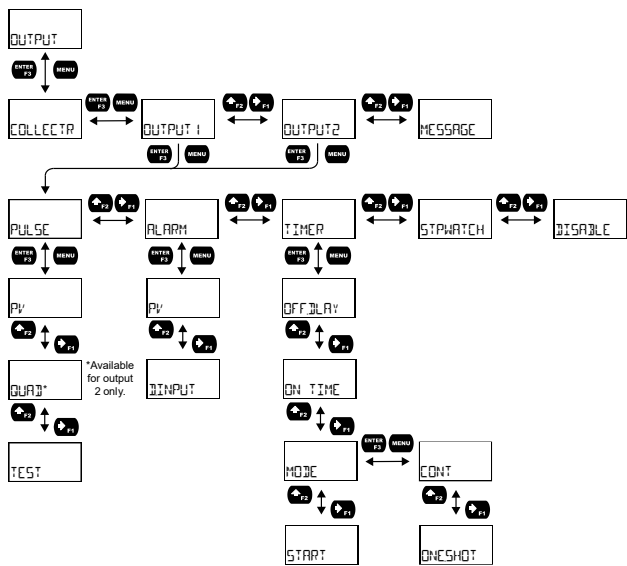
A timer output (TIMER) turns the open collector on and off at the specified time intervals. The timer can be set as single-shot or continuous timer.

The stopwatch output (STOPWATCH) allows the open collector to be manually activated by starting the stopwatch. The stopwatch count can be displayed on the top or bottom line.

The output may be disabled by selecting DISABLE.

Setup and Programming

The Open Collector Outputs are programmed in the following manner:



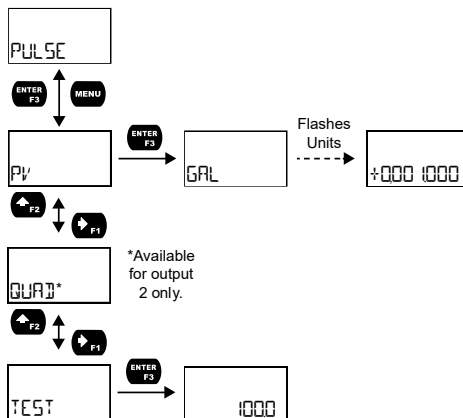
Setup and Programming

Pulse Output (PULSE)

The pulse outputs may be programmed to generate a scaled frequency based on the PV and a programmable factor. The factor determines the number of pulses per second generated per unit of measure. For example, if the meter display shows 100 gallons and the factor is set to 2, the number of pulses generated per second would be 200. The maximum frequency is 1,000 Hz.

Setting output 2 to quadrature will duplicate the other open collector output, but lag by 90 degrees out of phase. The other output should be programmed as desired for the quadrature output function and must be a pulse (PULSE) output selection. The quadrature maximum frequency for both outputs is 500 Hz.

The TEST option will output a fixed number of pulses per second based on the FREQ value entered.



Setup and Programming

Alarm (ALARM)

Alarm outputs may be assigned to the PV or the digital input. When assigned to the PV, the alarm may be set as either a high alarm or a low alarm. Alarm actions (AUTO, AUTOMAN, LATCH, L-CLEAR) determine how and when the alarm should be reset. They operate as follows:

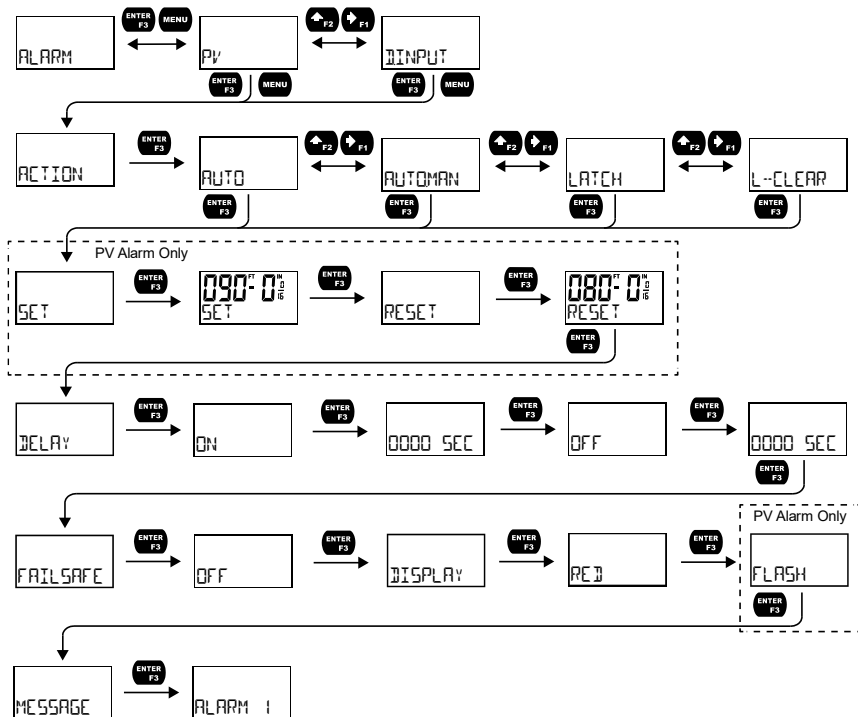
- **Automatic (AUTO):** Alarm will reset automatically once the alarm condition has cleared.
- **Automatic/Manual (AUTOMAN):** Alarm will reset automatically once the alarm condition has cleared but can also be reset using the **Enter** (ACK) button (or whichever function key is set to acknowledge) at any time.
- **Latching (LATCH):** Alarm must be reset manually and can be done so at any time. Press the **Enter** (ACK) button at any time to clear the alarm.
- **Latching with Reset after Clear (L-CLEAR):** Alarm must be reset manually and can only be done so after the alarm condition has cleared. Press the **Enter** (ACK) button after the alarm condition has cleared to reset the alarm.

If the alarm is set to PV, a set and reset point must be programmed. The set point is the display value at which the alarm will turn on and the reset point is the display value at which the alarm will turn off. If the set point is lower than the reset point, the alarm will be a low alarm; if the set point is higher than the reset point, the alarm will be a high alarm. The digital input alarm will trigger whenever the digital input is triggered.

For both the PV and digital input alarms, a delay before the alarm is turned on or off may be set, as well as a failsafe feature which will inverse the on/off programming.

Alarm states will be displayed on the meter even if no open collector output is physically connected. These may include a red LED backlight, flashing PV value (PV alarm only), and a programmable alarm message.

Setup and Programming



Setup and Programming

Flashing Red Alarm (RED)

The last two lines in the preceding menu flow chart show how to program the display to turn red, flash, and display a message when an alarm occurs.

Alarm 1 is High Alarm:



Alarm 2 is Low Alarm:



Setup and Programming

Timer (TIMER)

The timer output may be set to generate the timed pulse only once (ONESHOT) or continuously (CONT).

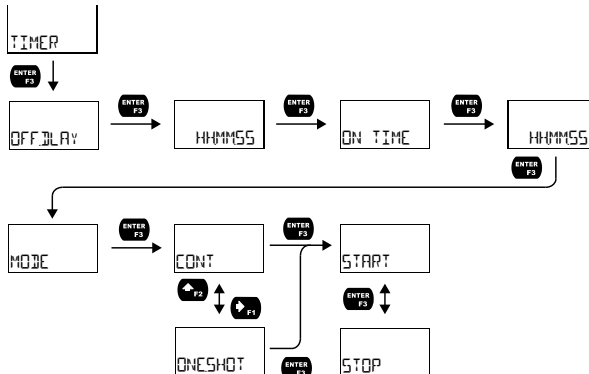
The timer output produces a constant width pulse at a constant frequency, if set as continuous timer. Program the *Off Delay* (OFF DELAY) from 1 second to 99 hours 59 minutes and 59 seconds. This is the time it takes from selecting START to turning on the output and for how long the output is off in continuous mode.

Program the *On Time* (ON TIME) for the active low pulse from 1 second to 99 hours 59 minutes and 59 seconds (pulse width). This is the period of time for which the output will remain on.

Select *Start* (START) to begin outputting the constant timed pulse.

Select *Stop* (STOP) to end outputting the constant timed pulse.

Function keys or the digital input may be assigned to start and stop timer functions (see the USER menu in the *Advanced Menu*).



Setup and Programming

Stopwatch (STPWATCH)

The stopwatch function may be used to manually run and control a process for a specific time interval up to 99 hrs., 59 min, and 59 seconds. The stopwatch function may be assigned to any open collector. There are three settings needed to use the function effectively.

1. Assign stopwatch to either top or bottom display line
2. Assign the open collector to control the process (on/off)
3. Assign a function key or digital input to start/stop the stopwatch

Application Example

To maintain consistency of a product, it is necessary to take and test samples at different times throughout the day. The stopwatch function is used to open and close a solenoid valve to know the exact amount of time needed to complete the desired sample. Once this is determined, the timer function can be used to automatically take a sample (batch) based on the time determined using the stopwatch function.

