

The **Smith Meter® Model GP-UF/A** is a general-purpose, field-programmable, frequency to analog converter designed for low- or high-input frequency applications which require fast response without output ripple. The GP-UF/A converts the pulse or sinusoidal-type input and delivers a dc, current, or voltage output proportional to flow.

Features

- **Display Process Variable.**
- **Field Programmable** – full-scale input selection from .001 to 99,999 pulses/unit.
- **Versatility** – accepts high- or low-level inputs.
- **Output Power Source** – Provides 12 Vdc to power transmitters.
- **Unique Conversion Technique** – allows fast analog update, even at low-input frequencies.
- **Scaling Factor** – 5 digits.

Applications

The GP-UF/A Converter accepts inputs from most Smith Meter transmitters.

Type of Transmitter	Output	Power Output Option Required
Turbine/Pickup	Sinusoidal	No
Turbine/Preamp	Pulse	Yes
HR-LNC	Pulse	Yes
PEXP	Pulse	Yes
D	Sinusoidal	No
LR-LNC	Contact Closure	No
E	Contact Closure	No
PPS	Pulse	1
PST	Pulse	Yes

Specifications

Accuracy

Resolution: 0.1% of full scale.
 Linearity: Not exceeding 0.2% of full scale.
 Ripple: Not exceeding 0.1% of full scale.

Stability

External Load Variation: 0-750 Ω: 0.2% of full scale (current output).



Ambient Temperature Variation Between 32°F-122°F (0°C-50°C): Not exceeding 0.12% per degree F (0.02% per degree C).

Power Supply Variation: Up to ±10%.

Input Signal

Low-Level:

Type: Sinusoidal wave, responds to 50 mV RMS, Max 35 Vdc may be superposed. Max signal 100V.

Impedance: 50 kΩ.

Frequency: 1 - 50 kHz.

High Level:

Type: Square wave, responds to ON/OFF >7/<4 volts.
 Maximum signal: 150V

Impedance: 100 kΩ.

Frequency: 0 to 100 kHz.

Input Power

Standard:

Voltage: 85 to 265 Vac.

Power Consumption: 4 watts max.

Frequency Range: 48-62 Hz.

Optional DC:

Voltage: 18 to 40 Vdc.

Power Consumption: 4 watts max.

Analog Signal Outputs

Isolated Analog (Programmable):

0-20 mA with 750 Ω max. loop resistance.

4-20 mA with 750 Ω max. loop resistance.

Isolated Voltage (Programmable):

0-10 Vdc or 2-10 Vdc with max. 3 mA load.

1 Standard GP-UF/A output power option insufficient to power the PPS Transmitter.

Pulse:

Type: Square wave (repeat of input).
Voltage: 10 Vdc.
Frequency: 0 to 100 kHz.
Source Impedance: 1 kΩ.
Load: Not less than 10 kΩ.

DC Output Power

Voltage: 12 Vdc – standard.
Current: 60 mA max. with AC power input.
Current: 20 mA max. with DC power input.

Environmental

Ambient Operating Temperature:
30°F to 122°F (0°C to 50°C).

Enclosures

Standard:

General-purpose NEMA 1.

Mounting: Any position – base-mount or snap-on 35 mm relay track.

Optional:

Weatherproof, NEMA 4.

Explosion-proof, NEMA 7, Class I, Group D.

Ordering Information

To assure that the GP-UF/A meets all requirements, please specify the following information when ordering:

- Model
- Input Power
- Type of Enclosure
- Output Current Source

Modeling

Example: **GP-UF/A — DC — G**

Basic Model Designation

GP-UF/A

Input Power

AC (85 to 265 Vac)
(Standard)
DC (18 to 40 Vdc)

Available Models	
GP-UF/A – AC – G	GP-UF/A – DC – G
GP-UF/A – AC – N4	GP-UF/A – DC – X
GP-UF/A – AC – X	–

