





SITRANS F flowmeters

SITRANS F R

Rotary-piston meters Introduction

Selection overview, rotary piston meters

					
Version	Rotary piston meters				Acid meters
Nominal diameter	DN 15	DN 25	DN 50	DN 80	DN 25
Order No.	7MR10...-...	7MR11...-...	7MR14...-...	7MR16...-...	7MR111-...
Nominal pressure					
PN 6			•	•	
PN 10		•			•
PN 16		•	•		
PN 25	•	•	•	•	
PN 40	•	•	•	•	
PN 63		•	•	•	
Flow variables					
Max. 20 l/min	•				
Max. 100 l/min		•			•
Max. 500 l/min			•		
Max. 1 000 l/min				•	
Flange standards					
Drilled acc. to EN	•	•	•	•	•
Drilled acc. to ASME	•	•	•	•	•
With raised faces	•	•	•	•	•
Approvals					
Custody transfer		•	•	•	
Material acceptance test EN 10204-3.1	•	•	•	•	
ATEX	in preparation				
Piston material					
Carbon	•	•	•	•	•
Cast iron	•	•	•	•	
Ni-resist		•	•	•	
Hard rubber	•	•	•	•	
PTFE 40 °C		•	•	•	
PTFE 90 °C		•	•	•	
CrNiMo steel with carbon contact surface		•			
CrNiMo steel with PTFE contact surface		•			
PCTFE	•	•	•		•
Designs					
Mechanical single-pointer dial	•	•	•	•	•
Mechanical double-pointer dial	•	•	•	•	•
As automatic batchmeter (incl. shut-off valve)		•	•		
With electronic flow register	•	•	•	•	•
Remote or compact installation	•	•	•	•	•

Benefits

- High measuring accuracy (approved for custody transfer)
- Suitable for flow rates up to 1000 l/min (264 USgpm)
- Wide flow rate range
- Low dependence on viscosity
- Low pressure drop
- Simple compact design
- High reliability
- Advantages with extremely high viscosity since pressure drops up to 3 bar (43.5 psi) permissible
- Advantages with very low viscosity (e.g. liquefied gas) since only low pressure drops occur because of the light-weight mechanism with good running characteristics
- Wide range of available materials, e.g. plastic lining for particularly corrosive liquids
- Easy service as a result of simple design
- Liquid temperatures up to 300 °C
- Also available with external heater
- Metering and dispensing without a power supply
- No inlet or outlet pipe sections required
- Independent of flow profile, conductivity and damping

Rotary-piston meters are characterized by:

- Accuracy
- Reliability
- Robust design

Application

For use in closed liquid circuits at pressures up to PN 63 (MWP914 psi) and liquid temperatures up to 300 °C (572 °F).

- For all liquids ranging from lubricating oils up to corrosive acids, viscosity ≤ 0.2 mPa s (cp) and for pasty, viscous liquids (e.g. colors for offset printing with 350 000 mPa s (cp))
- For measurements requiring an accuracy associated with custody transfer.

A prerequisite for exact measurements is that the liquid is homogeneous without coarse solid impurities or gas inclusions.

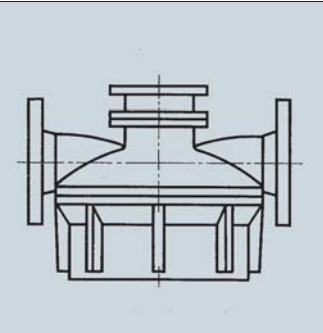
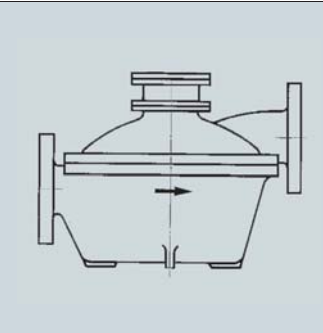
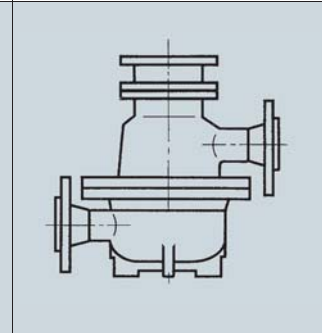
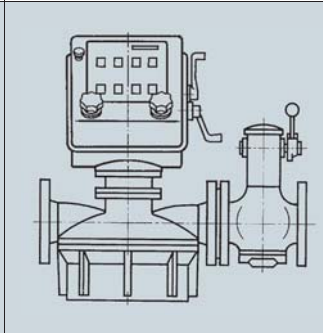
Rotary-piston meters are mainly used in the petroleum industry, the raw material industries, the chemical industry, the foodstuffs and beverage industries and in power stations and district heating stations:

In the basic version (meter mechanism and register) for metering in the production, distribution and consumption of liquids.

- With quantity preset register and mechanical shut-off valve as an automatic batchmeter without a power supply
- With accessories (pulser etc.) for flow rate measurement, remote metering and digital data processing

They complement one another with respect to the flow rate ranges but have particular advantages for specific applications.

Rotary-piston meters are approved for custody transfer in the European Union and in many other countries.

Rotary-piston meter								Automatic batchmeter							
Industrial design DN 25 (1") ... DN 80 (3") PN 4, 6, 10, 16				Industrial design DN 15 (½") ... DN 80 (3") PN 25, 40, 63				Acid-resistant model DN 25 (1"), PN 10				Rotary-piston meter with mechanical shut-off valve and quantity preset register DN 25 (1"), PN 10 DN 25 (2"), PN 6			
															
For industrial liquids such as: Alcohols, bitumen, dispersions, paints, greases, liquid gases, adhesives, lacquers, alkalis, solvents, mineral oils, acids etc.				For industrial liquids such as: Alcohols, bitumen, dispersions, paints, greases, liquid gases, adhesives, lacquers, alkalis, solvents, mineral oils, acids etc.				For particularly corrosive liquids such as: Phosphoric acid, hydrochloric acid, dilute sulfuric acid, etc.				For industrial liquids such as: Alcohols, bitumen, dispersions, paints, greases, liquid gases, adhesives, lacquers, alkalis, solvents, mineral oils, acids etc.			
Rated flow	Rated size DN	Order No.	Page	Rated flow	Rated size DN	Order No.	Page	Rated flow	Rated size DN	Order No.	Page	Rated flow	Rated size DN	Order No.	Page
l/min (USgpm)	mm (inch)			l/min (USgpm)	mm (inch)			l/min (USgpm)	mm (inch)			l/min (USgpm)	mm (inch)		
20 (5.3)	15 (½")	7MR1020 7MR1030	4/358	500 (132)	50 (2")	7MR1410 7MR1420 7MR1430 7MR1440	4/362	100 (26)	25 (1)	7MR1111	4/366	100 (26)	25 (1)	7MR1112 7MR1113	4/367
100 (26.4)	25 (1")	7MR1110 7MR1120 7MR1130 7MR1140	4/360	1000 (264)	80 (3")	7MR1610 7MR1620 7MR1630 7MR1640	4/364					500 (132)	50 (2)	7MR1412 7MR1413	4/368

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Rotary-piston meters - Introduction Function and Design

Function

Measuring principle

When metering flowing liquids, either the volume V is recorded over a given time t or the momentary flow rate q is determined.

