Instruction Manual

DOZ03 / DOZ05 / DOZ07

Oval gear flowmeter

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Safety Information

General Instructions

To ensure safe operation, the device should only be operated according to the specifications in the instruction manual. The requisite Health & Safety regulations for a given application must also be observed. This statement also applies to the use of accessories.
Every person who is commissioned with the initiation or operation of this device must have read and understood the operating instructions and in particular the safety instructions!
The work safety instructions in this manual as well as the safety, accident prevention and environmental protection regulations generally valid for the work area must be observed.

The liability of the manufacturer expires in the event of damage due to improper use, non-observance of this operating manual, use of insufficiently qualified personnel and unauthorized modification of the device.

Proper Usage

The flow meters DOZ03, DOZ05 and DOZ07 are designed to monitor continuous flow rates of liquids or gases which do not attack the device materials. All other usage is regarded as being improper and outside the scope of the device.

In particular, applications in which shock loads occur (for example, pulsed operation) should be discussed and checked in advance with our technical staff.

The series DOZ03, DOZ05 and DOZ07 flow meter devices should not be deployed as the sole agents to prevent dangerous conditions occurring in plant or machinery. Machinery and plant need to be designed in such a manner that faulty conditions and malfunctions do not arise that could pose a safety risk for operators.
Dangerous substances

For dangerous media such as e.g. Oxygen, Acetylene, flammable or toxic substances as well as refrigeration systems, compressors, etc. must comply with the relevant regulations beyond the general rules.

Qualified Personnel

The DOZ03, DOZ05 and DOZ07 devices may only be installed by trained, qualified personnel who are able to mount the devices correctly. Qualified personnel are persons, who are familiar with assembling, installation, placing in service and operating these devices and who are suitably trained and qualified.

Inward Monitoring

Please check directly after delivery the device for any transport damages and deficiencies. Additional with reference to the accompanying delivery note the number of parts must be checked.
Claims for replacement or goods which relate to transport damage can only be considered valid if the delivery company is notified without delay.

Requirements for use in hazardous areas:

- Reed switch: Connection to intrinsically safe electric circuit (simple electrical equipments must be operated intrinsically safe with a suitable barrier according to EN 60079-11).
- Equipotential bonding has to be ensured upon the pipe system.
- Meters with plastic housing: do not clean the meters with a dry cloth as this would cause electrostatic charge.
- The fluid conductivity must be higher than 1000 pico/Siemens/meter to avoid electrostatic charges.

Explosion and fire hazards

Improper grounding, poor ventilation, open flames or sparks can cause a hazardous condition and result in an explosion or fire and cause serious injury.

- Be sure the fluid system is properly grounded. See your pump instruction manual for details.
- If there is static sparking or if you feel an electric shock while using the meter, stop dispensing immediately. Identify and correct the problem before continuing.
- Provide fresh air ventilation. This will avoid the build-up of fumes from the fluid being dispensed.
- Do not smoke while dispensing flammable fluids.
- Keep the dispensing area free of debris including solvents, rags and spilled gasoline.

Meter hazards

Equipment misuse can cause the meter to rupture or malfunction and cause serious injury.

- This equipment is for professional use only.
- Read all instructions, tags and labels before operating the equipment.
- Use the equipment only for its intended purpose.
- Do NOT modify or alter the equipment.
- Do NOT leave equipment unattended while dispensing.
- Check equipment daily. Repair or replace worn or damaged parts immediately.
- Do NOT exceed the maximum working pressure level of the lowest rated system component.
- Use only extensions and nozzles that are designed for use with this equipment.
- Use only fluids and solvents that are compatible with the equipment. Read all fluid and solvent manufacturer's warnings.
- Tighten all fluid connections before operating this equipment.
- Do NOT stop or deflect leaks with hands, body, gloves or rags.
- Do NOT dispense towards any person or any part of the body.
- Do NOT place hands or fingers over the end of or into the dispense valve.
- Comply with all local, state, and federal fire, electrical and safety regulations.
- Use of this product in a manner other than specified in this manual may result in impaired operation or damage to equipment.

These meters are designed to dispense a wide range of chemicals. Consult the factory for chemical compatibility.

Installation

Before initial installation:
Please rinse the unit with clear water or the medium to be measured before the initial installation.

Read the following information and have a thorough understanding before proceeding with meter installation. Only qualified personnel should perform meter installation.

Install a strainer or Y or basket as close to the inlet side of the meter as possible. Strainers prevent dirt and other fluid contaminants from impeding meter performance. Strainers require periodic cleaning, as clogged strainers also impede meter performance. Contact your local representative for specific information, per your specific application.

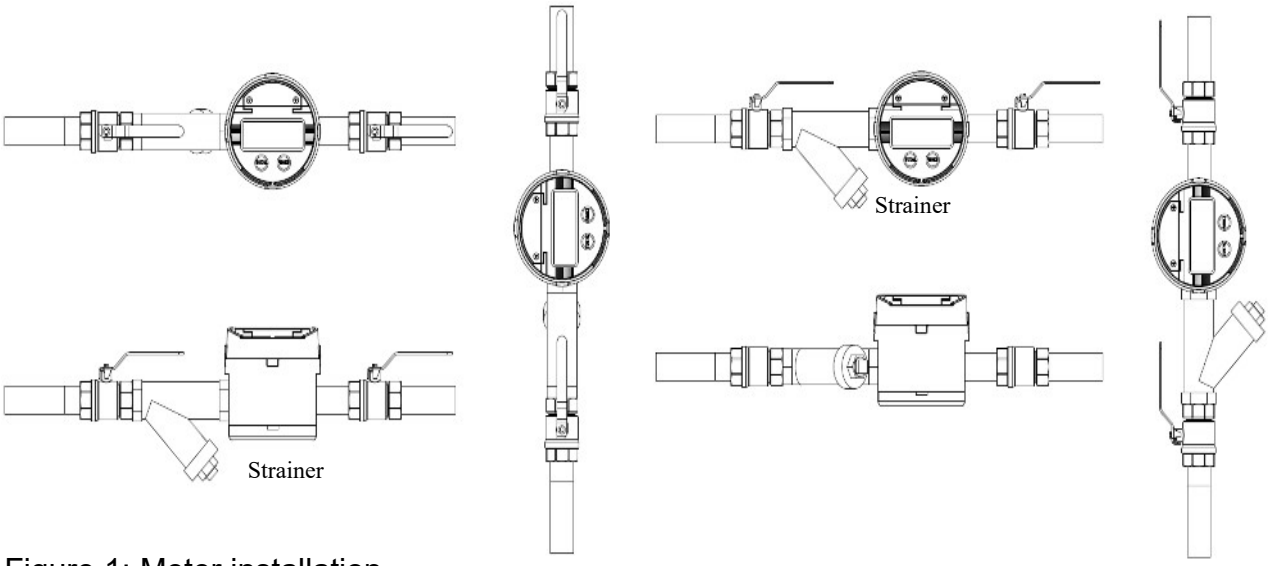


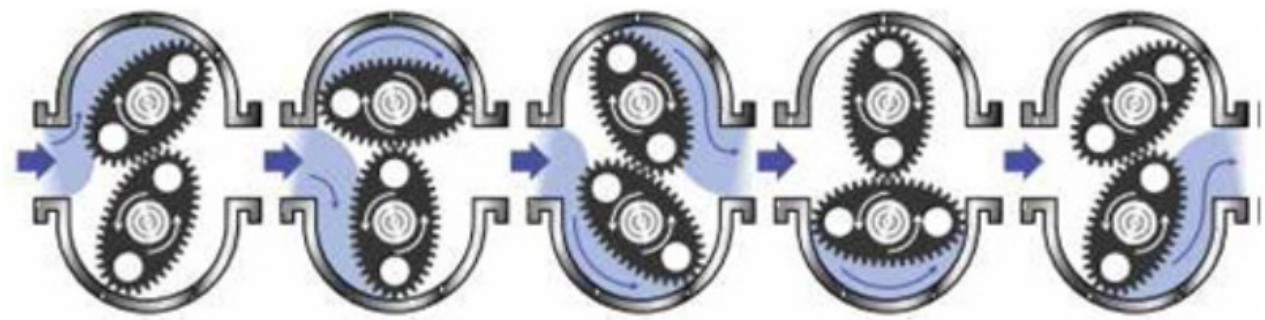
Figure 1: Meter installation

- Turn off any associated pumps to reduce line pressure and slowly fill the line and meter with fluid before restarting pumps. Doing so reduces the possibility of meter damage caused by errant air pressures in the line and meter.
- Make sure all pipe conforms to the same pressure output rating as the pump.
- Make sure to apply thread sealant to all pipe threads.
- Make sure to install the meter as shown in figure 1.
- Check for and repair leaks upon initialization of fluid flow.

