

**Badger Meter Europa GmbH**



**RusAutomation**

## **Industrial oval gear meter series IOG, LM OG-I and registers type ILR7XX and ILR7XXT**



# **INSTALLATION AND OPERATION MANUAL**

April 2017

OG\_IOG\_BA\_02\_1704

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## 1. Basic safety recommendations

Before installing or using this product, please read this instruction manual thoroughly. Only qualified personnel should install and/or repair this product. If a fault appears, contact your distributor.

### Before the first installation



Please flush the meter with fresh water or the medium to measure before the first installation.

### Installation

Do not place any unit on an unstable surface that may allow it to fall.  
Never place the units above a radiator or heating unit.  
Route all cabling away from potential hazards.  
Isolate from the mains before removing any covers.

### Power connection

Use only the type of power source suitable for electronic equipment. If in doubt, contact your distributor. Ensure that any power cables are of a sufficiently high current rating. All units must be earthed to eliminate risk of electric shock. Failure to properly earth a unit may cause damage to that unit or data stored within it.

### Protection class

The device has protection class IP 65 and needs to be protected against dripping water, water, oils, etc.

### Setup & operation

Adjust only those controls that are covered by the operating instructions. Improper adjustment of other controls may result in damage, incorrect operation or loss of data.

### Cleaning

Switch off all units and isolate from mains before cleaning.  
Clean using a damp cloth. Do not use liquid or aerosol cleaners.

### Repair of faults

Disconnect all units from power supply and have it repaired by a qualified service person if any of the following occurs:

- If any power cord or plug is damaged or frayed
- If a unit does not operate normally when operating instructions are followed
- If a unit exposed to rain/water or if any liquid has been spilled into it
- If a unit has been dropped or damaged
- If a unit shows a change in performance, indicating a need for service.



Failure to adhere to these safety instructions may result in damage to the product or serious bodily injury.



**RoHs**

Our products are RoHs compliant.

**Battery disposal**

The batteries contained in our products need to be disposed of as per your local legislation acc. to EU directive 2006/66/EG.

**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 50020).
- Equipotential bonding has to be ensured upon the pipe system.
- Meters with plastic housing (PPS): Please do not clean the meters with a dry cloth as this would cause electrostatic charge.
- The fluid conductivity must be better than 1000 pico/Siemens/meter to avoid electrostatic charges.
- If electronical register is mounted on the meter or operated with the meter, the electronical register must have a current ATEX approval and must be operated intrinsically safe with a suitable barrier according to EN 50020.

## 2. Scope of this manual

This manual contains installation and operation instructions for the Badger Meter industrial line of oval gear meters and registers.

Proper performance and reliability of these meters and registers depends upon installation in accordance with these instructions.

## 3. Product unpacking and inspection

Upon receipt of the product, perform the following unpacking and inspection procedures:

**Note:** If there is damage to the shipping container, request the carrier to be present when unpacking the product.

Carefully open the shipping package and follow any instructions marked on the exterior. Remove all packing material and carefully lift the product from the package.

Retain the package and all packing material for possible use in reshipment or storage.

Visually inspect the product and applicable accessories for any physical damage such as scratches, loose or broken parts, or any other sign of damage that may have occurred during shipment.

**Note:** If you find damage, request an inspection by the carrier's agent within 48 hours of delivery and file a claim with the carrier.

A claim for equipment damage in transit is the sole responsibility of the purchaser.

## 4. Product identification

Record the product identification numbers from the nameplate.

Model # \_\_\_\_\_

Serial Number # \_\_\_\_\_

Tag # \_\_\_\_\_(if applicable)

### **Disclaimer**

The user/purchaser is expected to read and understand the information provided in this manual, follow any listed safety precautions and instructions and keep this manual for future reference.

Misuse, mishandling, and/or inadequate maintenance may impair performance and/or compromise safety.



**⚠ WARNING****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.

**⚠ WARNING****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.



### 5. Meter installation

#### **CAUTION**

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.

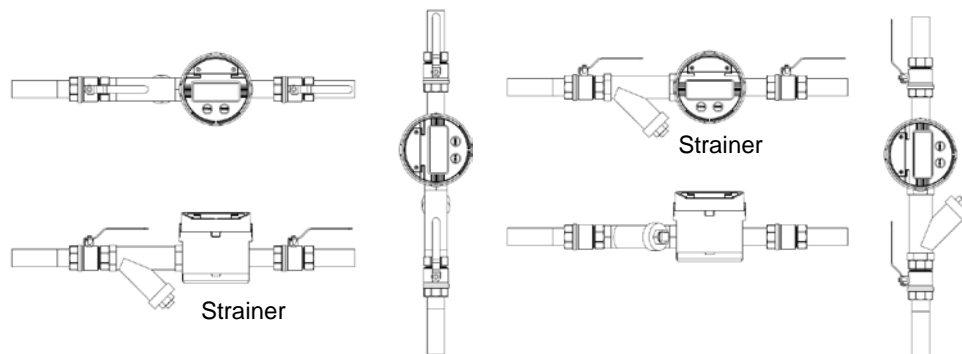


Figure 1: Meter installation

- 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.

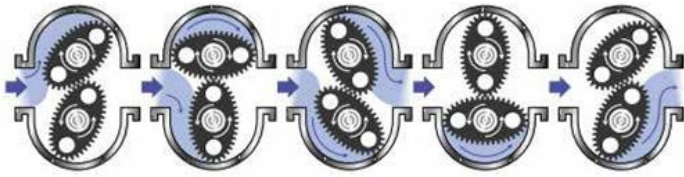
### 6. Recommended filter sizes

	Filter / Pore size (in mesh)	Filter / Pore size (in mm)
¼"	200	0,08
½"	60	0,250
¾"	60	0,250
1"	60	0,250
1 ½"	60	0,250
2"	60	0,250
3"	40	0,4

