Optiserve
Messtechnik

RectuTest® RT02 and VSM02
Overview - A

bar
-1 0 1 2 3 4 5 6 7 8 9 10

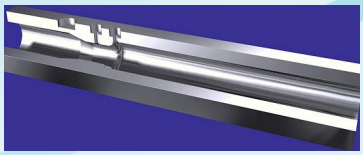
2/2023

RT02 with calibrated nozzle

Microprocessor-controlled volume flow meter **RT02** for gases and gas mixtures (selectable, nitrogen, argon oxygen, **compressed air**, for instance) with colour-coded polyamide double measuring hoses (2 times 2 m.) with quick connect couplings, temperature-sensor with 4 m. cable, pressure sensors laid out for max. overpressure of **10** bar (150 psi) (max. **16** bar (240 psi) without measuring). Works with external power supply (included, 90V-240V AC / 12V DC). Power consumption < 5W. Normal measurement rate: 1.5 measurements per second, in the so called emulation mode (a feature of the included software for Windows) the flow meter can reach **240** measurements per second.

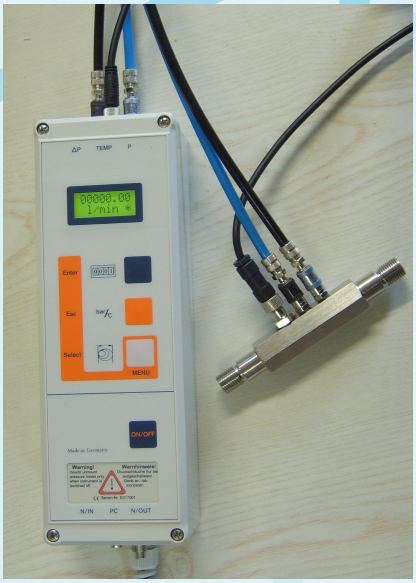
Safety features: the flow meter can be safely plugged in to fully pressurized measuring nozzles thanks to a built-in, electronically switched magnetic valve. Blinking display and automatic power-off on overload conditions.

The set includes one **measuring nozzle of your choice** which comes with a calibration certificate by an independent **DAkkS** accredited laboratory. Material: nickel plated brass, measuring precision **< 1 % of measured value** over the entire measuring range, dynamic range **1:25**. With the exception of very small nozzles (in the sub-mm-range), the nozzles **regain** about **two-thirds** of the pressure drop generated to measure the volume flow.



Therefore the effective pressure drop caused by the measuring nozzle varies from **0.0** to **0.1** bar (0.0 to 1.5 psi, max.).

The set includes an elaborate **software** for Windows 10 / 8 / 7 / Vista / XP (built-in there: the complete instruction manuals for both the software and the flow meter (English)) on CD-ROM, PC-link-cable (RS-232) 5 m plus a cable to adapt RS232 to **USB**.



Flow meter with 4-mm-nozzle (the set can be ordered with other nozzles as well)

Set Price: please ask

Equipment rental

Lending of a RT02 set with one measuring nozzle **1 mm, 2 mm, 4 mm, 1/2“, 1“** or **2“** of your choice for 14 days

Price: 320 €

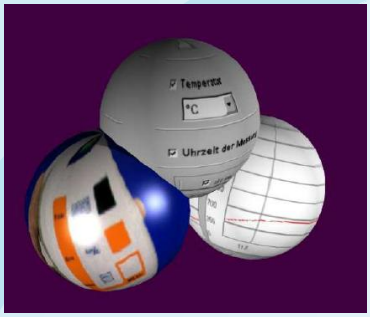
Extra week

Price: 120 €

The lended devices are used ones and usually have some scratches or other signs of past and intensive use. They are, as a matter of course, thoroughly tested and will deliver correct measuring results.

If a new RT02 set is **ordered** within 6 months after a used device was rented, the lending fees will be fully discounted from the invoice. In other words, the customer effectively did not pay **any** lending fees at all.

In cases of longer delivery times, we deliver a used device first, in order to bridge the delivery time. This service does not count as “lending” and is of course free of any charges.



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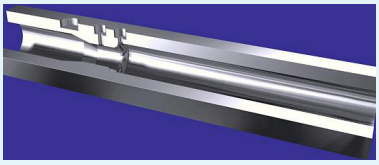
Measuring nozzles

Measuring nozzles can start with as little as **0.02** Nl/min and end with more than **40000** Nl/min. They are calibrated (together with the RT02 unit) in a **DAkkS**-accredited laboratory. A test engineer surveys the calibration process, advises control measurements and finally signs a test- and calibration certificate, which is of course independent from us.

This procedure ensures the most reliable quality certificates available and makes it easy to pass external or internal quality audits, as they become more and more mandatory in today's industry.



Example: cross sectional view of a 1/2" nozzle

The nozzle is equipped with colour coded quick connect couplings. To connect or disconnect a nozzle with the computational unit (RT02) is therefore only a matter of seconds.

The nozzle is meant to remain mounted in the pipeline and to serve as a permanently available **measuring access point.**

However, if you don't think of "the pipeline" as something that is fixed and stationary, then you can take the RT02 and the nozzle in a quite **mobile manner** to all sorts of pneumatic machines or tools you want to examine.