Setup: Assign the following to *Stopwatch Function*

- Bottom display line (*see pages 70 & 73 for details how to change the display*)
- Relay 1 (*see pages 73 & 76 how to change Open Collector and or Solid State Relay functionality*)
- F3: Start/Stop (*see page 109 for details on how to change the function keys*)

Procedure

- Press F3 to start the stopwatch; relay 1 turns on and the process starts running.
- Press F3 to stop the stopwatch; relay 1 turns off and the process stops.
- The bottom display indicates the time it took to complete the sample.

Setup and Programming

Solid State Relay Outputs (RELAY)

The meter can be optionally equipped with two solid state relays that may be set up for alarms, timer, stopwatch, or pump control. Alternatively, they may be disabled.

Alarms are available based on the PV value or the digital input. The alarm status will show on the display even if the output is not wired.

Pump control allows the relay to turn on and off a pump at specified on and off points. This can be done using only one of the relays to control one pump (ON--OFF) or using both relays in tandem to alternate between two pumps (ALTERN).

A timer output (TIMER) turns the relay on and off at the specified time intervals. The timer can be set as single-shot or continuous timer.

The stopwatch output (STOPWATCH) allows the relay to be manually activated by starting the stopwatch. The stopwatch count can be displayed on the top or bottom display.

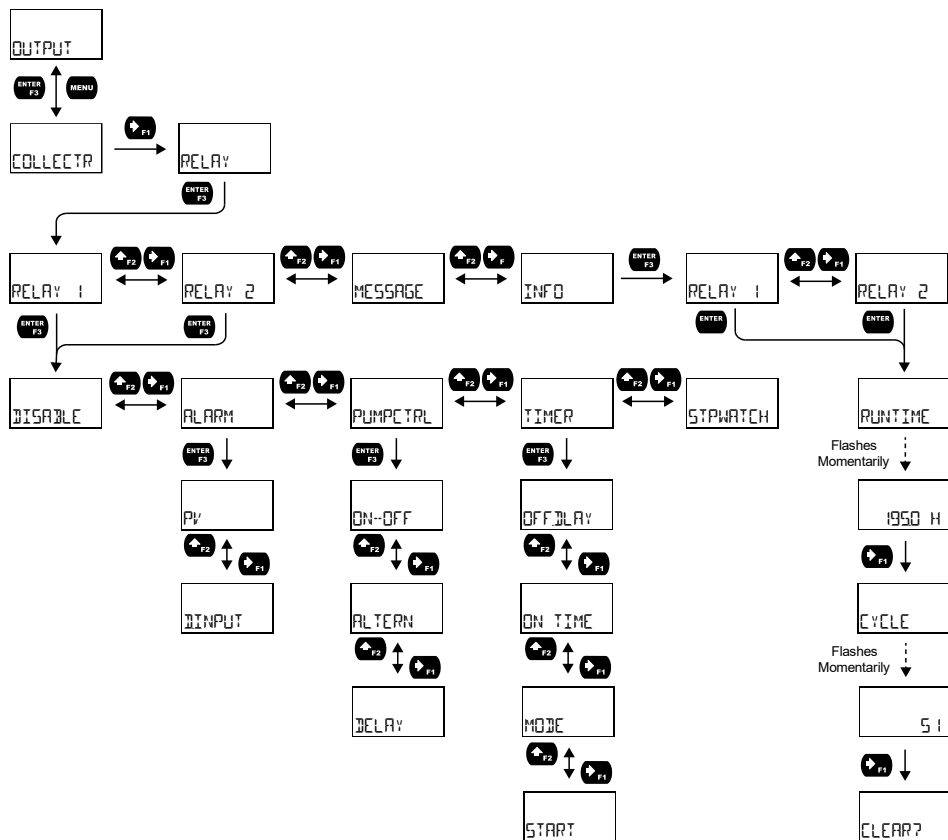
The output may be disabled by selecting DISABLE.



CAUTION

During setup, the relays do not follow the input and they will remain in the state found prior to entering the *Relay* menu.

Setup and Programming



Setup and Programming

Alarm (ALARM)

Alarm outputs may be assigned to the PV or the digital input. When assigned to the PV, the alarm may be set as either a high alarm or a low alarm. Alarm actions (AUTO, AUTOMAN, LATCH, L-CLEAR) determine how and when the alarm should be reset. They operate as follows:

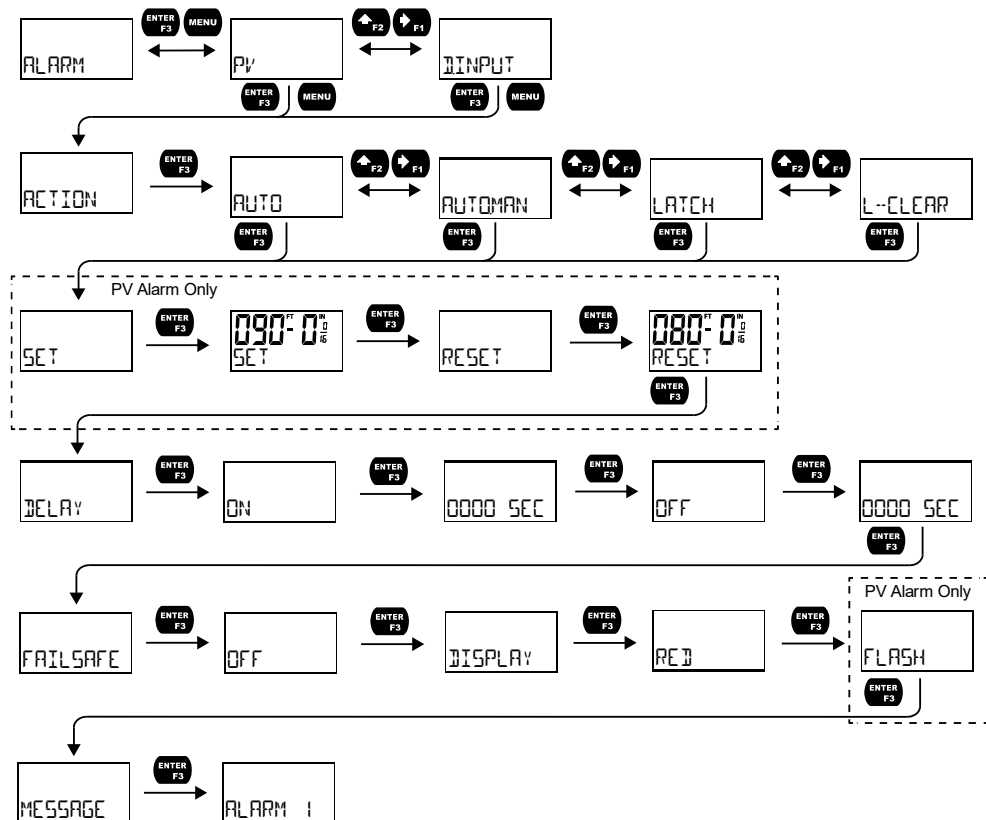
- **Automatic (AUTO):** Alarm will reset automatically once the alarm condition has cleared.
- **Automatic/Manual (AUTOMAN):** Alarm will reset automatically once the alarm condition has cleared but can also be reset using the **Enter** (ACK) button (or whichever function key is set to acknowledge) at any time.
- **Latching (LATCH):** Alarm must be reset manually and can be done so at any time. Press the **Enter** (ACK) button at any time to clear the alarm.
- **Latching with Reset after Clear (L-CLEAR):** Alarm must be reset manually and can only be done so after the alarm condition has cleared. Press the **Enter** (ACK) button after the alarm condition has cleared to reset the alarm.

If the alarm is set to PV, a set and reset point must be programmed. The set point is the display value at which the alarm will turn on and the reset point is the display value at which the alarm will turn off. If the set point is lower than the reset point, the alarm will be a low alarm; if the set point is higher than the reset point, the alarm will be a high alarm. The digital input alarm will trigger whenever the digital input is triggered.

For both the PV and digital input alarms, a delay before the alarm is turned on or off may be set, as well as a failsafe feature which will inverse the on/off programming.

Alarm states will be displayed on the meter even if no relay output is physically connected. Optional alarm indication includes a red LED backlight, flashing PV value (PV alarm only), and a programmable alarm message.

Setup and Programming



Setup and Programming

Pump Control (PUMPCTRL)

The pump control output is used in situations where the relays are used to control pumps. There are two options available for controlling pumps: on-off (ON--OFF) and pump alternation (ALTERN).

