

## **TECHVORT RLV – VORTEX FLOW METER**

### **Application:**

Reliable Flow Measurement of Steam, gas and liquids

- DM Water
- Chemical
- Pharma
- Gases, Steam and Air.



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## SPECIAL FEATURES

1. Process pressure up to 25 bar
2. Fluid temperature up to 450 deg C
3. Sizes available from DN 10mm to 500mm
4. Protection Class: IP68 (Optional)
5. Galvanically isolated pulse output available (for alarm, limit value, etc.)
6. Output available are 4-20mA, pulse, and RS232 communication
7. Measuring of volume Flow and Temperature at the same time
8. High resistance against Vibrations, Temperature shocks, Water Hammer and Dirty Media
9. No maintenance, no moving parts, no zero-point drift.

## INTRODUCTION:

### Principle of Operation:

This method of flow measurement involves placing a bluff body (called a shedder bar) in the path of the fluid. As the fluid passes this bar, disturbances in the flow called vortices are created. The vortices trail behind the cylinder, alternatively from each side of the bluff body. This vortex trail is called the Von Karman vortex street after von Karman's 1912 mathematical description of the phenomenon.

The frequency at which these vortices alternate sides is essentially proportional to the flow rate of the fluid. Inside, atop, or downstream of the shedder bar is a sensor for measuring the frequency of the vortex shedding.

This sensor is often a piezoelectric crystal, which produces a small, but measurable, voltage pulse every time a vortex is created.

Since the frequency of such a voltage pulse is also proportional to the fluid velocity, a volumetric flow rate is calculated using the cross sectional area of the flow meter.



Fig 1.1: Measuring principle

The frequency is measured and the flow rate is calculated by the flow meter electronics using the equation  $f = SV / L$  where  $f$  is the frequency of the vortices,  $L$  the characteristic length of the bluff body,  $V$  is the velocity of the flow over the bluff body, and  $S$  is the Strouhal number, which is essentially a constant for a given body shape within its operating limits.

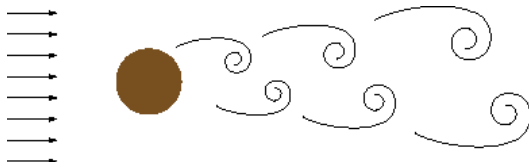


Fig 1.2: Vortex Shedding

The Karman street has two significant influences on the principle of operation of vortex flow meters:

1. The frequency of vortex shedding is definite and is related to the Reynolds number (flow velocity, viscosity of fluid, and the diameter of the cylinder).

2. The frequency of vortex shedding is the same as the vibrating frequency of the cylinder induced by the flow.

If the density and viscosity of the fluid are known and the diameter of the cylinder is given, the frequency measured at the cylinder can be used to represent the flow velocity.

Dimensional analysis shows that the frequency of vortex shedding  $f_v$  is governed by the Strouhal number of the vortex pattern

$$S = f_v D_c / V$$

Where  $D_c$  is the diameter of the cylinder or width of the barrier and  $V$  is the flow velocity.



Fig 1.3: Formation of Vortices

### Measuring System

The measuring system consists of a transmitter and a sensor.

**1) Compact version:** Transmitter and sensor form a mechanical unit.

**2) Remote version:** Sensor is mounted separate from the Transmitter. Analog output has the same accuracy as frequency output plus an additional 0.1% of span.

### FUNCTIONAL SPECIFICATIONS

#### Power Supply

12-24VDC (2-Wire)

12-24VDC (3-Wire)

Battery Operated 3.6V (Li Battery)

#### Output:

4-20mA, 2-Wire / 3-Wire

4-20mA, RS485

4-20mA, HART

#### Load Limitation:

**Max.** 600  $\Omega$

#### Ambient Temperature Limit:

-30 deg C ~ +70 deg C / -20 deg C ~ +60

deg C

#### Process Temperature Limits:

-50 deg C ~ +250 deg C,

-50 deg C ~ +450 deg C

#### Relative Humidity Limits:

5% ~ 90% Atmospheric Pressure

(86 ~ 106) KPa

#### Display:

0-Without display

4-Line Display with Push Button

4-Line Display for Remote Configuration

**CERTIFICATION:**

**CE mark:** The measuring system is in conformity with the statutory requirements of the EC Directives. We confirm successful testing of the device by affixing to it the CE Mark.

**C-tick mark:** The measuring system meets the EMC requirements of the Australian Communications Authority (ACA)

**Ex approval:**

Information about currently available Ex versions (ATEX, FM, CSA, etc.) can be supplied on request. All explosion protection data are given in separate documentation which is available upon request.

**ORDERING INFORMATION:**

**RLV**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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Code	Features
<b>1</b>	<b>Measurable Medium</b>
A	Gas, Liquid, Vapour
L	Liquid
G	Gas
S	Saturated or Superheated Steam
<b>2</b>	<b>Connection</b>
W	Wafer Type
F	Flange Type
<b>3</b>	<b>Measuring Material</b>
S	SS316L
A	Alloy
1	Special version to be specify
<b>4</b>	<b>Process Connection</b>
5	PN 25 Standard Flange Version

## RLT Instrumentation (Unit of RLT Group)

6	PN 16 Standard Flange Version
1	Special Version, to be specify
<b>5</b>	<b>Sensor</b>
B	SS A351, CF3M
A	Alloy C22
1	Special Version, to be specify
<b>6</b>	<b>Medium Temperature</b>
1	-40 deg C to 150 deg C
2	-40 deg C to 280 deg C
3	-40 deg C to 350 deg C
4	-40 deg C to 420 deg C
<b>7</b>	<b>Additional Option</b>
0	Basic Model
P	Pressure Compensation
T	Temperature Compensation
B	Temperature & Pressure Compensation
<b>8</b>	<b>Calibration</b>
3	3 point
5	5 point
1	Special version, to be specify
<b>9</b>	<b>Additional Test Certificate</b>
B	Basic Version
P	Pressure Test
M	Material Test
1	Special Version to be specify
<b>10</b>	<b>Approval</b>
N	Non-Hazardous Area
I	Intrinsically safe type ExiallCT4
F	Flame Proof Exd II CT6
E	Div 1.2, Ex ia Zone 4
A	ATEX III G+IECEX Z0 Ex ia IICZ=Zone

## RLT Instrumentation (Unit of RLT Group)

1	Special Version, to be specify
<b>11</b>	<b>Version</b>
C	Compact Version
R1	Remote Version with 10 Meter Cable
R2	Remote version with 20 Meter Cable
S	Submersible Type
<b>12</b>	<b>Cable Entry</b>
2	Gland M12
6	Gland M16
1	Special Version, to be specify
<b>13</b>	<b>Display</b>
0	Without Display
1	4 Line Display with push button
2	4 Line Display for Remote Configuration
<b>14</b>	<b>Power Supply</b>
A	12-24V DC(2-wire)
P	12-24V DC (3-wire)
R	Battery Operated 3.6V (Li Battery)
<b>15</b>	<b>Output &amp; Communication</b>
4	4-20mA, 2-wire/3-wire
R	4-20mA, RS485
H	4-20mA, HART

**RLT Instrumentation  
(Unit of RLT Group)**

*Head Office*



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