TURBINE FLOWMETER USER MANUAL

TA, TB AND TC

GUADARRAMA FLOW

Flowmeters and flow measurement technologies. Excellence in precision and repeatability. Made in Spain since 1972.

Index

VERY IMPORTANT

MECHANICAL INSTALLATION

- A FILTER between 0.5 - 1 mm (0.02 – 0.04 in) mesh must be installed in front of the flowmeter to protect it. Failure to install this filter can cause major damage to the equipment. This filter must be installed following the minimum flow meter inlet length indications to maintain laminar flow.
- The indications described in the user manual must be followed.

ELECTRICAL INSTALLATION. Only for models with power supply with pulse output.

- The power supply supplying voltage to the flowmeter:
  - It must not exceed 30 Vdc or be less than 12 Vdc.
  - It must not supply INDUCTIVE LOADS (Coils, solenoid valves, contactors, etc.).
- The polarity of the power supply cannot be reversed.
- The pulse output does not support loads greater than 100 mA.
- Power cables (Greater than 110 Vac) and Data (Pulse, analog, etc.) must go through separate conduits.

These turbine flowmeters have a magnetic pulse sensor to collect the rotation of each blade of the propeller inside the measuring tube. If the flowmeter has a strong electromagnetic field nearby that comes from an electric motor or other element such as a transformer, the pulse pickup may be influenced by this electromagnetic field.

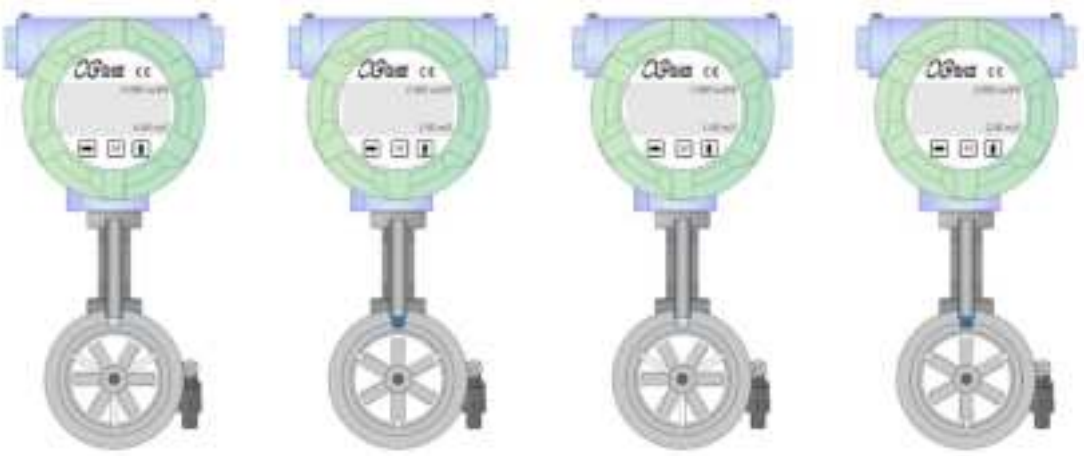
The pulse cable must go through signal channeling, never power and this must be shielded with one end of this mesh to ground. Nor can the excess cable be wound making a coil.

The fluid cannot carry air, since the flow meter would measure this air and the liquid.