Recommended filter sizes:

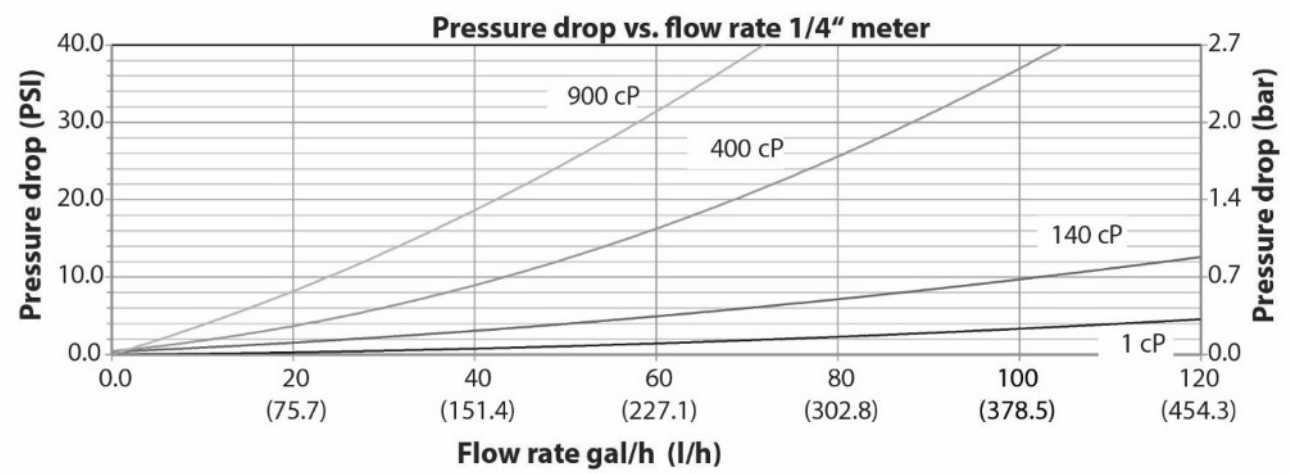
device size	filter / ore width [mesh]	filter / pore width [mm]
1/4“	200	0,08
1/2“	60	0,250
3/4“	60	0,250
1“	60	0,250
1 1/2“	60	0,250
2“	60	0,250
3“	40	0,4

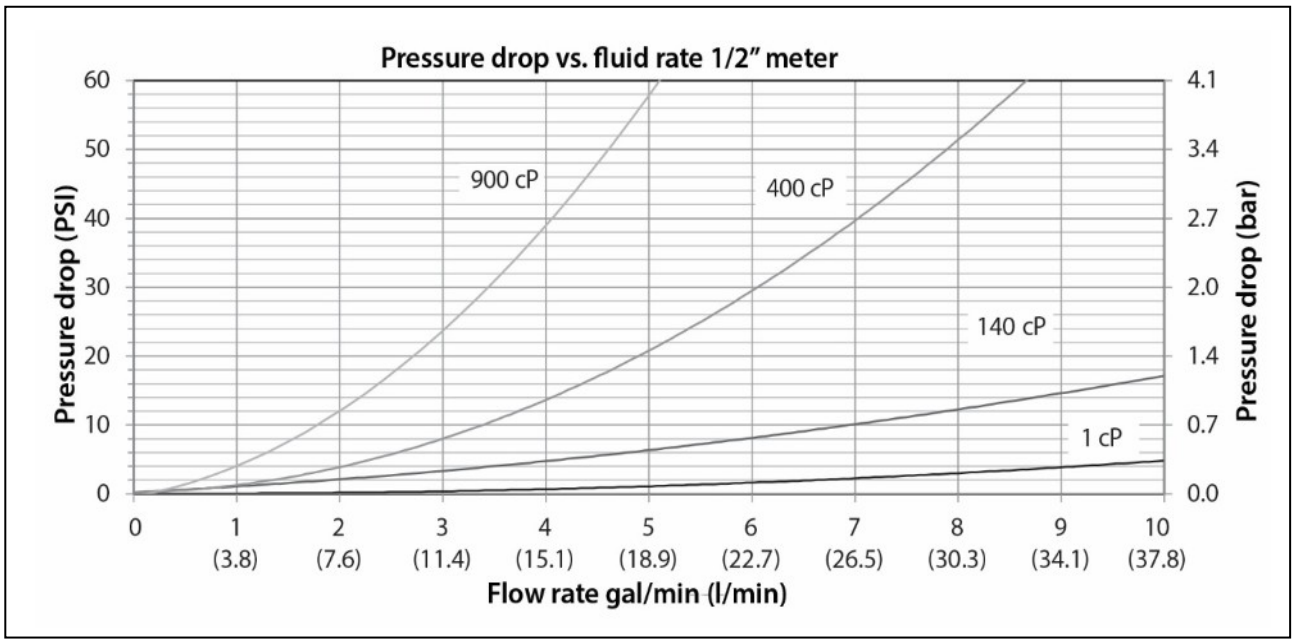
Meter operation

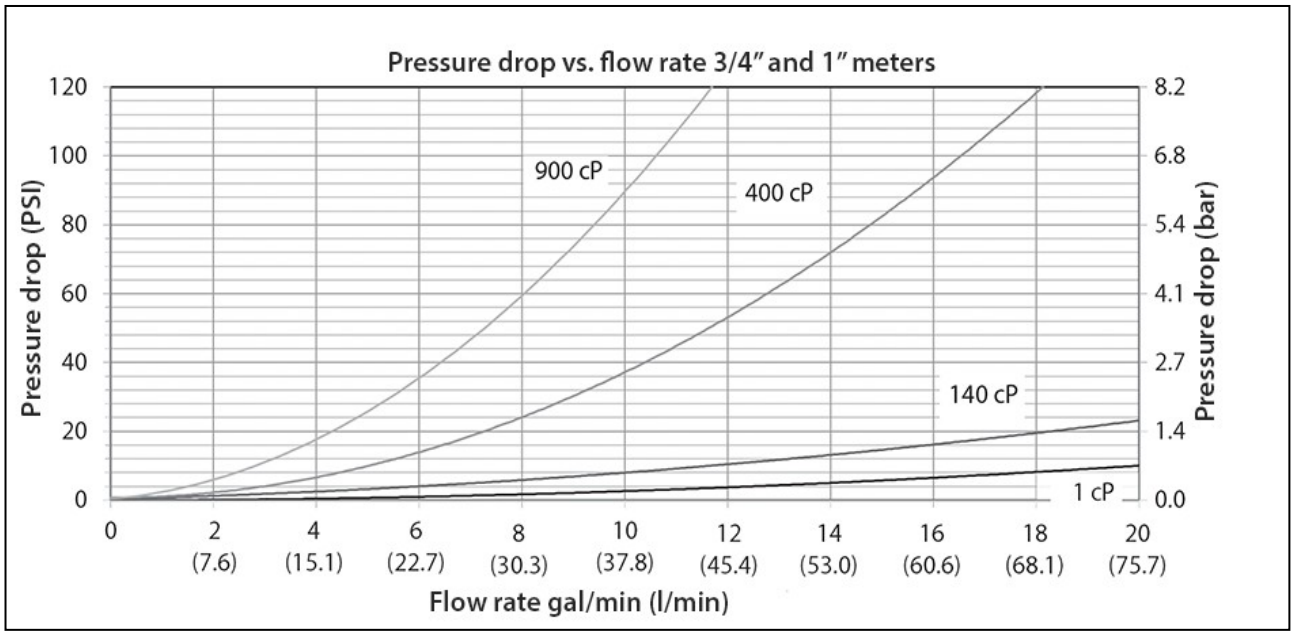


Fluid enters the inlet port and then passes through the metering chamber. Inside the chamber, fluid forces the internal gears to rotate before exiting through the outlet port. Each rotation of the gears displaces a specific volume of fluid. As the gears rotate, a magnet on each end of the gear pass a reed switch in the top-mounted register's circuit board. The reed switches send pulses to the microprocessor in the register to change the LED display segments.