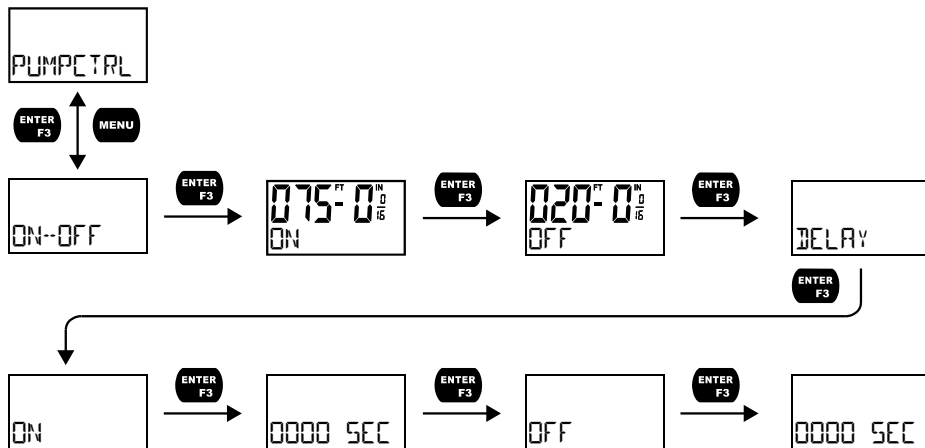
ON--OFF will turn the relay on at a programmed *on* point and off at a programmed *off* point. Setting the *on* point higher than the *off* point will make the output activate on a high PV value; setting the *on* point lower than the *off* point will make the output active on a low PV value. The relay will reset automatically.

For pump control applications where two similar pumps are used to control the level of a tank or a well, it is desirable to have the pumps operate alternately. This prevents excessive wear and overheating of one pump over the lack of use of the other pump. Pump alternation uses both relays in tandem to alternate between two similar pumps. The ALTERN menu is only available under Output 1 and will automatically set Output 2 to pump alternation as well. Use the pump *Alternation Time* setting (ALT TIME) to control the alternation based on runtime in addition to level cycles.

Setup and Programming

On/Off Pump Control (ON--OFF)

When programming a single pump to turn on and off, the *on* and *off* points must be programmed. The relay will activate at the *on* point and deactivate at the *off* point. On and off delays may optionally be programmed to delay the activation or deactivation of the relay by a certain number of seconds after reaching either the *on* point or *off* point.



Setup and Programming

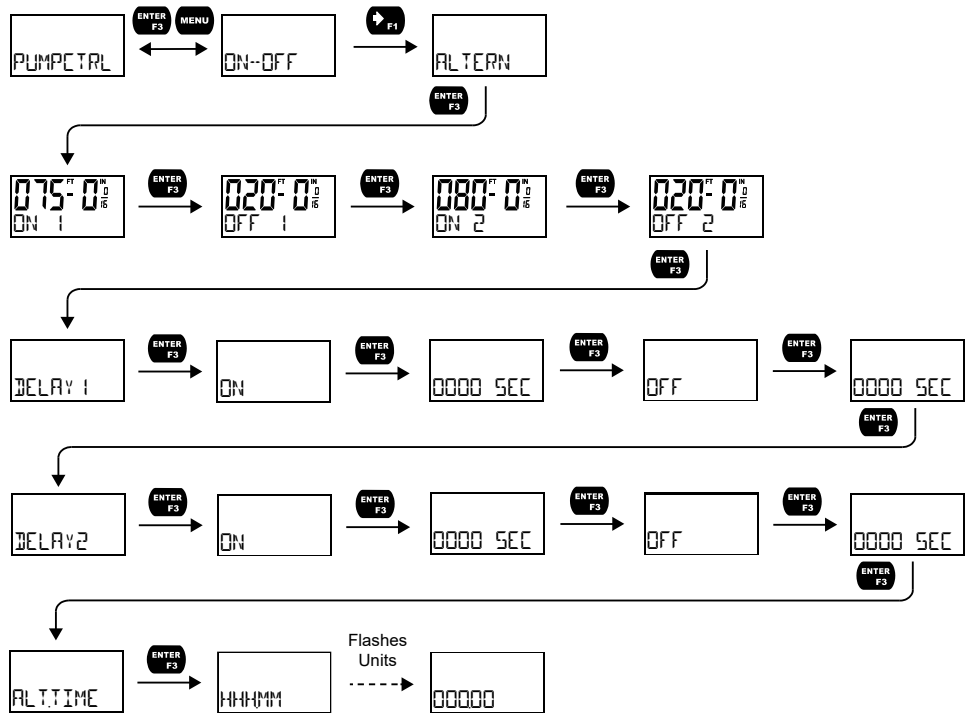
Pump Alternation (ALTERN)

Pump alternation sets the two relays to alternate every time the first *on* point (ON 1) is reached. The active relay will turn off once the first *off* point (OFF 1) is reached. If the PV reaches the second *on* point (ON 2), the other relay will also turn on. The second relay will turn off once the second *off* point (OFF 2) is reached and the first relay will remain active until the first *off* point (OFF 1) is reached.

On and off delays may optionally be programmed for each *on* and *off* point to delay the activation or deactivation of the relays by a certain number of seconds after reaching either the *on* point or *off* point.

For pumps that typically remain on extensively, the alternation time (ALTIME) parameter sets a period of relay on-time after which the relays should alternate. For example, if the alternation time is set to one hour, pump 1 will turn off after one hour of runtime regardless of the level reading, at which point pump 2 becomes the active pump. Pump 2 will run until one hour has passed, or the tank has reached a desirable level; whichever happens first. By using the proper on/off points, the alternation can be set up so that the first pump on is the first pump off. This is desirable when the two pumps are of similar rating.

Setup and Programming



Setup and Programming

Pump Control with Alternation & Alarm Example

The following is a typical application where the relays and open collectors are used for pump alternation and high and low level alarm.

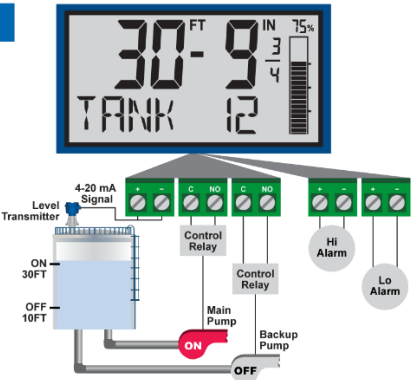
Pump and Alarm On & Off Point Programming

Relay	On Point	Off Point	Function
1	35 feet	10 feet	Controls backup pump
2	30 feet	10 feet	Controls main pump

OC	On Point	Off Point	Function
1	35 feet	34 feet	Trips high alarm
2	5 feet	6 feet	Trips low alarm

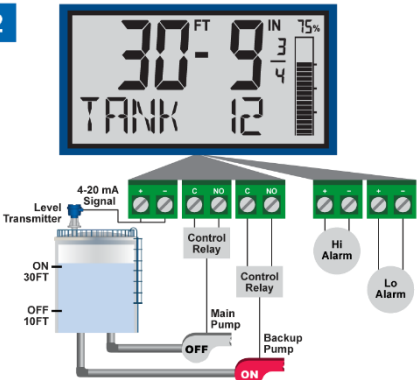
The following graphics provide a visual representation of a typical pump alternation application:

1



Relay #2 turns the main pump on at 30 feet and turns it off at 10 feet.

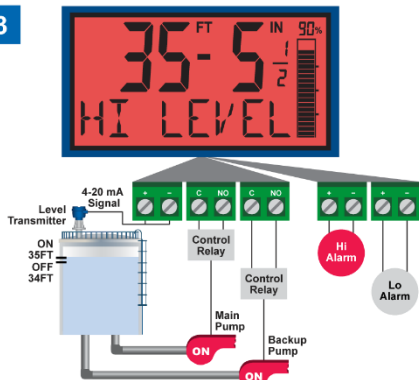
2



With the Pump Alternation feature activated, the next time the level reaches 30 feet, relay #1 transfers and starts the backup pump.

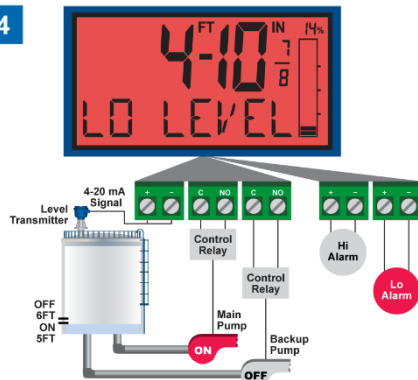
Setup and Programming

3



If the backup pump is not able to keep up, and the level reaches 35 feet, relay #2 transfers and starts the main pump as well. Open collector #1 trips the High Level Alarm, the display turns red and flashes "Hi Level" message to indicate an alarm condition. The High Level Alarm resets at 34 feet.

4



Once the level has dropped below the reset points, both relays will turn off. If the Main Pump fails to turn off, open collector #2 trips the Low Level Alarm at 5 feet to warn against the pump running dry. The Low Level Alarm resets at 6 feet.

Setup and Programming

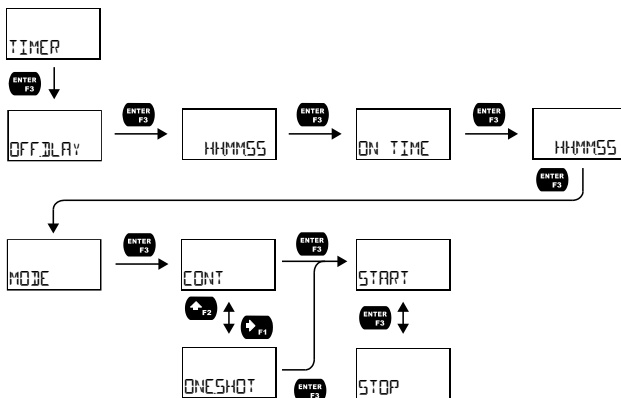
Timer (TIMER)

The timer output may be set to generate the timed pulse only once (ONESHOT) or continuously (CONT). The timer output produces a constant width pulse at a constant frequency, if set as continuous timer.