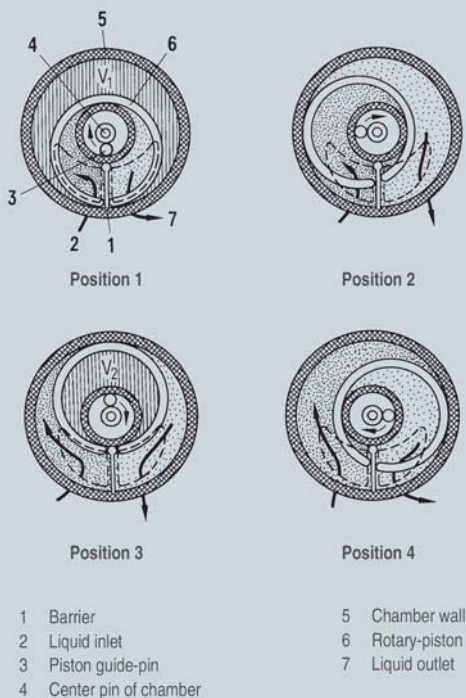
The relationship between these variables is $V = q \cdot t$.

In accordance with these two measuring principles, a differentiation is made between:

- direct volumetric meters, also referred to as positive displacement meters. These include rotary-piston meters.
- indirect volumetric meters such as velocity meters, where the flow velocity v represents a direct measure of the flow rate q at a given cross-section F according to the relationship $q = v \cdot A$. Examples include electromagnetic flowmeters and flowmeters operating according to the differential pressure principle.

Rotary-piston meters are direct volumetric meters: They operate according to the positive displacement principle. Their operation is based on the continuous limitation of defined portions of the volumetric flow in the mechanism by continuous filling and emptying of the measurement space. This consists of the walls of the measuring chamber and the moving part, i.e. the rotary-piston.

The rotary-piston is driven by the pressure difference in the metered liquid between the inlet and outlet. The meters are basically purely mechanical devices operating without a power supply.



Measuring process in the rotary-piston

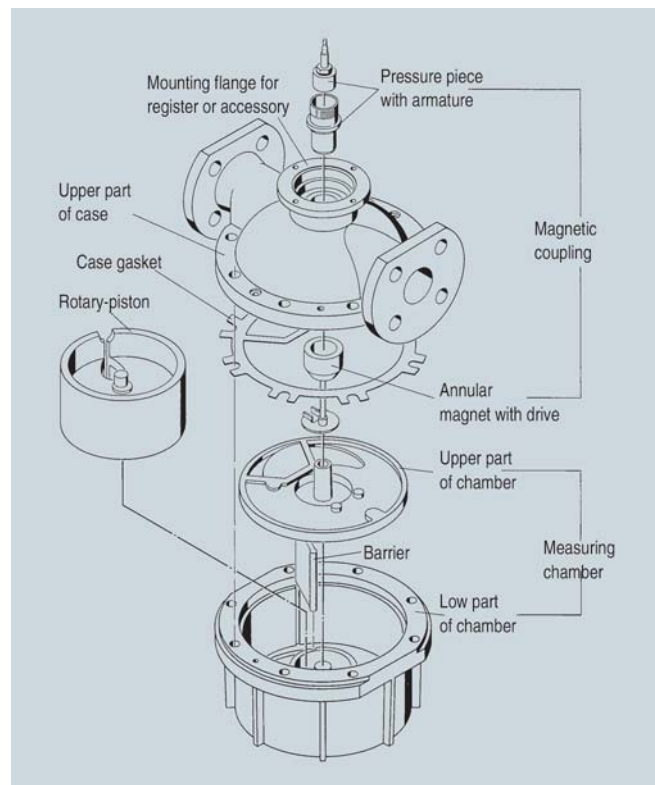
The rotary-piston (6) which has a double T-shaped cross section is guided by its gudgeon or guide pin (3) in an annular space in the base of the measuring chamber and also by its slot on the barrier (1).

The inlet port (2) and outlet port (7) are located on either side of the barrier. They are continuously sealed by the rotary-piston and the barrier.

The incoming liquid fills the sickle-shaped spaces, attempts to enlarge them and thus turns the piston until the volumes V_1 and V_2 are reached in succession. With the further movement of the piston, this filled space is connected to the outlet and emptied. Since the two sickle-shaped spaces – the inner and outer – are displaced with respect to one another, no deadpoint occurs during the movement of the piston. The piston moves continuously according to the flow of the metered liquid.

The rotary movement of the piston guide-pin is picked up by a drive member and transmitted via a gland-free (industrial design only) permanent magnetic coupling to the register. One revolution of the piston pin corresponds to the passage of the capacity of the measuring chamber ($V_1 + V_2$) through the meter. A gear unit converts the revolutions into a decimal value of e.g. 10 l, 100 l, 1 m³ or gallons.

Design










Metering mechanism of a rotary-piston meter DN 25/PN 10 (1"/MWP 145 psi) (industrial model)

The measuring chamber is inserted into the case for the rated pressure classes PN 25, PN 40 and PN 63 (MWP 363, 580 and 914 psi). The meters for rated pressures PN 4, PN 6 and PN 10 (MWP 58, 87 and 145 psi) have a measuring chamber machined to the lower part of the case.

All components of the meters are made of wear-resistant materials. Several materials are available for the parts which come into contact with the metered liquid (see Selection and Ordering data). The most suitable combination can be selected taking into account the corrosion resistance with respect to the liquid to be measured as well as the running characteristics and the permissible temperatures; the summary on aids selection.

Rotary piston meters - Configurations

		Mechanical display			Digital displays	
		Compact design			As separate model	Compact design
		Without pulse and current output	With pulse and current output		With pulse and current output Incl. protective cover	With pulse and current output Incl. mounting bracket
Registers						
Single-pointer dial type 01		•	•	•		
Double-pointer dial type 11 und 12		•	•	•		
Quantity preset register		•	•	•		
SITRANS F RA110 electric flow registers (7MV1070-....)					•	
• Without mounting bracket						•
• With mounting bracket						
Protective cover						
					•	
Pulser						
10 pulses/revolution 100 pulses/revolution					•	•
10 pulses/value per revolution 100 pulses/value per revolution			•			
Intermediate gear						
		•	•	•		
Pulser						
10 Impulse/measuring chamber volumes 100 Impulse/measuring chamber volumes				•		
Cooling attachment						
Up to 80 °C: none Up to 180 °C: one Up to 260 °C: two		•	•	•	•	•
Rotary piston meters and automatic batchmeters						
Rotary piston meters DN 15 7MR10... DN 25 7MR11... DN 25 7MR111... DN 50 7MR14... DN 80 7MR16...		•	•	•	•	•
Automatic batchmeters DN 25 7MR111... DN 50 7MR141...		Measuring chamber volumes: DN 15 (1/2") 0,033 l (0.0087 USgpm) DN 25 (1") 0,179 l (0.0473 USgpm) DN 50 (2") 1,5 l (0.317 USgpm) DN 80 (3") 4,32 l (1.14 USgpm)				

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Rotary-piston meters - Introduction Configuration

Configuration

Planning a liquid metering system

When planning a liquid metering system, it is first necessary to clarify the operational and measuring requirements:

- Purpose of the system, e.g. plant supervision, closed-loop or open-loop process control or metering for accounting
- purposes
- Designation, composition and viscosity of the metered liquid; flow rate, operating pressure and temperature
- Minimum and maximum quantities to be measured
- Distances between storage tank, metering point and quantity limitation point.

Intended use of the system

This determines the operating mode, which can be continuous or intermittent.

