

Introduction

In any plant or system, the need to measure and control such functions as temperature and reflux is, more often than not, an essential process.

The items described on the following pages are designed to complement – from a measurement and control point of view – the extensive range of process plant and pipeline equipment available from QVF. Included in this section are resistance thermometers, thermometer pockets, flowmeters, electronic timers, acid strength control cells and electro magnets. Like the majority of other items in this catalogue, all wetted parts are constructed from either borosilicate glass or other corrosion resistant materials.

All glass components detailed on the following pages have standard flat buttress end connections. Further details of these are provided in Section 1 – *Technical Information*.

For standard flat buttress end connections from DN 15 to DN 150, it is possible to achieve a 3° deflection in the joint by using a flexible gasket. Details of these and all other couplings and gaskets can be found in Section 9 – *Couplings*.

Unless otherwise stated, all dimensions are given in mm.

For permissible operating conditions, **unless otherwise stated in the individual descriptions**, please see Section 1 – *Technical Information*.

The majority of glass components in this section can be either CORWRAPped or CORCOATed and these are identified by a bold blue line at the foot of each appropriate page. Full details of both CORWRAP and CORCOAT can be found in Section 1 – *Technical Information*. For CORWRAP items, add a suffix **C** to the standard catalogue reference. For CORCOAT items, add a suffix **L**. Therefore a TPG 1/100 becomes a TPG 1/100C or a TPG 1/100L respectively.

For details of supporting equipment, please see Section 10 – *Structures*.

Resistance Thermometers

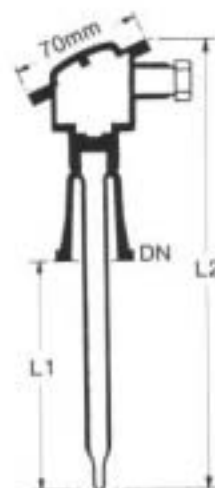
QVF resistance thermometers offer all the advantages of the heat and corrosion-resistant properties of borosilicate glass, together with extreme accuracy of temperature measurement by platinum resistance.

Resistance thermometers are used for remote indication, recording or control of temperature.

Indication is by means of suitable bridge instruments with the resistance thermometer forming one side of a balanced bridge circuit.

QVF resistance thermometers consist of a single resistance element in a borosilicate glass sheath. Thermometers with duplex element are available on request.

The resistance of the elements is 100 ohm at 0°C and the fundamental interval is 38.5 ohm. This complies with the resistance temperature relationship specified in British Standard Specification 1904: 1984 Class B for grade 2 thermometers.



DN	L1	L2	Catalogue reference
25	100	250	WT1/100
25	140	290	WT1/140
25	280	430	WT1/280
40	140	295	WT1.5/140
40	400	555	WT1.5/400
40	550	705	WT1.5/550

Typical applications:

WT1/100	Column fittings
WT1/140	Column fittings
WT1/280	20 litre spherical vessels
WT1.5/140	Column fittings
WT1.5/400	50 and 100 litre spherical vessels
WT1.5/550	200 litre spherical vessels and 30 litre reaction vessel

Resistances:

At 0°C = 100.0 ohm
At 100°C = 138.5 ohm
At 200°C = 175.84 ohm
At 300°C = 212.02 ohm

For CORWRAP items, add a suffix C to the standard catalogue reference. For CORCOAT items, add a suffix L.

Measurement & Control

Thermometer Pockets

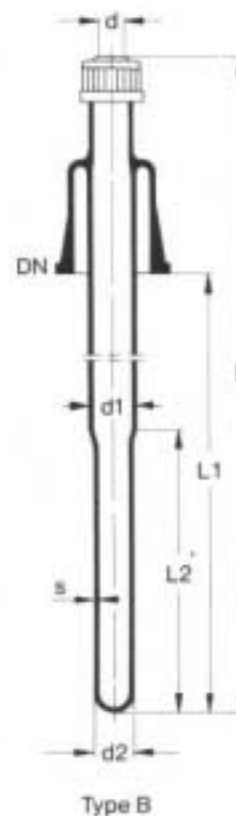
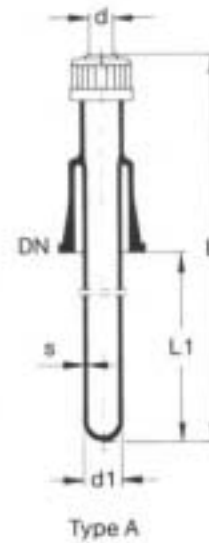
These thermometer pockets are designed for use with standard stem type thermometers, thermocouples or sensing probes. Improved temperature sensitivity can be achieved by filling the pocket with a suitable heat transfer fluid.