Program the *Off Delay* (OFFDELAY) from 1 second to 99 hours 59 minutes and 59 seconds. This is the time it takes from selecting START to turning on the output and for how long the output is off in continuous mode.

Program the *On Time* (ONTIME) for the active low pulse from 1 second to 99 hours 59 minutes and 59 seconds (pulse width). This is the period of time for which the output will remain on.

Select *Start* (START) to begin outputting the constant timed pulse. Select *Stop* (STOP) to end outputting the constant timed pulse. Function keys or the digital input may be assigned to start and stop timer functions (see the USER menu in *Advanced*).



Setup and Programming

Stopwatch (STPWATCH)

The stopwatch function may be used to manually run and control a process for a specific time interval up to 99 hrs., 59 min, and 59 seconds. The stopwatch function may be assigned to any relay. There are three settings needed to use the function effectively.

1. Assign stopwatch to either top or bottom display line
2. Assign the relay to control the process (on/off)
3. Assign a function key or digital input to start/stop the stopwatch

Application Example

To maintain consistency of a product, it is necessary to take and test samples at different times throughout the day. The stopwatch function is used to open and close a solenoid valve to know the exact amount of time needed to complete the desired sample. Once this is determined, the timer function can be used to automatically take a sample (batch) based on the time determined using the stopwatch function.

Setup: Assign the following to *Stopwatch Function*

- Bottom display line (*see pages 70 & 73 for details how to change the display*)
- Relay 1 (*see pages 76 & 84 how to change Open Collector and or Solid State Relay functionality*)
- F3: Start/Stop (*see page 109 for details on how to change the function keys*)

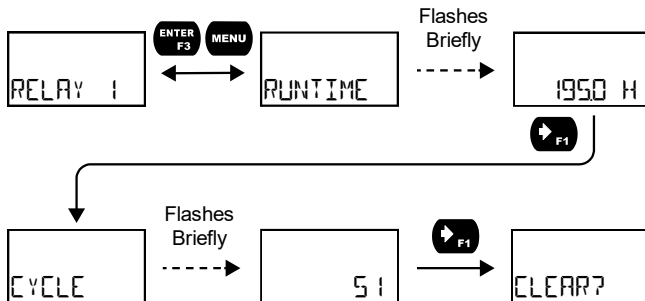
Procedure

- Press F3 to start the stopwatch; relay 1 turns on and the process starts running.
- Press F3 to stop the stopwatch; relay 1 turns off and the process stops.
- The bottom display indicates the time it took to complete the sample.

Setup and Programming

Runtime & Cycle Count (INFO)

The relay information menu shows runtime and cycle count for each relay. These values may be cleared at any time by selecting the *Clear* option (CLEAR?).



Setup and Programming

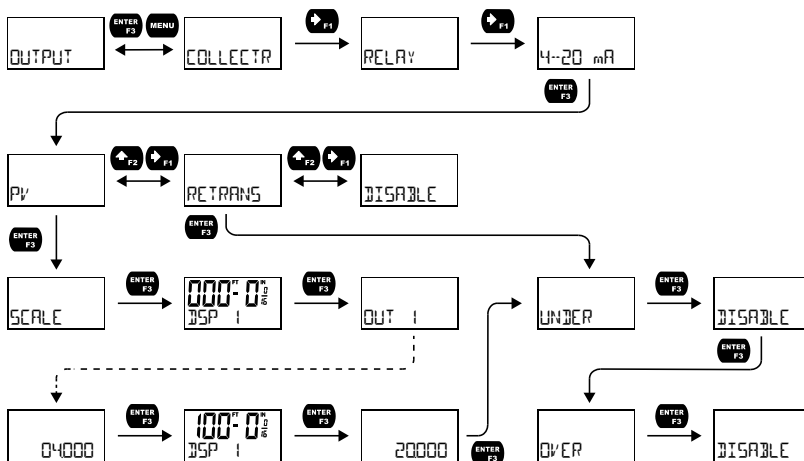
Isolated 4-20 mA Output (4--20 mA)

The 4-20 mA menu is used to scale the isolated 4-20 mA output based on display values. This menu is not present on models without a 4-20 mA output option.

The 4-20 mA analog output can be scaled to provide a 4-20 mA signal for any PV display range or to simply retransmit the 4-20 mA input. The output may be disabled (DISABLE) and will only output the minimum signal.

Overrange and underrange values determine what mA signal the meter will output if the mA input is underrange (<3.5 mA) or overrange (>20.5 mA). This value may be set to 1 mA, 3.5 mA, 3.8 mA, 20.5 mA, 20.8 mA, 23 mA, or disabled.

No equipment is needed to scale the analog output; simply program two display values and corresponding mA output signals.



Setup and Programming

Process Variable (PV)

To scale the analog output, enter display value 1 and a corresponding analog output value for this display, and enter display value 2 and a corresponding analog output value for this display value. This will provide a linearly scaled analog output.

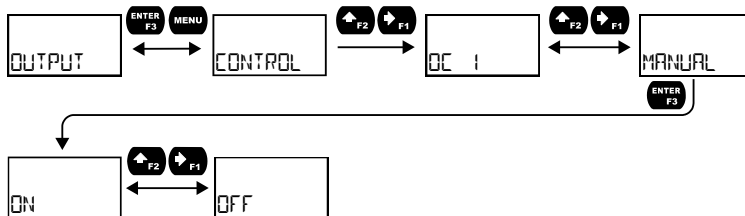
Retransmit (RETRANS)

This option will retransmit the 4-20 mA analog input without the need to scale the output.

Output Manual Control (CONTROL)

The *Control* menu is used to control the open collector outputs, 4-20 mA analog output, and the relays manually, ignoring the input. Each open collector, relay, and analog output can be programmed independently for manual control. Selecting automatic control sets all relays and analog output for automatic operation.

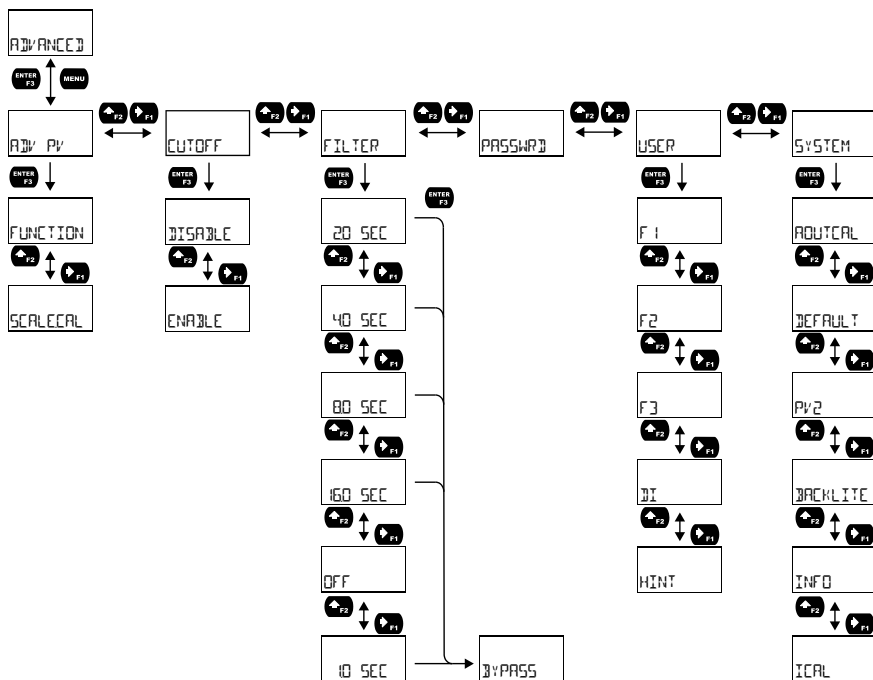
After selecting manual control for a specific output, you can set the output value. To change the output value, return to the Control menu, select the output to control, select manual control, and enter a new input.



Setup and Programming

Advanced Features Menu (ADVANCE)

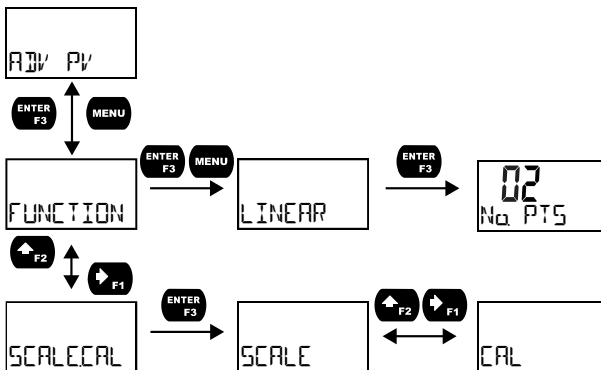
To simplify the setup process, functions not needed for most applications are located in the *Advanced Features* menu. The options under advanced features include *advanced PV setup*, *cutoff*, *filter*, *password*, *function key programming*, and *system settings*.