- Continuous operation
The consumption of the measured liquid depends on the plant demand. An example is the metering of the oil flow to a firing plant. The decisive factor is that a specific heating power is produced. The measured values are used for plant supervision or as a slave variable in a closed-loop control system.
- Intermittent operation
Up to 4 h daily or 1 500 h/year, the quantity to be measured is often fixed in advance; with metering for accounting purposes, for example, according to the capacity of the transport tank; in process engineering for example in the apportioning of solvents for paint manufacture according to a recipe. The measurement thus determines the sequence of the process.

The type of volumetric meter to be used and the design of the measuring system also depends on the intended use.

- The type and size of the volumetric meter must also be clarified before planning begins. Their fundamental relationships with the system design will be dealt with in more detail below.

Although the numerical ranges must be greater in systems for continuous measurements, the registers for this mode of operation can be simpler.

The system design also becomes much simpler for continuous operation. For example, there is no need to consider the problems of quantity limitation as in the case of intermittent operation. In the latter type of systems, the reliable separation of the liquid remaining in the metering system from the metered quantity - the quantity limitation - is one of the most important conditions for the accuracy of the system.

The distances between storage tanks, metering point and quantity limitation point

The distances are mostly determined by fixed local conditions. In this case it is often necessary to find a means of reaching a practical compromise between system engineering and operational necessities.

Design of a liquid metering system

A liquid metering system can consist of:

- Filters
- Gas separators
- Volumetric meter

Like the filter and gas separator, the meter should also be installed in the pipe such that it always remains filled with liquid. Errors in measurement and corrosion due to the ingress of air are avoided in this manner.

- Rotary-piston meters
These volumetric meters consist of a metering mechanism and a register combined into one unit. The register is selected according to the forms in which the measured values are to be presented. Any accessories used depend on the intended use of the metering system.

- Metering mechanism
When determining the rated size of the meter, the flow rate required for the operation of the system, the viscosity of the metered liquid and the permissible pressure loss in the meter are decisive factors. These three values depend on one another. They must be taken into account jointly when selecting the rated size of the meter and adapted to one another if necessary.
It is not necessary to consider the rated size of the installed pipe during this determination.
The decisive factors for the choice of materials are the nature and temperature of the liquid.
- Registers
Pointer dials, quantity preset registers and flow registers are available as registers. For descriptions and technical data, see "Registers and quantity preset registers" page 4/387.
- Accessories
The normal range of the rotary-piston meters can be extended using accessories. Example of accessories available:
 - Electrical transmitters for remote metering,
 - Electrical and electronic instruments for flow measurements
 - Thermal insulation attachments.

All the meters, displays and accessories are designed on a modular basis, and therefore all have the same connecting flanges.

Shut-off device

The flow of liquid is interrupted using this device - valve, gate, tap, etc. - when the intended quantity has been delivered.

In order to prevent harmful pressure surges (water hammer) and large overshoot quantities, the flow should be throttled continuously or in several stages before the final shut-off. Our quantity preset register with mechanical shut-off valve operates with four shut-off stages (cf. page 4/387).

The SITRANS F RA110 current or pulse output can also be used to control electric shut-off valves.

Quantity limitation

When the metered liquid has flowed through the metering system, it passes either into the process plant or into a vessel for further transport. The transition point from the metering system is significant from a measuring viewpoint and is referred to as the quantity limitation. If exact measurements are to be achieved, the metering system - from the gas separator to the quantity limitation - must always be filled with measurement material. A differentiation is made between two modes of operation depending on the location of the quantity preset limitation:

- empty-hose installations or systems and
- filled-hose installations or systems.

Minimum delivery quantity and value per revolution

When planning systems for batch operations it is important to take account of the "minimum delivery quantity" which can be measured and indicated with insufficient accuracy by the selected register. The regulations for metering systems for custody transfer can serve as a guideline:

The minimum delivery quantity is the smallest quantity which can be measured in one operation with permissible error limit.

It is also dependent on the value per revolution of the fastest element of the register. The value per revolution corresponds to that quantity which is indicated by a full revolution of this element (pointer or drum).

The minimum delivery quantities generally have the following relationships to the values per revolution:

- for pointer dial type 01: 1 x value per revolution.
- for all other pointer dials: 0.5 x value per revolution
- for all drum-type counters: 1 x value per revolution.

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Rotary-piston meters - Introduction Configuration

Certain values per revolution or certain values of the minimum delivery quantity are assigned to each rated size of the individual meter types. These values have been selected such that they almost always represent the best solutions to the metering problems. Should it be found during the planning of a system that the minimum delivery quantity attainable with the value per revolution stated in the catalogue does not correspond to the operational requirements, please contact us.

Viscosity, density

Viscosity in the CGS and SI systems

Viscosity is a measure of the internal friction of a liquid. A differentiation is made between dynamic and kinematic viscosity. Dynamic viscosity is the decisive factor for the use of volumetric meters. Common viscometers generally determine the kinematic viscosity. The dynamic viscosity can be calculated from it as follows:

$$\text{Dynamic viscosity} = \text{kinematic viscosity} \times \text{density}$$

$$1 \text{ mPa}\cdot\text{s} = 1 \text{ mm}^2/\text{s} \times 1 \text{ g}/\text{cm}^3$$

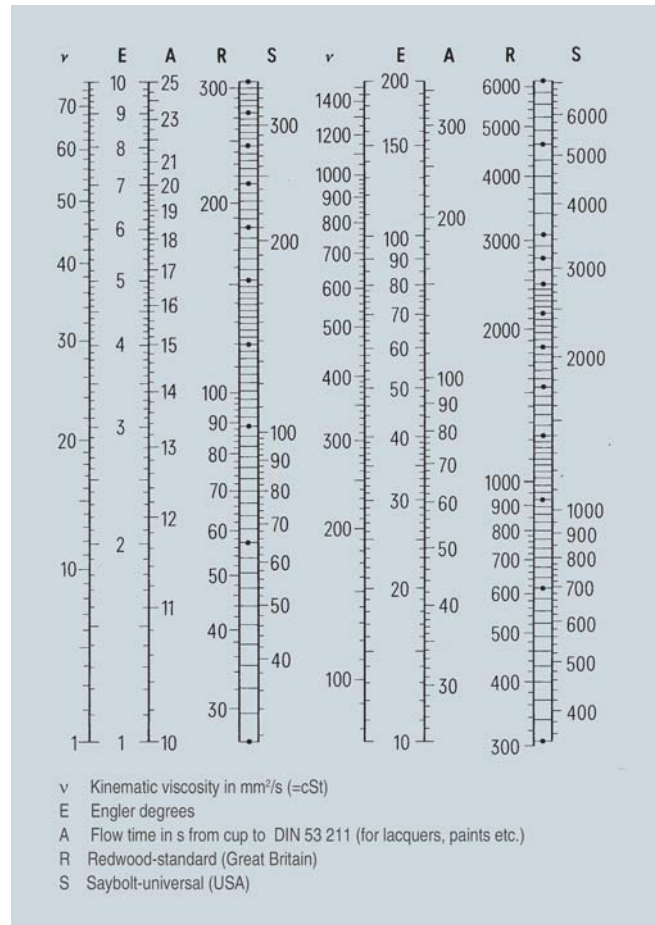
Conventional viscosity units

In practice, calculations were frequently carried out with common engineering units based on the flow times of liquids from standard orifices. The most common units of this kind were