1. General information

1.1. Measuring principle

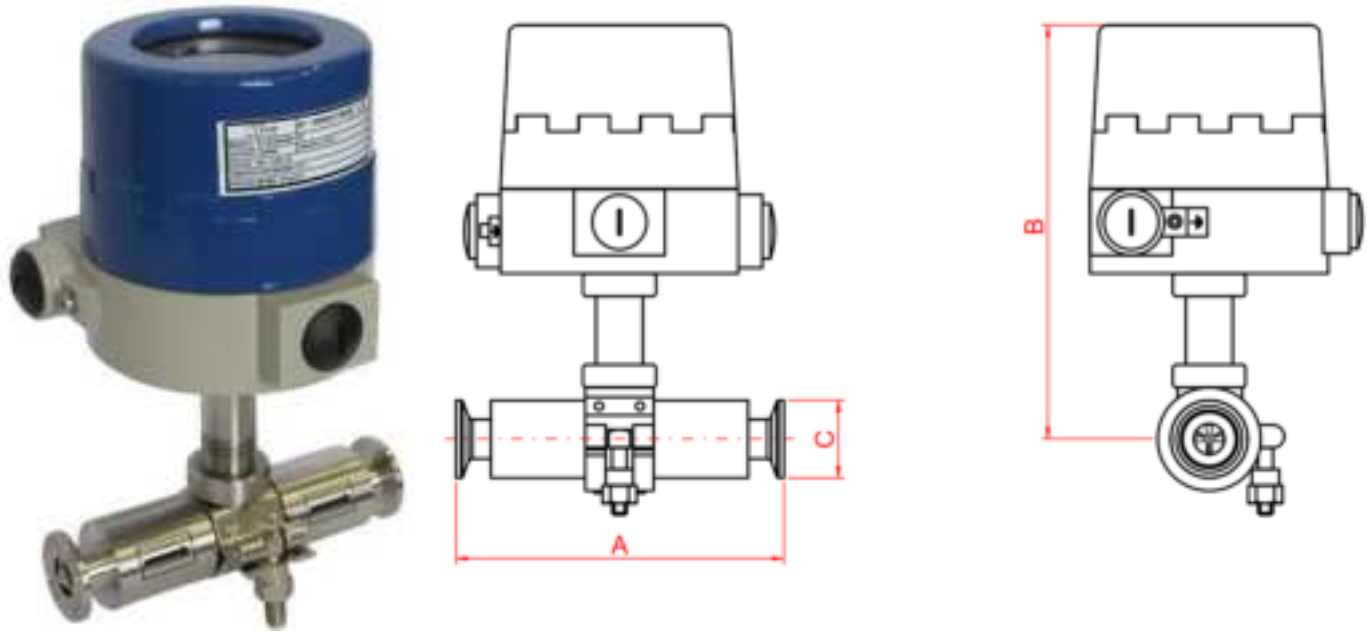
Turbine flowmeters are equipped with a propeller that rotates when the flow circulates inside it. The rotation speed is proportional to the flow rate, so once the speed is known, the flow rate can be determined. To know this, a sensor is used that generates a pulse every time a propeller blade passes in front of it. In this way, a train of pulses is obtained whose frequency allows the flow rate to be determined.



2. Equipment Description

2.1. Description and dimensions of the turbine flowmeters

2.1.1. TA Model



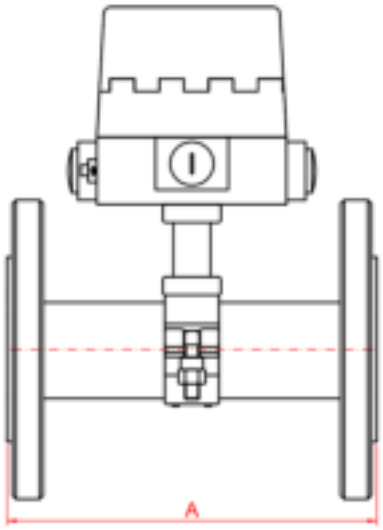
Data sheet in Metric Units

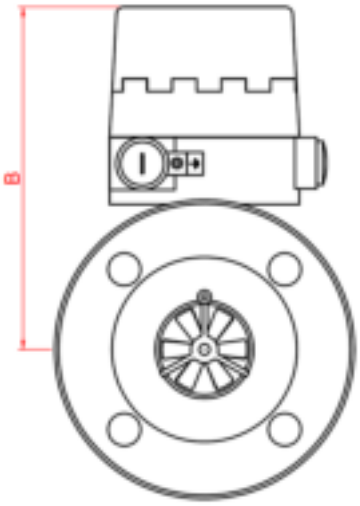
Model	Temperature (°C)		Pressure (bar)	Flow Rate (L/h)		Standard Resolution	Materials		Connections	Dimensions (mm)					Weight (kg)
	Min.	Max.	Maximum	Min.	Max.	Pulses/liter (approx.)	Impeller	Body	Clamp Connection	A	B			C	Standard
											CEB01C	CEB01MA	CEB09BV/SI/SIA		
TA15	-30	90	40	300	3.000	1.000	AISI 2205	AISI 316	DN15	144	135	110	190	34	1