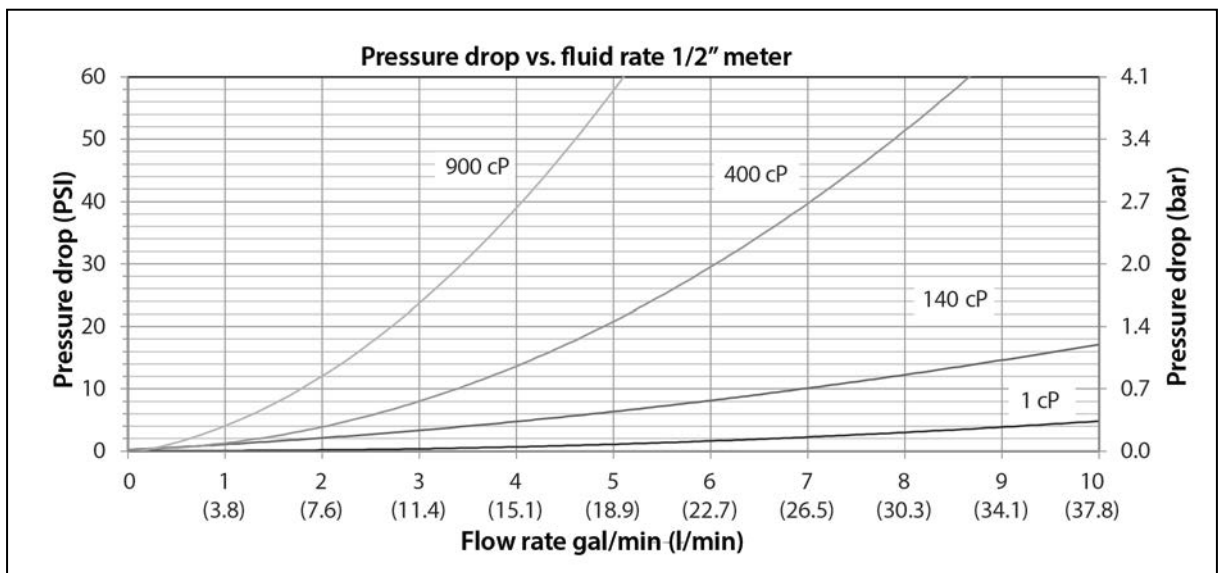
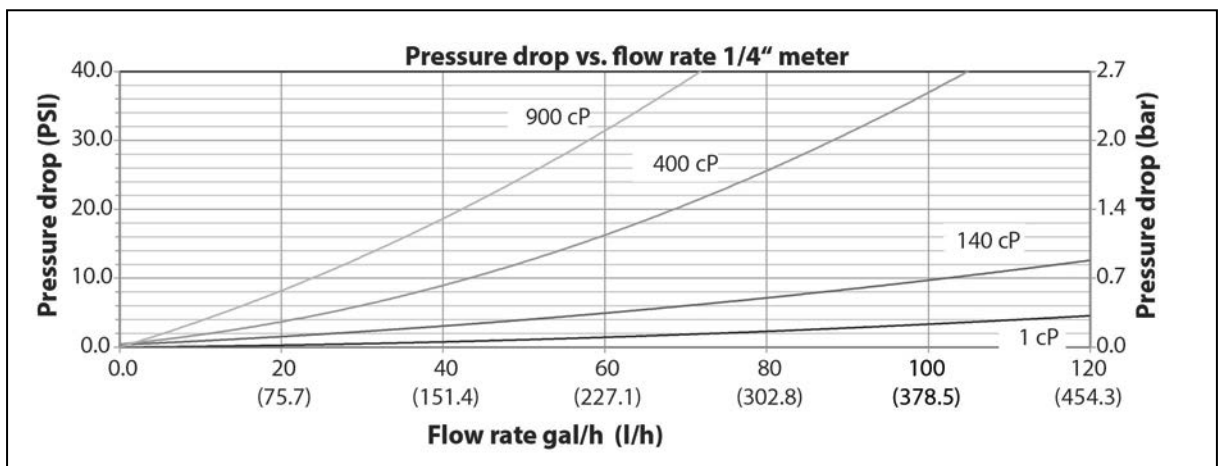


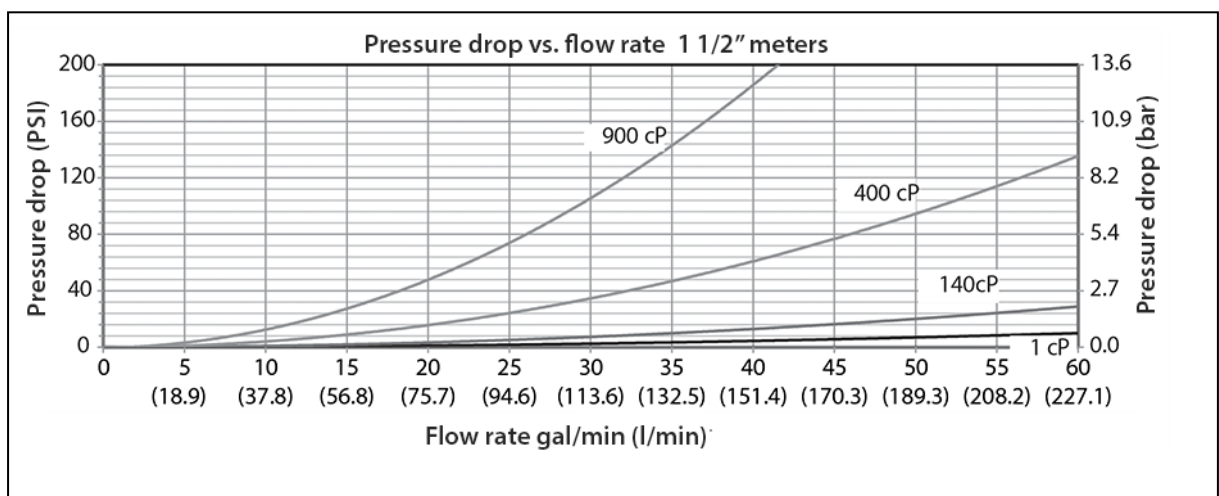
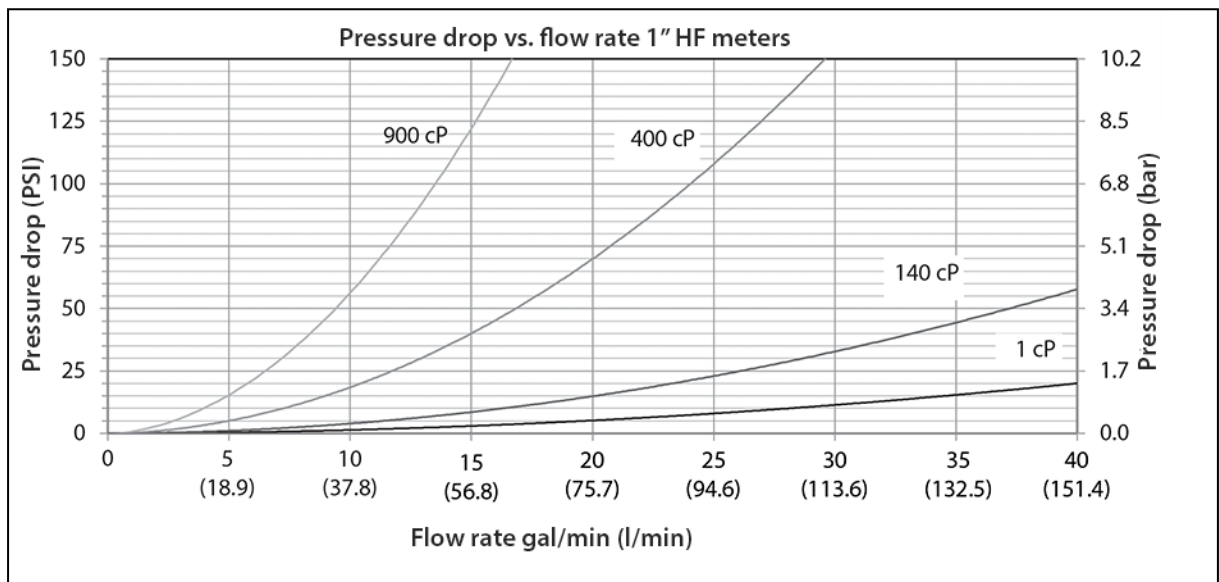
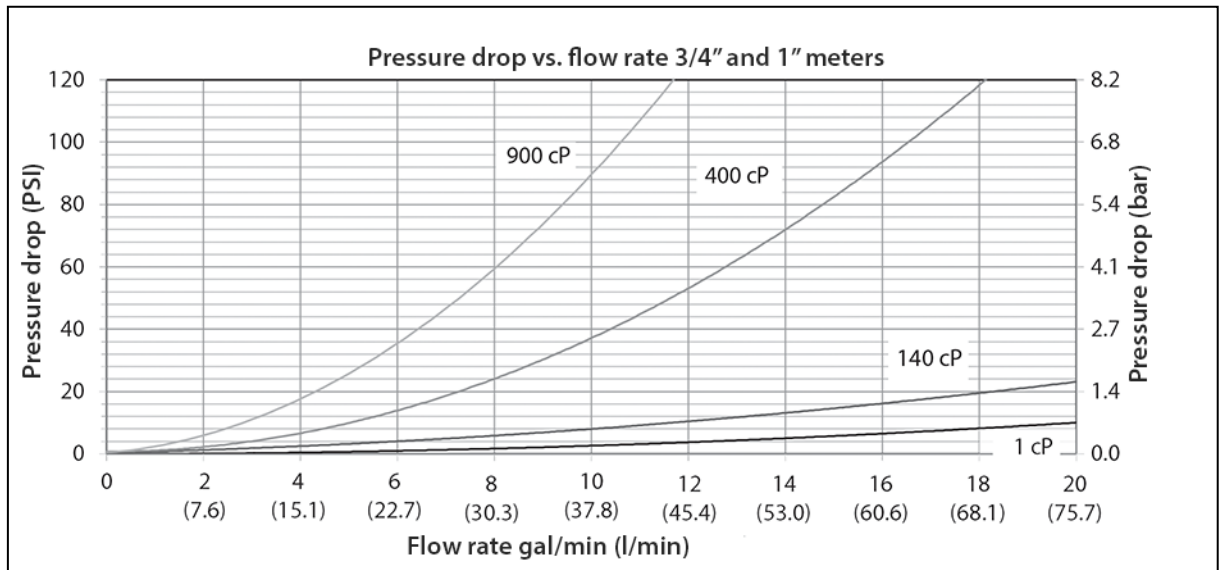