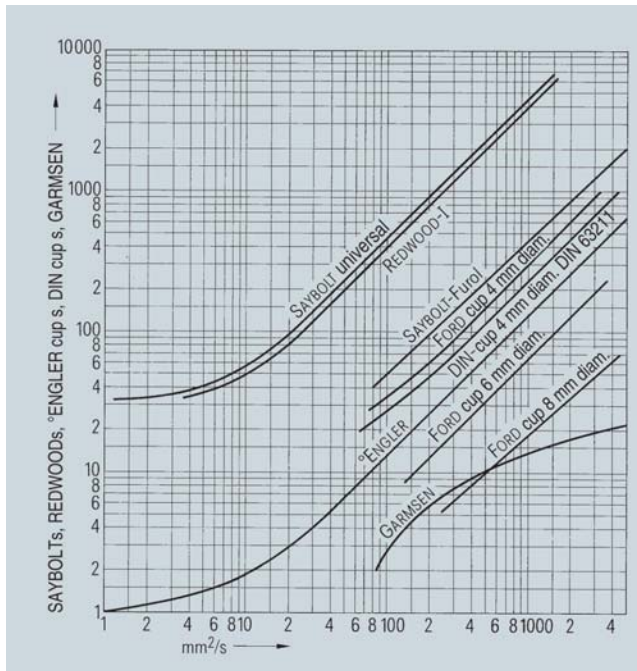
- in Germany Engler-Grade °E
- in Great Britain Redwood-seconds R
- in the USA Saybolt-seconds S

In figure Fig. "Conversion ... into common engineering units" shows these common units in comparison with mm²/s values of the kinematic viscosity of the CGS system.

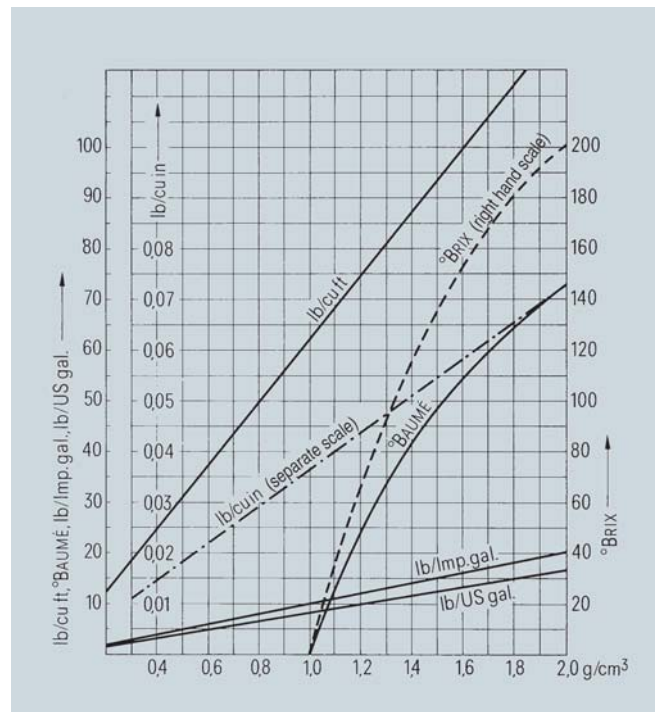
Note: The temperature to which the value refers must be specified with each viscosity value.



Conversion of the kinematic viscosity into common engineering units, water at 17 °C (68.2 °F) has a dynamic viscosity $\eta = 1.09 \text{ mPa} \cdot \text{s}$ (cp)



Conversion of the kinematic viscosity-unit mm²/s into other units



Conversion of the density unit g/cm³ into other units

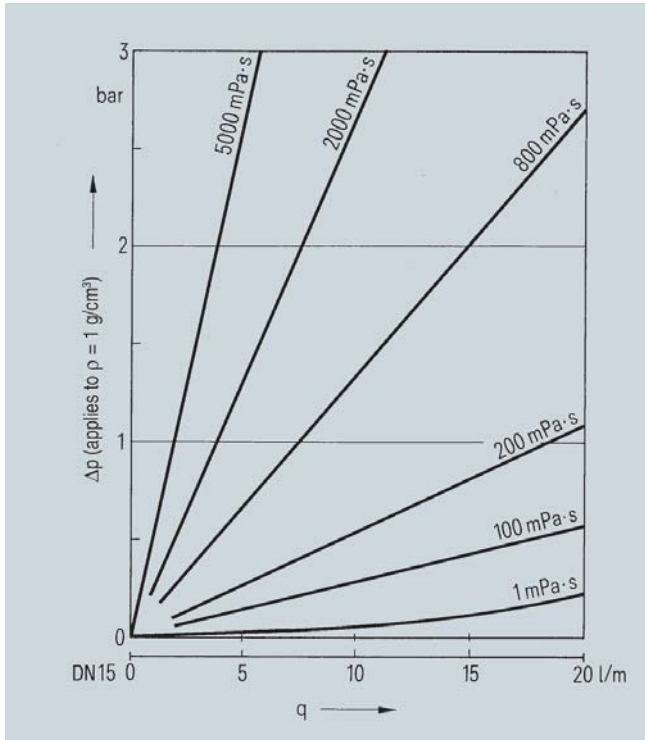
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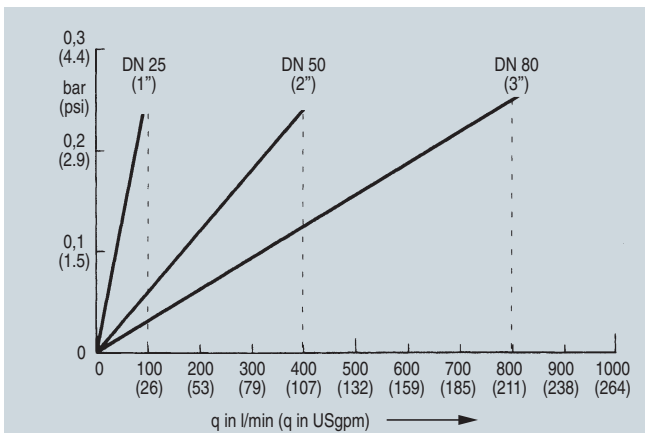
Rotary-piston meters - Introduction
Configuration - Recommended materials

Pressure loss

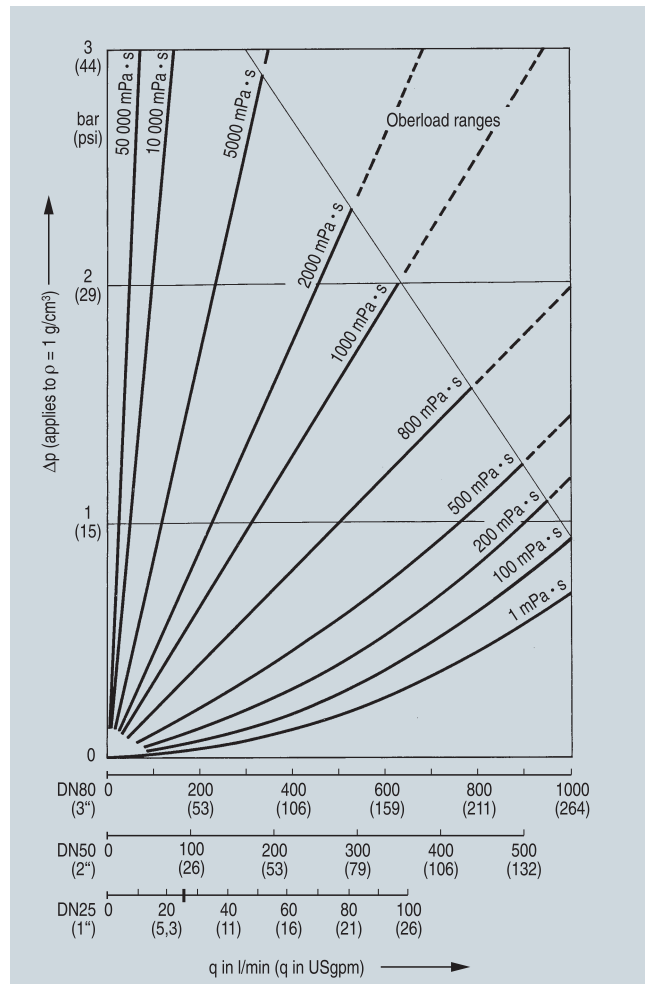
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Pressure loss depending on the flow and viscosity of the measured liquid in a rotary-piston meter DN 15 (1/2")