Data sheet in US Units

Model	Temperature (°F)		Pressure (psi)	Flow Rate (GPH)		Standard Resolution	Materials		Connections	Dimensions (in)					Weight (lb)
	Min	Max.	Maximum	Min.	Max.	Pulses/Gallon (approx.)	Impeller	Body	Clamp Connection	A	B			C	Standard
											CEB01C	CEB01MA	CEB09BV/SI/SIA		
TA15	-22	194	580	79	790	3,785	AISI 2205	AISI 316	½”	5.67	5.31	4.33	7.48	1.34	2

2.1.2. TB Model





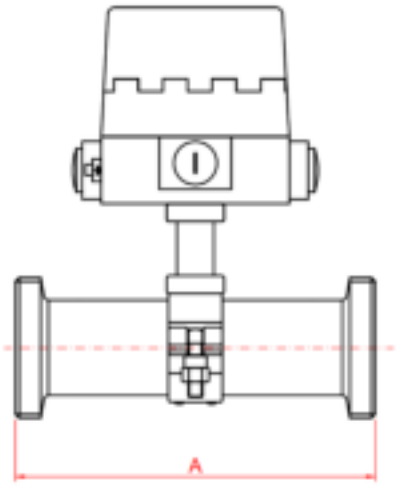
Data sheet in Metric Units

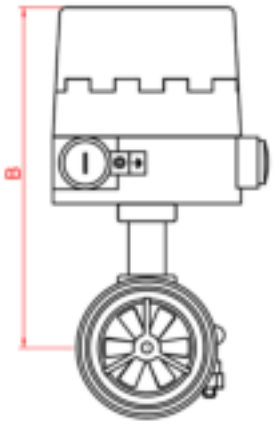
Model	Temperature (°C)		Pressure (bar)	Flow Rate (L/h)		Standard Resolution	Materials			Connections	Dimensions (mm)				Weight (kg)
	Min.	Max.	Maximum	Min.	Max.	Pulses/liter (approx.)	Impeller	Body	Flanges	EN-1092-1 Flanges	A	B			Standard
												CEB01C	CEB01MA	CEB09BV/SI/SIA	
TB32	30	90	40	1.000	12.000	150	AISI 2205	AISI 316	AISI 304	DN32 PN-40	200	140	115	195	5
TB40	30	90	40	2.000	20.000	69	AISI 2205	AISI 316	AISI 304	DN40 PN-40	200	145	120	200	7
TB50	30	90	40	3.000	40.000	31	AISI 2205	AISI 316	AISI 316	DN50 PN-40	200	150	125	205	9
TB80	30	90	40	5.000	100.000	11	AISI 2205	AISI 316	AISI 304	DN80 PN-40	200	165	140	220	15

Data sheet in US Units

Model	Temperature (°F)		Pressure (psi)	Flow Rate (GPH)		Standard Resolution	Materials			Connections	Dimensions (in)				Weight (lb)
	Min.	Max.	Maximum	Min.	Max.	Pulses/Gallon (approx.)	Impeller	Body	Flanges	EN-1092-1 Flanges	A	B			Standard
												CEB01C	CEB01MA	CEB09BV/SI/SIA	
TB32	-22	194	580	264	3,170	568	AISI 2205	AISI 316	AISI 304	1 ¼" PN-40	7.87	5.51	4.53	7.68	11
TB40	-22	194	580	528	5,280	261	AISI 2205	AISI 316	AISI 304	1 ½" PN-40	7.87	5.71	4.72	7.87	15
TB50	-22	194	580	972	10,567	117	AISI 2205	AISI 316	AISI 316	2" PN-40	7.87	5.91	4.92	8.07	20
TB80	-22	194	580	1,321	26,417	42	AISI 2205	AISI 316	AISI 304	3" PN-40	7.87	6.50	5.51	8.66	33