### 7. Meter operation



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.





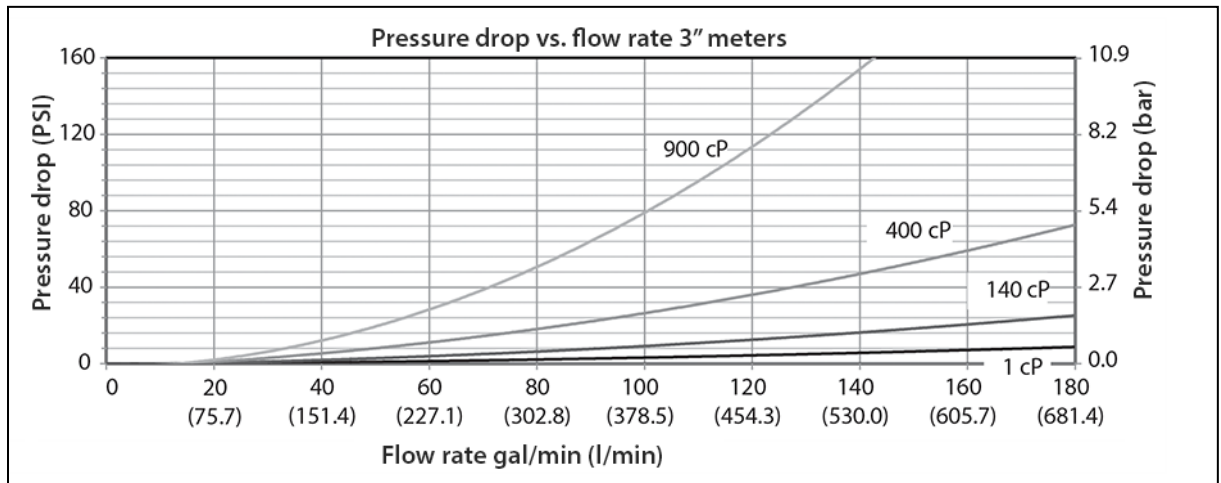
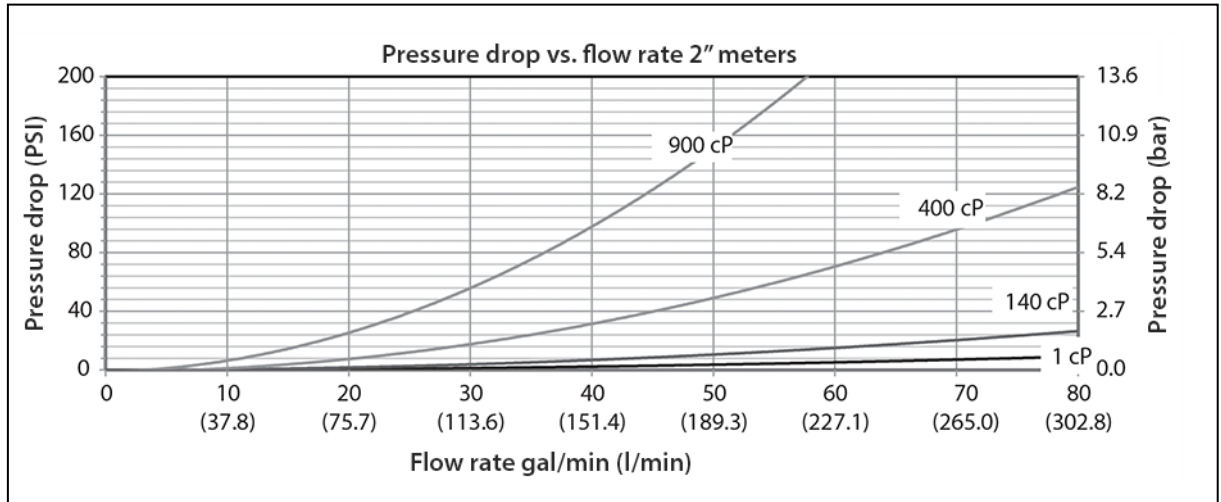


Figure 2: Pressure drop vs. flow



**8. Register operation** The following describes register operation and program settings for the industrial oval gear series registers: Industrial Standard (ILR 700 / 701 / 701T), Industrial Pulse (ILR 710 / 750 / 750T), Industrial Quadrature/Dual Pulse (ILR 720) and the Industrial Analog (ILR 730 / 750 / 750T).

