



INSTRUCTION MANUAL

Mini Turbine Flowmeters 800/900/1000 Series

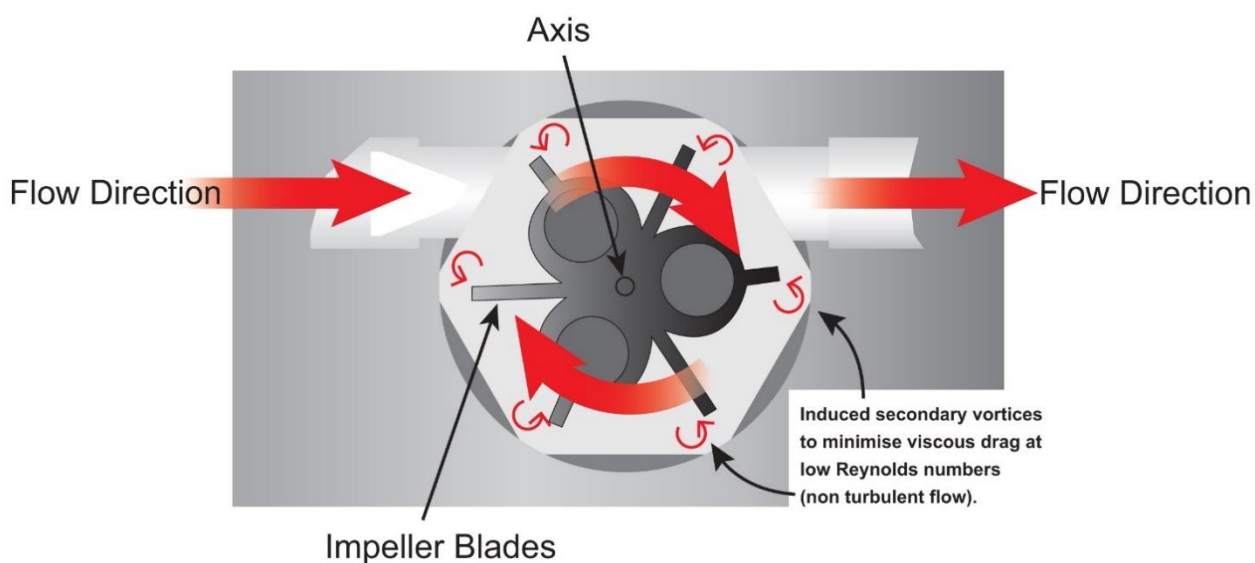


Instructions for Safe Installation

Titan Enterprises Limited

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Turbine principle of operation

General

Please read this instruction manual carefully before installation and operation of your mini turbine device - this should only be completed by competent personnel.

Failure to follow these guidelines may result in damage to the device, equipment or personal injury.

The installation instructions in this manual are applicable to the following Turbine flowmeter models and materials / sensors manufactured/supplied by Titan Enterprises:

Models: NSF-Approved 800 Series 900 Series 1000 Series

Materials: Stainless Steel PVDF

Sensors: Hall effect (NPN or NPN & PNP)

The operating principle is straightforward. A jet of liquid is directed onto a freely rotating Pelton wheel turbine inside a specially designed chamber. The turbine has sealed magnets which are detected by a Hall Effect sensor as the turbine rotates. The frequency of the resulting output pulses is directly proportional to the flow rate, while the total number of pulses corresponds to the total volume of liquid that has passed through the meter. Sapphire is used as the standard bearing material for long, reliable, and maintenance-free operation. Stainless steel and non-metallic options allows these meters to be used with highly aggressive chemicals and ultra-pure water, whilst also being approved for food contact use.

Intended use:

- Titan Enterprises' flowmeters are designed for measurement of low particulate (<80µm) liquid flow. These units **must not** be used with gases of any type.
- It is the installers responsibility to ensure the meter is correct for the application and process conditions.
- It is the installers responsibility to ensure all wetted materials are compatible with the liquid being measured.
- These meters are not approved for safety or MID flow measurement.
- The meters are not for use in Explosive Atmospheres / Hazardous Environments.
- The installer must ensure the meter is operated within its specification only.
- Titan Enterprises Ltd accepts no liability for damage or loss resulting from incorrect or inappropriate installation or use.

Disclaimer:

This information has been reviewed and believed to be correct at the time of publication. Titan Enterprises holds no responsibility for any inaccuracies. The material in this document is for information purposes only.

Storage:

The equipment should be stored in its original packaging in a non-hazardous area. Care must be taken to ensure it is not subjected to extremes of temperature or humidity. Store away from solvents.