2.1.3. TC Model





Data sheet in Metric Units

Model	Temperature (°C)		Pressure (bar)	Flow Rate (L/h)		Standard Resolution	Materials		Connections	Dimensions (mm)				Weight (kg)
	Min.	Max.	Maximum	Min.	Max.	Pulses/liter (approx.)	Impeller	Body	DIN 11851 Sanitary Thread	A	B			Standard
											CEB01C	CEB01MA	CEB09BV/SI/SIA	
TC25	30	90	40	800	8.000	230	AISI 2205	AISI 316	DN25	200	135	110	190	2
TC32	30	90	40	1.000	12.000	150	AISI 2205	AISI 316	DN32	200	140	115	195	3
TC40	30	90	40	2.000	20.000	69	AISI 2205	AISI 316	DN40	200	145	120	200	3
TC50	30	90	25	3.000	40.000	31	AISI 2205	AISI 316	DN50	200	150	125	205	4
TC80	30	90	25	5.000	100.000	11	AISI 2205	AISI 316	DN80	200	165	140	220	5

Data sheet in US Units

Model	Temperature (°F)		Pressure (psi)	Flow Rate (GPH)		Standard Resolution	Materials		Connections	Dimensions (in)				Weight (lb)
	Min.	Max.	Maximum	Min.	Max.	Pulses/Gallon (approx.)	Impeller	Body	DIN 11851 Sanitary Thread	A	B			Standard
											CEB01C	CEB01MA	CEB09BV/SI/SIA	
TC25	-22	194	580	211	2,110	870	AISI 2205	AISI 316	DN 1”	7.87	5.31	4.33	7.48	5
TC32	-22	194	580	264	3,170	568	AISI 2205	AISI 316	DN 1 ¼”	7.87	5.51	4.53	7.68	7
TC40	-22	194	580	528	5,280	261	AISI 2205	AISI 316	DN 1 ½”	7.87	5.71	4.72	7.87	7
TC50	-22	194	362	972	10,567	117	AISI 2205	AISI 316	DN 2”	7.87	5.91	4.92	8.07	9
TC80	-22	194	362	1,321	26,417	42	AISI 2205	AISI 316	DN 3”	7.87	6.50	5.51	8.66	11

2.2. Transmitters

Transmitters are electronic devices that are used to calculate, using the pulses/liter factor, the volume of liquid that passes through the Turbine flowmeter. Depending on the model chosen, there is the option of having local indication (display), pulse output, analog output, or all combined.

CEB01C

CEB01MA

CEB09 (BV/BVSI/BVSIA)

- **CEB01C**: NPN – PNP transistor output, without local indication.
- **CEB01MA**: Analog (4 – 20 mA) output, without local indication.
- **CEB09BV**: Local Indication of:
  - Total Volume: Total liters that have passed through the equipment since the beginning of its operation, with a resolution of 8 digits.
  - Partial Volume: Total liters that have passed through the equipment since the last reset, with a resolution of 7 digits.
  - Volumetric Flow: Instantaneous flow rate that circulates through the flowmeter, with a resolution of 5 digits.
- **CEB09BVSI**: Local indication and NPN – PNP transistor output.
- **CEB09BVSIA**: Local indication, NPN – PNP transistor and analog (4 – 20 mA) output.