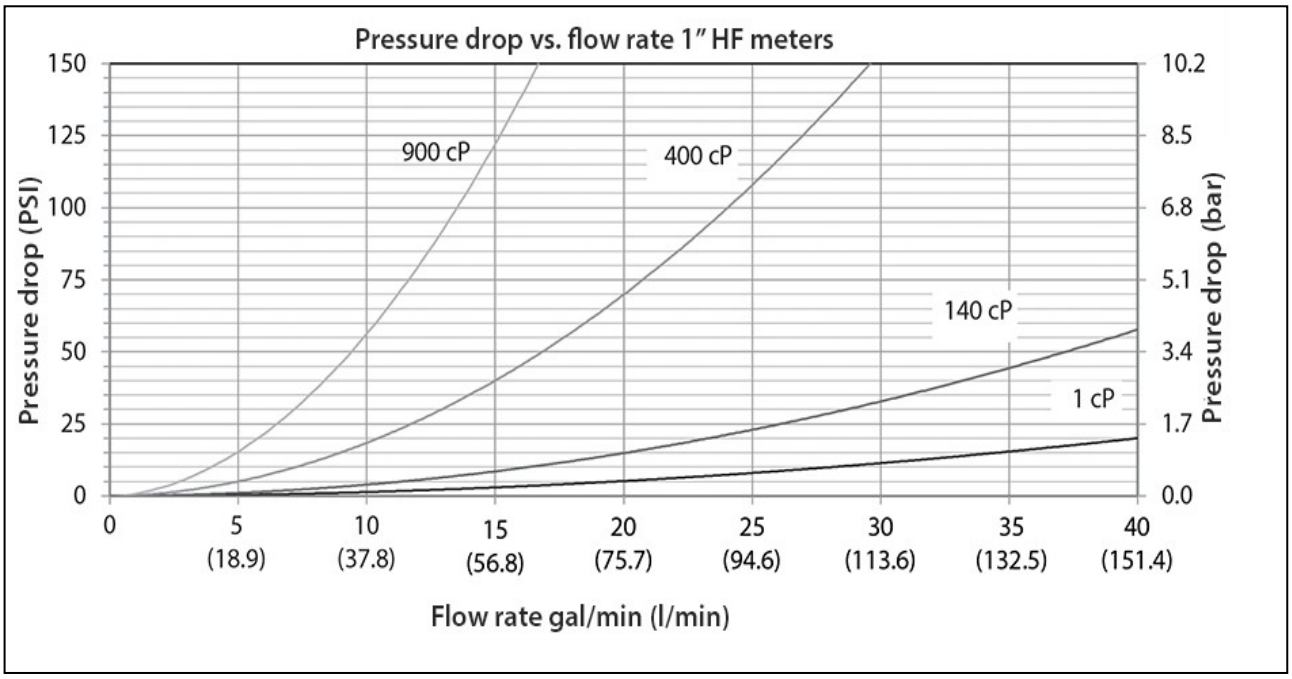
Pressure loss diagrams

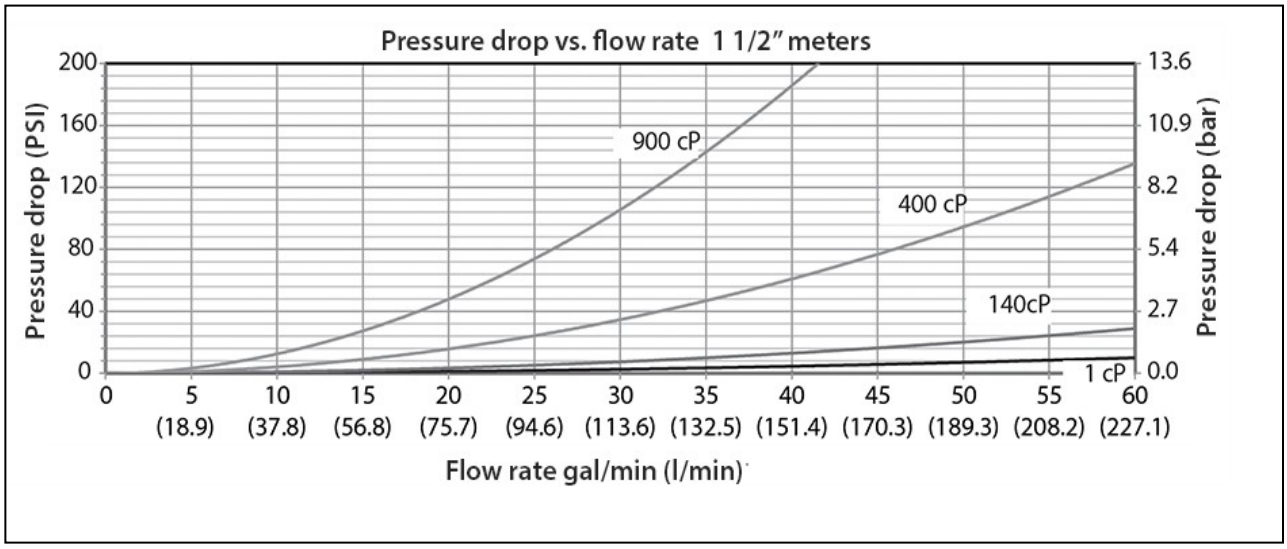


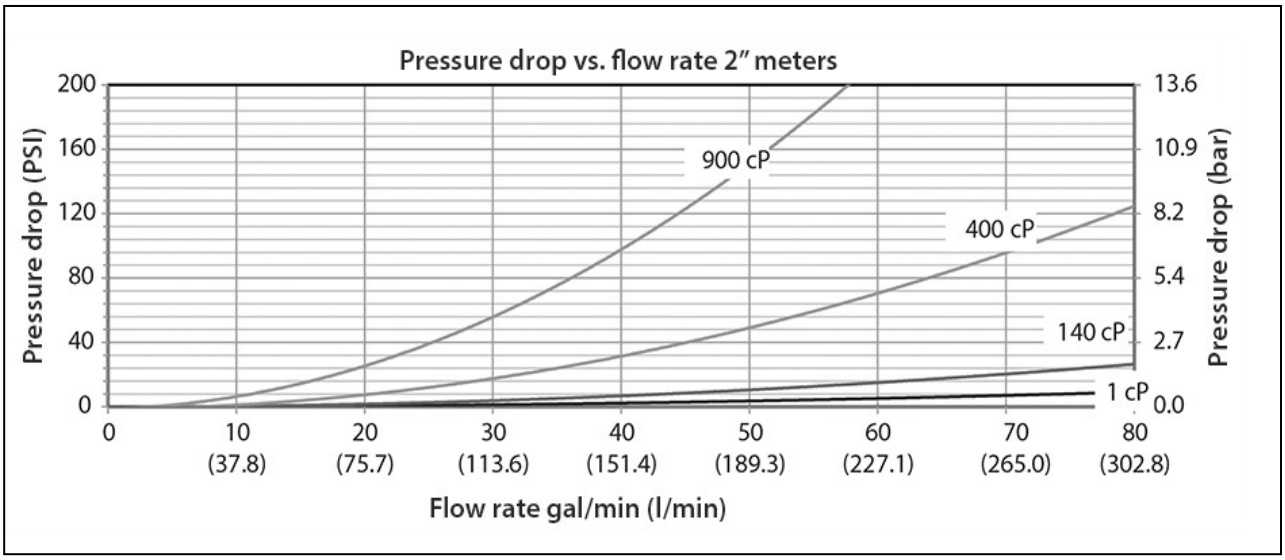


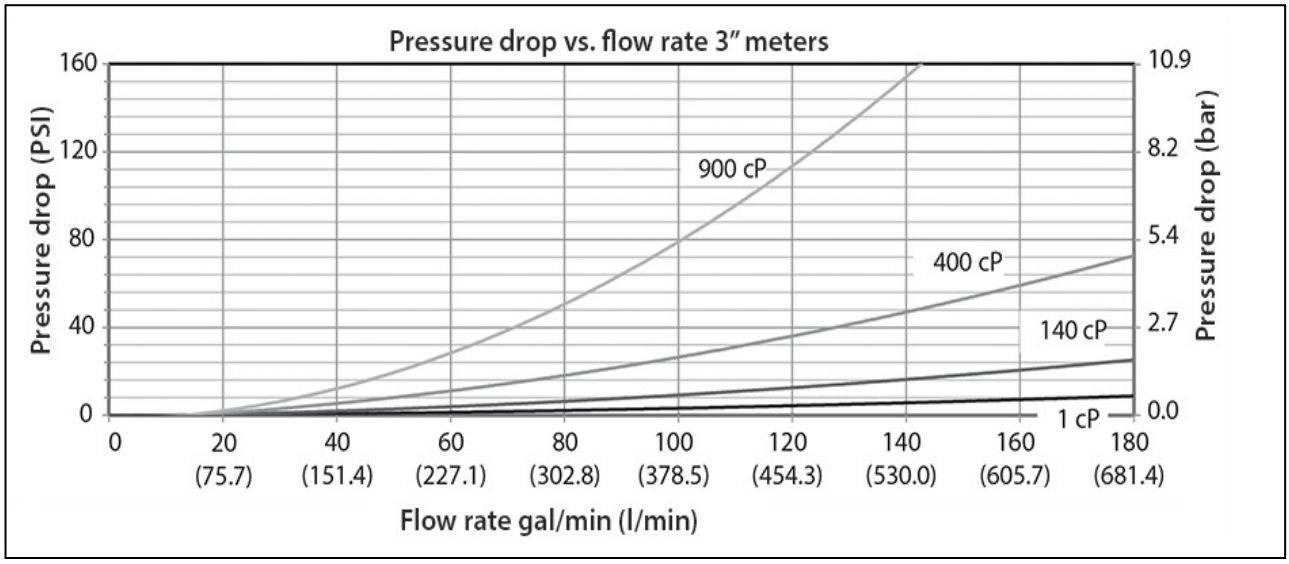


for DOZ07 only:






Pressure drop vs. flow rate 2″ meters
Pressure drop (PSI)
200
160
120
80
40
0
13.6
10.9
8.2
5.4
2.7
0.0
Pressure drop (bar)
900 cP
400 cP
140 cP
1 cP
0
10
(37.8)
20
(75.7)
30
(113.6)
40
(151.4)
50
(189.3)
60
(227.1)
70
(265.0)
80
(302.8)
Flow rate gal/min (l/min)


Pressure drop vs. flow rate 3″ meters
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900 cP
400 cP
140 cP
1 cP
0
20
(75.7)
40
(151.4)
60
(227.1)
80
(302.8)
100
(378.5)
120
(454.3)
140
(530.0)
160
(605.7)
180
(681.4)
Flow rate gal/min (l/min)

Evaluation units general

Features:

- Large, six-digit LCD display
- Display in litres, pints, quarts or gallons freely programmable
- 11-digit non-resettable totaliser and 6-digit resettable totaliser
- Replaceable battery with long life
- Stored calibration factor
- 9-point linearisation
- Scalable pulse output (with output signal code B and option D2)
- 4-20 mA output (for output signal code B and option D2)
- Protection class: IP65

Description:

The electronic evaluation unit (register) consists of a microprocessor board powered by a lithium battery. It can be programmed in litres, pints, quarts or gallons and adds in litres or gallons.
A calibration factor and a unit of measure are programmed during a factory test. Unlike mechanical units, these can be electronically recalibrated in the field if necessary. A 6-digit LC display with three decimal places shows the exact amount of liquid flowing through the meter. The register is protected from normal wear and tear by a robust, shockproof housing.

Operation:

The magnets integrated in oval gear counters send pulses to the register.