Pressure loss Δp for liquid gas with 0.25 mPa·s (cp), approx. 16 °C (60.8 °F) and PN 16 (MWP 232 psi) (values for liquid gas authorized by the German calibration authorities: 100, 400 and 800 l/min (26.4, 106 and 211 USgpm))



Operating ranges for rotary-piston meters DN 25 (1"), 50 (2") and 80 (3"); pressure loss depending on the flow and viscosity of the measured liquid.

Notes

The following limitation applies to the automatic batchmeter because of the higher flow resistance through the associated shut-off valve:

- with the same q , Δp is increased by approx. 30 %;
- with the same Δp , q is reduced by approx. 20 %.

1 mPa·s = 1 cp

Recommended materials for rotary-piston meters and automatic batchmeters

Several materials are available for the rotary-piston meters from page 4/358 of this catalog for the parts which come into contact with metered liquid. These materials must be combined with due regard to the corrosion resistance against the metered liquid.

The following summary shows combinations of materials for a number of liquids.

In order to keep the summary as simple as possible, only the minimum version is listed in each case. However, higher quality materials can also be used for metered liquids. If this is required by the customer, e.g. for multipurpose use of the meter, please inquire in case of doubt.

The data is based for the greatest part on our many years of experience. Because of the complexity of the corrosion problem, however, the data should only be considered as recommendations. It does not constitute a guarantee.

Restrictions of the application range for the recommended materials imposed by the casing gasket

Rotary-piston meter					Casing gasket		Permissible temperature range	
Order No.	Nominal size (DIN)	Rated pressure (DIN)	Nominal size (ASME)	ASME B16.5 ¹⁾	Type	Material	°C	°F
7MR1020	DN 15	PN 25	(1/2")	(300 ... 600)	Flat gasket	AFM 34 ²⁾	-10 ... +250, up to 300 for short time	(14 ... 482, up to 572 for short time)
7MR1030		PN 40						
7MR1110	DN 25	PN 10/PN 16	(1")	(150)				
7MR1120		PN 25		(300 ... 600)				
7MR1140		PN 63		(900 ... 1 500)				
7MR1410	DN 50	PN 6/PN 10	(2")	(150)				
7MR1420		PN 25		(300 ... 600)				
7MR1440		PN 63		(900 ... 1 500)				
7MR1610	DN 80	PN 4/PN 6	(3")	(150)				
7MR1620		PN 25		(300 ... 600)				
7MR1640		PN 63		(900 ... 1 500)				
7MR1130	DN 25	PN 40	(1")	(300 ... 600)	O-Ring	FPM ³⁾	-10 ... +260	(14 ... 500)
7MR1130					O-Ring	FEP-FPM ⁴⁾	-10 ... +200	(14 ... 392)
7MR1430	DN 50	PN 40	(2")	(300 ... 600)	O-Ring	FPM ³⁾	-10 ... +260	(14 ... 500)
7MR1430					O-Ring	FEP-FPM ⁴⁾	-10 ... +200	(14 ... 392)
7MR1630	DN 80	PN 40	(3")	(300 ... 600)	O-Ring	FPM ³⁾	-10 ... +260	(14 ... 500)
7MR1630					O-Ring	FEP-FPM ⁴⁾	-10 ... +200	(14 ... 392)

¹⁾ The flanges are drilled according to ANSI B16.5. The pressure data according to DIN are maximum permissible pressures up to approx. 100 °C (212 °F). The maximum permissible pressure is reduced at higher temperatures. When ordering, the data of the ANSI pressure classification must be specified in plain text.

²⁾ AFM 34: Aramide fibers with inorganic fillers and synthetic elastomers

³⁾ FPM: Fluorine rubber (Viton)

⁴⁾ FEP-FPM: Fluorine rubber (FEP-Viton), with tetrafluoroethylene-hexafluoropropylene imposed by the casing gasket

Directions for use of the following summary.

The recommended material combinations are marked with "•". If several materials are listed for one metered liquid, these are alternatives for the casing and the measuring chambers since possible limitations apply to the minimum version (see footnotes).

In case of several recommendations for rotary-pistons, the running characteristics and the permissible temperatures have been taken into account. No preference is expressed, the choice should be made according to the customers wishes.

The data in the summary generally applies to a liquid temperature of 20 °C (68 °F) with the exception of substances which can only be metered, when heated, e.g. bitumen or cocoa paste.

The suffix "solution" always denotes an aqueous solution.

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Rotary-piston meters - Introduction

Configuration - Recommended materials

Medium to be measured	Materials										
	Casing and measuring chamber			Rotary-piston						Casing gasket	
	Cast iron or cast steel	CrNiMo-steel	With enamel lining	Cat iron	Ni-Resist	Carbon (synth.)	Hard rubber to 40 °C (104 °F)	PCTFE to 40 °C (104 °F)	PTFE/Graphite to 90 °C (194 °F)	PN 4/6/10/25/63 AFM 34	PN 40 FPM FEP-FPM
Acetaldehyde		•			•				•	•	•
Acetone	• 1)	•			•					•	•
Acrylnitrile	•				•	•					•
Aluminium sulphate solution					•	•			•	•	
Formic acid					•				•		
Ammonia solution											
• Discoloration possible	•				•	•			•		•
• No discoloration		•			•	•			•		
Ammonium chloride solution		•			•				•		•
Amyl acetate		•			•				•		•
Amyl alcohol		•			•	•			•		
Aniline	• 1)	•			•				•		
Barium chloride solution		•			•	•			•		
Benzaldehyde	• 1)	•			•				•		•
Benzene	• 1)	•			•	•			•		
Benzol	• 1)	•			•				•		
Bitumen (heat meter)	•		•		•				•		
Lead acetate solution		•			•	•			•		•
Lead chloride solution		•			•	•			•		
Boric acid ≤5 %, ≤50 °C (122 °F)		•			•	•			•		•
Butane	• 1)				•	•			•		
Butyric acid		•			•	•			•		
Butyl acetate	• 1)	•			•				•		
Calcium chloride solution		• 2)	•		•	•			•		
Caprolactam		•		•	•				•		
Cellosolves	• 1)	•			•				•		
Chlorobenzene (anhydrous)	• 1)	•			•				•		
Chloroform		•			•				•		
Choline chloride solution		•			•				•		
Chromium sulfaph. solution <50 °C (122 °F)		•			•	•			•		
Cyclohexanol (Anol)	• 1)	•		• 1)	•				•		
Diacetone alcohol	• 1)	•			•				•		•
Dibutylphthalate	•	•		•	•				•		
Diesel oil	•			•	•	•			•		
Dimethylaniline	•	•		•	•				•		
Ferric chloride solution		•			•				•		
Acetic acid		•			•				•		
Ethyl acetate	• 1)	•			•				•		
Ethylalkohol (Ethanol)	• 1)	•			•	•			•		
Ethyl amine	•				•				•		
Ethylene chloride dry	•	•			•				•		
Ethylee nglycol anhydrous	• 1)	•		•	•	•			•		
Fatty acid		•		•	•				•		
Liquefield gas ⁴⁾	•				•				•		
Liquefield wax	•			•					•		•
Formalin		•			•	•			•		•
Freon		•			•				•	• 4)	
Furfurol		•			•				•		•
Glucose solution		•			•	•			•		
Glycantine	• 1)	•		• 1)	•				•		
Glycerine											
• pur		•			•	•			•		
• crude		•			•	•			•		
Urea solution (aqueous)		•			•	•			•		
Fuel oil, heavy	•			•	•				•		
Hydraulic oil	•			•	•				•		
Cocoa butter		•			•				•		
Cocoa paste (heated)	•	•		•	•				•		
Caustic potash solution		•			•	•			•	• 5)	
Potassium bichromate solution		•			•				•		
Potassium chloride solution		• 2)			•	•			•		
Magnesium chloride solution		• 2)			•	•			•		