Enclosure

G – General-Purpose (Standard)
N4 – Weatherproof
X – Explosion-Proof

Programming Procedure

Programming is accomplished by using the four keys that are located at the right side of the display. The keys and their functions are as follows:

- △ – This key is used to step through the program parameters sequentially or to advance the selection of the blinking underlined character.
- ◁ – This key is used to display the descriptive text of the parameter that is displayed or to shift to the next digit to be programmed.
- P – This key is used to activate or deactivate the program mode. If the display is showing the process variable, pressing P will put the unit in the program mode. If the unit is in program mode, pressing P will take the unit out of program mode and display the process variable.
- E – This key is used to enter the write condition of the parameter that is being displayed. When pressed, the digit will blink and can be altered. Once the digit has been changed, pressing “E” again will write that value to memory.

The standard procedure for programming the unit is as follows:

1. Start programming by pressing “P”.
2. Enter the parameter to be changed by pressing “E”.
3. Select the required digit to be changed by pressing “◁” until that digit is blinking.
4. Move to the required setting by pressing “△” until the required digit is blinking.
5. Move to the next digit by pressing “◁”.
6. When all the required digits have been changed, write the value to memory by pressing “E”.
7. Move to the next parameter by pressing “△”.
8. Terminate programming by pressing “P”.

Parameters that are not required to be changed can be skipped by continuing to press “△” until the parameter that is required to be changed is displayed.

If parameter 02 is programmed as locked and the pass code had not been entered in parameter 00, all the parameters can be read (except the pass code) but can not

be changed. If program parameter 02 is programmed as unlocked, the parameters can be changed without the use of a pass code. Once the instrument is installed, it is recommended that parameter 02 be changed to locked so only authorized personnel who have the pass code can change the program parameters.

Programming

Default Settings

The unit is shipped from the factory with the following default parameter settings.

Step Number	Description	Function	Value
00	SECRET	Pass Number	0000
01	C. SECRET	New Pass Number	0000
02	ACCESS ?	Lock Function	1 = unlocked
03	DECP \square/μ	Decimals of Pulse Factor	0 (no decimals)
04	\square/μ	Pulse Factor	1 (pulse/unit)
05	DP FREQ.	Decimals of Measurement	0 (no decimals)
06	FMAX	High End of Range	00100 (pulse/second)
07	FMIN	Low End of Range	00000
08	TIMEBASE	Time Reference	0 = .../second
09	ZERO MODE	Zero Level	1 = live zero
10	OFF-RATE	Cut-Off Low End	1% of high end
11	PREDIV	Input Frequency Divider	001
12	TMIN	Minimum measurement period	400

The unit can be returned to the default settings at any time by pressing both the P and \triangleleft when the power is turned on to the unit.

Parameters

00 – Secret

This four digit parameter is used to protect the unit against unauthorized or inadvertent alteration of the program parameters. To change the programming of the instrument, the operator enters the pass code that has previously been entered in the unit. If an incorrect pass code is entered, the programming mode will be cancelled and the display will revert back to the measurement value. If a value is not entered in this parameter, the remaining parameters can be viewed but not changed. The default value when shipped from the factory is 0000.

01 – C. SECRET

This four digit parameter is used to change the pass code that was originally programmed in the unit. In order to enter a value in this parameter, a correct value had to be programmed in parameter 00.

02 – ACCESS

This single digit parameter is used during installation and start-up where parameters must be changed frequently. The options for this parameter are:

- 0 - locked
- 1 - unlocked

After the installation and start-up process are completed, this parameter should be programmed as 0 (locked) so that the pass code must be entered before parameters can be changed. The default value, as shipped from the factory, is 1 (unlocked).

03 – Decimals of pulse factor

This single digit parameter sets the number of decimal places that will be used for the number of pulses per one unit of volume coming from the transmitter. The selections for number of decimal places are as follows:

- 0 - no decimal places (0)
- 1 - one decimal place (0.1)
- 2 - two decimal places (0.01)
- 3 - three decimal places (0.001)

The actual number of pulses is programmed in parameter 04. The default value for this parameter, as shipped from the factory, is 0 (no decimal places).

