PROCESSAUTOMATIC
TURBINE FLOWMETERS

TECHNICAL MANUAL AND
OPERATING INSTRUCTIONS

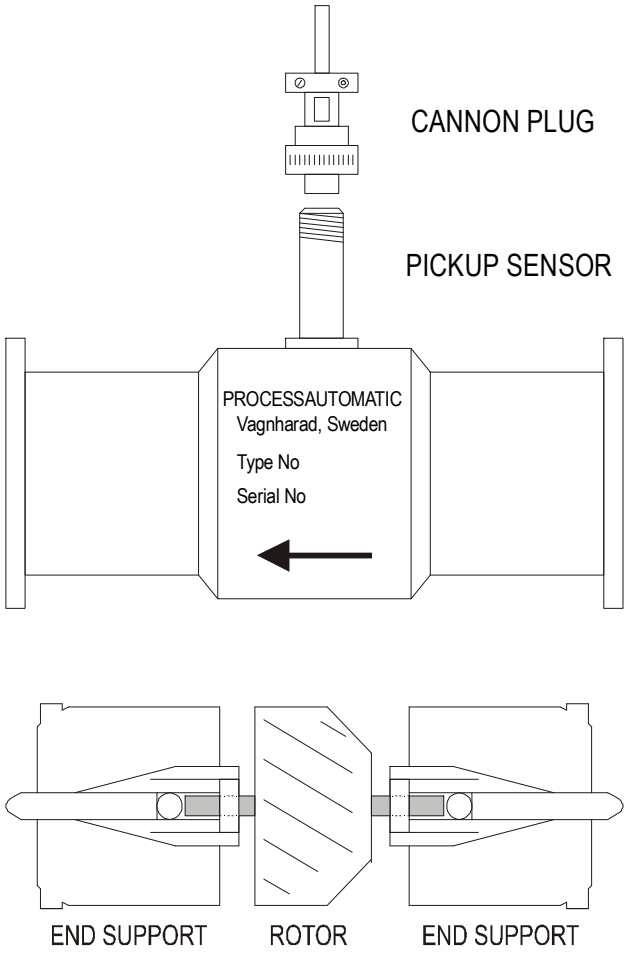
CONTENTS.

GENERAL DESCRIPTION.

The PROCESSAUTOMATIC turbine flowmeter is made up from a stainless steel housing with a slightly magnetic, multi-blade, free-spinning rotor inside. The rotor is supported by two end supports.

A non-intrusive and removable pickup sensor detects the rotor blades and transmits a frequency which is proportional to the flow.

Each flowmeter is accurately calibrated in the factory before delivery and is shipped with a calibration certificate.



APPLICATIONS AND SPECIFICATIONS.

Applications :	The turbine flowmeter is suitable for a wide range of applications measuring liquids with a low viscosity. It is not suitable for measuring liquids containing particles which may get caught in the moving parts. The flowmeter is not suitable for measuring air or gases. Running the flowmeter dry, (i.e. pushing air or gases through it) may reduce the life of the unit due to lack of lubrication of the bearings.
Response time :	It has a fast response time to changes in flow rate and can also be used for high-speed batching applications. Response time to a change in flow rate equivalent to 50% of the maximum flow rate is approx 50 milliseconds.
Temperature :	Max product temperature : + 125 degrees C. Min product temperature : - 50 degrees C.
Accuracy and repeatability :	The flowmeter accuracy is +/- 0.5% of reading within the stated flow range for a viscosity of 1 cSt. Repeatability is 0.1%. Repeatability is defined as the maximum difference between two readings sampled within the stated flow range under the same conditions and flow rate.
Pressure rating :	The pressure rating is based on the limitation for the end connection. For example, Triclover is limited to 10 Bar (150 PSI). Disregarding the pressure rating for the end connection, the flowmeter pressure rating is 250 Bar (3750 PSI).
Pressure drop :	Approx 0.27 Bar (4 PSI) at max stated flow rate for water.

CONSTRUCTION AND MATERIALS.

End Connections :

The turbine flowmeters is available with different end fittings and connections. Standard end fittings include Triclover, BSP, BSM and flanges (DIN and ANSI).

There are sometimes variations in standards between different countries and regions and suitable matching welding connections are available through your local distributor or from the factory.

Internals :

One set of internals includes a rotor and two corresponding end supports. The internals are locked inside the body by a circlip on each side.

The bearings are designed to allow the liquid to wash through the moving parts and this feature is particularly suitable for food and beverage applications.

The internals are interchangeable between flowmeters of the same size, regardless of end fittings.

