

Apollo Flow Measurement Ltd
RN3/4/7 Flowmeter Manual
Issue 8
November 2007

Installation & Operation of the RN3/4/7 Turbine Flowmeter

Note

Read this manual prior to installation

CONTENTS

- 1 Introduction
- 2 Installation
 - 2.1 Mechanical
 - 2.2 Electrical
- 3 Commissioning
- 4 Intrinsic Safety
- 5 Maintenance
- 6 Fault Finding
- 7 Specification

RN3 Turbine Flowmeter
(screwed connections)



RN4 Turbine Flowmeter
(flanged connections)

RN7 Hygienic Flowmeter
(hygienic connections)



1 INTRODUCTION

The Apollo Industrial Turbine Flowmeter provides an accurate and economical means of measuring flows of clean liquids in the range of 2 to 10,000 litres / minute.

The stainless steel body and hangers, together with an extremely strong rotor construction results in a meter that can be used in a wide range of duties on both lubricating and non lubricating liquids.

The standard meter can be used at temperatures of up to 110°C, with optional sensing coils and bearing materials allowing temperatures of up to 232 °C.

The meter can be supplied with threaded, flanged or hygienic connections.

For hazardous areas ATEX certified meters are available to Code II 1 G EEx ia IIc T5.

All turbine meters are individually calibrated to ensure their accuracy.

The meter must not be used above its specification for pressure, temperature or flow rate.

2 INSTALLATION

WARNING: Installation and maintenance should be carried out by suitably trained and competent staff.

2.1 Mechanical

The flowmeter can be installed in any attitude in the pipeline, however for vertical pipelines bearing life will be increased if the flow is upwards.

Where fitted, control valves should be downstream of the flowmeter to ensure that it is full of liquid at all times. This will increase both accuracy and bearing life.

If the meter is to be used with an open ended pipe it should be installed at the lowest level in the system to provide a positive head on the outlet of the meter.

Turbulence should be kept to a minimum to maintain the accuracy of the meter. Ten diameters of straight pipe, the same bore as the flowmeter upstream and five downstream is normally sufficient to allow the flow to straighten to an acceptable level. Where there is severe turbulence, or it is not possible to have the required lengths of straight pipe an on-site calibration should be carried out.

The response time of the flowmeter to a step change in flow is very small and will not normally affect the accuracy, except in cases of very short batches or pulsating flow.

To protect the meter from damage and prevent a blockage, a filter should be fitted upstream of the meter. Recommended mesh sizes are as follows:

Up to 9mm bore	0.1mm
9 - 50mm bore	0.3mm
Over 50mm bore	0.5mm

2.2 Electrical

The electrical output from the flowmeter is a voltage sine wave, varying from 50 mV at the lowest flow on the smallest meter to 3V at the highest flow of the largest meter. The frequency of the signal is directly proportional to the flow rate of the liquid.

Twin core screened cable should be used to connect the meter to the instrumentation. The level of protection required will depend upon the level of electrical noise in the area and the transmission distance. It is good practice to run signal cables separately to power cables.

All standard flowmeters are provided with a 2 pin MS connector. The cable screen should be cut back and not earthed at the flowmeter end.

Where cable runs exceed 100 metres an amplifier such as the Apollo P/5 or PPW may be required.

2.3 Hygienic

The RN7 is not supplied sterilised. If sterilisation is required this should be carried out before use.

3 COMMISSIONING

- 1) Check that the bore of the meter is clear of any packing material.
- 2) Line up the arrow on the meter body with the flow direction. The RN3, RN4 and RN7 meters can operate in either direction, however the arrow indicates the direction it was calibrated in.
- 3) Where gaskets are used ensure that they are located centrally.
- 4) Ensure no material is left in the pipe that could become tangled in the rotor (PTFE tape etc.)
- 5) Connect the pickoff coil and plug using finger pressure only.
- 6) Bleed air out of the system slowly to prevent overspeeding of the rotor.

4 INTRINSIC SAFETY

For areas where potentially explosive gasses may be present sources of ignition must be eliminated.

The Industrial Turbine range can be supplied with ATEX certified sensors and amplifiers. The signal can be used in the hazardous area or taken through suitable barriers to a safe area.