04 – (K-Factor) Number of pulses per one unit of volume

This four or five digit parameter is used to program the number of pulses being supplied by the transmitter for each unit of volume going through the meter. The number of digits available is dependent on whether a decimal is being used in the number. Most meter manufacturers will supply the nominal number of pulses per unit volume being output from the transmitter. The default value for this parameter, as shipped from the factory, is 1 pulse/unit.

Example:

Note: Parameter 08 must be set to (1) for minutes.

To display in gallons per minute utilizing a 1000 P/Rev Transmitter and a Smith G6 meter with 5:1 gallon gearing:

Output pulses = (1000 Pulses/Rev) / 5 gal = 200 Pulses per gallon.

K-Factor = 200 P/Gal.

To display in dekaliters per minute utilizing a 1000 P/Rev Transmitter and a Smith G6 meter with 5:1 dekaliter gearing:

Output pulses = (1000 Pulses/Rev) / 5 dekaliter = 200 pulses per dekaliter and a Smith G6 meter with 5:1 dekaliter gearing.

K-Factor = 200 P/Dekaliter.

To display in dekaliters per minute utilizing a 1000 P/Rev Transmitter and a Smith G6 meter with 5:1 dekaliter gearing:

Output pulses = (1000 P/Rev) / 5 dekaliter = 200 Pulses per dekaliter

1 dekaliter = 10 liters

K-Factor = 10 liters x 200 P/dekaliter

F-Factor = 2000 P/liters

Note: The GP-UF/A does not offer an hour time base selection in parameter 08, therefore to display in units per hour the K-Factor must be divided by 60. The display has a fixed label if units/min, however using the following example the actual amount will be in units per hour.

To display in Barrels per Hour (BPH) utilizing a 1000 P/Rev Transmitter and a Smith M16 meter with 1:1 Barrel gearing (Max flow rate of 12,500 BPH) use the following example; this will require that parameter 03 be set for (2) decimal places and parameter 06 be set to the maximum flow rate in BPH:

M16 output pulses = (1000 Pulses/Rev) x BBL = 1000 pulses per BBL
(1000 P/BBL) / 60 minutes.hour = 16.66

K-Factor = 16.66 to display in BPH

To display in Barrels per Hour (BPH) utilizing a Smith 10" Sentury Turbine Meter (Max flow rate 12,000BPH) use the following example; this will require that parameter 03 be set for (2) decimal places and parameter 06 be set to the maximum flow rate in BPH:

Nominal K Factor for a 10" Sentury = 525P/BBL
(525 P/BBL) / 60 minutes /hour = 8.75

K-Factor = 8.75 to display in BPH

05 – Decimals of measurement (DP FREQ.)

This single digit parameter sets the number of decimal places for the display readings and the range definition. The selections for number of decimal places are as follows:

- 0 - no decimal places (0)
- 1 - one decimal place (0.1)
- 2 - two decimal places (0.01)
- 3 - three decimal places (0.001)

The actual ranges are programmed in parameters 06 and 07. The default value for this parameter, as shipped from the factory, is 0 (no decimal places).

06 – Maximum frequency (FMAX)

This four or five digit parameter allows the operator to program the maximum frequency that will provide either the 10V or 20 mA signal from the converter. If there is a decimal point programmed in parameter 05, this will be a four digit entry. If no decimal point is entered, this will be a five digit entry. The default value for this parameter, as shipped from the factory, is 00100 pulses/second.

Examples:

Smith G6 meter is rated for 1000 GPM Max or 3750 LPM Max.

Smith M16 is rated 12500 BPH or 2000 M3/Hr
(see notes under parameter 04)

07 – Minimum frequency (FMIN).