DN	d	d1 ¹	d2 ¹	L	L1	L2	s	Type	Catalogue reference
25	10	16	—	170	65	—	2	A	TPG 1/65
25	10	16	—	205	100	—	2	A	TPG 1/100
25	10	16	—	245	140	—	2	A	TPG 1/140
25	10	16	—	435	330	—	2	A	TPG 1/330
40	10	24	—	255	140	—	2	A	TPG 1.5/140
40	10	24	16	565	450	150	1.8	B	TPG 1.5/450
40	10	24	16	625	510	150	1.8	B	TPG 1.5/510
40	10	24	16	750	635	150	1.8	B	TPG 1.5/635
40	10	24	16	965	850	150	1.8	B	TPG 1.5/850
50	10	30	16	420	300	150	1.8	B	TPG 2/300

¹Internal diameters

Typical applications:

TPG 1/100	Columns and pipeline
TPG 1/140	Boilers and columns
TPG 1/330	20 litre spherical vessels
TPG 1.5/140	Pipeline and column adaptors
TPG 1.5/450	50 litre spherical vessels
TPG 1.5/510	100 litre spherical vessels and cylindrical vessel VZ5/6
TPG 1.5/635	200 litre spherical vessels and cylindrical vessels VZ10/6, VZ20/9, VZ30/12
TPG 1.5/850	Cylindrical vessels VZ50/12, VZ100/450, VZ150/450, VZ200/450, VZ400/600
TPG 2/300	Column adaptors CA450/6/2 and CA450/9/2



For CORWRAP items, add a suffix C to the standard catalogue reference. For CORCOAT items, add a suffix L.

Flowmeters

In these flowmeters, the float inside a glass measuring tube is maintained at a particular level, the level being determined by the volume of liquid flowing through. The upper edge of the float is the measuring line.

To ensure accurate measurement, flowmeters must be fitted in an absolutely vertical position when a measuring accuracy of $\pm 1.2\%$ of the full scale value in a range from 10 to 100% can be achieved.

The complete item consists of:

- 1 x Borosilicate glass measuring tube graduated in mm
- 1 x Steatite float (vitrified clay)
- 1 x PTFE top float trap
- 1 x PTFE bottom float trap
- 1 x Calibrated scale with two fixing clamps, one side calibrated to water (at 20°C) and the other side to air (under normal climatic conditions).

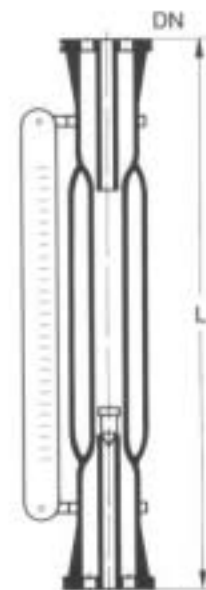
Other calibrated scales can be supplied if required for special liquids/gasses and operating conditions. If required, the following information should be specified:

- Liquid/gas
- Specific gravity
- Viscosity
- Operating temperature
- Maximum operating pressure
- Measuring range
- Nominal bore of pipeline
- Required graduation scale

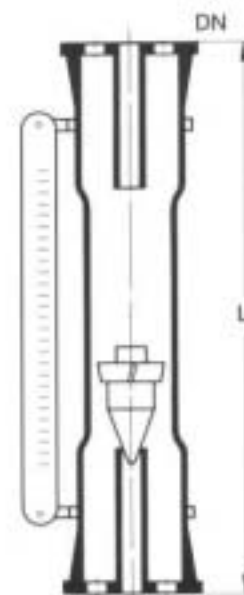
DN	L	Measuring range		Type	Catalogue reference
		Air (Nm ³ /h)	Water at 20°C (l/h)		
25	500	0.018 – 0.18	0.4 – 4	A	M 1/4
25	500	0.06 – 0.6	1.6 – 16	A	M 1/16
25	500	0.1 – 1	2.5 – 25	A	M 1/25
25	500	0.25 – 2.5	6.3 – 63	B	M 1/63
25	500	0.7 – 7	16 – 160	B	M 1/160
40	500	1.6 – 16	40 – 400	B	M 1.5/400
50	500	4 – 40	100 – 1000	B	M 2/1000
80	500	10 – 100	250 – 2500	B	M 3/2500
100	800	16 – 160	400 – 4000	B	M 4/4000

Please note:

The measuring range can be increased by using PTFE floats with a steel core to increase the range by a factor of 1.6 or with a hastelloy float to increase the range by a factor of 2.5.