General Safety:

Installation should be completed by competent personnel only, adhering to the instructions provided.

Equipment must be protected from electric and electrostatic shock, fire and solvents.

Ensure the flowmeter being installed is undamaged.

Ensure the flowmeter being installed is chemically compatible with the liquid being measured.

Manufacture Information:

The Turbine flow meter is designed and manufactured by:

Titan Enterprises Ltd, Unit 2, 5A Coldharbour Business Park, Sherborne, Dorset, United Kingdom.
DT9 4JW.

Prior to Installation

ATTENTION:

 PRESSURE	DANGER: Risk of Injury due to pressure. Always ensure systems are de-pressurised before working on them
 TEMPERATURE	DANGER: Risk of Injury due to high temperature. Always ensure high temperature systems are cooled adequately before working on them
	DANGER: Risk of Injury due to electrical voltage. Isolate electrical supply before working on the flow meter Incorrect wiring may damage the meter and cause overheating
	DANGER: Risk of Injury due to chemical liquids. Always ensure adequate safety and COSHH procedures are adhered to if working with hazardous chemicals
	WARNING: A regulated maximum 24VDC power supply must be used to prevent electrical damage to the flow meter
	WARNING: Siting the meters close to or on the same power supply as solenoid valves can damage the electronics
	WARNING: Air or gas purging of mechanical meters will damage moving parts
	WARNING: Particulates will damage flow meter devices. Liquids should always be filtered to 80µm upstream of the flow meter
	WARNING: Ensure the meter is installed in the correct flow direction. Mechanical meters will operate in forward and reverse flow, but are only designed and calibrated for forward flow
	WARNING: Incorrect installation may lead to erroneous flow measurements
	WARNING: Pulsating flow can lead to erroneous flow measurement. It is recommended to dampen any pulsation as much as possible upstream of the flow meter

Mechanical Installation

The pipe-work should be designed in such a way as to eliminate reverse flow and the flow passes through the meter in the direction of the arrow. The flow meter should be installed in a position that prevents it from draining down as, on start-up, serious damage could result by 'impacting' an empty flowmeter with a high velocity fluid stream.

Ideally the meter should be installed with minimum straight lengths of tube either side for a distance of 15 pipe diameters upstream and 5 pipe diameters downstream.

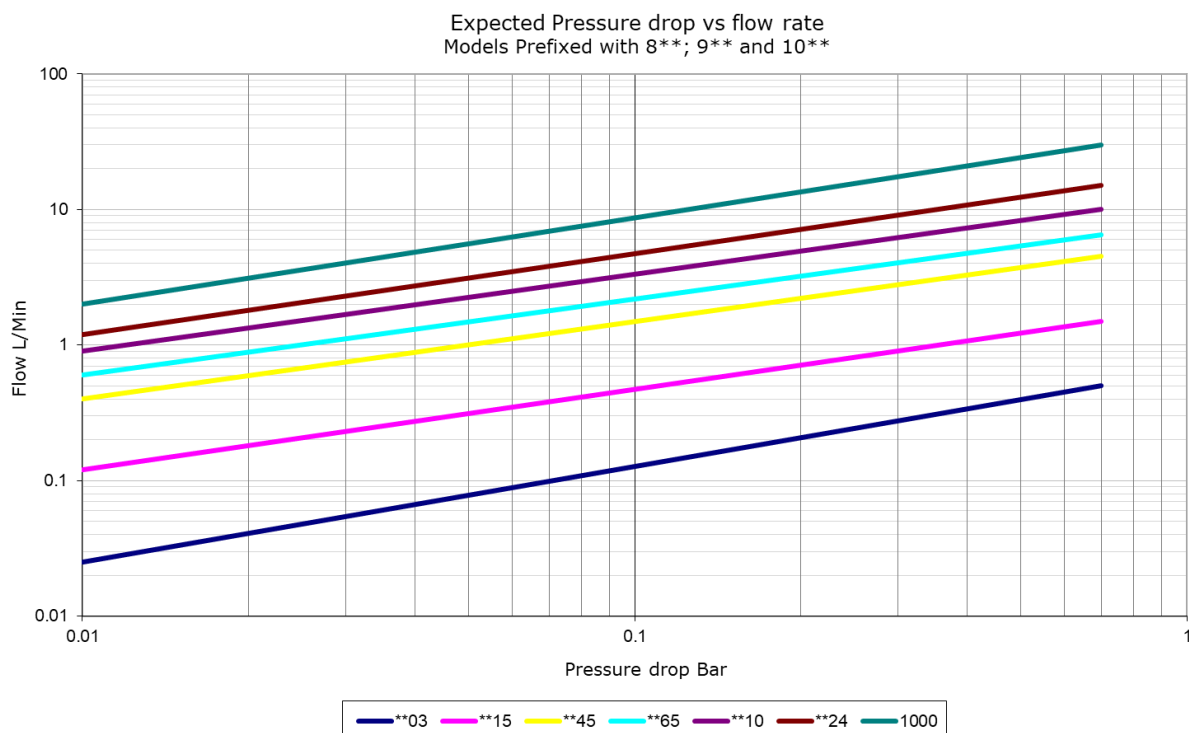
The liquid should be clean and homogenous. In all cases an upstream filter of at least 80 microns **MUST** be fitted. It is recommended that before the flowmeter is installed in the line a 'dummy' section of pipe is inserted and the system flushed. This is to eliminate any debris in that section of the line. The pipe must not stress the body of the meter and should be fully supported either side with appropriate isolation valves, and in some cases, a bypass valve.