SITRANS F flowmeters

SITRANS F R

Rotary-piston meters - Introduction Configuration - Recommended materials

Medium to be measured	Materials										
	Casing and measuring chamber			Rotary-piston						Casing gasket	
	Cast iron or cast steel	CrNiMo-steel	With enamel lining	Cat iron	Ni-Resist	Carbon (synth.)	Hard rubber to 40 °C (104 °F)	PCTFE to 40 °C (104 °F)	PTFE/Graphite to 90 °C (194 °F)	PN 4/6/10/25/63 AFM 34	PN 40 FPM FEP-FPM
Malt		•			•					•	•
Masut	•			•						•	
Molasses (alkaline)	•			•	•			•	•	•	•
Molasses (acid)		•			•					•	•
Methanol (methyl alcohol)	• 1)3)	•				•				•	•
Methyl chloride	• 3)	• 3)	• 6)			•		•	•	•	•
Methylene chloride		•				•				•	•
Naphtalene		•		•		•		•	•	•	•
Sodium acetate solution		•				•		•	•	•	•
Sodium chloride solution (alkaline)		•				•		•	•	•	•
Sodium chloride solution (basic)			•								
Sodium nitrite solution	•	•		•		•		•	•	•	•
Caustic soda e. g. 30 %, 20 °C (68 °F) e. g. 50 %, 50 °C (122 °F)	•	•		•		•		•	•	•	•
Nitrobenzene	• 1)	•				•				•	•
Oleum ≤40 %, 60 ... 70 %		•						•		•	•
Paraffin oil	•			•						•	•
Permutite process water		•				•		•		•	•
Petroleum	•					•		•		•	•
Vegatable oil											
• Neutralized	•	•		•	•					•	•
• Crude		•			•					•	•
Phenol		•				•		•	•	•	•
Phosphoric acid		• 7)	• 6)7)			•		•	•	•	•
Phosphorous trichloride			• 6)			•		•		•	•
Castor oil	•	•		•	•					•	•
Soot oil	•			•						•	•
Nitric acid max. 65 %, 40 °C (104 °F)		•						•		•	•
Hydrochloric acid			•			•		•			
Chocolate compound	•	•		•	•					•	•
Sulfur (liquid)	•			•						•	•
Carbon bisulfide	• 1)	•		•		•			•	•	•
Sulfuric acid			•			•		•	•	•	•
• To 80 %, max. 80 °C (176 °F)			•			•		•	•	•	•
• 80 to 85 %, max. 40 °C (104 °F)		•				•		•	•	•	•
• 86 to 97 %, max. 25 °C (77 °F)	•					•		•	•	•	•
• 98 to 100 %, max. 50 °C (122 °F)		•				•		•	•	•	•
Sea water		• 2)				•		•		•	•
Soap (Liquid)		•			•					•	•
Soap solution		•			•					•	•
Silicium tetrachloride		• 2)				•		•		•	•
Starch solution		•			•					•	•
Carbon tetrachloride	• 1)	• 2)				•			•	•	•
Toluene	• 1)	•				•				•	•
Transformer oil	•			•						•	•
Trichlorethylene	• 2)	•				•				•	•
Vinyl chloride		•				•				•	•
Water, demineralized		•				•		•		•	•
Hydrogen peroxide		• 8)								•	•
Plasticizer	•	•		•	•					•	•
Wine		•				•		•	•	•	•
Xylene	• 1)	•				•				•	•
Zinc chloride solution		• 2)	•					•		•	•
Sugar solution		•				•				•	•
Sugar syrup		•				•				•	•

1) With metered liquids with a strong degreasing action, rust can occur.

2) To be pickled and passivated

3) Pitting may occur

4) Butane, propane, propylene

5) Not resistant for freon 21, 22, 31, 32

6) Resistant < 30 %

7) Duroplast/Tantalum design I

8) Without addition of chlorine and fluorine

SITRANS F flowmeters

SITRANS F R

Rotary-piston meters - Introduction Configuration - Recommended materials

Definitions

Flow rate

q_{\min} is the smallest flow rate which must be present if readings within the stated tolerance are to be obtained under the given operating conditions. The q_{\min} value primarily depends on the viscosity of the liquid.

Attention must also be paid to the weight and material running characteristics of the moving parts of the metering mechanism. Data on q_{\min} as a function of the above mentioned factors are listed in the technical specifications of the respective mechanism.

q_{\max} is limited by

- The maximum permissible speed which can be expected of the moving parts of the mechanism (rotary piston) without the life (long-term accuracy) of the meter being shortened to an unacceptable extent. For this reason, the permissible q_{\max} value for continuous operation is restricted to approx. half of the q_{\max} for batch operation (approx. 1 500 h/year).
- The pressure loss, i.e. the pressure difference occurring in the mechanism through hydraulic losses. A maximum value of 3 bar (43.5 psi) is permissible. This value is only reached with very high viscosities and large flow rates. The meter size and the viscosity of the liquid are decisive factors for the actual pressure loss which occurs.

Values for $q_{\max \text{ cont.}}$ and $q_{\max \text{ batch}}$ (dependent on viscosity) are listed in the technical specifications.

Theory of the error curve for volumetric meters

On the basis of the German Standards and Weights and Measures Regulations (also EC and OIML recommendations), the measuring error in volumetric meters, i.e. the difference between the registered quantity (A, actual reading) and the actual quantity (N, correct value) is defined as follows: a positive error means an indication which is too large, a negative error an indication which is too small, compared to the actual quantity (N). To calculate the percentage error, the following applies:

$$f = (A - N)/N \cdot 100 \text{ in \% of the correct value}$$

The primary cause of measuring errors is the gap loss which cannot be completely avoided despite the highest manufacturing precision for the parts of the mechanism - a flow which does not produce a corresponding rotary movement in the mechanism and is thus not recorded.

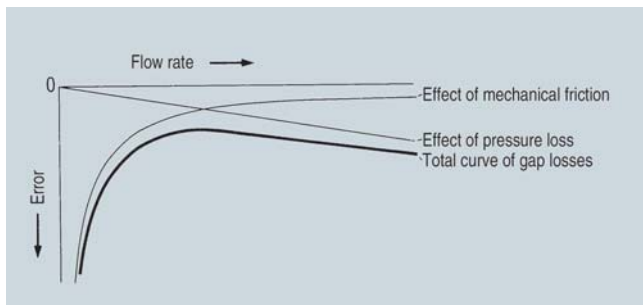


Diagram to illustrate the theory of the error curve for volumetric meters

If it is assumed that other external influences, e.g. gas inclusions in the liquid to be measured, are eliminated by appropriate measures, the following simplified statement can be made on the form of the error curve:

Gap losses always lead to negative errors (positive delivery error corresponds to a negative indication error).