Setup and Programming

Advanced Process Variable Setup (ADV PV SETUP)

The Advanced PV Setup menu contains options to apply input signal conditioning functions to the input and scale/calibrate the input signal.

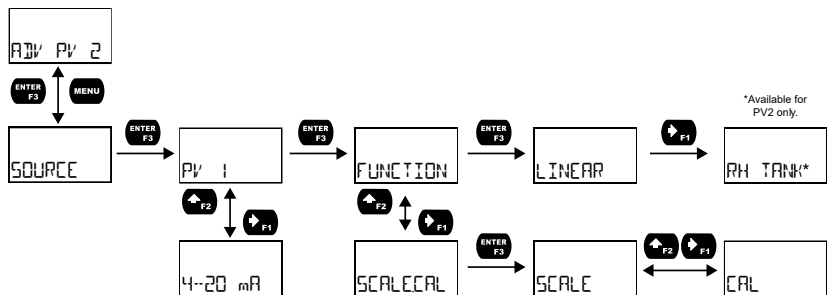


Setup and Programming

Input Signal Conditioning Functions (FUNCTION)

The *Function* menu is used to select the input signal conditioner applied to the input: linear or round horizontal tank volume calculation, if PV2 is enabled. Multi-point linearization is part of the linear function selection.

Meters are set up at the factory for linear function with 2-point linearization. The linear function provides a display that is linear with respect to the input signal.

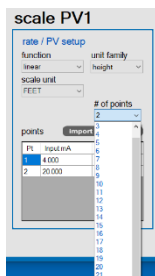


Setup and Programming

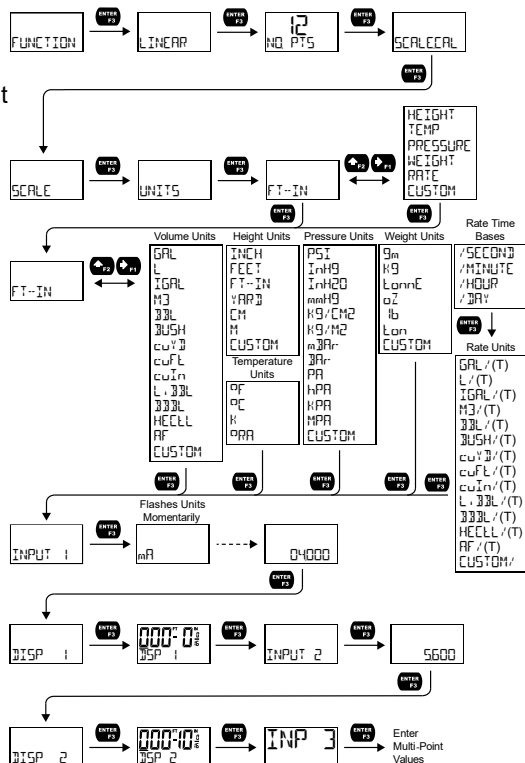
Multi-Point Linearization (LINEAR)

Meters are set up at the factory for linear function with 2-point linearization. Up to 32 linearization points can be selected for PV1 and PV2 under the linear function. Multi-point linearization can be used to linearize the display for non-linear signals such as those from level transmitters used to measure volume in odd-shaped tanks or to convert level to flow using weirs and flumes with complex exponent.

If the dual-scale level feature has been selected, the menus for PV1 & PV2 are enabled.



IDE20 Configuration Software showing the linear points setup feature. Up to 32 points can be selected for PV1 and PV2.



Setup and Programming

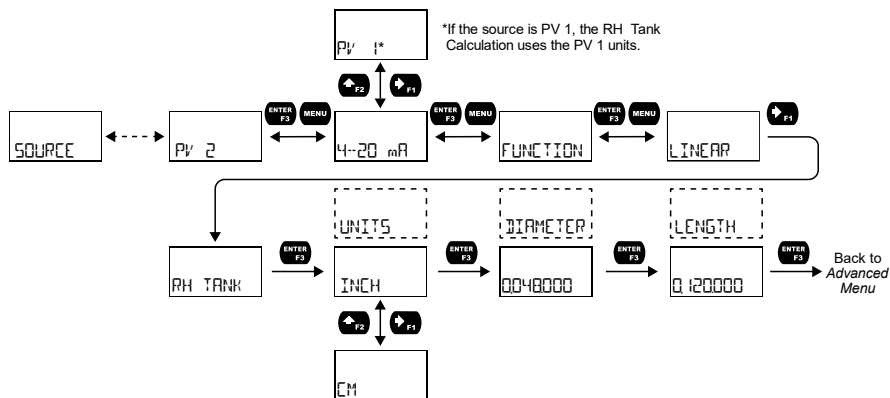
Round Horizontal Tank Linearization (RH TANK)

This function automatically calculates the volume in a round horizontal tank with flat ends. It is only available for PV2 while the meter is in dual-scale mode.

For instructions on how to enable PV2 see *Changing System Settings (SYSTEM)* on page 114

Select units (feet, inches, or cm) for the tank dimensions. Enter the diameter and the length in feet & inches or cm and the results will be calculated automatically in US gallons or liters. The unit of measure for the volume can be changed using the display menu.

See *Changing the Engineering Units (UNITS)* on page Changing the Engineering Units (UNITS) 70 and *Available Unit Classes and Units* on page 65 for a list of available volume units. There is no need to enter scaling values.



Setup and Programming

scale PV2

PV setup

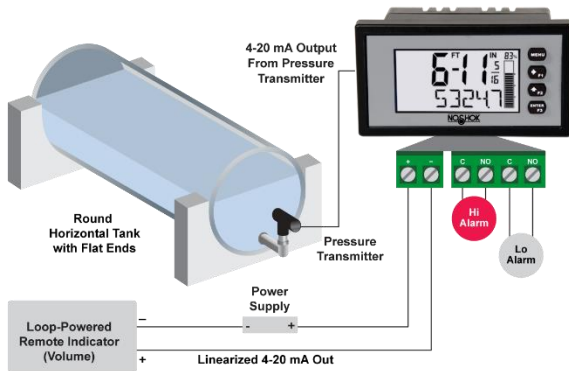
function: round horiz tank
PV2 source: PV1
tank unit: FT-IN
volume unit: GAL

round horizontal tank

diameter: 4.00 length: 10.00

tank volume: 940.03 GAL

IDE20 Configuration Software Round Horizontal Tank Function Automatically Calculates the Volume Once the Diameter and the Length of the Tank are Entered.



IDE20-G-HB or IDE20-H-HB Displaying Height in Feet & Inches on Top Line and Volume in Gallons on the Bottom Line using the RHT Linearization Function.

Setup and Programming

Advanced Scaling and Calibration (SCALE/CAL)

This menu offers options to scale or calibrate the meter.

Scaling the Input (SCALE)

The scale menu in the *Advanced* menu is the same as the scale menu in the *Input* menu. See *Scaling the 4-20 mA Input (INPUT)* on page 64 for details about scaling the meter.

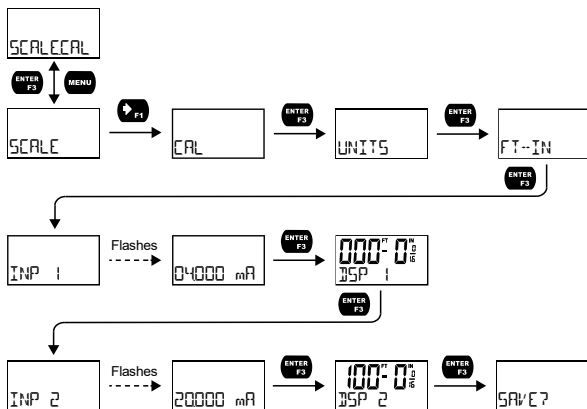
Calibrating the Input (CAL)

To scale the meter without a signal source, refer to *Scaling the 4-20 mA Input (INPUT)*, page 64

The meter can be calibrated to display the process in engineering units by applying the appropriate input signal and following the calibration procedure. The **CAL** menu can be used either with a calibrated current source or with a live signal coming from a 4-20 mA transmitter connected to the process being measured.

During calibration, the mA input value will be displayed as **INP 1** and **INP 2**. Adjust the input source until the desired mA value is shown.

The use of a calibrated signal source is required.



Setup and Programming

Follow these steps to calibrate the input:

1. After accessing the `SCALE` menu, press the **Right-Arrow** button to scroll to the *Calibration* menu (`CAL PV`) and press **Enter**.
2. Select the appropriate units for the desired process variable, then press **Enter**. For information on units, see *Available Unit Classes and Units* on page 65.
3. The meter displays `INP 1`. Apply a known signal and press **Enter**. The display will flash while accepting the signal.
4. After the signal is accepted, the meter displays `ISP 1`. Enter a corresponding display value for the input signal, and press **Enter** to accept.
5. The meter displays `INP 2`. Apply a known signal and press **Enter**. The display will flash while accepting the signal.
6. After the signal is accepted, the meter displays `ISP 2`. Enter a corresponding display value for the input signal and press **Enter** to accept.
7. After completing calibration, the `SAVE ?` display will need to be acknowledged using the **Enter** key before calibration will take effect.