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.



Figure 3: Register display and button

### 8.1. Normal operation

(for models ILR 7XX)

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.

### 8.2. Status

The status indicators are RESET and TOTAL.

### 8.3. 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.

NOTE: For the ILR 720 model only, the batch totalizer can be reset by a low pulse on the external reset input.

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.

#### 8.4. Flow rate

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

#### 8.5. Battery

The "LBat" indicator will indicate when the battery is approaching end of life. When the indicator is illuminated, the 2/3AA, 3.0 VDC lithium battery is drained to 10% of its total capacity and should be changed. Normal battery life is five years.

Note: A 2/3AA, 3.6 VDC battery may also be used as a replacement.

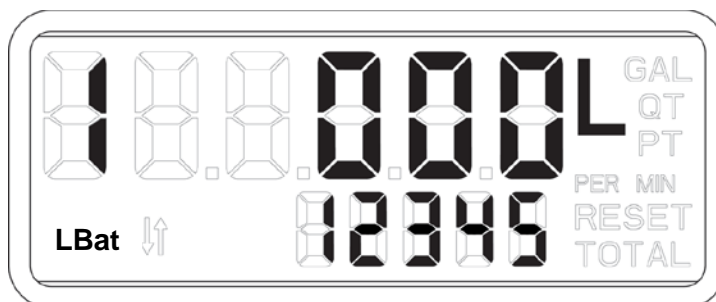


Figure 4: Low battery indicator

#### 8.6. Checksum

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

#### 8.7. 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.



## 9. Register programming

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

(for all ILR models with display)

#### 9.1. Unit of measure

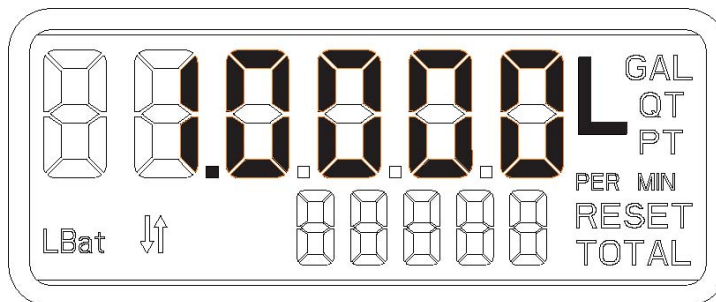


Figure 5: Unit of measure & scale factor programming

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 (the selected 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.

#### 9.2. Scale factor

(for all ILR models with display)

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.

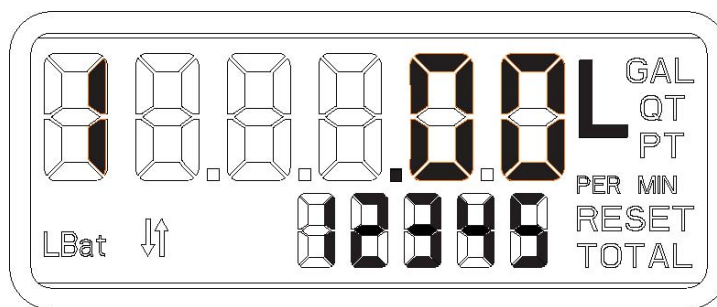
NOTE: Error checking will not allow the user to advance to the next screen.



### 9.3. Changing the meter pulse rate (for all ILR models with display)

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.

### 9.4. Changing the register orientation (for all ILR models with display)

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

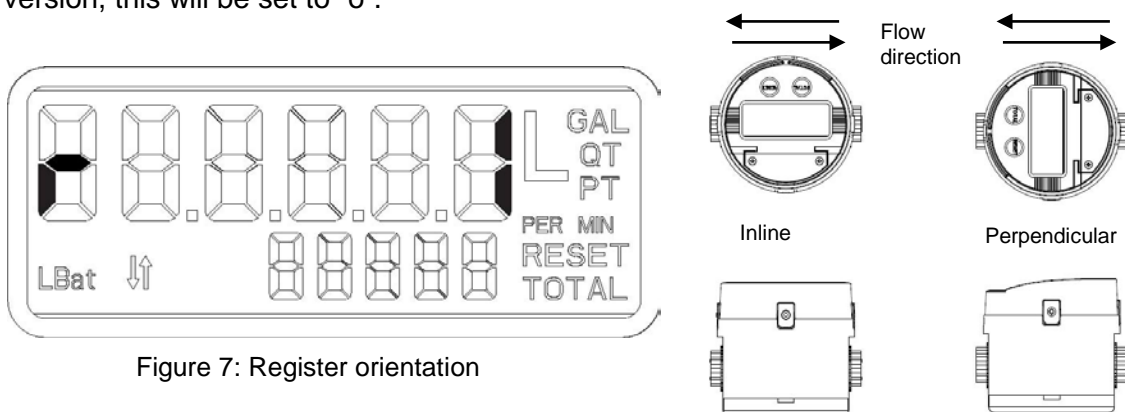


Figure 7: Register orientation



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 RCDL-nutating disc meters and the Vision turbine meters).
2. When finished adjusting the register orientation, press and hold the **TOTAL** button for one second to advance to the “Default Display” section.

### 9.5. Changing the display mode (for all ILR models with display)

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:

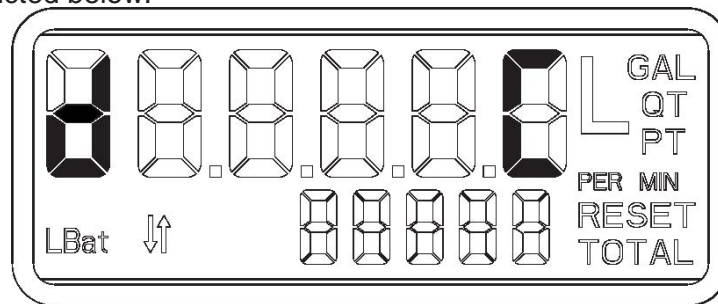


Figure 8: Default display

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. For ILR 710, ILR730, ILR701, ILR701T, ILR750 and ILR750T models, see additional programming parameters.

### 9.6. Exiting programming mode (for all ILR models with display)

To exit the programming mode:

1. 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.





### 10. Additional programming: Industrial analog and industrial pulse (ILR 710 & ILR 730, ILR750, ILR750T, ILR701, ILR701T)

#### Output pulse length

(for models ILR 710, ILR750 and ILR750T)

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.

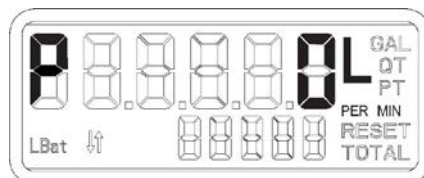


Figure 9: Output pulse length screen

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:

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

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.