The register is in sleep mode until pulses arrive. The pulses are generated by the liquid flowing through the meter.

The register shows the current flow rate, the subtotal and the total.

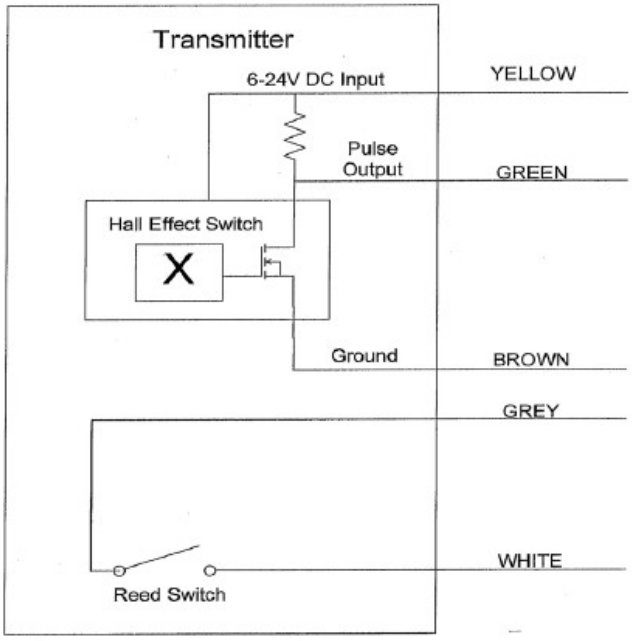
The resettable totaliser has a 6-digit display with three digits after the decimal point. If the measured quantity exceeds 999.999, the display jumps over. Then only 2 digits behind the decimal point 9999.99 are displayed and so on up to the maximum value of 999999. After 999999 is reached, the totaliser starts again with 0.000. When the reset button is pressed, the totaliser is reset to zero. The register also has a resettable total counter. To reset this, the total and reset keys must be pressed simultaneously ("Total" key pressed and held, "Reset" key pressed). This can be used for several subtotals.

The non-resettable totalisers have 11 digits and count arbitrarily in either gallons or litres.

Electrical Connection / Evaluation units

DOZ03, Code RH
potential free Reed contact and Hall sensor, 3 m cable:

Connection plan:



Hall effect switch:

Rating: Power Supply: Supply input range:5-24 VDC, 3,5 mA
Output current: 30 mA, max.
Wiring: Yellow: Hall effect DC+
Brown: Hall effect ground
Green: Hall pulse output

Reed switch:

Rating: Power rating: 10 W
Switching voltage: 100 V (DC or peak AC)
Switching current: 500 mA (DC or peak AC)
Wiring: Grey: Reedswitch
White: Reedswitch
Green: Hall effect pulse output

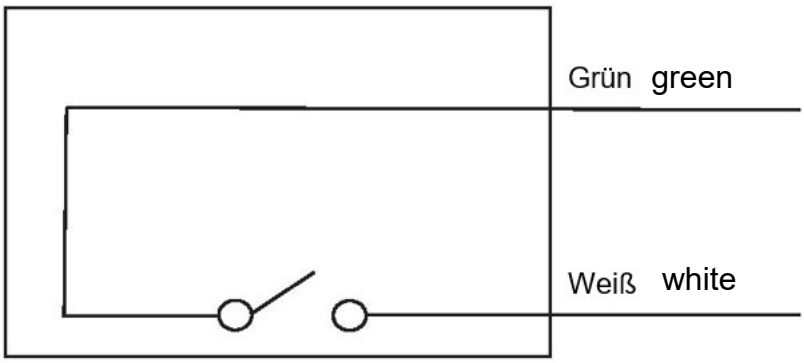
Pulses per liter (PPL)

Meter size	meas. range code	measuring range	pulses/L
1/8“	06	0,017...0,83 l/min	appr.4400
1/4“	08A	0,04...1,67 l/min	appr. 2170
1/4“	08B	0,25...8,33 l/min	appr. 390

Note: Pulses per liter are shown unit-specifically on the calibration certificate supplied and on the type plate.