Model	Power Supply	Output			Material	Description
		Indication	Pulses	4 – 20 mA		
CEB01C	24 Vdc		X		Aluminum	NPN - PNP transistor output, without local indication
CEB01MA	24 Vdc			X	Stainless Steel	4 – 20 mA output, without local indication
CEB09BV	Internal	X			Aluminum	Local Indication, without outputs
CEB09BVSI	Internal	X	X		Aluminum	NPN – PNP transistor output and local indication
CEB09BVSIA	24 Vdc	X	X	X	Aluminum	NPN – PNP transistor and 4 – 20 mA output and local indication

Note: CEB09BV/SI/SIA transmitters have a specific user manual.

3. Installation

3.1. Mechanical installation

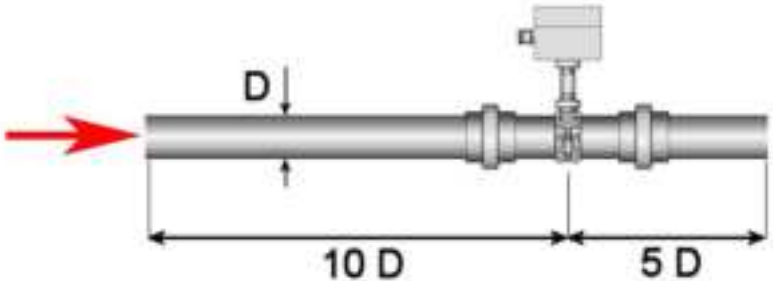
Stainless steel turbine flowmeters accurately measure when correct mechanical installation is performed. The recommendations that are exposed in this section, try to achieve the following objectives:

- **Laminar flow**: The liquid that passes through the equipment must do so in a laminar regime, that is, not turbulent.
- **Always with liquid**: The flowmeter must always be filled with liquid.
- **Avoid the passage of air:** The passage of air, or other gas through the flowmeter must be avoided.

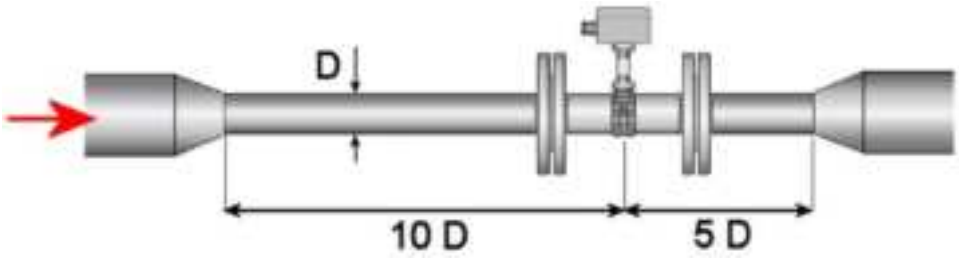
Caution: A 0.5 – 1 mm (0.02 – 0.04 in) mesh FILTER must be installed in front of the flowmeter to protect it. Failure to install this filter can cause major damage to the equipment. This filter must be installed following the minimum flow meter inlet length indications to maintain laminar flow.

3.1.1. Laminar Flow

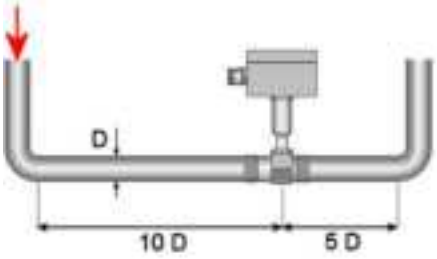
Straight sections. It is essential to place a section of straight pipe with the same internal diameter as that of the flow meter and, as a general rule, with a minimum length of 5 times the diameter at the outlet and 10 times the diameter at the inlet.

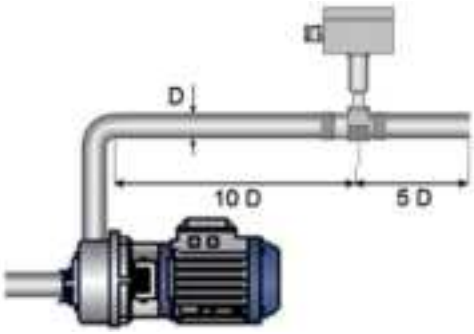


Reductions. If the diameter of the pipe is different from that of the flowmeter, concentric reductions must be placed before and after the indicated straight sections.