The total gap loss is made up of two components:

- A component with a hyperbolic function which results from the varying influence of mechanical friction (this influence decreases with increasing flow rate after the friction at rest has been overcome) and
- A loss component which increases linearly with the flow rate and is due to the increasing flow resistance and thus the higher pressure difference in the mechanism.

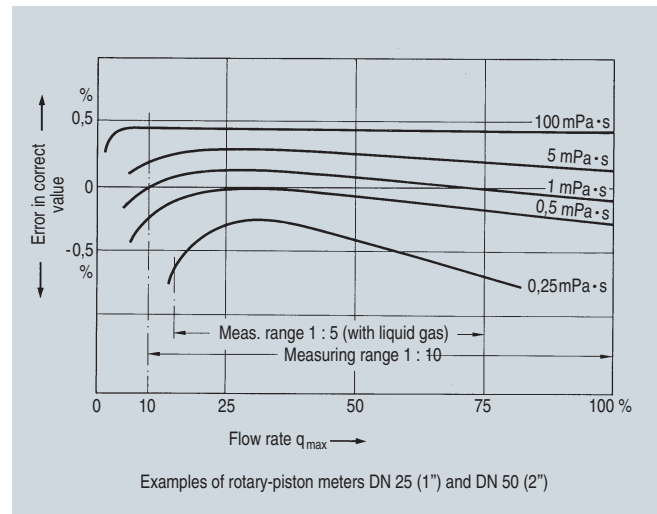
The total curve can be formed from these two effects. It is characteristic for all positive displacement meters. The illustration "Error curves of volumetric meters" is greatly enlarged to simplify understanding.

Error curves of rotary-piston meters

The shape of the error curve is also affected by the viscosity of the metered liquid. The error in measurement increases with decreasing viscosity, especially at the beginning and towards the end of the flow rate range.

By appropriate regulation, i.e. changing a pair of gear-wheels between the meter mechanism and the register, the position of the error curve can be displaced parallel to the zero line and thus the meter can be optimally calibrated. The appropriate pair of replacement gears can be read off from a table or determined with the aid of a calculating disk.

The illustration "Error curves of volumetric meters" shows error curves without any regulation having been carried out.



Error curves of volumetric meters dependent in shape and location on the flow rate and the viscosity of the liquid

Note: 1 mPa·s = 1 cp

Measuring accuracy

The rotary-piston meters are approved in the European Community and in many other countries for the custody transfer.

The following error limits apply between 0.2 % and 0.5 % of the correct value (depending on the liquid, the measuring range and the relevant calibration specifications).

The stated error limits in % of the correct value apply to the whole flow rate and for any delivery quantity greater than the smallest permissible quantity.

This is an important difference compared to other measuring instruments whose errors are related to the full-scale value and thus only reach the stated accuracy at one point - full-scale deflection. The minimum flow rate should not fall below 10% of the maximum flow rate in order to remain within the stated accuracy limit. This explains why the usual flow rate range for volumetric meters is 1:10.

Note: The measuring system of the rotary-piston meter must always be filled with the liquid to be measured in order to achieve a high measuring accuracy.

Service life (long-term accuracy)

The service life of a volumetric meter, i.e. the operating time until an overhaul or recalibration becomes necessary, is determined by the mechanical abrasion of the moving parts of the mechanisms which occurs because of forces from the metered liquid.

As well as the nature of the materials used (running characteristics), the service life is dependent on the lubricating properties of the metered liquid, the service is dependent on the lubricating properties of the metered liquid, the daily operating time and the cube of the flow rate (speed of rotation). The last factor is one of the reasons why only half of the maximum flow rate specified for the batch operation is permissible for continuous operation.

Since the above factors can hardly be determined exactly with industrial use of the meter, unequivocal statements on the service life (long-term accuracy) are not possible.

Recalibration is required every two years by law (in Germany) for meters used for custody transfer. On the basis of this regulation, it is recommended that meters which are not used for custody transfer be checked and recalibrated if necessary, at intervals of two to three years. Even this recommendation is based on average, "normal" operating conditions. A period of three years is too short, for example, for a meter used for the batch dispensing of lubricating oil, it will still work within the stated error limits even after five years or more

SITRANS F flowmeters









SITRANS F R

Rotary-piston meters - Introduction

Technical specifications

Technical specifications

Meter sizes (DN), pressure stages (PN) and permissible flow rates (q) for rotary-piston meters and automatic batchmeters

Design	DN		PN		Rated flow rate		Permissible flow rate								
	mm	(inch)	bar	(psi)	l/min	(USgpm)	With viscosity	Min. ¹⁾ with continuous ²⁾ operation		Max. with intermittent ³⁾⁴⁾ operation		Max. with continuous operation			
	mm	(inch)	bar	(psi)	l/min	(USgpm)	mPa·s (cp)	l/min	(USgpm)	l/min	(USgpm)	l/min	(USgpm)		
Rotary-piston meter for industrial use															
 up to PN 16 (MWP 232 psi)	15 ⁵⁾	(½) ⁵⁾	25 40	(363) (580)	20	(5.3)	≤ 1 < 5 800 2 000 5 000 10 000 ⁷⁾	1.5 1.0 0.2 0.2 0.2 0.2	(0.26) (0.2) (0.05) (1.3) (0.03) (0.03)	10 ⁶⁾ 20 20 10 4 1	(5.3) (5.3) (5.3) (1.3) (0.53) (0.26)	10 10 10 5 2 1	(2.6) (2.6) (2.6) (1.3) (0.53) (0.26)		
	 up to PN 63 (MWP 914 psi)	25	(1)	10	(145)	100	(26.4)	0.3	12	(3.2)	100	(26)	80	(13)	
				16	(232)			0.6	6	(1.6)	100	(26)	80	(13)	
				25	(363)			1	5	(1.3)	100	(26)	80	(13)	
40				(580)	5			3	(0.8)	100	(26)	80	(13)		
63				(914)	800			1	(0.26)	100	(26)	80	(13)		
50	(2)	6	(87)	500	(132)	0.3	40	(11)	500	(106)	350	(44)			
 up to PN 63 (MWP 914 psi)	10	(2)	6			(87)	500	(132)	0.6	20	(5.3)	500	(132)	350	(44)
									1	18	(4.8)	500	(132)	350	(44)
									5	10	(2.6)	500	(132)	350	(44)
									800	2	(0.53)	500	(106)	350	(44)
50	(2)	10	(363)	500	(132)	5 000	1	(0.26)	80	(13)	60	(13)			
 up to PN 63 (MWP 914 psi)	10	(2)	10			(363)	500	(132)	10 000	1	(0.26)	70	(5.3)	50	(5.3)
									20 000 ⁷⁾	1	(0.26)	50	(2.6)	30	(2.6)
									0.3	60	(16)	1 000	(211)	700	(93)
									0.6	35	(9.3)	1 000	(264)	700	(93)
 up to PN 63 (MWP 914 psi)	80	(3)	6	(58)	1 000	(264)	1	25	(6.6)	1 000	(264)	700	(93)		
							5	10	(2.6)	1 000	(264)	700	(93)		
							800	5	(1.3)	1 000	(211)	500	(93)		
							5 000	5	(1.3)	700	(93)	350	(93)		
							10 000	5	(1.3)	600	(40)	250	(40)		
20 000 ⁷⁾	5	(1.3)	300	(20)	150	(20)									
Rotary-piston meter acid-resistant mode															
	25	(1)	10	(145)	100	(26.4)	0.6	10	(2.6)	100	(26)	50	(13)		
							1	8	(2.1)	100	(26)	50	(13)		
							5	4	(1.0)	100	(26)	50	(13)		
Automatic batchmeter (Rotary-piston meter with quantity preset register and mechanical shut-off valve)															
	25	(1)	10	(145)	100	(26.4)	0.3	12	(3.2)	100	(26)	–	–		
							0.6	6	(1.6)	100	(26)	–	–		
	50	(2)	6	(87)	500	132	1	5	(1.3)	100	(26)	–	–		
							5	3	(0.8)	100	(26)	–	–		
							800 ⁹⁾	1	(0.26)	100	(26)	–	–		
							0.3	40	(11)	500	(106)	–	–		
							0.6	20	(5.3)	500	(132)	–	–		
1	18	(4.8)	500	(132)	–	–									
5	10	(2.6)	500	(132)	–	–									
800 ⁹⁾	2	(0.53)	400	(106)	–	–									