#### 10.1. Pulse rate out (for model ILR 710, ILR750 and ILR750T)

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 100 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.

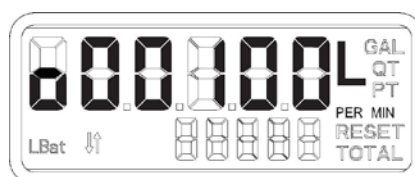


Figure 10: Pulse rate out screen  
OG\_IOG\_BA\_02\_1704



### 10.2. Analog minimum flow rate (for models ILR 730, ILR750 and ILR750T)

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 4mA 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.

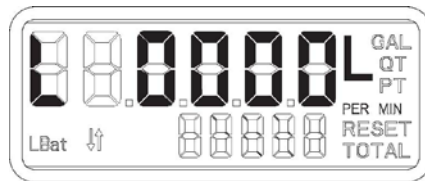


Figure 11: Analog minimum flow rate screen

### 10.3. Analog maximum flow rate (for models ILR 730, ILR750 and ILR750T)

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.

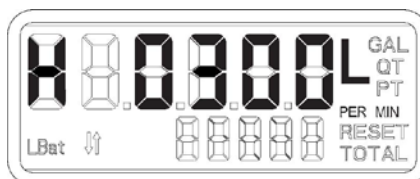


Figure 12: Analog maximum flow rate screen



#### 10.4. Linearisation (for models ILR701, ILR701T, ILR750 and ILR750T)

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).

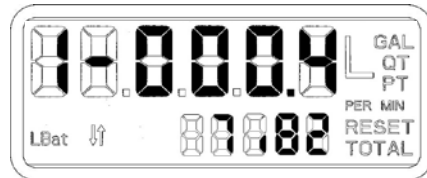


Figure 13: Linearisation point 1 (of 9)

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.



Figure 14: Linearisation point 9 (of 9)

Number 9 at the left hand side of the display shows the 9<sup>th</sup> 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.



## 11. Register output specifications & wiring

### 11.1. Pulse (model ILR 710)

#### Register wiring

External DC+: Yellow

External ground: Brown

Pulse output: White

DC Input: 8 to 24 VDC; 20 to 40mA

Outputs: Pulse output with internal pull-up resistor; optional open collector output with output jumper removal; pulse output is scalable in pulses per liter or pulses per gallon.

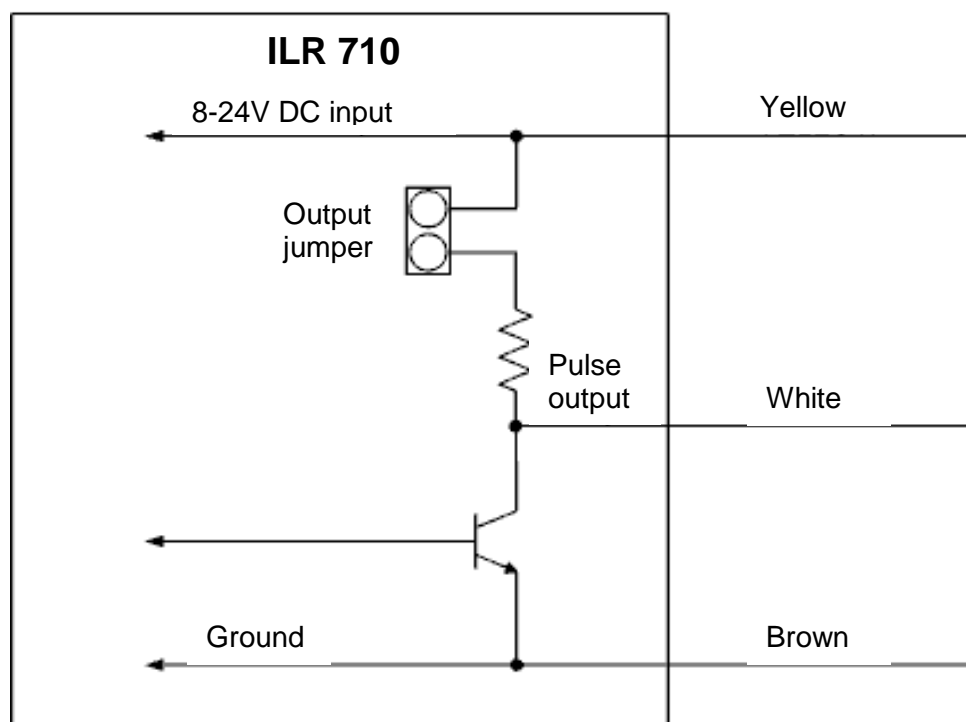


Figure 13: ILR 710 wiring

11.2. Dual pulse (model ILR 720)

**Register wiring**

External DC+: Yellow

External ground: Brown

Pulse output 1: White

Pulse output 2: Green

External reset: Grey

DC input: 8 to 24 VDC; 20 to 40mA

Outputs: Dual-pulse output with internal pull-up resistor; optional open collector output with output jumper removed; dual pulse output forms a quadrature signal for direction of flow.

Inputs: External reset pulled low to reset the batch totalizer.