This four or five digit parameter allows the operator to program the minimum frequency that will provide a 2V or a 4 mA signal from the converter. If there is a decimal point programmed in parameter 05, this will be a four digit entry. If no decimal point is entered, this will be a five digit entry. The default value for this parameter, as shipped from the factory, is 0 pulses/second.

08 – Time reference (TIME BASE)

This single digit entry allows the operator to set up the time base for the variable displayed as well as the range definitions in parameters 06 and 07. The options are as follows:

- 0 = seconds
- 1 = minutes

The default value for this parameter is seconds.

09 – Zero level (ZERO MODE)

This single digit entry allows the operator to set up the zero level of output. The options are as follows:

- 0 = zero (0)
- 1 = level zero (4 mA or 2V)

A selection of 0 will set the minimum output to be either 0 mA or 0V depending on how the unit is wired. A selection of 1 will set the minimum output to be either 4 mA or 2V depending how the output is wired. The default value for this parameter is 1 (level zero).

10 – Low flow cutoff (OFF-RATE)

This two digit percentage entry allows the operator to program a low flow cutoff for the meter. When this level is reached, the output is cutoff to its zero level (unless the low end is programmed to an even higher level). The level is programmed as a percentage of the maximum frequency programmed in parameter 06.

The default value for this parameter is 1% of the maximum frequency

Example: If programmed for 10% of 1000 GPM the Low flow cutoff would be 100 GPM

11 – Input divide (PREDIV)

This three digit entry provides the operator the ability to divide the incoming pulses by a number from 001 to 255. The default value for this parameter is 001.

12 – Minimum Measurement Period (TMIN)

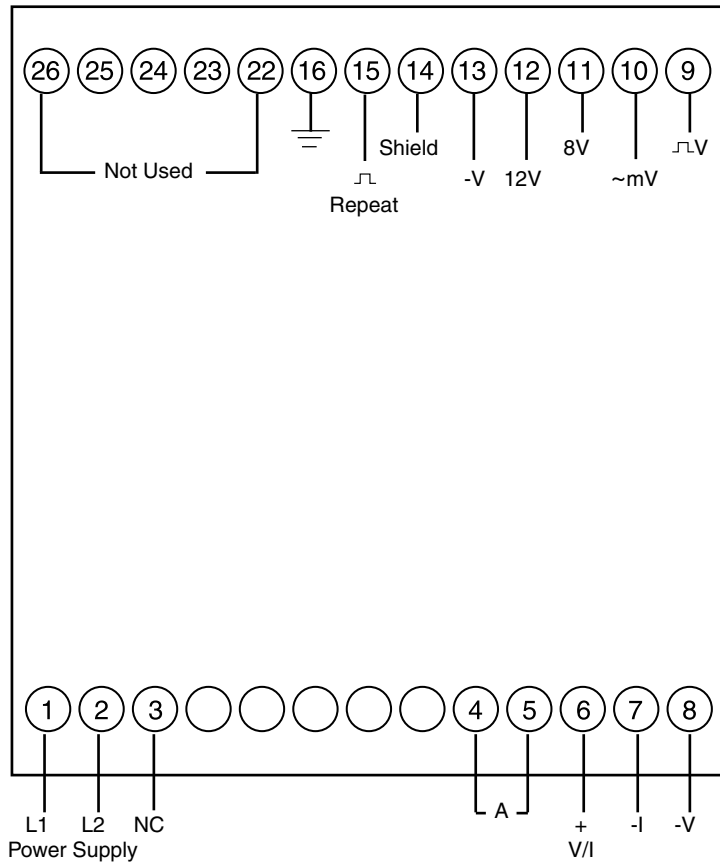
This five digit entry is used to achieve an averaging of the input frequency measurements over the programmed time period. This entry will help stabilize cyclic measurements. Valid entry range is from 00005 to 99999. Entry is in milliseconds, recommended minimum setting is 400 milliseconds, smaller entries can be used for higher frequency applications.

Example: for 2 second averaging, enter 2000.