When screwing fittings into a threaded body always place the second spanner next to the fitting being inserted. Never tighten one fitting against the other across the meter body as this will distort the body and damage the sapphire bearings.

On initial start-up, increase the flow slowly to ensure no over speeding of the flowmeter occurs as the air is forced from the line. This is best achieved by monitoring the flow rate and ensuring that a 50% over-range is not exceeded. **Never blow a flowmeter with an airline.** Care should be taken to ensure that no air enters the system (e.g. leaky pump gland) or that no cavitation takes place.

With a volatile liquid we recommend at least twice the vapour pressure plus 1 bar as the operating back pressure. It is the user's responsibility to ensure that the materials of construction are compatible with their fluid.

Titan Enterprises accepts no responsibility for material compatibility.

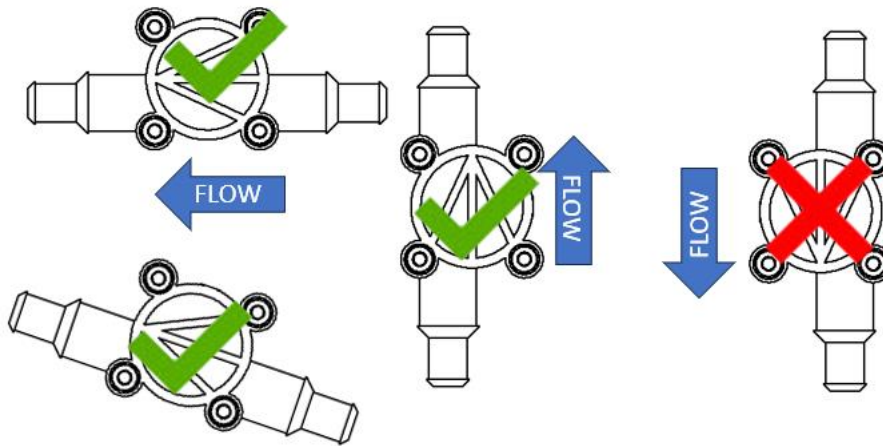


Optimal Orientation

Ensure the flow meter is always fully flooded and with the outlet horizontal or above the inlet to ensure any entrained gas does not remain in the meter.

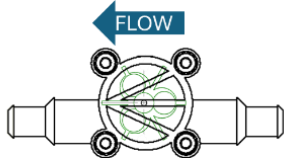
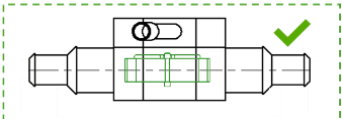
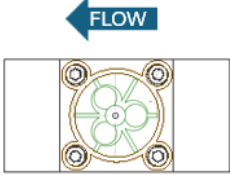
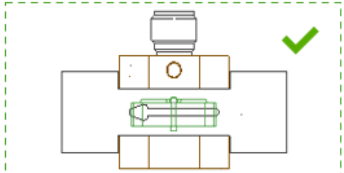
Install with the outlet above the inlet where possible, to prevent gas lock in the measurement section.

It is not recommended to install meters in a downward flow orientation.



Optimal Orientation of Mechanical Meters for Best Performance

*Note: The **Turbine** meters are uni-directional by design and must be installed with flow in the direction of the arrow on the flowmeter.*

800 Series	900/1000 Series
  Optimal Orientation with Turbine Horizontal	  Optimal Orientation with Turbine Horizontal

Electrical Installation



WARNING: Always use a regulated power supply to prevent over voltage damaging the device.