Note: The `SAVE ?` prompt is not displayed if no changes have been made to the scaling.

Setup and Programming

Low-Height Cutoff (CUTOFF)

The low-height cutoff feature allows the meter to be programmed so that the often-unsteady outputs from level transmitters, or levels that read close to zero but do not reach zero due to setup constraints, may display zero on the meter. The display will read zero when the display would be below the programmed cutoff level value. The cutoff can be disabled to display negative values. The meter will display zero below the cutoff value.

Noise Filter (FILTER)

The noise filter is available for unusually noisy signals that cause an unstable process variable display. The noise filter averages the input signal over a certain period of time. The filter level determines the length of time over which the signal is averaged. The filter level can be set between 1 and 16 seconds or turned off. The higher the filter level, the longer the averaging time and so the longer it takes the display to settle to its final value. Setting the filter level to off disables the filter function.

Noise Filter Bypass (BYPASS)

The noise filter bypass changes the behavior of the meter so that small variations in the signal are filtered out but large abrupt changes in the input signal are displayed immediately. The bypass value determines the minimum amount of signal change to be displayed immediately. All signal changes smaller than the bypass value are filtered or averaged by the meter. The noise filter bypass may be set between 0.1 and 99.9% of full scale.

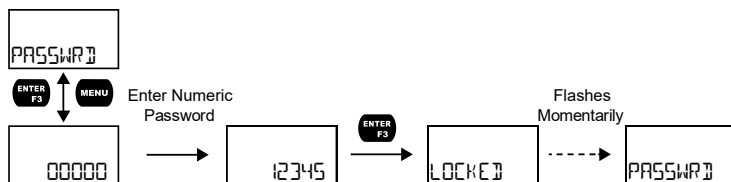
Setup and Programming

Enabling Password Protection (PASSWORD)

The *Password* menu is used for programming security to prevent unauthorized changes to the programmed parameter settings.

To set a password, enter the *Password* menu and program a five-digit password. When a password has been enabled the meter will display **LOCKED** when trying to access *Programming Mode*.

For instructions on how to program numeric values see *Setting Numeric Values*, page 63.



Making Changes to a Password Protected Meter

If the meter is password protected, the meter will display the message **LOCKED** when the *Menu* button is pressed. Press the *Enter* button while the message is being displayed and enter the correct password to gain access to the menu. After exiting *Programming Mode*, the meter returns to its password protected condition.

Disabling Password Protection

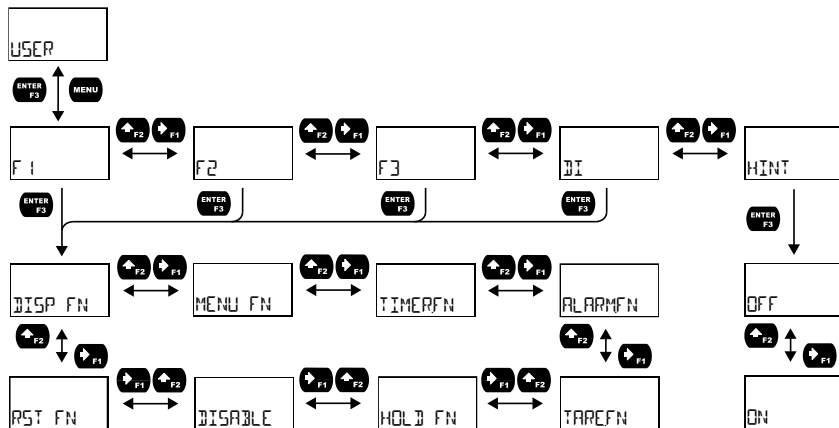
To disable password protection, access the *Password* menu and clear the entered password either by pressing and holding the *Right Arrow* button until all digits reset to zero or manually changing all the digits to zero. When the **Enter** button is pressed, the meter will display **UNLOCKED** and will no longer require a password to access *Programming Mode*.

Note: If the meter is password protected and the password has been forgotten, the password may be overridden using the master password: **50865**

Setup and Programming

Programmable Function Keys User Menu (USER)

The *User* menu allows the user to assign the front panel function keys F1, F2, and F3, and the digital input (located on the input signal connector) to access some of the menus or to activate certain functions immediately (e.g. reset max & min, hold relay states, etc.). This allows the meter to be greatly customized for use in specialized applications.



Setup and Programming

Tare (TARE)

The tare function zero's out the display. In the case of scale weight, tare is used to eliminate container weight and provide net weight readings. There are two tare functions; Tare and Reset Tare. When the tare function is used, the display reading is offset by the displayed amount to make the displayed value zero. Reset tare removes the display offset of the net value, and the gross and net values become the same until a new capture tare is entered.

Program a function key or the digital input for the tare and reset tare.

Tare on the display is not practical for FT-IN, but the bottom line can be used for weight applications.



Setup and Programming

Function Keys & Digital Input Available Settings

Refer to the following table for descriptions of each available function key or digital input setting.

Display	Description
DISP FN	Set the function key or digital input to display a value
DISPLAY	Cycle max, min, and PV(s)
DISP PV	Display the PV
PCT PV	Display the PV's percentage of max (20 mA)
UNITS	Display the PV's units
TAG	Display the PV's tag
DISPMIN	Display the PV's minimum
DISPMAX	Display the PV's maximum
MIN MAX	Display the PV's minimum and maximum value
mA IN	Display the mA input value
mAOUT	Display the mA output value
MENU FN	Set the function key or digital input to access a menu
RLYINFO	Go to relay information menu (INFO)
MANCTRL	Go to output control menu (CONTROL)
TMR OC1	Open collector 1 timer
TMR OC2	Open collector 2 timer
TIMER R1	Relay 1 timer
TIMER R2	Relay 2 timer
TIMERFN	Set the function key or digital input to start or stop a timer
STARTALL	Start all timers
STOPALL	Stop all timers

Setup and Programming

Display	Description
SSTPALL	Start or stop all timers
OC 1	Start/stop open collector 1 timer
OC2	Start/stop open collector 2 timer
RLY 1	Start/stop relay 1 timer
RLY2	Start/stop relay 2 timer
START	Start the selected timer output
STOP	Stop the selected timer output
STR--STP	Start or stop the selected timer output
ALARMFN	Set the function key or digital input to acknowledge an alarm
ACK	Acknowledge all active alarms
SETPPOINT	Set all output set points
SETPTOC 1	Set open collector 1 set point
SETPTOC2	Set open collector 2 set point
SETPTR 1	Set relay 1 set point
SETPTR2	Set relay 2 set point
SWATCHFN	Set the function key or digital input to activate stopwatch
START	Start the stopwatch
STOP	Pause/Stop the stopwatch
STR--STP	Start or stop the stopwatch
TAREFN	Set the function key or digital input to tare the display value
TARE	Tare the display value
RST TARE	Reset the display value
HOLD FN	Set the function key or digital input to hold an output
HOLDOUT	Hold all outputs
HL UNHLD	Hold or un-hold all outputs

Setup and Programming

Display	Description
OC H2	Hold/un-hold open collector outputs
RLY H2	Hold/un-hold relay outputs
mROUT	Hold/un-hold 4-20 mA output
HOLD	Hold selected output
HL UNHLD	Hold or un-hold selected output
DISABLE	Disable the function key or digital input
RST FN	Set the function key or digital input to reset a value
RESET	Reset min, max, or max/min PV value
R MINMAX	Reset max and min PV value

Setup and Programming

Enabling the Function Key Hint Feature (HINT)

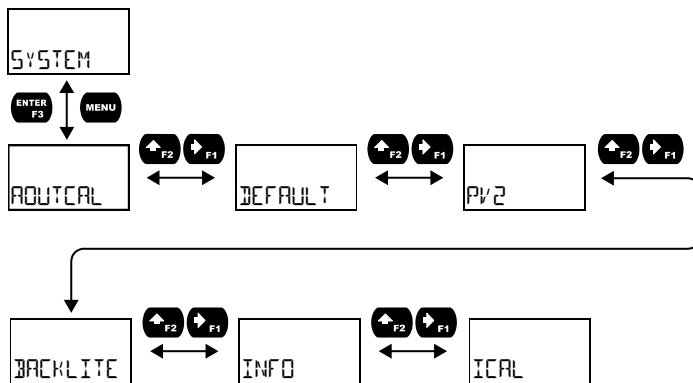
Enabling the function key hint feature will cause a hint message to be displayed when pressing the F1, F2, or F3 function keys. This text gives a brief description of what the button is programmed to do. Pressing that function key a second time will execute that action.

The hint feature does not affect the digital input (DI) which is intended for immediate execution.

Changing System Settings (SYSTEM)

The System menu contains the following menus:

Analog Output Calibration, Restore Factory Defaults, Dual-Scale (PV2), Backlight, Information, and Internal Calibration.