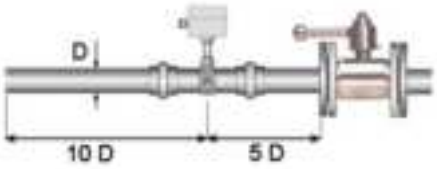


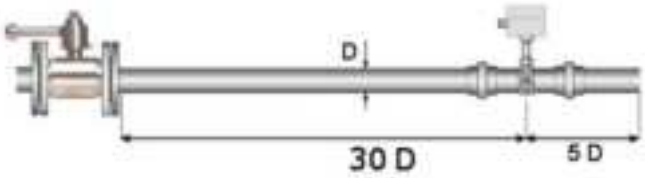
Curved sections. In front of or behind these straight tubes other elements or curved sections can be placed.





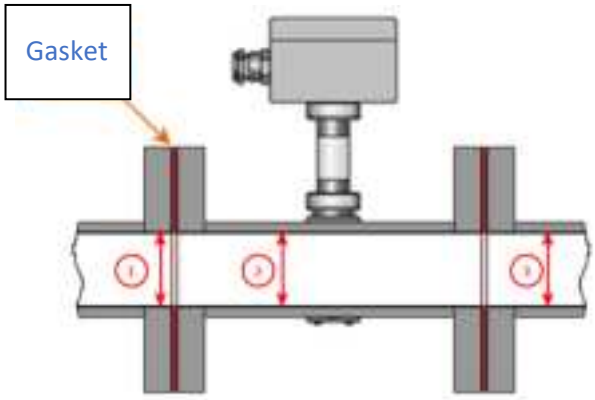
Valves. Manual valves must be placed behind the flow meter. If you want to put them in front of it, you have to increase the straight section to 30 D. This is because, if a valve is left half open, the laminar flow of the liquid is greatly altered.





Unions with the pipe. The unions of the flowmeter with the pipes are critical points where turbulence can occur, affecting the precision of the equipment, if they are not carried out properly.

- As already indicated, the internal diameter of the pipe must be equal to that of the flow meter.
- Furthermore, the union fitting and gasket must not disturb the flow of the liquid. This point may be particularly important in the case of flanged junction TB turbine flowmeters.



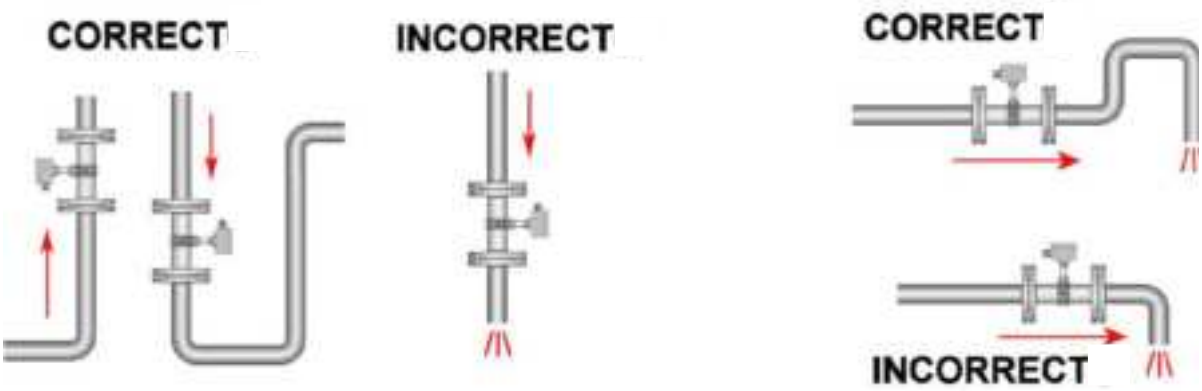
1 - Inner diameter of gasket and flange
2 - Internal diameter of flowmeter
3 - Internal diameter of the pipe

It is very important that the gasket is centered and that it has the same internal diameter to avoid turbulence at the inlet of the flowmeter. It is recommended to use self-centering gaskets such as:

- Gaskets whose outside diameter rests on the inside of the bolts.
- Gaskets with dimensions equal to the flanges, including their holes.