Type A



Type B

Flowmeters with Integral Transducer

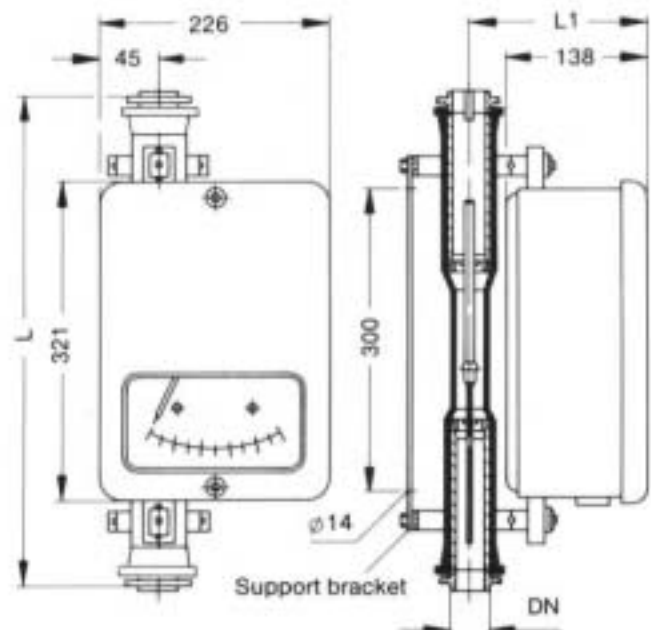
These flowmeters operate on the same principle as those shown on the previous page. In these units, however, the float is fitted with a magnet, the signal from which is converted via a transducer into a signal on a calibrated scale and a pneumatic output signal (range 0.2 to 1 bar.g) proportional to the flow rate. The units require an instrument air supply of 1.4 bar.g to operate.

All wetted parts are constructed from either borosilicate glass or PTFE. The nominal bores and relative flowrates are shown in the table below. When ordering, the media being handled together with its density must be specified in order that the units can be specifically calibrated.

These flowmeters comply with Class 1 to VDI/VDE 3513. The scale starting value in each case is 10% of the scale end value.

The following table shows the minimum and maximum flow rates for water and air.

DN	L	L1	Flow		Catalogue reference
			Air (Nm ³ /h)	Water (at 20°C) (l/h)	
25	500	165	0.4 - 14	15 - 500	MKP 1
40	500	175	15 - 75	600 - 3000	MKP 1.5
50	500	185	88 - 175	3500 - 7000	MKP 2
80	500	190	188 - 300	7500 - 12000	MKP 3



Acid Strength Control Cell

The acid strength control cell is commonly used as part of the control system on HCl absorbers where it acts as a measuring device to boil a sample of product which is continuously removed from the column.

Electrical supply: 240V, 50 Hz.

The acid strength control cell comprises:

- 1 x Glass body
- 1 x Immersion heater: 250W, 240V, single phase, 50Hz type QK1/2.5/240
- 1 x Backing flange type CF
- 1 x Insert type CN
- 1 x Gasket type TR
- Nuts and bolts as required

For use in hazardous areas, the acid strength control cell can be supplied with a steam-heated immersion heater to special order.