DOZ05 and DOZ07, Code R
potential free Reed contact, pulse output, 2,7 m cable:

Connection plan:



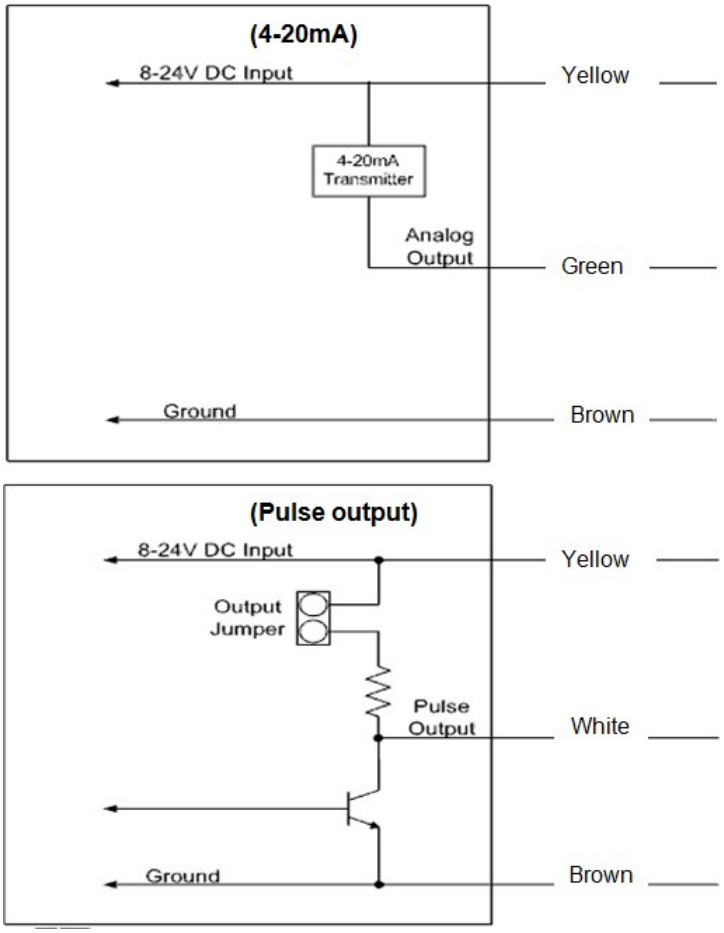
Pulse per unit of measure

Type	Meter size	pulses/L	pulses/gallon
DOZ05	1/2“	ca. 100	ca. 378,5
DOZ05	3/4“	ca. 66	ca. 249,8
DOZ05	1“	ca. 66	ca. 249,8
DOZ07	1“	ca. 43	ca. 162,8
DOZ07	1 1/2“	ca. 17	ca. 64,4
DOZ07	2“	ca. 9	ca. 34,1
DOZ07	3“	ca. 3	ca. 11,4

Note: Pulses per liter are shown unit-specifically on the calibration certificate supplied and on the type plate.

On Site Display (mounted or seperate), Pulse output NPN, Analoge output (4...20 mA), 3 m cable, order code B or Option D2

Connection plan:



Register wiring

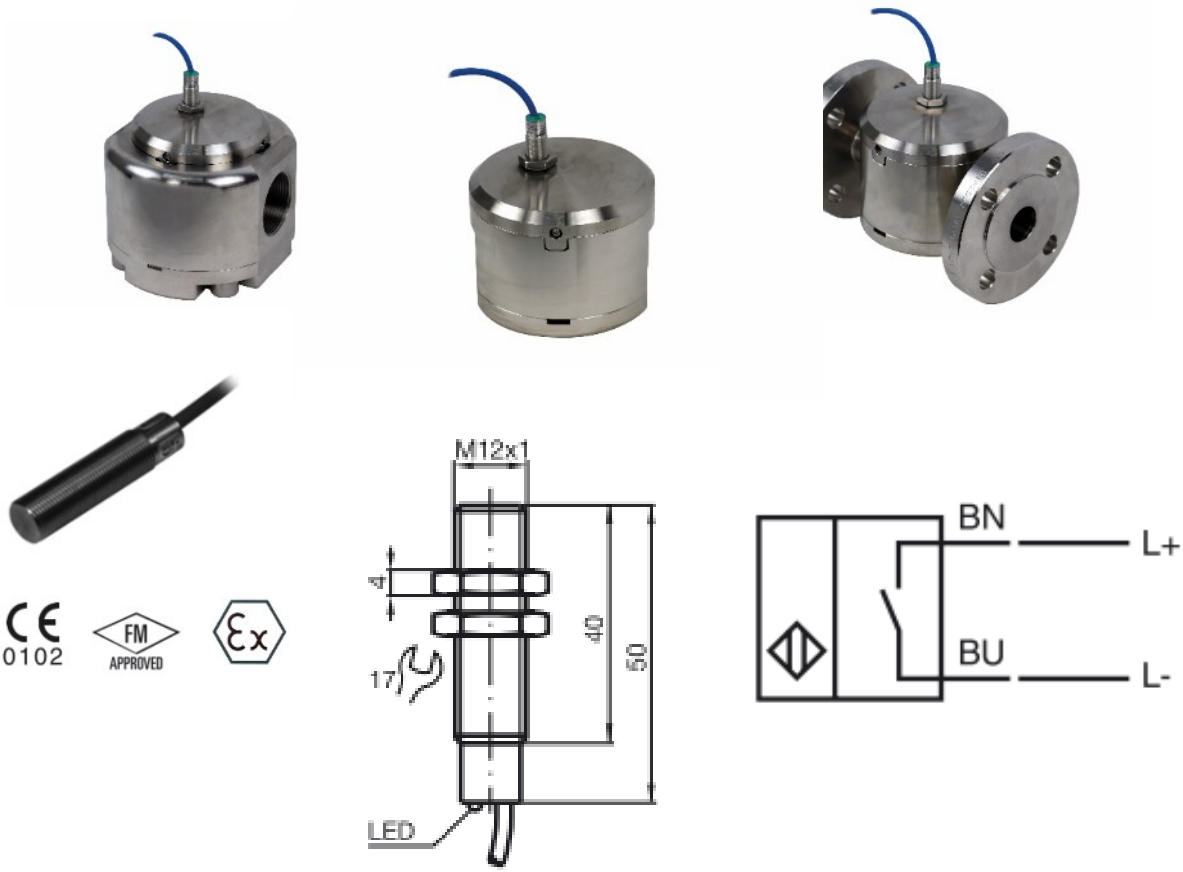
External DC+	:	Yellow
External ground	:	Brown
Pulse output	:	White
Analog output	:	Green
DC input	:	8 to 24 VDC; 20 to 40 mA

Outputs:

- Analogue 4 to 20 mA output in loop powered configuration; external load of 50 ohms to 250 ohms; flow rate is linear scaled between 4 mA minimum and 20 mA maximum set points; flow rates below programmed minimum read 4 mA.

- **Pulse output with internal pull-up resistor (10 KΩ); optional open collector output with output jumper removal; pulse output is scalable in pulses per liter or pulses per gallon.**

DOZ05 and DOZ07, Code M
NAMUR Pulse output, unscaled, 2 m cabel



Technical data:

Switching function	Normally open (NO)
Output type	NAMUR 2-wire
Nominal voltage	Uo 8,2 V (Ri ca. 1 kΩ)
Effective internal inductivity	Ci ≤ 15 nF; a cable length of 10m is considered
Effective internal inductance	Li ≤ 35 µH; a cable length of 10m is considered
Switch state indicator	LED (yellow)
Ambient temperature	-25 to 70°C (-13 to 158°F)
Cable length	2 meters (PVC)
Core cross-section	0,34 mm²
Material	Stainless steel 1.4404 (316L)
Protection class	IP66 / IP67

Marking:

Namur	CE 0102 / Ex II2G Ex ib IIC T6 Gb

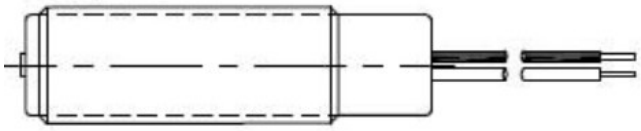
Pulse per unit of measure

Type	Meter size	pulses/L	pulses/gallon
DOZ05	1/2“	ca. 100	ca. 378,5
DOZ05	3/4“	ca. 66	ca. 249,8
DOZ05	1“	ca. 66	ca. 249,8
DOZ07	1“	ca. 43	ca. 162,8
DOZ07	1 1/2“	ca. 17	ca. 64,4
DOZ07	2“	ca. 9	ca. 34,1
DOZ07	3“	ca. 3	ca. 11,4

white

<u>Note:</u> Pulses per liter are shown unit-specifically on the calibration certificate supplied and on the type plate.