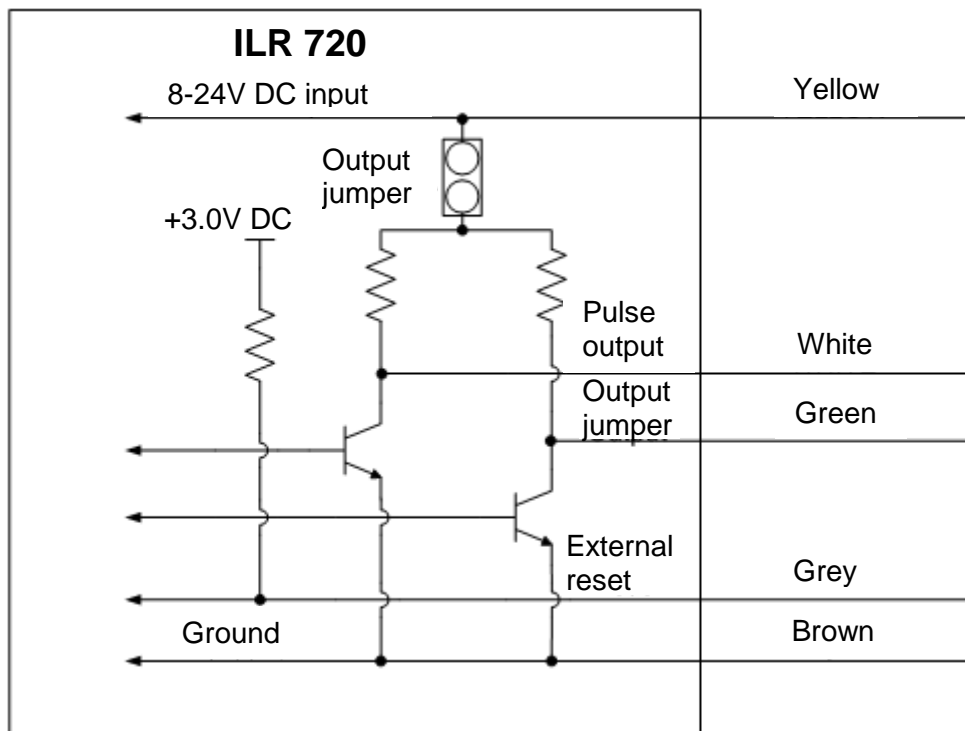


Figure 14: ILR 720 wiring



## 11.3. Analog (model ILR 730)

**Register wiring**

External DC+: Yellow

External ground: Brown

Analog output: White

DC input: 8 to 24 VDC; 20 to 40mA

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

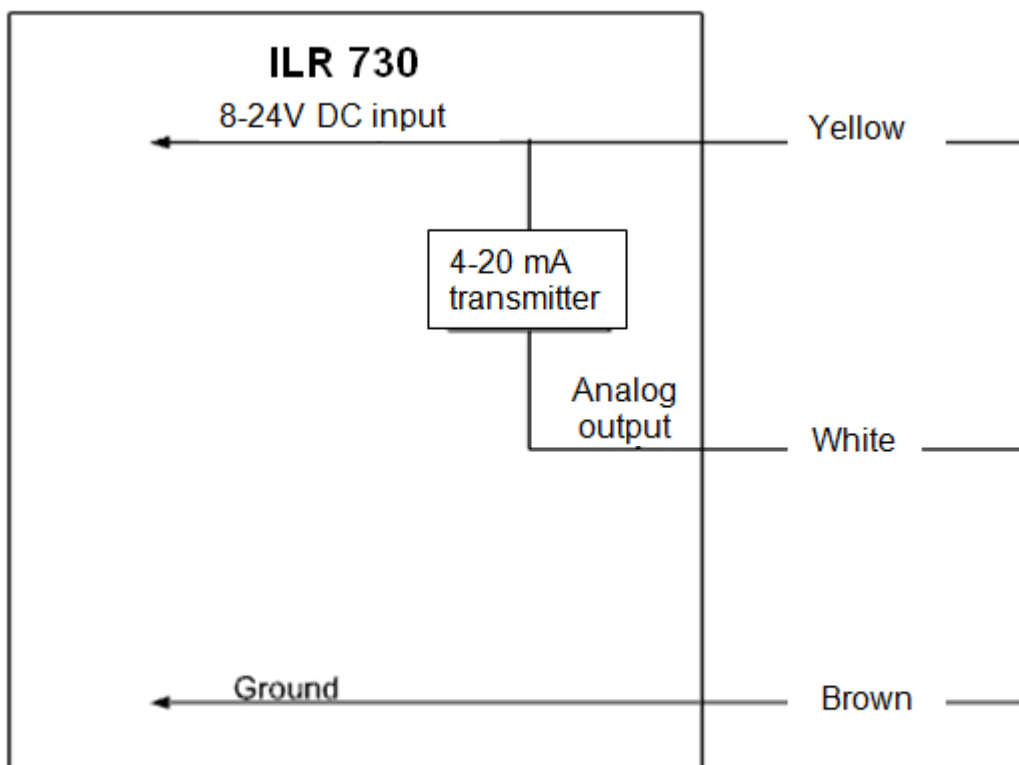


Figure 15: ILR 730 wiring

## 11.4. Pulse transmitter (model ILR 740)



Figure 16: Pulse transmitter

**Orientation:** The register must be mounted as delivered. The transmitter will not function if mounted differently.

**Transmitter wiring**

Reed switch outputs: Green and white.

Ratings: Max power: 10W (not to exceed!); max. voltage: 200 VDC/peak AC; max. current: 0.5A DC/peak AC.

Outputs: Raw reed switch output with no signal conditioning.

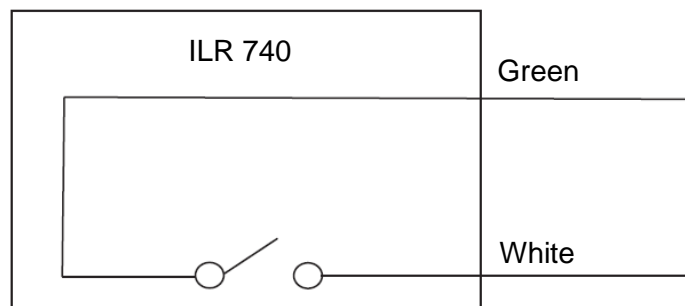


Figure 17: ILR 730 wiring

**Pulse per unit of measure (IOG series)**

Meter	Pulse per gallon	Pulse per liter
½"	378.5	100
¾"	249.8	66
1"	249.8	66
1" HF	162.8	43
1 ½"	64.4	17
2"	34.1	9
3"	11.4	3

**Note:** Actual pulses per unit of measure are listed on the calibration certificate provided with the meter.



### 11.5. Pulse transmitter reed (model ILR 741)

The meter size selector switch must be set to correspond to the size of the meter to properly detect fluid flow:

- Position 1 (top): 1/2", 3/4", 1"
- Position 2 (center): 1 1/2"
- Position 3 (bottom): 2", 3"

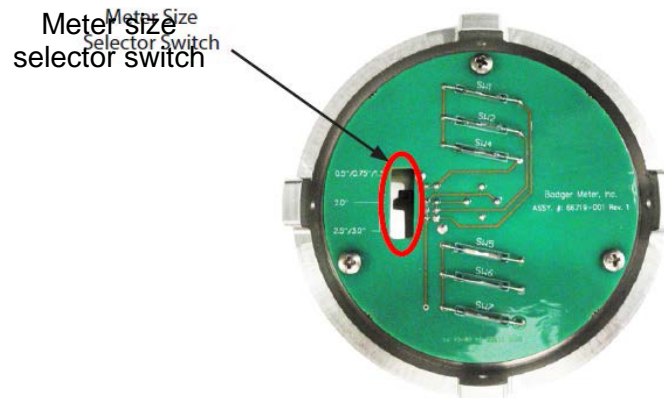
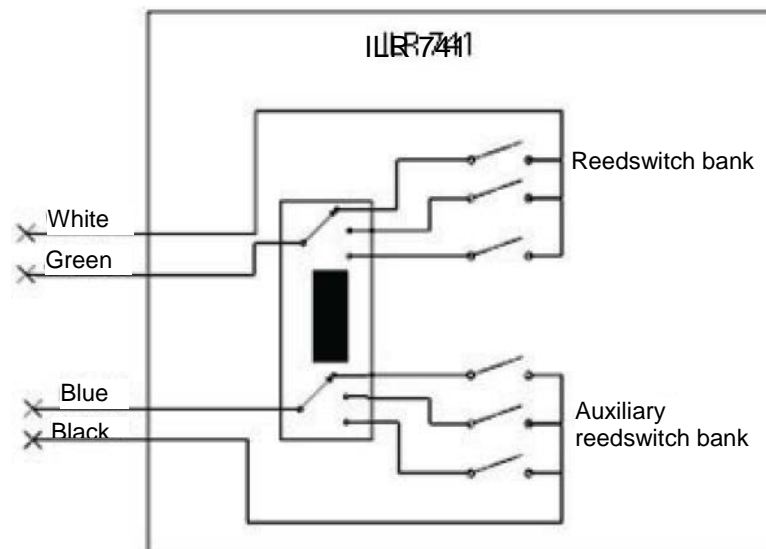