3.1.2. Always with liquid

The flow meter can be mounted in the pipeline in a VERTICAL or HORIZONTAL POSITION, but it must always be avoided that the flow meter can remain empty. A flowmeter should never be installed in an open discharge.



3.1.3. Avoid air passage

The passage of air or any gas through the flowmeter must be avoided, otherwise a measurement error would be made. If it cannot be avoided, a degasser or any other system must be installed that prevents air from passing through the equipment.

In mobile installations, the air hose must be purged before reaching the flow meter.

Important. The passage of compressed air, steam or any other gas under pressure can seriously damage the turbine flow meter.

3.1.4. Other recommendations

The flow meter must not be mounted next to the electric motor of a pump. It must be moved a minimum of 50 cm away.

The fluid should not back up, otherwise it would count it positively. If there is a risk that this circumstance could occur, a non-return valve must be fitted.

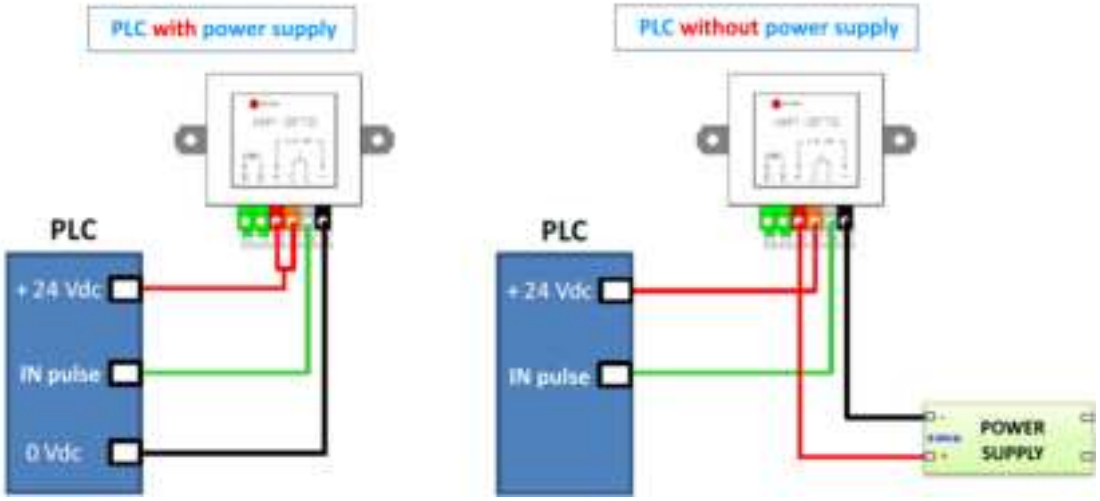
In lines with very hot liquids, if the flowmeter is installed in a horizontal line, rotate it 90 degrees so that the transmitter is not above the pipe, as the internal electronics could overheat.