DOZ05 and DOZ07, Code P or N
PNP or NPN pulse output, Open Collector, unscaled, 3 m cabel



Connection: white ⎍
red (+)
black (-)

Technical data:

Switching function	Open collector
Output type	NPN or PNP 3-wire (2 versions available)
Supply voltage	5-30 VDC (I ≤ 15 mA)
Supply current	100 mA max (Pmax = 0,66 watt)
Effective internal inductivity	Ci ≤ 12 nF
Effective internal inductance	Li ≤ 0 µH
Cable length	3 meters
Material	Stainless steel 1.4404 (316L)
Protection class	IP66 / IP67

Marking:

USA	Intrinsically safe Class I, II, III, Division 1 GROUP ABCDEFG T6 to T5 Class I, Zone 0, AEx ia IIC T6 to T5
Canada	Intrinsically safe Class I, Division 1 GROUP ABCD T6 to T5 Class I, Zone 0, Ex ia IIC T6 to T5
ATEX	Ex II 1G Ex ia IIC T6 to T4 Ga
IIECEx	Ex ia IIC T6 to T4 Ga

Pulse per unit of measure

Type	Meter size	pulses/L	pulses/gallon
DOZ05	1/2“	ca. 100	ca. 378,5
DOZ05	3/4“	ca. 66	ca. 249,8
DOZ05	1“	ca. 66	ca. 249,8
DOZ07	1“	ca. 43	ca. 162,8
DOZ07	1 1/2“	ca. 17	ca. 64,4
DOZ07	2“	ca. 9	ca. 34,1
DOZ07	3“	ca. 3	ca. 11,4

Note: Pulses per liter are shown unit-specifically on the calibration certificate supplied and on the type plate.

Function of the on-site display

The register display consists of two rows of seven-segment digits, status, unit of measures, flow rate, and battery indicators.
Operating function settings and programming are provided using the **TOTAL** and **RESET** buttons.

Normal operation

To enter normal operation mode - when the screen is blank after exiting programming mode, or upon initial use, press either the **TOTAL** or **RESET** button once.

Status

The status indicators are RESET and TOTAL

Totalizers

The top row of indicators is the batch totalizer. This totalizer displays the cumulative volume of flow through the meter with six digits. The batch totalizer totalizes in selected units of measure.
To reset the batch totalizer, after 2 seconds of no flow, press and release the **RESET** button.

The bottom row of indicators display the resettable totalizer with five digits or the five least significant digits of the non-resettable totalizer. RESET and TOTAL is indicated when the resettable total is displayed in the five-digit lower row. Only TOTAL is indicated when the non-resettable total is displayed.

To toggle between the non-resettable totalizer and the resettable totalizer, press and release the TOTAL button.

To reset the resettable totalizer, press and hold the TOTAL button and then press and release the RESET button.

To display 11-digit non-resettable totalizer, while the non-resettable total is displayed, press and hold the TOTAL button for seconds. The top row displays the 6 most significant digits; the bottom row displays five least-significant digits.

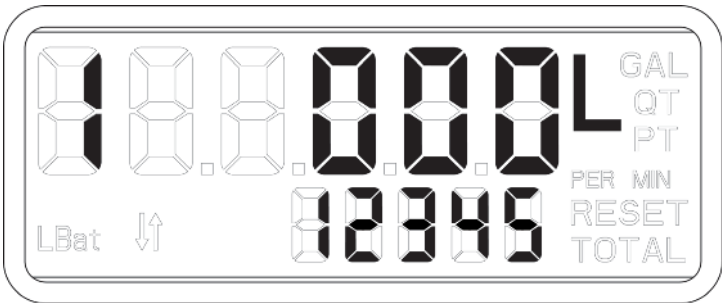
NOTE: The non-resettable totalizer normally displays 5 least-significant digits.

Flow rate

PER MIN is displayed in conjunction with the unit of measure. All flow rates are calculated in volume unit per minute.

Battery

The "LBat" indicator will indicate when the battery is approaching end of life. When the indicator is illuminated, the CR123A, 3.0 VDC lithium battery is drained to 10% of its total capacity and should be changed. Normal battery life is five years.



Checksum

To display the firmware checksum, press and hold the RESET button for three seconds. To return to normal display, release the RESET button.

Display scale factor

To display the scale factor:
At the same time, press and hold the TOTAL and RESET buttons for two seconds to display the programmed scale factor. To return to the normal display, release both buttons.

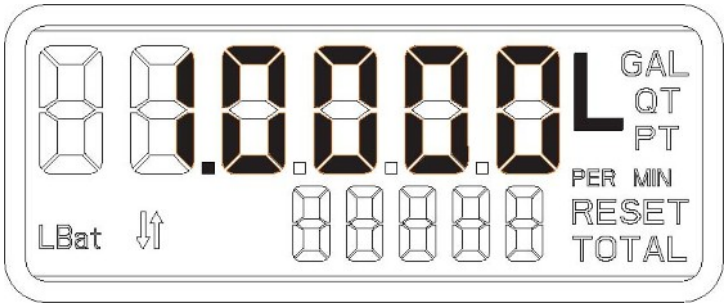
Programming of the on-site display

In programming mode only, pressing and releasing the **TOTAL** button advances to the next parameter on the current screen. Pressing and releasing the **RESET** button changes the current flashing selection to another selection (such as “L” to “GAL”).

To enter the programming mode, press the TOTAL button three times and then press the RESET button three times (the time lag between pressing both buttons six times must be within two seconds).

Changing the unit of measure and scale factor:

Unit of measure:



1. Press and release the RESET button to change the unit of measure (L, GAL, QT, PT).
2. Press and release the TOTAL button to select desired the unit of measure (theselected unit of measure will flash).
3. When the appropriate unit of measure is selected, press the TOTAL button to advance to the scale factor programming.

Scale factor

The register collects input pulses from the oval gear meter and then determines the appropriate display output using the scale factor. This scale factor varies depending upon the viscosity of the liquid being measured, therefore calibrating the meter and register in the appropriate liquid will affect the scale factor. The scale factor is displayed as 5 digits (on the top row) next to the unit of measure. The scale factor consists of 1 integer digit and 4 decimal digits (see figure 5).

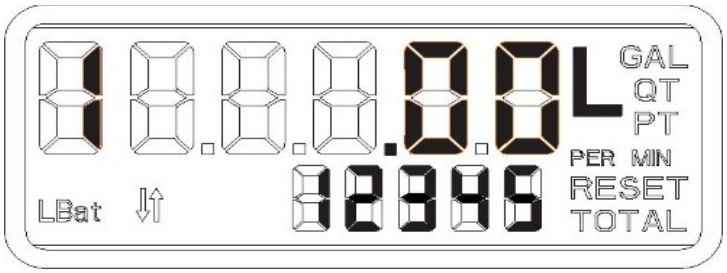
1. Press the TOTAL button to select a digit (selected digits flash). After cycling through all 5 digits of the scale factor, the register will return to the unit of measure selection.
2. Press RESET to change the selected digit. The scale factor must fall between the values of 0.5000 and 2.0000. The Badger Meter factory preset is set between those values at 1.0000.
3. When finished adjusting the unit of measure and scale factor, press and hold the TOTAL button for one second to advance to the Pulse Rate section.

NOTE: Error checking will not allow the user to advance to the next screen.

Changing the meter pulse rate

The meter pulse rate (screen is indicated by the “I” on the top row, on the left side) is the number of pulses per unit of measure as detected by the register. The pulse rate varies according to the type of attached meter. The bottom row consists of the 5-digit integer value of the meter pulse rate, whereas the top row consists of the 2-digit decimal value of the meter pulse rate.

The meter pulse rate is entered in pulses per liter if the selected unit of measure is liters. The meter pulse rate is entered in pulses per gallon if the selected unit of measure is gallons, quarts or pints.

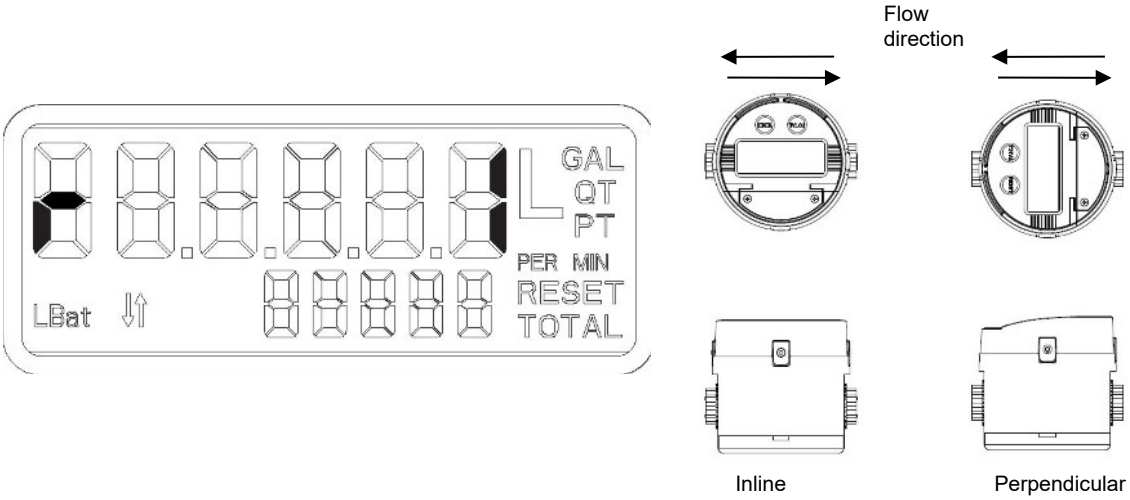


1. Press the TOTAL button to select a digit (selected digits flash). Press RESET to change the selected digit. The pulse rate can be any value between 00000.01 and 99999.99 on the top row; integer values are displayed on the bottom row. Example: 10.45 would display .45 on the top row and 10 would be displayed on the bottom row.
2. When finished adjusting the pulse rate, press and hold the TOTAL button for one second to advance to the “register orientation” section.