Wiring Diagram

Terminal

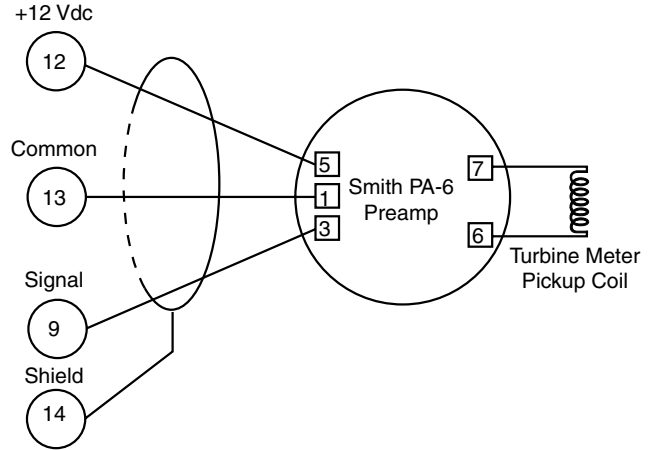
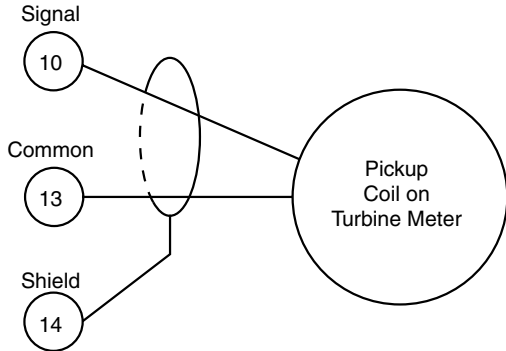
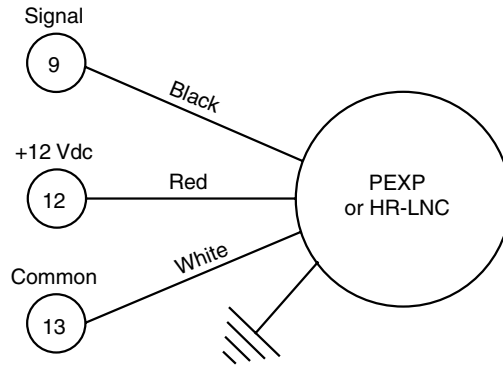
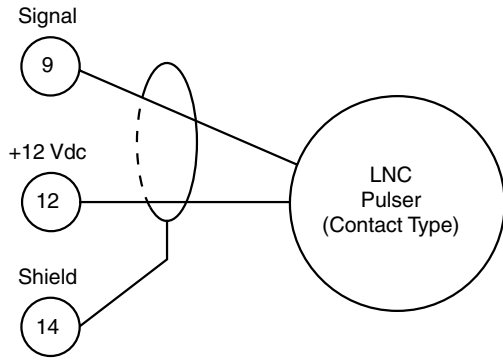
- 1 L1 (85-265 Vac), + (18-40 Vdc)
- 2 N/L2 (85-265 Vac), - (18-40 Vdc)
- 3 No connection
- 4 } Jumper for voltage output
- 5 } otherwise no connection
- 6 + output (mA and V) } Active output
- 7 - mA output } output
- 8 - V output
- 9 High level pulse input (square wave V)
- 10 Low level pulse input (sine wave mV)
- 11 +8V output (Namur sensors)
- 12 +12V output
- 13 Common V output
- 14 Shield
- 15 Repeat of input pulse
- 16 Ground