Figure 18: ILR 741 transmitter switch positions

### Transmitter wiring





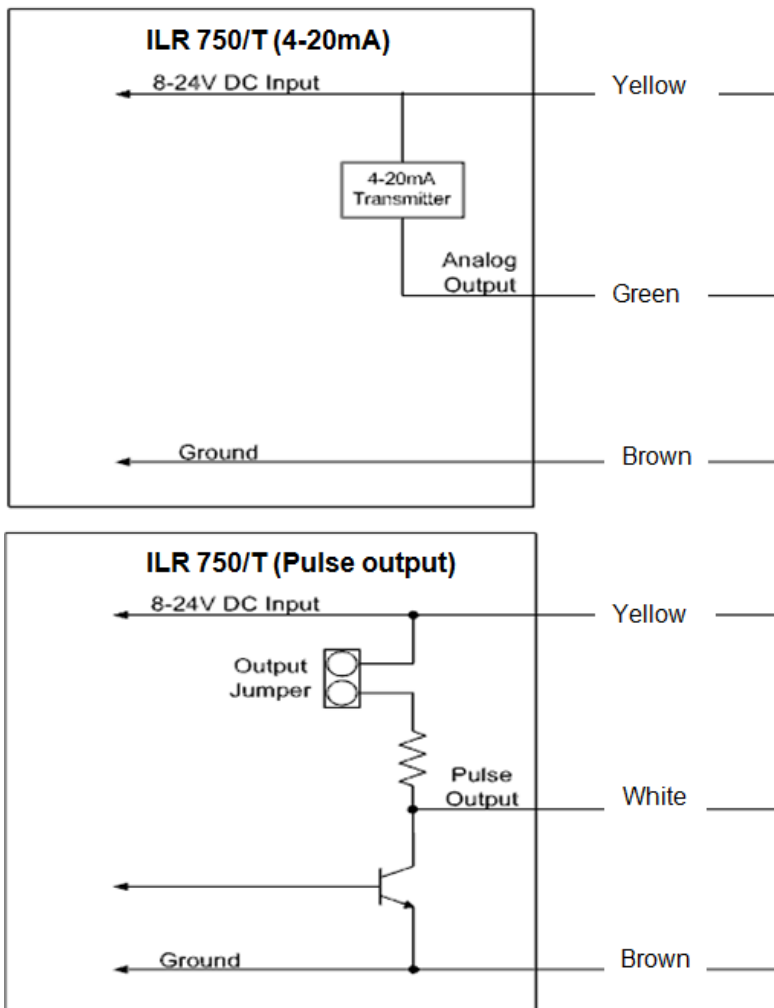
11.6. Pulse and analog output (model ILR750 and 750T)

**Register wiring**

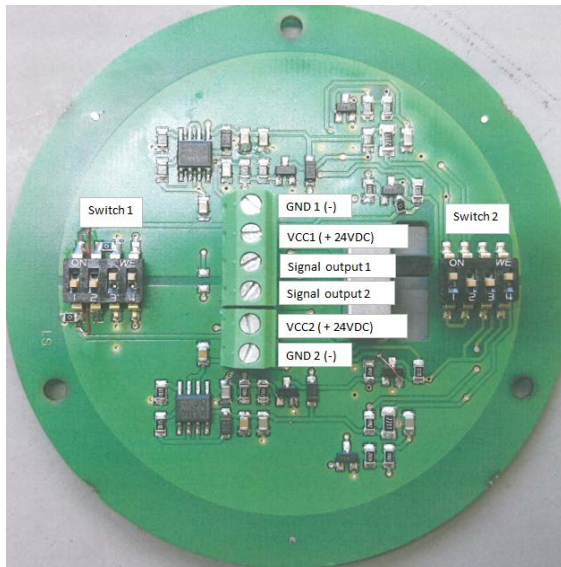
External DC+	:	Yellow
External ground	:	Brown
Pulse output	:	White
Analog output	:	Green
DC input	:	8 to 24 VDC; 20 to 40mA

Outputs:

- Analog 4 to 20mA output in loop powered configuration; external load of 50 ohms to 250 ohms; flow rate is linear scaled between 4mA minimum and 20mA maximum set points; flow rates below programmed minimum read 4mA.
- Pulse output with internal pull-up resistor; optional open collector output with output jumper removal; pulse output is scalable in pulses per liter or pulses per gallon.



11.7. Pulse transmitter hall



Sample:

The switches need to be set as explained in the chart below.

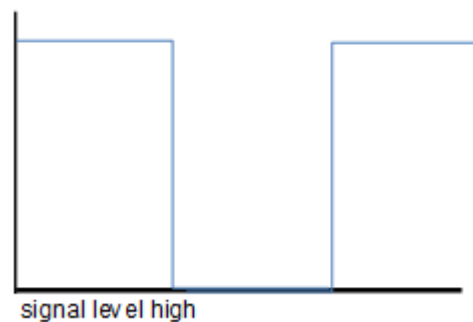
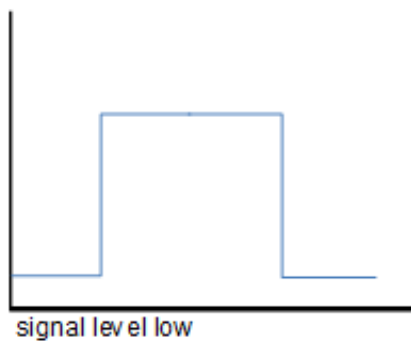
1 Means "ON"; 0 means "OFF"

The sample in the picture would be 1-0-0-1.

- GND 1            Ground channel 1 (-)
- VCC1            Power supply +24VDC for channel 1
- SIG 1            Signal output channel 1
  
- GND 2            Ground channel 2 (-)
- VCC2            Power supply +24VDC for channel 2
- SIG 2            Signal output channel 2

Switch 1				Switch 2				Output 1 and 2
1	2	3	4	1	2	3	4	
1	1	0	0	0	0	0	0	No Pull-up, signal level high, 1 power source for each output *
1	1	1	1	0	0	0	0	No Pull-up, signal level high, only 1 power source for both outputs
0	0	0	0	0	1	1	0	No Pull-up, signal level low, 1 power source for each output
0	0	1	1	0	1	1	0	No Pull-up, signal level low, only 1 power source for both outputs
1	1	0	0	1	0	0	1	Pull-up, signal level high, 1 power source for each output
1	1	1	1	1	0	0	1	Pull-up, signal level high, only 1 power source for both outputs
0	0	0	0	1	1	1	1	Pull-up, signal level low, 1 power source for each output
0	0	1	1	0	1	1	0	Pull-up, signal level low, only 1 power source for both outputs

\* Standard setup if nothing else is described in the order.