NOTE: Error checking will not allow the user to advance to the next screen.

Changing the display orientation

Depending on the orientation perpendicular or inline on the meter. For remote version, this will be set to “o”.

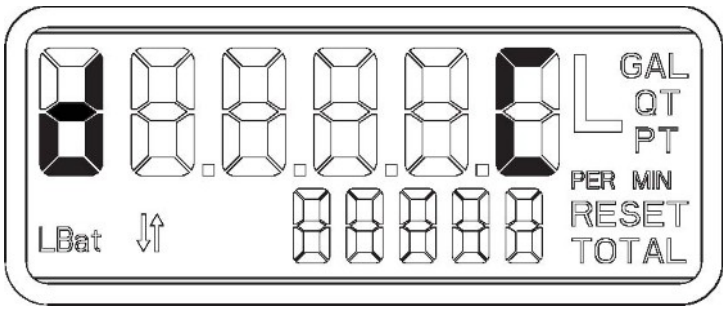


1. Press the RESET button to toggle between available options (“I, for an inline-to-flow orientation and “P” for a perpendicular-to-flow orientation or “O” for Remote versions and for the oval gear meters (DOZ03 / DOZ05 / DOZ07)).
2. When finished adjusting the register orientation, press and hold the TOTAL button for one second to advance to the “Default Display” section.

Changing the display mode

The display mode screen (indicated by a “d” on the top row, on the left side) determines the information displayed on the top line of the register during normal operation. The display mode may be either the totalizer screen or the flow rate screen.

“C,” indicates the totalizer screen and “F” indicates the flow rate screen. The totalizer screen is depicted below:



1. While a letter is flashing on the display, press the RESET button to select either totalizer or flow rate.
2. Upon completion of this setting, the programming of the industrial standard register and the industrial dual pulse output is complete.

Exiting programming mode

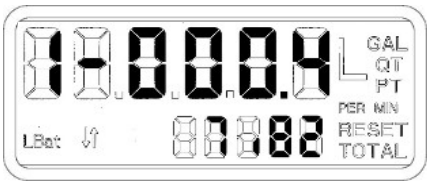
To exit the programing mode:

On any screen, press and hold the both the TOTAL and RESET buttons. The screen will revert back to the programmed scale factor, and then flash. Following the three flashes, the register display will be blank.

NOTE: Pressing the TOTAL or RESET buttons will turn the display back on.

Linearisation

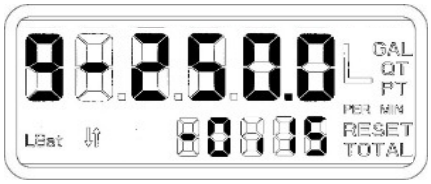
Indicated by 1 – 9 on the left hand side of the display, followed by a hyphen (-), this screen allows the setting of the linearisation (in total 9 points).



Linearisation point 1 (of 9)

Press the TOTAL button to select a digit (selected digits flash). Press RESET to change the selected digit. The flow rate will be set in the top row of the meter and is displayed in the unit you selected at step 9.1 (unit of measure). In the sample shown above this would be the flow rate 0.4 liter per minute. On the bottom line of the meter you can set in the correction of the error in %. In the sample below, the error at a flow rate of 0,4 liter per minute would be -7,82%; to correct this, +7,82% needs to be set in (the plus symbol [+] will not be shown).

Once the adjustment of the linearisation is completed, press and hold the TOTAL button for one second to advance to the next linearisation point.



Linearisation point 9 (of 9)

Number 9 at the left hand side of the display shows the 9th linearisation point. The sample shows a flow rate of 250.0 liter per minute and a deviation of the flow meter of +0,15%. To correct this error, -0,15% needs to be set as correction.

NOTE:
Minimum 3 linearisation points needs to be programmed.
The flow rates do not have to be programmed from low to high; the software will sort the flow rates automatically, no matter at which point (1-9) they are programmed.

To exit the programming mode:

On any screen, press and hold both the TOTAL and RESET buttons. The screen will revert back to the programmed scale factor, and then flash. Following the three flashes, the register display will be blank.

NOTE: Pressing the TOTAL or RESET buttons will turn the display back on.

Additional programming of more parameters for display with pulse and analogue output (Type B and D2)

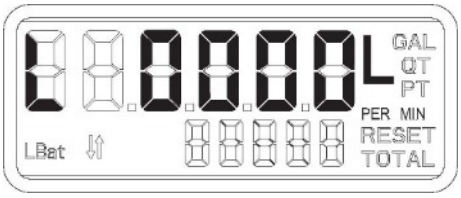
Analogue minimum flow rate

Indicated by a “L” on the left hand side of the display, this screen allows the setting of the flow rate that corresponds to the 4 mA output:

NOTE: The minimum flow rate value must be less that the maximum flow rate value.

- Minimum 0.0 LPM/GPM
- Maximum 100.0 LPM/GPM
- Default 0.0 LPM/GPM

NOTE: Error checking will not allow the user to advance to the next screen.
To advance to the next programming screen, hold the TOTAL button for one second.



Analogue minimum flow rate screen

Analogue maximum flow rate

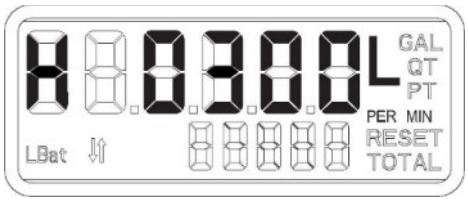
Indicated by a “H” on the left hand side of the display, this screen allows the setting of the flow rate that corresponds to the 20mA output:

NOTE: The maximum flow rate value must be greater than the minimum flow rate value.

- Minimum 0.0 LPM/GPM
- Maximum 100.0 LPM/GPM
- Default 30 LPM / 8 GPM

To advance to the next programming screen, hold the TOTAL button.

NOTE: Error checking will not allow the user to advance to the next screen.



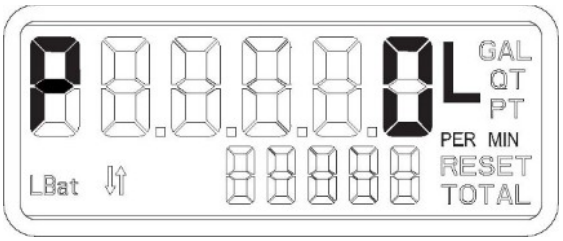
Analogue maximum flow rate screen

Output pulse length

Indicated by a “P” on the left hand side of the display, this screen allows the selection of the low duration of the output pulse.

- “0” for zero milliseconds (pulse output is disabled)
- “2” for 2 milliseconds
- “10” for 10 milliseconds
- “20” for 20 milliseconds
- “40” for 40 milliseconds
- “100” for 100 milliseconds

To advance to the next programming screen, hold the TOTAL button.



Output pulse length screen

About Output Pulse Length: The pulse rate duration should take into account the "Pulse Rate Out" and maximum meter flow rate, to prevent an output pulse duration greater than the required time between pulses. The Output Pulse Length should be set to less than the value of “t.”

Per the equation:

$$t = \frac{\text{Maximum meter flow rate (in GPM or l/m)}}{60 \text{ X output pulse rate}} \times 1000$$

where t = the required pulse rate in milliseconds.

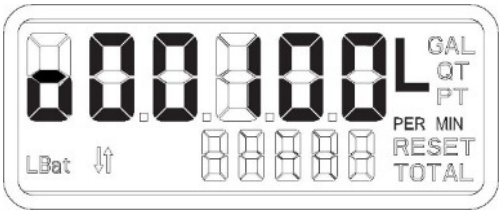
The output pulse rate = the programmed parameter (default = 1.00 PPL/PPG)

The maximum meter flow rate = the maximum flow rate of the meter for the application.