Replacement internals can be ordered separately and are shipped already calibrated complete with a calibration certificate.

Pickup sensor :

The pickup sensor type PA95 is universal for all standard types and sizes.

Materials :

Body :	Stainless steel.
End supports :	Stainless steel.
Rotor :	FV520.
Bearings :	Stellite
Pickup sensor :	Stainless steel.

TYPES, SIZES AND FLOWRANGES.

Types :

The different types of flowmeters are defined by the end connection.

The two standard types are :

PATC	Triclover end connections.
PAT	Threaded male end connections.

The following two types are also available :

PAH	BSM-threaded male end connections.
PAF	Flanged end connections.

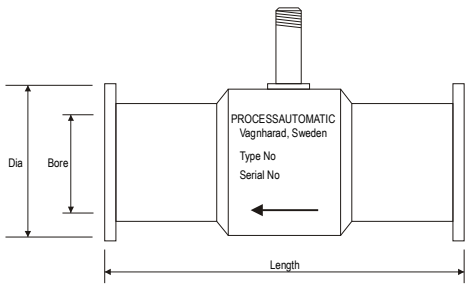
Please note that standards for different connections may vary between countries and regions.

Sizes and flow ranges :

The flow range defines the minimum and maximum flow rate for the flowmeter.

Type	**Size (mm)**	**Flow range (litres/minute)**
---/12/1	12	2.3 - 14
---/15/2	15	4.5 - 34
---/15/4	15	9.0 - 68
---/18/8	18	18 - 140
---/25/16	25	27 - 270
---/31/24	31	41 - 410
---/37/42	37	70 - 700
---/50/66	50	110 – 1100

DIMENSIONS



Flowmeter dimensions : The table below covers the PAT and PATC range. Dimensions for other types are available on request.

PATC Dimensions :

Model	Length (mm)	Bore (mm)	Dia (mm)
PATC/12/1	62	9.6	50
PATC/15/2	62	11.8	50
PATC/15/4	62	11.8	50
PATC/18/8	90.5	15.5	50
PATC/25/16	90.5	21.5	50
PATC/31/24	117	27.3	50
PATC/37/42	108	33.5	50
PATC/50/66	132	45.2	64

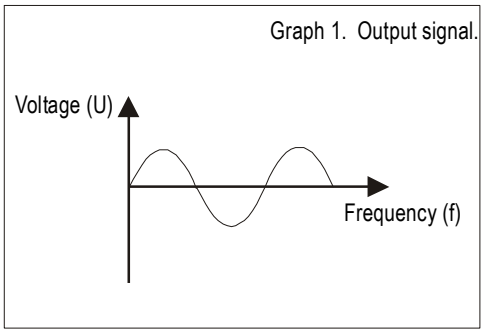
PAT Dimensions :

Model	Length (mm)	Bore (mm)	Dia R”
PAT/12/1	62	9.6	1/2
PAT/15/2	62	11.8	5/8
PAT/15/4	62	11.8	5/8
PAT/18/8	82	15.5	3/4
PAT/25/16	89	21.5	1
PAT/31/24	98	27.3	1 1/4
PAT/37/42	110	33.5	1 1/2
PAT/50/66	132	45.2	2

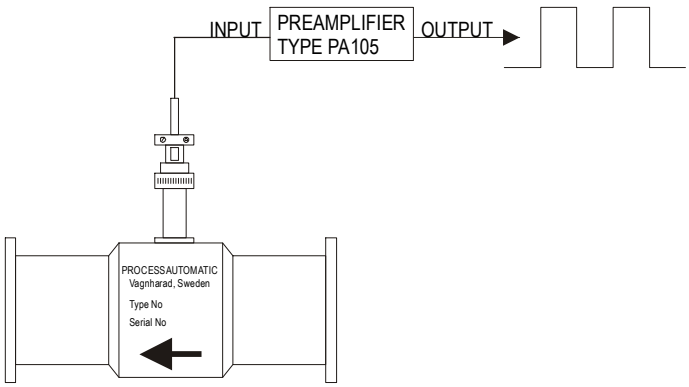
ELECTRICAL CONNECTION.

Output :

The output from the magnetic pickup sensor is a sine wave signal. The frequency is proportional to the flow.
The amplitude also varies with flow and size of flowmeter.
Minimum amplitude is 25 mV peak-peak.



Some receivers and instruments require the input signal to be a square wave signal with an amplitude of 5VDC - 24 VDC. In these instances, it is necessary to use a preamplifier, such as Processautomatic model 105 or PA106, between the flowmeter and the receiving instrument.



ELECTRICAL CONNECTION, (continued).