Setup and Programming

Analog Output Calibration (AOUTCAL)

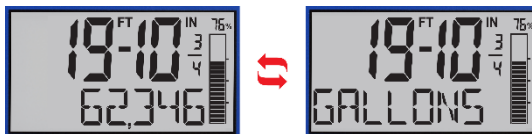
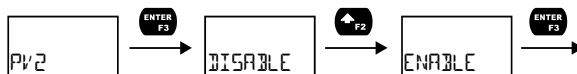
To perform the analog output calibration, it is recommended to use a milliamp meter with a resolution of at least 0.1 μA to measure the output current. The values saved internally during this procedure are used for scaling the 4-20 mA output in the *Setup* menu.

4-20 mA Output Calibration Procedure

1. Go to the *Advanced Features* menu and navigate to the `SYSTEM` menu and press Enter. Navigate to `AOUTCAL` and press Enter.
2. The display will show 4 mA. The IDE20 mA output should now be close to 4 mA. Enter the actual value read by the digital mA meter on the second line of the display and press Enter.
3. The display will show 20 mA. The IDE20 mA output should now be close to 20 mA. Enter the actual value read by the digital mA meter on the second line of the display and press Enter.
4. The IDE20 will now calculate the calibration factors and store them.
5. Press Menu to exit.

Setup and Programming

Enabling the Dual-Scale Feature (PV2)



Dual-Scale Mode

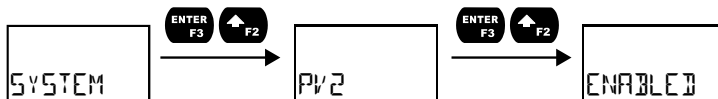
Top Line: Height in Feet and Inches

Bottom Line: Toggling Between Volume (62,346) and Units (gallons)

For some level applications, such as displaying the height and volume of a tank, it is possible to enable a second PV which can be scaled to display a different value based on the same 4-20 mA input. This is accomplished by enabling the dual-scale feature (PV2).

When the dual-scale feature is enabled, additional menus will be displayed to allow for the programming of the second PV. The input menu will display PV1 and PV2 for scaling and the display menu will allow both PVs to be displayed on either line, for example. See *Display Functions & Messages* on page 52 for additional information on where additional dual-scale specific menus will appear.

PV2 must be enabled to use the Round Horizontal Tank feature. See *Round Horizontal Tank Linearization (RH TANK)* on page 103



Setup and Programming

Enabling or Disabling the Backlight (BACKLITE)

The backlight may be enabled or disabled using the Backlight menu. The backlight is enabled by default, but the input must be wired appropriately for the backlight to function. See *Safe Area Current Loop (4-20 mA) Connections* on page 42. The voltage drop is the same if the backlight is not wired or if it is disabled in the *System* menu.

Viewing System Information (INFO)

System information, such as software (firmware) number and version, model number, and system tag, may be viewed in the INFO menu. Press the *Right Arrow* button to cycle through all available meter information. Press **Menu** to go back to the previous menu.

Setup and Programming

Calibrating the Internal mA Reference (ICRL)

The meter is factory calibrated prior to shipment to display 0 to 100, which corresponds to the 4-20 mA input. The calibration equipment is traceable to NIST standards.

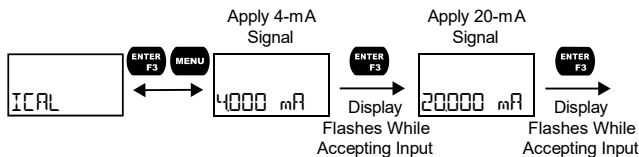
The use of calibrated signal sources is necessary to calibrate the internal source of the meter. The meter's internal source is what allows the user to scale the meter without applying a signal.

Check calibration of the meter at least every 12 months.

Note: Allow the meter to warm up for at least 15 minutes before performing the internal source calibration procedure.

The *Internal Calibration* menu is part of the *Advanced* menu. Internal Calibration is performed as follows:

1. Press the **Menu** button to enter *Programming Mode*.
2. Press the **Up-Arrow** button **twice** and press **Enter** to access the **Advanced** menu.
3. Press the **Up-Arrow** button and press **Enter** to access the **System** menu.
4. Press the **Up-Arrow** button and press **Enter** to access the **ICAL** menu.
5. The meter displays *low* input current message (4000 mA). Apply a 4 mA signal and press **Enter**. The display flashes for a moment while the meter is accepting the low input signal.
6. After the display stops flashing, the display moves to the *high* input calibration (20000 mA). Apply the high input signal and press **Enter**. The display will flash again while the meter is accepting the high input signal.



Meter Operation

Meter Operation

The meter is equipped with four front panel buttons. Three of the buttons labeled F1, F2, and F3 can be programmed as function keys to perform a variety of meter functions simply by pressing the button. These include operation of the tare function, resetting the tare, resetting the meter's relays or open collectors, starting and stopping timers, and displaying max/min values. See *Function Keys & Digital Input Available Settings* on page 111 for a complete list of settings available.

A digital input is available on the meter, and it may function in a similar fashion as the function keys to allow remote operation of a single task.

The max & min readings (peak & valley) reached by the process can be displayed either continuously by assigning it to a display line in the Display menu, or momentarily by pressing the F1 key (default) or assigning it to any of the other function keys or the digital input.

Pressing the F1 key cycles through various display values (e.g. max, min); press the Enter key to lock the display in the current process value and press the Enter key again to unlock the display.

The relay information menu shows runtime and cycle count for each relay.

Change the display units within the selected unit class at any time without the need to re-scale the meter. Select the desired units via the UNITS menu in the DISPLAY menu, and the meter automatically converts the display values to the new unit of measure.

Meter Operation

Front Panel Buttons Operation

Button Symbol	Description
	Press to enter or exit <i>Programming Mode</i> , view settings, or exit max/min readings
	Press to display max/min readings or other parameter/function assigned through the <i>User</i> menu
	Press to reset max/min readings or other parameter/function assigned through the <i>User</i> menu
	Press to acknowledge alarms or other parameters/function assigned through the <i>User</i> menu

Function Keys Operation

During operation, the programmable function keys operate according to the way they have been programmed in the *Advanced Features – User* menu. The table above shows the factory default settings for F1, F2, and F3.

A hint message may be enabled to provide a description of what each function key does prior to executing their assigned function. See *Enabling the Function Key Hint Feature (HINT)* on page 114.

Digital Input Operation

A digital input is standard on the meter. This digital input is programmed identically to function keys F1, F2, and F3. The input is triggered with a contact closure between DI+ and DI-, or with an active low signal. During operation, the digital input operates according to the way it has been programmed in the *Advanced Features – User* menu.

Meter Operation

Maximum/Minimum Readings

The max & min readings (peak & valley) reached by the process can be displayed either continuously or momentarily.

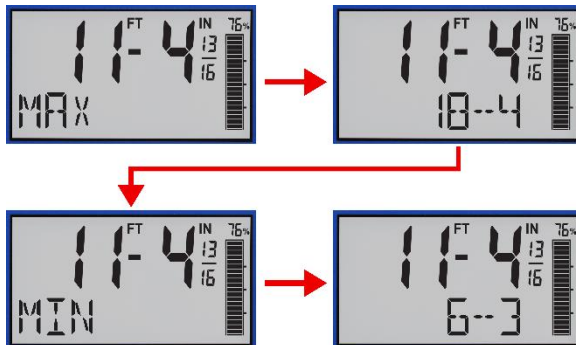
Display momentarily by pressing the F1 key (default) or assigning to any of the other function keys or to the digital input in the *User* menu.

Display continuously by pressing the **Enter** button while the max/min is being displayed to lock the display. Press **Enter** again to unlock.

Any of the F1-F3 function keys (buttons) and the digital input can be programmed to reset the max & min readings. The meters are set at the factory to display the max reading by pressing the *Right Arrow/F1* button and to use the *Up-Arrow/F2* button to access the *Reset* menu. Press the *Right Arrow* button to cycle through the available parameters to reset.

Top Line: Process Value

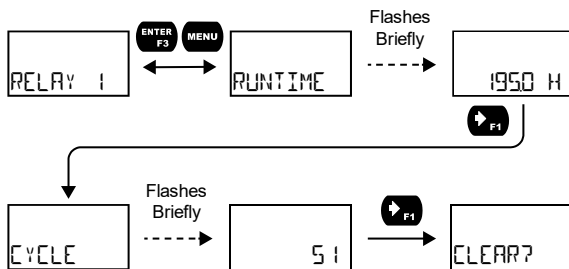
Bottom Line: Max & Min



Meter Operation

Runtime & Cycle Count (INFO)

The relay information menu shows runtime and cycle count for each relay. These values may be cleared at any time by selecting the *Clear* option (CLEAR?). If the cycle count or runtime values need to be changed on a frequent basis, it would be convenient to set up a front panel button or the digital input to simplify this process.



Note: See the menu tree under *Solid State Relay Outputs (RELAY)* on page 84 for complete menu structure on this feature.