Pulse rate out

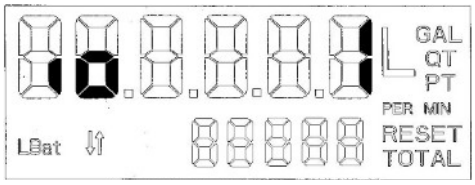
Indicated by an “o” on the left hand side of the display, this screen allows selection of the pulses output per liter or per gallon depending on unit of measure (0.01 PPL/PPG to 999.99 PPL/PPG).
The meter pulse rate is entered in pulses per liter if the selected unit of measure is liters. The meter pulse rate is entered in pulses per gallon if the selected unit of measure is gallons, quarts or pints.
To advance to the next programming screen, hold the TOTAL button.

NOTE: Error checking will not allow the user to advance to the next screen.



pulse rate out screen

Signal sequence of pulse output



Signal sequence of pulse output

This parameter can be changed for the signal inversion of the pulse output.

io = 1 default setting – (no signal inversion) at no flow condition the pulse output signal is “1” (high) 24V for example

io = 0 the output is inverted by the software, at no flow condition the pulse output signal is “0” (low) 0V

Cleaning

Before cleaning, switch off the appliance and disconnect it from the mains. Clean with a damp cloth. Do not use cleaning agents.

Battery disposal:

The batteries contained in our devices must be disposed of properly in accordance with §12 of the BattV.
in accordance with §12 of the German Battery Ordinance (BattV) and in accordance with the the EU directive 2006/66/EC.

DOZ05

Oval Gear Flowmeter for Middle Flow Rates

- **viscosity independent**
- **process connection 1/2“, 3/4“ and 1“**
- **measuring range: 1...30 l/min , 2...60 l/min and 2,3...68 l/min**
- **high accuracy from 0,5 % of measured value**
- **materials: aluminium, st. steel, PVDF, PPS, LCP**
- **output signals: pulse output (Reed, PNP, NPN or NAMUR)**
- **optionally with separate display and analogue and pulse output**
- **P_{max}: 210 bar, T_{max}: 120 °C**

Description:

The DOZ05 oval gear flowmeter measures the volume flow of liquid media with a viscosity of up to 500.000 mm²/s, regardless of the actual viscosity of the medium.
In a measuring chamber, two toothed oval gears are rotated by the flowing medium. Each rotary movement transports a defined quantity of liquid through the meter. This rotational movement is detected by a reed contact and output as a pulse. The output frequency of these pulses is directly proportional to the flow rate.
Optionally, the device can be combined with an on-site display, which also offers an analogue or pulse output.
In addition to the connection size in combination with the measuring range, various material combinations, sealing materials and process connections ensure a wide range of applications.

Typical applications:

The DOZ05 oval gears flowmeters are used wherever the flow rate of liquids with different viscosities must be measured reliably and cost-effectively. Due to the many material combinations, the meters are designed not only for standard applications but also for many chemical applications, e.g. for liquids based on hydrocarbons.
Due to the high accuracy of the oval wheel meters, they are generally used for high-precision measuring tasks.

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Models:

Code	Material		P_{max} [bar]	T_{max} [°C]
	Housing	Rotor		
AL	aluminium	LCP	140	80
EE	st. steel*	st. steel*	210	120
ER	st. steel*	PPS	210	80
PR	PVDF	PPS	16	80

* st. steel: 1.4571 (316 Ti)

Technical Data:

Size	Measuring range [l/min]	Visco-sity [mPa s]	Accuracy [% of m.v.]	Pulses/L
1/2“	1...30	> 5	± 0,5	ca. 100
1/2“	2...25	< 5	± 1,5	ca. 100
3/4“	2...60	> 5	± 0,5 (1,5*)	ca. 66
3/4“	4,5...53	< 5	± 1,5 (2,5*)	ca. 66
1“	2,3...68	> 5	± 0,5	ca. 66
1“	5,3...60	< 5	± 1,5	ca. 66

* valid for PVDF-version

Repeatability: 0,03 %

Info on viscosity specification:

$$1\ \text{mPa s (as well cPoise)} = \frac{1\,\text{mm}^2/\text{s (cStoke)}}{\text{medium density}\,[\text{g/cm}^3]}$$

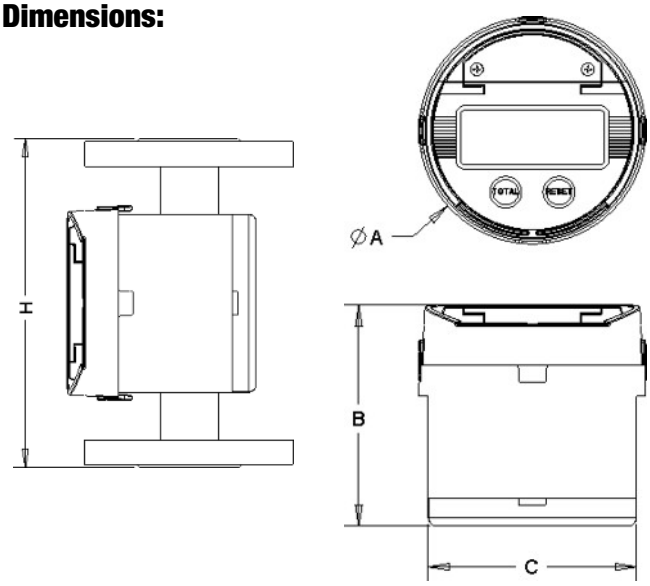
Output Signals / Protection Class:

Pulse output R: pot.-free, reed contact, IP65, 2,7 m cable

Pulse output N/P: PNP or NPN, open collector, 3-wire
5-30 VDC (I ≤ 15 mA), IP66 / IP67
3 m cable

NAMUR M: N/O, 2-wire, U_0 8,2 V (R_i approx. 1 kΩ)
LED switching status display,
2 m cable, IP66 / IP67, -25...70 °C

Dimensions:



Size	A [mm]	B [mm]	C [mm]	H [mm]
1/2“	100	88	92	170
3/4“	100	98	92	170
1“	100	98	92	170

Order Code:

Order number: DOZ05. | 15. | AL. | R. | 1. | V. | 0

Oval gear flowmeter for middle flow rates

Connection / Measuring range:
15 = 1/2“ / 1...30 l/min (not with PVDF)
20 = 3/4“ / 2...60 l/min
25 = 1“ / 2,3...68 l/min

Material housing / rotor, P_{max}, T_{max}:
AL = aluminium / LCP, 140 bar, 80 °C
(not with flange connection)
EE = st. steel / st. steel, 210 bar, 120 °C
ER = st. steel / PPS, 210 bar, 80 °C
PR = PVDF / PPS, 16 bar, 80 °C (for 3/4“ only)

Output signal:
R = potential-free reed contact, pulse output., 2,7 m cable
M = NAMUR pulse output, unscaled, 2 m cable
P = PNP pulse output, OC, unscaled, 3 m cable
N = NPN pulse output, OC, unscaled, 3 m cable
A = built-up on-site display, battery-powered
B = built-up on-site display, pulse output NPN,
analogue output (4...20 mA), 3 m cable
D1 = external on-site display with wall bracket
D2 = external on-site display with wall bracket,
analogue and pulse output, 3 m cable

Process connection:
1 = BSP female thread Rp
2 = NPT female thread
3 = DIN flange PN 16
4 = ANSI flange 150 lbs

Gaskets:
V = FKM
E = EPDM
F = FFKM

Options:
0 = without
V = for highly viscous media >1000...500.000 mm²/s
9 = please specify in plain text

ATEX version on request

On-Site Display, Transmitter

Output signal A or D1 and
Output signal B or D2:

Display: 6-digit, LCD (different units possible)
flow rate or total display

Totalizer: 11-11-digit (not resettable)
6-digit (resettable)

Ambient temperature: -20 °C ... 80 °C

Supply: battery, replaceable (CR123A)

Calibration factor: can be entered and stored

9-point linearization: medium: water, for other media please contact PKP.

Protection class: IP65

Additional only for output signal B and D2:

Pulse output: NPN open collector, scaleable, adjustable pulse length

Analogue output: 4...20 mA (min / max values pro-grammable)

Supply: battery CR123A, additional
5...30 VDC (I ≤ 15 mA)

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