The CD-ROM that contains the calibration data of the measuring nozzle. The data are protected, by means of a software security key, against voluntary or involuntary changes. Yet they remain readable for humans (perfect transparency).

Test protocol (example)

Messergebnisse

Absolutdruck PAp, Temperatur Tp und Feuchte Hp wurden am Eingang des Prüflings gemessen.

Qs	Qp	PAp	Tp	Hp	ABW	MU
l/min	l/min	mbar	°C	%	l/min %vM	l/min
0,000	0,000	953,4	22,86	3,1		
10,011	9,990	956,3	22,86	3,1	-0,021 -0,21	0,038
20,065	20,040	962,1	22,86	3,1	-0,025 -0,12	0,076
30,043	30,020	970,2	22,86	3,1	-0,023 -0,08	0,11
40,016	39,970	980,7	22,86	3,1	-0,046 -0,11	0,15
49,992	49,950	993,5	22,81	3,2	-0,042 -0,08	0,19
75,227	75,130	1037,7	22,70	3,3	-0,097 -0,13	0,29
95,064	94,900	1084,9	22,62	3,5	-0,164 -0,17	0,36
120,106	119,910	1162,9	22,50	3,7	-0,196 -0,16	0,46
140,091	139,920	1239,8	22,41	3,9	-0,171 -0,12	0,53

Verwendete Bezeichner und Referenznormale

Qs	Normvolumenstrom des Normals für die folgenden Normbedingungen: Absolutdruck: 1013,25 mbar, Temperatur: 20,00 °C, Feuchte: 0,0 % rF G Air, LFE 50MJ10-09-MS, SerNo: 100000-W1
Qp	Normvolumenstrom des Prüflings
PAp	Absolutdruck
Tp	Temperatur, max. erweiterte MU: 0,2 °C
Hp	Relative Feuchte
ABW	Abweichung Qp - Qs absolut und in Prozent vom Messwert
MU	Erweiterte Messunsicherheit

Die Volumenstromangabe Qp des Prüflings entspricht dem arithmetischen Mittelwert des Anzeigewertes über 60 Sekunden.

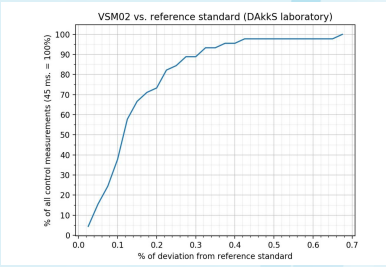
Messunsicherheit

Angegeben ist die erweiterte Messunsicherheit, die sich aus der Standardmessunsicherheit durch Multiplikation mit dem Erweiterungsfaktor k = 2 ergibt und die Messunsicherheit des Normals und des Kalibrierverfahrens beinhaltet. Der Wert der Messgröße liegt mit einer Wahrscheinlichkeit von 95 % im zugeordneten Werteintervall.

The RT02 can store calibration data of up to 5 measuring nozzles at the same time. In setup mode the actually used nozzle can be easily selected.

*Of course one can use an **arbitrary** number of nozzles in total. All that is needed is a short "refueling stop" at a computer running the software.*

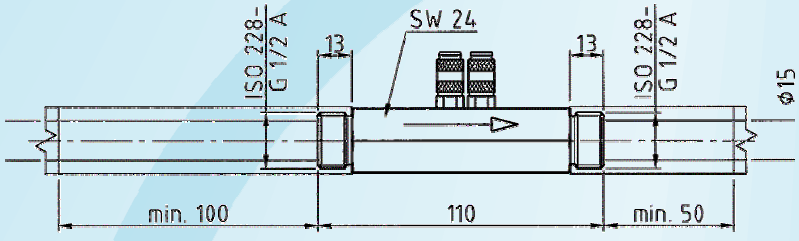
Measuring precision < 1 % of MV.



The diagram above shows 45 flow measurements taken with the RT02 in comparison to 45 measurements made by the DAkkS accredited laboratory (a handful of different nozzles were used).

The **highest** deviation that occured (in one point) reached **0.66 %** of the reference value.

95 % of our measurements had an error of less than 0.37 % of the reference value, for 70 % of our results the error was less than 0.165 % and about **40 %** of our values even reached an error margin of less than **0.1 %** (< one thousandth) compared to the laboratory measurements.



Price: please ask

Nozzle sets

Using some nozzles of different sizes in, maybe, an array-like frame (please see the image below as an example) is a logical and very simple solution to meet the demand for extended measuring ranges.

In principle this works just like the range switch in a common household multimeter (microampere, milliampere, ampere: you already know this).

In the image above, the pressurized air enters the frame through the white plastic hose in the corner down right. The air is led through just one open valve to the appropriate nozzle (then the flow is measured) and it leaves the frame again through the white plastic hose in the upper right corner.

In this example there are only three nozzles used: 1-mm, 2-mm and 4-mm. Yet this allows (let's say at 6 bar) measurements from **1.0** Nl/min to **485.0** Nl/min.

With the following combination of 5 nozzles (namely 0.2 mm, 1 mm, 4 mm, 1/2" and 2") the possible maximum range (at 6 bar) would be like this: ***0.04*** *Nl/min to* ***35000*** *Nl/min.*

This results in a continous measuring range of, believe it or not, not less than ***1 : 875000****.*

The diagram to the right can help you to find suitable combinations of nozzles, if needed.

Price: please ask