Meter displaying the amount of
time a relay has been activated



Meter displaying the number of
times a relay has cycled



Changing PV2 Engineering Units

It is possible to change PV2's display units within the selected unit class without the need to re-scale the meter. The **UNITS** menu in the **DISPLAY** menu allows the unit of measure to be changed (e.g. from gallons (**GAL**) to liters (**L**)) and the meter will automatically convert the display value to the new unit of measure. If entering a custom unit (**CUSTOM**), the input must be scaled using the custom unit. See *Changing the Engineering Units (UNITS)* on page 70.

Troubleshooting

Troubleshooting

This product is a highly sophisticated instrument with an extensive list of features and capabilities. If the front panel buttons are used to program the meter, it can be a difficult task to keep everything straight. That is why we strongly recommend the use of the free IDE20 Configuration Software for all programming activities. A Micro B USB cable is required to use the IDE20 Configuration Software for programming the meter.

If you have programmed the meter with the front panel buttons and it is not working as intended, try reprogramming the meter using the IDE20 Configuration Software.

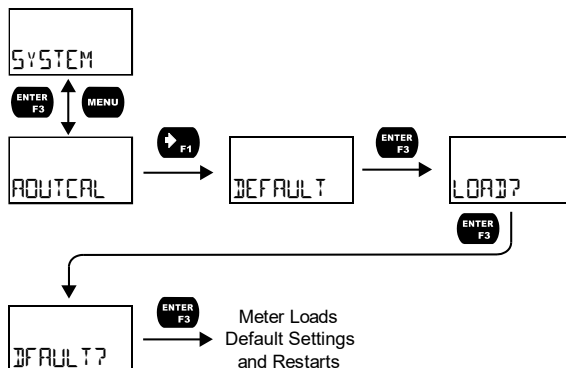
Troubleshooting

Reset Meter to Factory Defaults

When the parameters have been changed in a way that is difficult to determine what's happening, it might be better to start the setup process from the factory defaults. This can be accomplished using IDE20 Configuration Software or with the front panel buttons.

To load factory defaults:

1. Press the **Menu** button to enter *Programming Mode*.
2. Press the **Up-Arrow** button **twice** and press **Enter** to access the **Advanced** menu.
3. Press the **Up-Arrow** button and press **Enter** to access the **System** menu.
4. Press the **Right-Arrow** button and press **Enter** to access the **Default** menu.
5. Press **Enter** twice in quick succession. The meter will load default settings and restart.



Troubleshooting

Determining Software Version

To determine the software (firmware) version of a meter:

1. Press the **Menu** button to enter *Programming Mode*.
2. Press the **Up-Arrow** button **twice** and press **Enter** to access the **Advanced** menu.
3. Press the **Up-Arrow** button and press **Enter** to access the **System** menu.
4. Press the **Up-Arrow** button **twice** and press **Enter** to access the **Info** menu.
5. Press the **Right-Arrow** button to cycle through the meter information. When done, press the **Menu** button to return to the previous menu.

Troubleshooting

Factory Default Settings

The following table shows the factory setting for most of the programmable parameters on the meter.

Parameter	Display	Default Setting
Input Menu		
Unit of Measure	UNIT	Feet & Inches
Input 1	INP 1	4.000 mA
Display 1	DSP 1	0.00
Input 2	INP 2	20.000 mA
Display 2	DSP 2	100.00
Output Menu		
Open Collector Output 1	OUTPUT 1	Disabled
Pulse Factor	FACTOR	1.0
Test Frequency	FREQ	100
Alarm	ALARM	PV
Alarm Action	ACTION	AUTO
Set Point	SET	20.00
Reset Point	RESET	10.00
Alarm On Delay	DELAY ON	0 seconds

Troubleshooting

Parameter	Display	Default Setting
Alarm Off Delay	DELAY OFF	0 seconds
Alarm Failsafe	FAILSAFE	OFF
Red LED	RED	ON
Flash PV	FLASH	ON
Alarm Message	MSG	ON
Message Text	MSG EDIT	ALARM 1
Timer Off Delay	OFFDELAY	1 minute
Timer On Time	ON TIME	1 second
Timer Mode	MODE	Continuous
Open Collector Output 2	OUTPUT 2	Disabled
Set Point	SET	40.00
Reset Point	RESET	30.00
Message Text	MSG EDIT	ALARM 2
Relay Output 1	RELAY 1	Disabled
Alarm	ALARM	PV

Troubleshooting

Parameter	Display	Default Setting
Alarm Action	ACTION	AUTO
Set Point	SET	70.00
Reset Point	RESET	60.00
Alarm On Delay	DELAY ON	0 seconds
Alarm Off Delay	DELAY OFF	0 seconds
Alarm Failsafe	FAILSAFE	OFF
Red LED	RED	ON
Flash PV	FLASH	ON
Alarm Message	MSG	ON

Message Text	MSG EDIT	ALARM 3
Pump Ctrl On	ON	70.00
Pump Ctrl Off	OFF	60.00
Pump Ctrl On Delay	DELAY ON	0 seconds
Pump Ctrl Off Delay	DELAY OFF	0 seconds

Troubleshooting

Parameter	Display	Default Setting
Pump Alt On 1	ON 1	70.00
Pump Alt Off 1	OFF 1	60.00
Pump Alt On 2	ON 2	90.00
Pump Alt Off 2	OFF 2	80.00
Pump Alt On Delay 1	DELAY 1 ON	0 seconds
Pump Alt Off Delay 1	DELAY 1 OFF	0 seconds
Pump Alt On Delay 2	DELAY 2 ON	0 seconds
Pump Alt Off Delay 2	DELAY 2 OFF	0 seconds
Timer Off Delay	OFF DELAY	1 minute
Timer On Time	ON TIME	1 second
Timer Mode	MODE	Continuous
Relay Output 2	RELAY 2	Disabled
Set Point	SET	20.00
Reset Point	RESET	10.00

Troubleshooting

Parameter	Display	Default Setting
Message Text	MSG EDIT	ALARM 4
4-20 mA Output	4-20 mA	PV

Advanced Menu

Signal Conditioning Function	FUNCTION	Linear (2 pts)
Low Cutoff	CUTOFF	Enabled: 0
Filter	FILTER	2.0 seconds
Filter Bypass	BYPAS	0.4 PCT
Password	PASSWD	00000 (Unlocked)
Function Key 1	F1	Display
Function Key 2	F2	Reset
Function Key 3	F3	Acknowledge
Digital Input	DI	Acknowledge
Function Key Hint Feature	HINT	Disabled
Dual-Scale	PV 2	Disabled
Backlight	BACKLIGHT	Enabled

Display Menu

Troubleshooting

Parameter	Display	Default Setting
Ft&In Display	UNITS	FT-IN/*
Bargraph	BARGRAPH	Percent of PV
Bottom Line	BOTTOM	Tag (LEVEL)

Troubleshooting

Troubleshooting Tips

Certain sequences of events can cause unexpected results. To solve these issues, it is best to start fresh from factory defaults and use the manual as a step by step programming guide, rather than a random approach to programming. See *Reset Meter to Factory Defaults* on page 125 for details on resetting the meter to factory defaults. In addition, for best results, we recommend using the free IDE20 Configuration Software for all programming needs.

Symptom	Check/Action
No display at all	1. Check that the 4-20 mA current loop is providing at least 3.5 mA to the meter. 2. Check that the voltage drop of all devices connected to the 4-20 mA current loop does not exceed the max rating of the loop power supply.
Not able to change setup or programming, LOCKE is displayed	Meter is password-protected, enter correct five-digit password to unlock.
Meter display flashes: 1. 999^{FT} 11^{IN} 2. --99^{FT} 11^{IN}	Check that the number of digits required for the scaled value does not exceed the maximum digits for the display line. If it does, try adjusting the decimal point location for less precision or changing the PV display to the bottom line.
Display is unstable	Check: 1. Input signal stability and value. 2. Display scaling vs. input signal. 3. Filter and bypass values (increase).
Display response is too slow	Check filter and bypass values

Troubleshooting

Display reading is not accurate	Check: 1. Input signal conditioner selected: Linear or RHT 2. Scaling or calibration
Display does not respond to input changes, reading a fixed number	Check display assignment. It might be displaying max, min, or set point.
Display shows: 1. $\overline{M}\overline{R}\%$ and a number 2. $\overline{M}\overline{I}\overline{N}$ and a number	Press Menu to exit max/min display readings.
Relay operation is reversed	Check fail-safe settings in <i>Output</i> menu
Relays do not respond to signal	Check: 1. Relay action in <i>Output</i> menu 2. Set and reset points 3. Check manual control menu
If the display locks up or the meter does not respond at all	Cycle the power to reboot the microprocessor.
Other symptoms not described above	Call Technical Support for assistance.

NOSHOK Technical Support

Corporate Headquarters

1010 West Bagley Road

Berea, Ohio 44017

Ph: 440.243.0888

Fax: 440.243.3472

E-mail: noshok@noshok.com

Web: www.noshok.com

For the latest version of this manual please visit www.noshok.com