Method of use

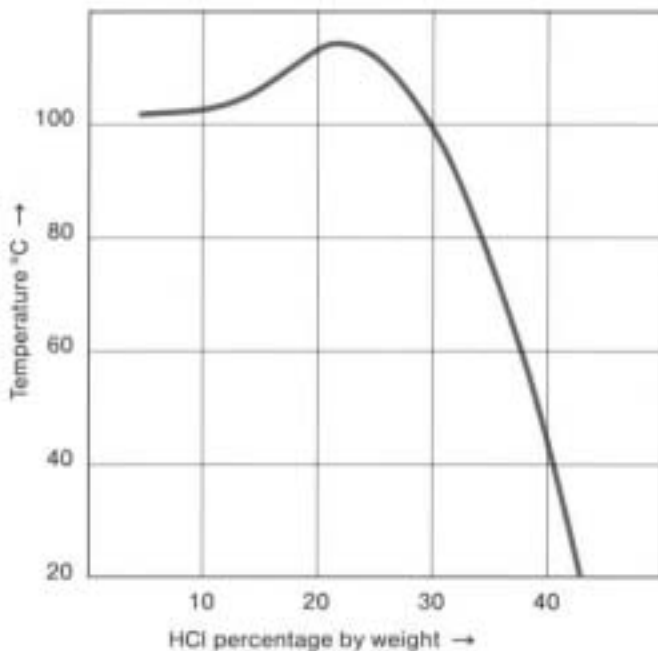
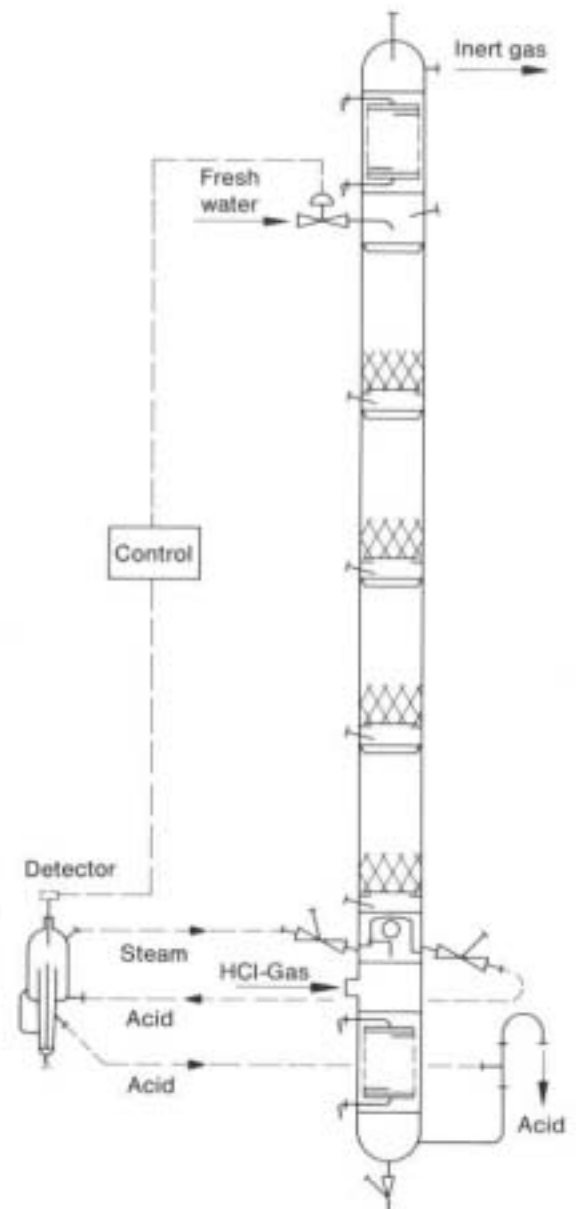
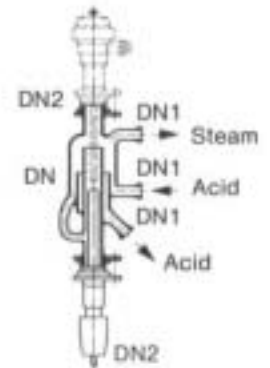
Within the 28 to 35% weight/weight concentration range, boiling point at constant pressure is a direct function of hydrochloric acid strength. The slope of the boiling point/concentration curve for 28 to 35% weight/weight hydrochloric acid solutions shows an average 4°C temperature variation for 1% change in concentration.

This property is, therefore, a very useful one on which to base a system of automatic control.

A sample of the make acid is continuously removed and its boiling point measured. The temperature reading actuates a recorder/controller which regulates the flow of make water to maintain a constant boiling point and hence a constant product strength.

For further information on the specification of control equipment, please contact our Technical Department.

DN	DN1	DN2	Catalogue reference
80	15	25	MZ 240



HCl boiling point/concentration curve

For CORWRAP items, add a suffix C to the standard catalogue reference.

Measurement & Control

Electro-Magnets

For use with RHM reflux separators, the RPA electro-magnet can be used in hazardous areas and is certified as (Ex)s G5 by PTB in Germany.

Operating voltage: 24V
Operating current: 0.5A

They are mounted off the main tubular support structure using the adjustable fitting supplied. They should be located just clear of the glass and lined up with the marks on the body of the reflux separator.



Catalogue
reference

RPA

Electronic Timers

These electronic timers are designed for use in conjunction with type RPA electro-magnets shown above and magnetically operated reflux separators detailed in Section 6 – *Column Components*.

The timer allows variations of reflux and take-off in the ratio 1/99/1.

Standard operating voltage 240V, 1 ph, 50Hz.



Catalogue
reference

QAT

A flameproof version of this timer is also available. This is housed in an explosion proof enclosure EEXd IIB T6 (III A Class) and allows variations of reflux and take-off in the ratio 1/100/1.

Catalogue
reference

QAF