Output Programming

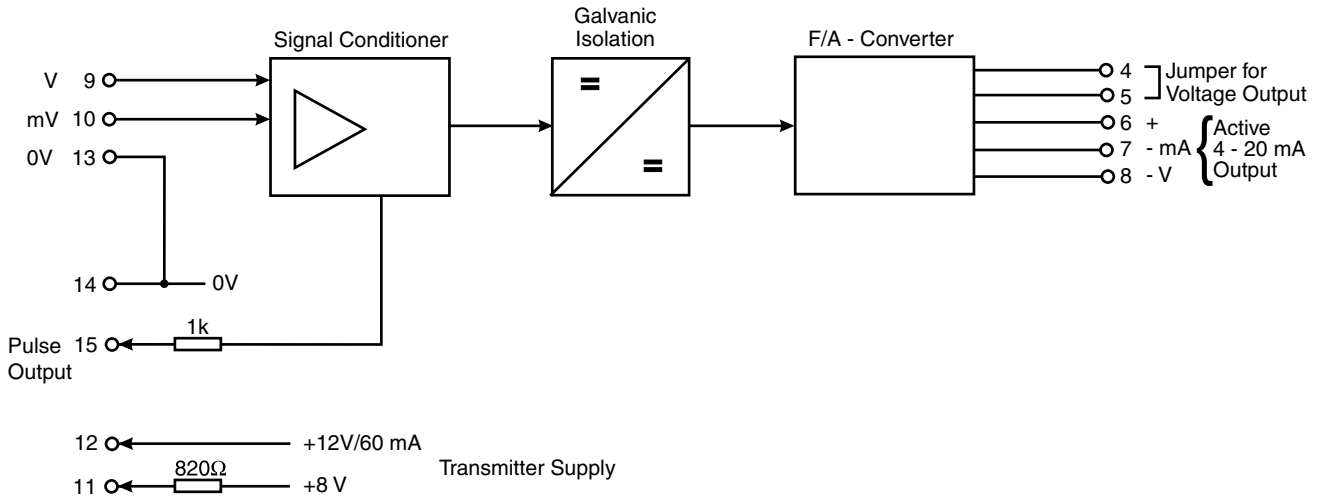
- A - Jumper Terminals 4 and 5 for voltage output.
- B - Current output from Terminals 6⁽⁺⁾ to 7⁽⁻⁾.
Voltage output from Terminals 6⁽⁺⁾ to 8⁽⁻⁾.

Input Wiring Diagrams



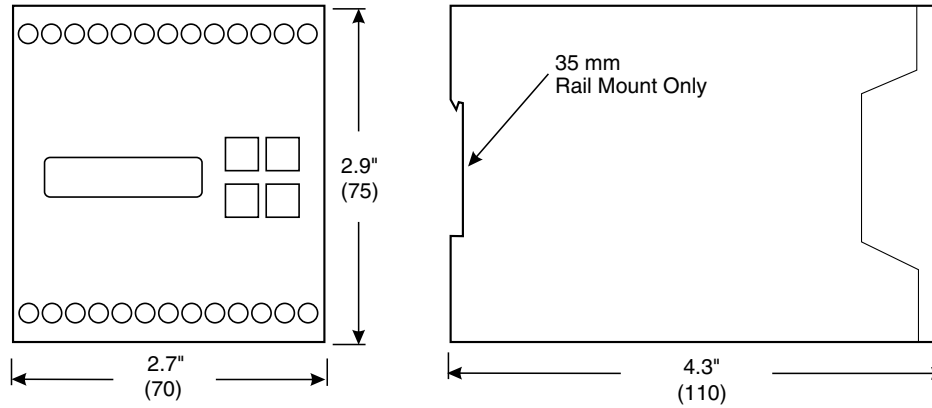
Functional Diagram

Active 4 - 20 mA Output



Dimensions

Inches (mm)