Wiring :

The preferred cable is a screened 2-core twisted copper cable. The screen should be earthed at the receiver end only.

The cable should run clear from high-voltage cables to avoid electrical interference from other devices.

Maximum cable length without transmitters or amplifiers is 100 metres.

The output signal is an AC signal and as such has no polarity.

Pickup sensor :

The pick-up sensor type **PA95** is universal for all standard types and sizes of the flowmeter. It consists of a stainless steel casing with a coil inside. Two pins allow for connection to a mating cannon connector.

It is possible to test the pickup sensor by measuring the electrical resistance between the two pins using a multimeter. The resistance of a working pickup sensor is approximately 470 Ohms.

INSTALLATION

Location :

The flowmeter can be installed horizontally, vertically or at an angle. For best results, ensure that the flowmeter is completely full of liquid at all times during operation as entrained air or air pockets will affect the accuracy.

If mounted vertically or at an angle, flow direction should preferably be upwards to ensure a full pipe during operation.

The pickup sensor should normally be at the highest point where possible to avoid condensation from the pipe work draining onto it.

Filters :

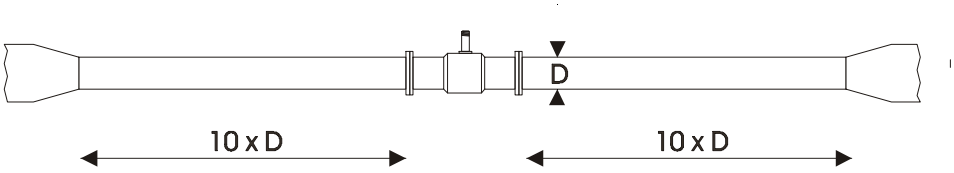
Coarse filters should be inserted upstream in case solid particles may be present in the liquid.

Flow straightners :

To optimize accuracy, the connecting pipe work should be of the same size as that of the flowmeter. Ten times the pipe diameter of straight pipe before and after the flowmeter is recommended. These pipe sections should be free from devices which may cause turbulence, such as valves and probes.

Flow direction :

The flowmeter can be used to accurately measure flow in one direction only as indicated by the arrow on the flowmeter body. Reverse flow will not cause any damage.



MAINTENANCE

General :

The required maintenance schedule depends on the particular application. In general, the Processautomatic Turbine flow meter is maintenance free; as the bearings are continuously lubricated by the flowing liquid. But it is still recommended to dismantle the flow meter periodically (i.e. each month) to check for cleanliness of bearings and rotor.

The Turbine flow meter can be in-line cleaned by all chemical methods commonly used in the food industry. This includes 1% Nitric acid at 70°C followed by 1% NaOH at 70°C and water at 90°C. Continuous line temperature up to 125°C can be tolerated.

Removal & refitting of turbine flow meter internals:

Carefully note or mark the position of the end supports and mark the wings that are positioned between the punch marks (2 small indentations which are located on either side of one of the wings of each end support). When the end supports are refitted, it is very important that the same wings are refitted in their original location. Also carefully note the rotor configuration in respect of the flow direction.

Remove the two retaining circlips with a suitable pair of pliers by pulling the lip of each circlip so that the ring leaves the circlip groove. Withdraw both end supports (two) and rotor with shaft.

The rotor assembly can then be cleaned and replaced into the flow meter body and secured by replacing the circlips securely into the circlip grooves; located inside of the flow meter body.

The end supports and rotor must be replaced into the flow meter body in exactly the same direction as they were originally fitted. If the rotor assembly is refitted in the

opposing direction, the flow meter accuracy will be seriously affected.

NOTE: In the event of mechanical damage to the internals, a complete new set can be purchased from your local supplier or from Processautomatic.

Pickup sensor : In the event that the pickup sensor is refitted or replaced, please follow the following steps.

Thoroughly clean the threaded pickup hole in the flowmeter body with a dry cloth.

Screw in the pickup sensor gently by hand until it reaches the bottom of the hole.

Unscrew ¼ of a turn.

Tighten locknut.

WARRANTY.

All of the PROCESSAUTOMATIC flowmeters are guaranteed by warranty for 60 months (5 years) from the date of dispatch against any defects arising from any material or manufacturing deficiencies. Please refer to General Conditions of Sale for further information.

It is important that the flowmeter is used within set flow range limits. Exceeding flow range limits by forcing a larger volume of gas or liquid thru the flowmeter than specified will cause the rotor to generate too much friction-induced heat on the axis, causing permanent damage to the rotor and end supports. This phenomena is also referred to as over speeding - and is not covered by warranty.