4. Electrical connection

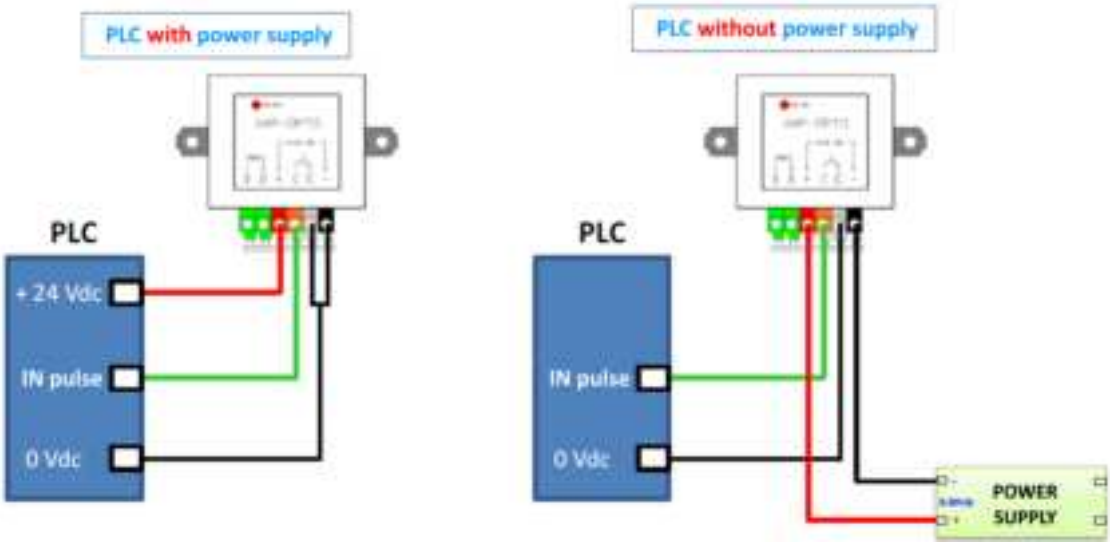
4.1. CEB01C Transmitter

4.1.1. NPN – PNP open collector pulse output

PNP Connection



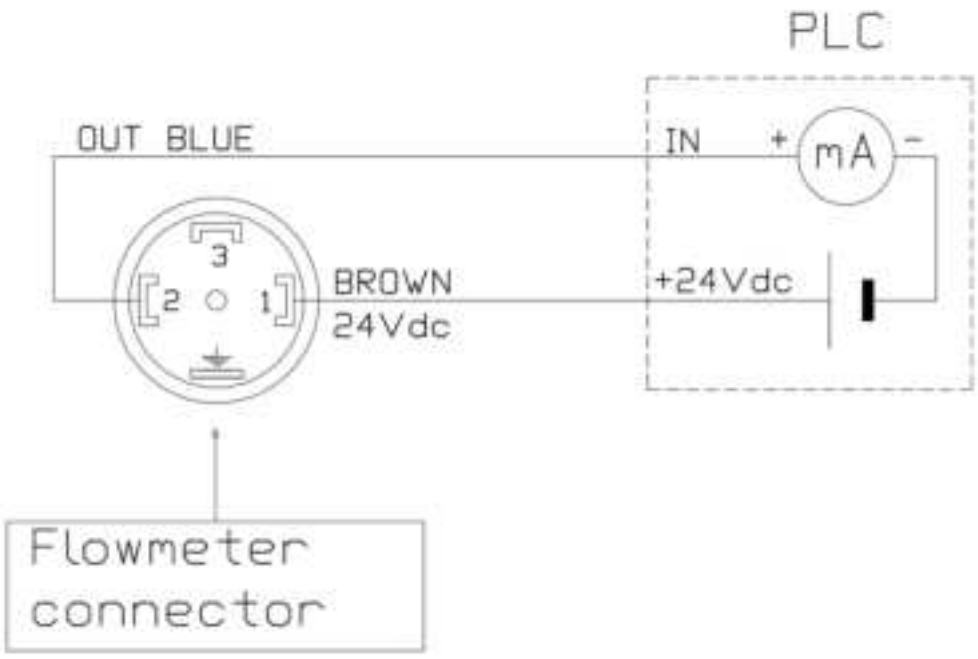
NPN Connection



4.2. CEB01MA transmitter

4.2.1. 4 – 20 mA analog output.

CEB01MA



- Passive 4 – 20 mA output
- Maximum load: 500 ohms

5. Contact

For any problem you may encounter or service you need, do not hesitate to contact the G - Flow offices.

Telephone:		+34 916378174 / +34 916378175
E-mail:		serviciotecnico@g-flow.com
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	Laboratory	
	Factory	