WARNING: Do not connect on the same power supply as inductive load devices such as solenoid valves. These will cause voltage spikes high enough to damage the electronics of the flowmeter.

CAUTION: This equipment is not intended for use in residential environments and may not provide adequate protection from radio reception in such environments. (The equipment is Group 1 Class A ref CISPR).

CAUTION: The equipment operates by measuring a rotating magnetised impellor using a proximity sensor. As such the presence of strong magnets or magnetic fields can cause false flow measurement.

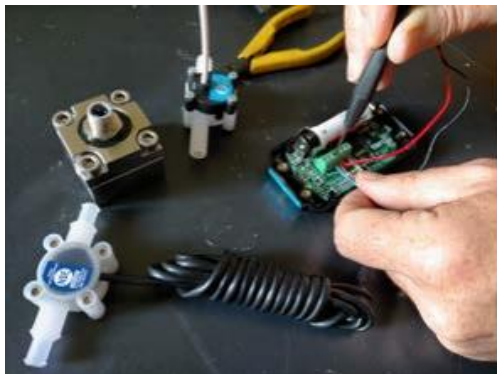
- Connect in accordance with the wiring diagrams in the instructions.
- Use adequately sized wire for the flowmeter and power supply being used.
- We recommend using lower than maximum voltage to supply our meters to ensure long life of all electronic components e.g. 12VDC.
- It is recommended that all signal cables are screened and run separately from power distribution cables. Where possible locate the flowmeter away from inverters, motors and other apparatus that emit electrical noise.

Electrical Characteristics

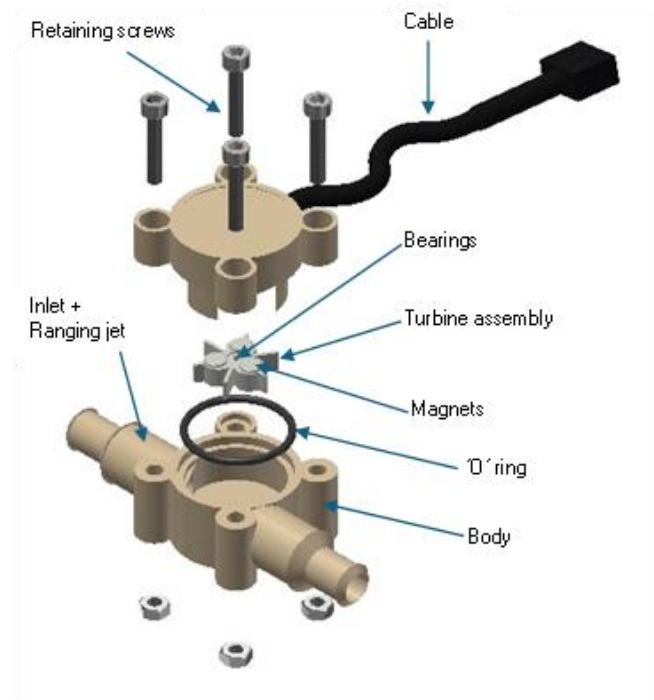
Type	Hall Effect Sensor (NPN Only)	Dual Output (NPN & PNP)
Description	Single Hall Effect sensor with inbuilt 10kOhm pull up resistor	PCB unit using Hall Effect sensor to give both NPN and PNP outputs
Supply	4.5 to 24Vdc	
Temp range	-20 to 125°C	-20 to 60°C
Rise and fall times	1.5uS max	
Supply current	7.5mA typical	20mA@12Vdc typical
Switch current	10mA max	15mA@12Vdc typical
Internal Protection	None	Protection from failure due to miswiring and occasional Voltage spikes
Connections	3 Core +V, 0V, NPN Pulse	4 Core (M12- 4pin circular connector) +V, 0V, NPN, PNP
LED Indication	None	2 LED Power (Green) + Pulse (Orange)
Output	NPN Open collector	NPN Open collector PNP Open collector (Outputs Logic compliant to TTL Voltage levels)
Pull up / down resistors required across Output	None required 10kOhm Pull up resistor installed in the flow meter	Yes 10kOhm pull up / down resistor supplied

It is recommended that all “signal” cables are screened and run separately to power lines and switched inductive loads and are located well away from inverters and other “noisy” apparatus. Always use sound wiring practice ([see installation video](#)). Hall effect sensors (NPN or PNP) require an external pull-up resistor connected between the output and a suitable power supply to attain a pulse. Typically, the flowmeter power supply may be used but sometimes a dc pulse, which is of a different voltage, may be required e.g. using a PLC with a 24V power supply and an internal 5V rail for the pull-up resistor/ pulse input.