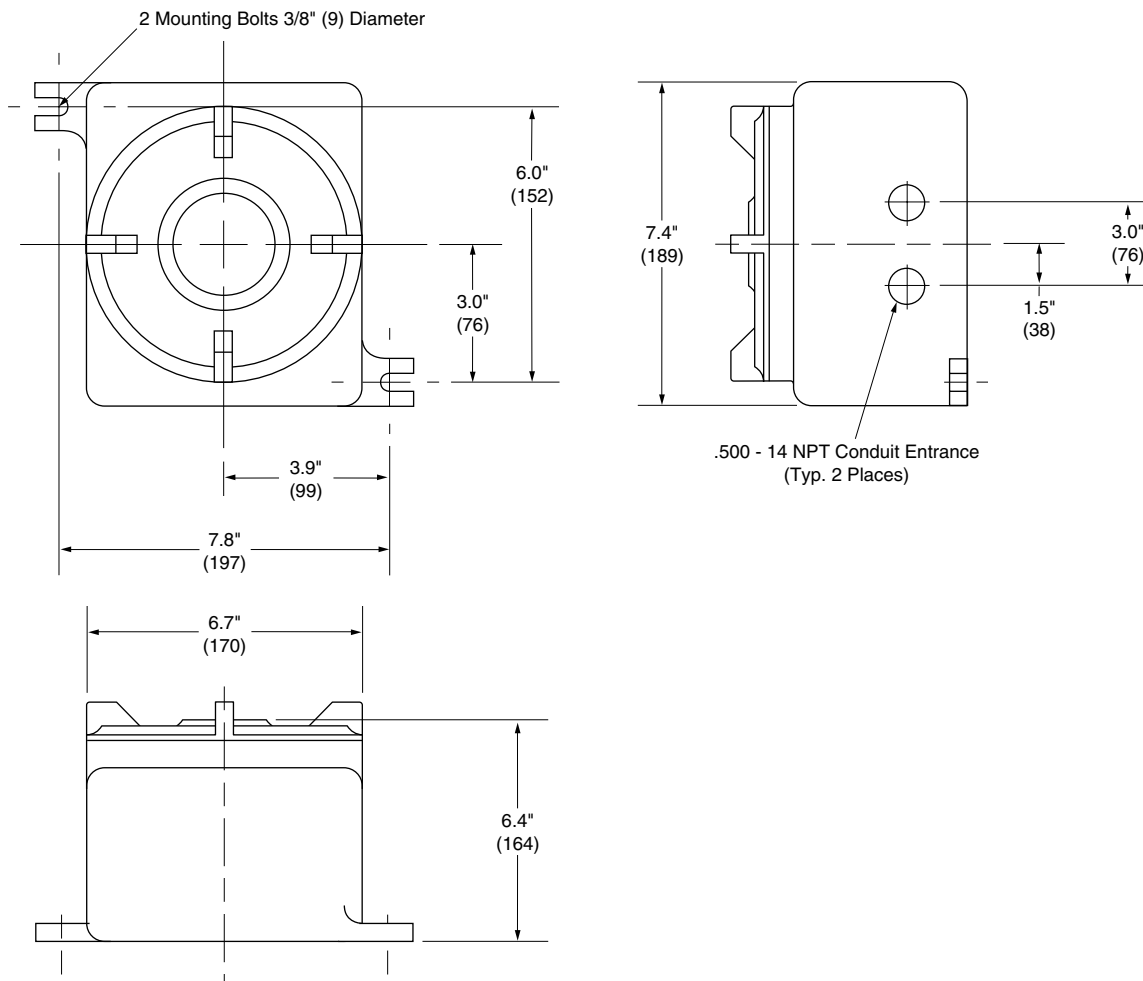


Weight: Approx. 0.9 lb (0.4 kg).

Note: Dimensions – Inches to the nearest tenth (millimetres to the nearest whole mm), each independently dimensioned from respective engineering drawings.

Dimensions – Explosion-Proof Housing

Inches (mm)



Note: Dimensions – Inches to the nearest tenth (millimetres to the nearest whole mm), each independently dimensioned from respective engineering drawings.

Revisions included in SS09024 Issue/Rev. 1.6 (8/11):
LP Loop-powered output source removed.

The specifications contained herein are subject to change without notice and any user of said specifications should verify from the manufacturer that the specifications are currently in effect. Otherwise, the manufacturer assumes no responsibility for the use of specifications which may have been changed and are no longer in effect.

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