The Apollo sensor is certified to II 1 G EEx ia IIc T5.

5 MAINTENANCE

The meter must not be removed from the line while the surface temperature is high or line is pressurised.

Provision must be made to drain the line prior to disassembly.

Once installed the meter requires very little maintenance. It is recommended that after each 3000 hours the meter is removed from the line and inspected for signs of wear or build up of debris.

In the event of excessive play in the rotor the meter should be returned to Apollo for re-bushing of the bearings and recalibration.

After 5,000 hours the meter should be recalibrated.

6 FAULT FINDING

- 1) No Signal:
 - a) Check that liquid is actually flowing.
 - b) Check that the wires are connected correctly with no breaks.
 - c) Resistance of sensor is approximately 1100 . If it is short circuit across the coil or to the case, or open circuit across the coil replace it.
 - d) Check there is nothing stopping the rotor from turning.
- 2) Repeatable Error:

This could be caused by turbulence or the viscosity of the liquid. An on-site calibration should be carried out.
- 3) Random Error:
 - a) Check that there is nothing fouling the rotor.
 - b) There may be electrical interference. Check that the cable is correctly screened and separate from any power supply cables. In severe cases an amplifier may be required.

7 SPECIFICATION

Linearity:	+/- 0.5% of reading
Repeatability:	+/- 0.1% of reading
Pressure Drop:	0.4 Bar at maximum flow
Max Flow:	110% of stated maximum for short periods
Max Pressure:	35 Bar (Subject to flange rating) Higher pressure ratings available on request
Temperature:	Standard Coil -30 to 110 °C IS Coil -30 to 110 °C HT Coil up to 180 °C HT Coil & tungsten carbide bearing sleeves up to 232 °C

FLOW RANGES

Model No			Flow Range litres/min	K factor # pulses/litre
RN3/10	RN4/10		1-10	5000
RN3/15	RN4/15	RN7/20/2	2-20	2400
RN3/20/5	RN4/20/5	RN7/20/5	5-50	1080
RN3/20/8	RN4/20/8	RN7/20/8	8-80	1080
RN3/25/15	RN4/25/15	RN7/25/15	15-150	620
RN3/25	RN4/25	RN7/25	25-250	362
RN3/32	RN4/32	RN7/32	45-450	111
RN3/40	RN4/40	RN7/40	67-670	82
RN3/50	RN4/50	RN7/50	110-1100	59
RN3/65	RN4/80	RN7/80	225-2250	24.5
	RN4/100		450-4500	6.6
	RN4/150		900-9000	2.3

The nominal K factor is based on water at 20 °C. Each flowmeter is individually calibrated on water and will have a unique K factor

CONNECTIONS AND DIMENSIONS

Model No	BSP	L mm	Model No	Flange	L mm	Model No	Triclamp	L mm
RN3/10	$\frac{3}{8}$ "	82.6						
RN3/15	$\frac{1}{2}$ "	82.6	RN4/15	15	139.7	RN7/15/2	1"	127
RN3/20/5	$\frac{3}{4}$ "	82.6	RN4/20/5	20	139.7	RN7/20/5	1"	127
RN3/20/8	$\frac{3}{4}$ "	82.6	RN4/20/8	20	139.7	RN7/20/8	1"	127
RN3/25/15	1"	90.5	RN4/25/15	25	139.7	RN7/25/15	$1\frac{1}{2}$ "	127
RN3/25	1"	90.5	RN4/25	25	139.7	RN7/25		127
RN3/32	$1\frac{1}{4}$ "	110.0	RN4/32	32	145.0			
RN3/40	$1\frac{1}{2}$ "	116.7	RN4/40	40	152.4	RN7/40	2"	155
RN3/50	2"	154.0	RN4/50	50	165.1	RN7/50	$2\frac{1}{2}$ "	216
RN3/65	$2\frac{1}{2}$ "	170.0	RN4/80	80	250.0	RN7/80	3"	300
			RN4/100	100	300.0			
			RN4/150	150	360.0			

The dimension L of the flowmeters is the overall length of the flowmeter in millimetres.

FLOWMETER DETAILS

Date	Model Supplied	Serial Number	K factor pulses/litre