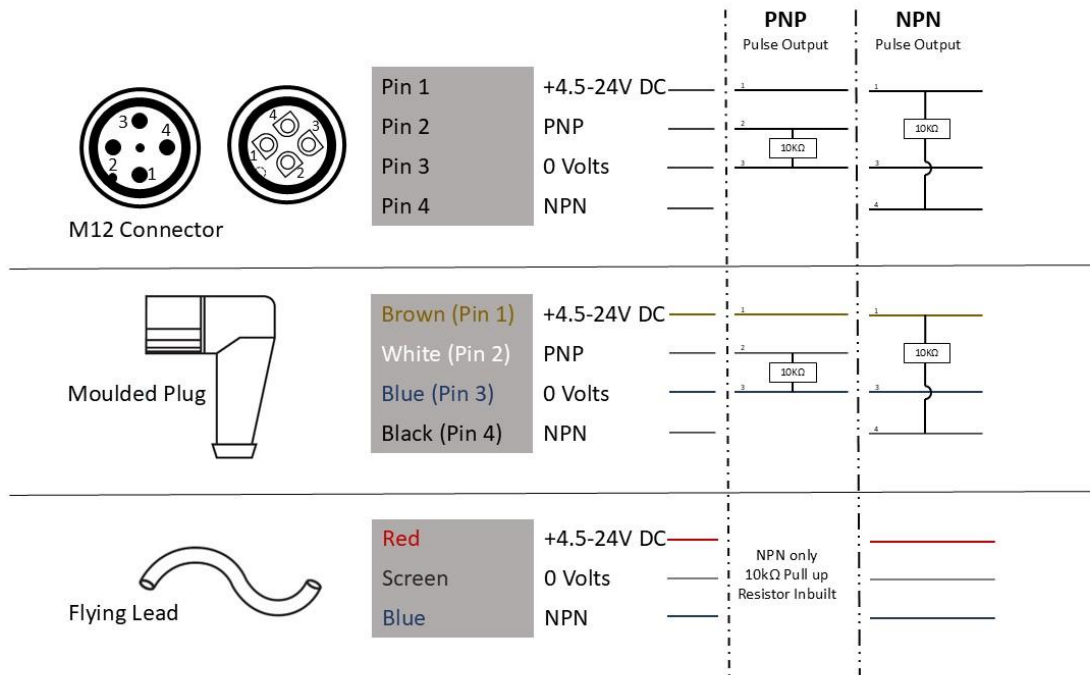
Wiring instruction videos for Titan flowmeters can be found on the [website](#) or scan the QR code:



All turbine meters do not look the same for each model. This illustration is for guidance only.



Connection Options



Pull-up / pull-down resistor required for NPN/PNP sensors (10kOhm supplied)

Commissioning

Checklist for General Flowmeter Installation

- Install the flow meter on the pressure side of any delivery system.
- Install the meter in a section to ensure the meter remains full of liquid, at all times.
- Ideally the meter should be installed with minimum straight lengths of tube either side for a distance of at least 15 pipe diameters upstream and 5 pipe diameters downstream.
- Install the device well away from valves, regulators, bends and other components that could cause excessive turbulence on the fluid entering or leaving the meter.
- Ensure the meter being installed is appropriate for the pressure, temperature, flow range and chemicals being measured prior to installation.
- The meter may be supplied with end caps to protect the inlet and outlet. These need to be removed prior to installation.
- Care must be taken to ensure no contamination of the meters occurs during installation as this can damage internal components.
- Pulsating flow can lead to erroneous flow measurement. It is recommended to dampen any pulsation as much as possible upstream of the flow meter.
- It is good practice to use upstream and downstream isolating full bore ball valves to facilitate easy meter installation or removal.
- Secure meter and/or piping to ensure no stress is seen at the port connections.
- Secure meter to prevent excessive vibration.
- Care must be taken to ensure that the end fittings on the meter are not stressed during use. Ideally, flexible tubes should be used.

Troubleshooting

If problems occur during commissioning always check the fundamentals first.

- Is the flowmeter/instrument the correct one for the installation?
- Is the power connected to the meter and the instrument, and is it turned on?
- Is the instrument set/wired correctly? I/P port, pulse type, frequency span, units etc.
- Where possible check the O/P from the flowmeter with an oscilloscope before proceeding.
- Was the line flushed prior to installing the meter?
- Was the flow increased slowly?
- Is the meter blocked?

If you are unable to find a solution, ask your supplier for technical support or contact
technical@flowmeters.co.uk

[Ready to specify this solution for
your project or application?](#)

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