11.8. Pulse transmitter (for 1/4")

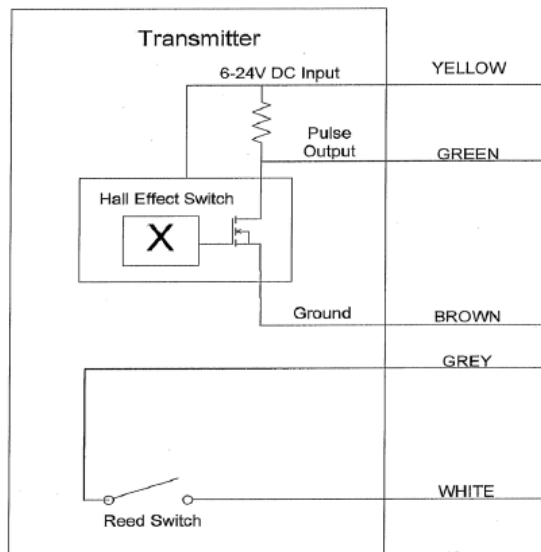


Figure 19: 1/4" and 1/4" low flow wiring

**Hall effect switch**

Rating: Power  
 Supply: Supply input range: 5-24V DC  
 Supply current: 3.5 mA  
 Pulse Output: Output current: 30 mA, max.

Wiring: Yellow: Hall effect DC+  
 Brown: Hall effect ground  
 Green: Hall pulse output

**Reed switch**

Rating: Power rating: 10W  
 Switching voltage: 100V (DC or peak AC)  
 Switching current: 500 mA (DC or peak AC)

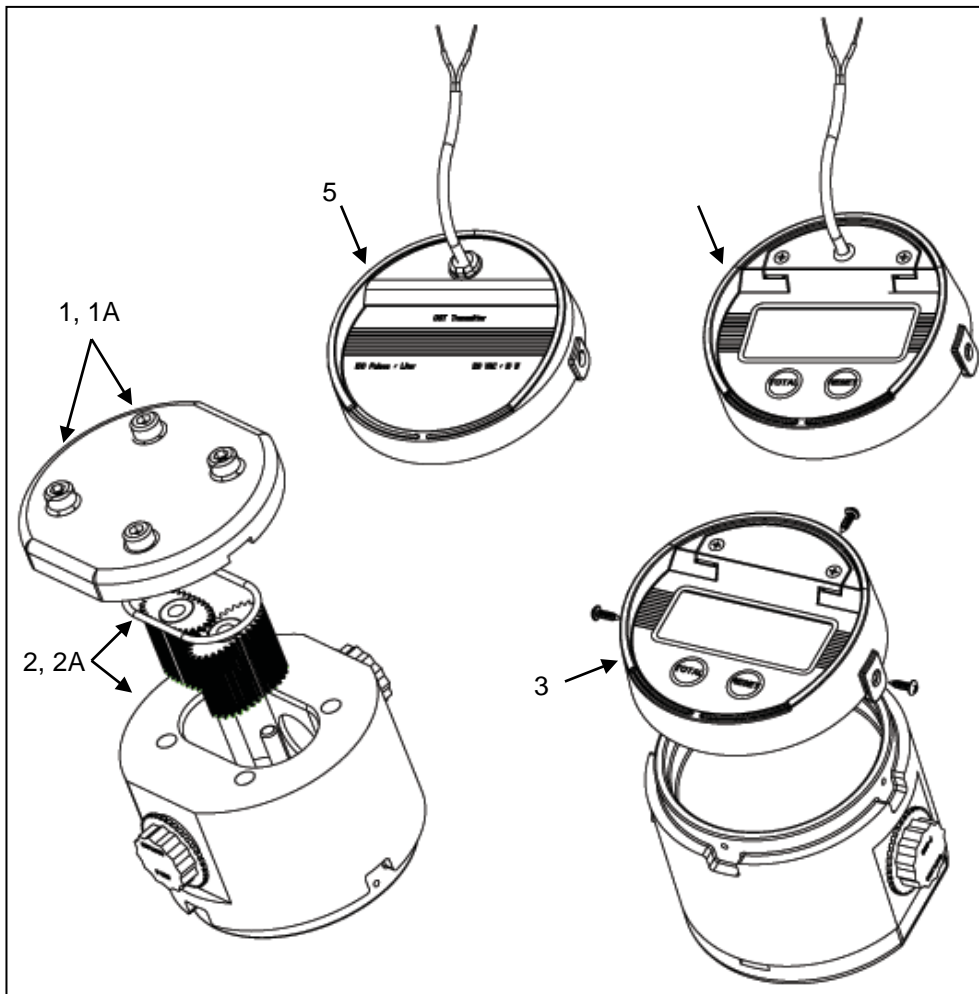
Wiring: Grey: Reedswitch  
 White: Reedswitch  
 Green: Hall effect pulse output

**Pulses per liter (PPL)**

Meter size	Pulses per liter
1/4 "	approx. 390
1/4 " LF	approx. 2170



### 12.Repair parts



Item	Description	Article n°.						
		1/2"	3/4"	1"	1" HF	1-1/2"	2"	3"
1	Aluminum cover w/screws	66885-015	66885-013	66885-013	66885-026	66885-028	66885-030	66885-032
1A	SST cover w/screws	66885-016	66885-014	66885-014	66885-027	66885-029	66885-031	66885-033
2	SST gear service kit w/aflas o-ring	66885-005	66885-007	66885-007	66885-035	6685-037	66885-039	66885-041
2A	LCP gear service kit w/aflas o-ring	66885-006	66885-008	66885-008	66885-034	66885-036	66885-038	66885-040
3	ILR-700 industrial register w/screws	66885-001	66885-001	66885-001	66885-001	66885-001	66885-001	66885-001
4	ILR-710 industrial register single pulse output w/screws	66885-002	66885-002	66885-002	66885-002	66885-002	66885-002	66885-002
4A	ILR-720 industrial register quad output with ext reset w/screws	66885-003	66885-003	66885-003	66885-003	66885-003	66885-003	66885-003
4B	ILR-730 industrial register analog output 4-20 mA w/screws	66885-004	66885-004	66885-004	66885-004	66885-004	66885-004	66885-004
5	ILR-740 transmitter w/screws	66885-012	66885-012	66885-012	66885-012	66885-012	66885-012	66885-012
6	Battery (not shown)	66299-001	66299-001	66299-001	66299-001	66299-001	66299-001	66299-001



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