¹⁾ For metal rotary-pistons: increase by a factor of 2, for PCTFE and PTFE/graphite filling rotary-pistons: increase by a factor of 3.

²⁾ Continuous operation: up to 8 hours a day.

³⁾ For metal pistons: reduce by a factor ≈0.8 to extend service life.

⁴⁾ Intermittent operation: up to 4 hours a day

⁵⁾ Note: When using pistons made of carbon, there is danger of break in the case of liquid hammers

⁶⁾ When using pistons made of carbon.

⁷⁾ Flow rates for higher viscosities on request; we have experience of up to 350 000 mPa·s (cp).

⁸⁾ Values in brackets apply to casing in CrNiMo steel.

⁹⁾ Max. permissible viscosity for exact closing of the shut-off valve and for exact dispensing: viscosities up to 4 000 mPa·s (cp) possible.

Note:

In order to extend the service life of the pulse sensor, rotary-piston meters with current and/or pulse output (without intermediate gear) should only be operated at max. 60% of the permissible flow.

Piston materials

Piston material	Design	Permissible liquid temperature		Max. perm. dyn. viscosity mPa·s (cp)	Order No. code.
		°C	°F		
Carbon		-10 ... 300	14 ... 572	25	K
Cast iron (mat. No. GG 25)	with slotting	-10 ... 300	14 ... 572		E
Cast iron (mat. No. GG 25)		-10 ... 300	14 ... 572		B
Ni-Resist (mat. No. 0.6660)	with slotting	-10 ... 300	14 ... 572		N
Ni-Resist (mat. No. 0.6660)		-10 ... 300	14 ... 572		C
Hard rubber	with slotting	-10 ... 40 ¹⁾	14 ... 104 ¹⁾	50	G
Hard rubber		-10 ... 40 ¹⁾	14 ... 104 ¹⁾	50	D
PTFE/graphite filling	with slotting	0 ... 40 ²⁾	32 ... 104 ²⁾	120	F
PTFE/ graphite filling		0 ... 40 ²⁾	32 ... 104 ²⁾	120	L
PTFE/ graphite filling	with slotting	0 ... 90 ²⁾	32 ... 194 ²⁾	120	R
PTFE/ graphite filling		0 ... 90 ²⁾	32 ... 194 ²⁾	120	M
PCTFE	with slotting	-10 ... +40 ²⁾	14 ... 104 ²⁾	120	H
PCTFE		-10 ... +40 ²⁾	14 ... 104 ²⁾	120	J
Gni steel with carbon contact surface (DN 25 (1") only)	Collar piston	-10 ... +200	14 ... 392	> 10	S
Gni steel with PTFE contact surface (DN 25 (1") only)		-10 ... +40	14 ... 104	> 10	T

¹⁾ For 120 min max. 65 °C (149 °F); for 20 min max. 90 °C (194 °F), e. g. for cleaning procedures

²⁾ Error limit max. 1%; at 90°C (194 °F) max. 2%

SITRANS F flowmeters

SITRANS F R

Rotary-piston meters - Introduction

Technical specifications

Further technical specifications

Materials and max. permissible liquid temperatures

Housing (also lining with acid resistant meters) and measuring chamber	Temperature range
• Cast iron, spheroidal graphite, cast steel, Cranium steel	-30 ... +300 °C (-22 ... +572 °F)
• Cast iron/enamel, Duroplast measuring chamber	-20 ... +80 °C (-4 ... +176 °F)

General data

Error limits	Between 0.2 % and 0.5 % of the correct value (depending on the metered fluid, the measuring range and the relevant calibration regulations) except for rotary-piston meters DN 15 (½") and acid-resistant meters with PCTFE pistons; where 1% of the actual value applies.
Reproducibility	Within 0.05 %
Adjustment	In steps from 0.01 %
Pressure drop	Max. permissible 3 bar (43.5 psi), max. 0.5 bar (7.25 psi) for acid resistant meters
Transmission from wet to dry space	Gland-free, via permanent magnet coupling
Installation position (axis of meter mechanism)	
• Rotary-piston meter for industrial use	
- Acid-resistant model	Any
- Automatic batchmeter	Vertical
• Special designs	
- Rotary-piston meter for oil fuels	Any
- Rotary-piston meter for liquid gas	Meter axis vertical
Special inlet and outlet pipe sections	Not necessary
Pipe connection	Flanges drilled to DIN 2501, DIN 2547 (PN 63 only)
Filter size (mesh width)	0.8 mm (0.031 inch) for rotary-piston meter

Note

The material combinations which can be supplied are listed in the Selection and Ordering data. The maximum permissible liquid temperature is determined by the "weakest link" in the particular combination (the PCTFE rotary-piston, for example, in a meter made of Cranium steel).

Automatic batchmeter

With this meter, the maximum permissible liquid temperature is also limited by the operation and design of the shut-off valve.

The following temperatures are permissible for valves with maintenance free

- Gland seal: -10 ... +200 °C (14 ... 392 °F)
- Bellows seals: -10 ... +40 °C, max. 3 bar (14 ... 104 °F, max. 43.5 psi)

Models for higher liquid temperatures on request. The installation of cooling attachments also necessitates a corresponding increase in length of the mechanical shut-off valve.

The following restriction applies to the automatic batchmeters because of the higher flow resistance through the associated shut-off valve:

- with the same value q , Δp is increased by approx. 30 %
- with the same value Δp , q is reduced by approx. 20 %

In case of a dynamic viscosity 60 mPa·s (cp), constructional details of the shut-off valve cone must be changed.

Furthermore, installation of a filter is omitted for 800 mPa·s (cp) and above.

SITRANS F flowmeters

SITRANS F R

Rotary-piston meters
Ordering example

Ordering example 1

The following is required:

A rotary-piston meter for heavy fuel oil for flow measurements and monitoring of consumption in a power station.

Pipe connection flanges to DIN,
flow direction downwards,
with display for flow and total value.

Flow-proportional output signal at full-scale value
20 mA, at start-of-scale value 4 mA.
Measuring range 400 to 2 000 l/h (6 to 33 l/min.),
operating pressure 40 bar,
max. temperature of fuel oil 120 °C,
viscosity of fuel oil in working condition 25 mPa · s

Selected:

Acc. to application (page 4/343) and rated flow rate (page 4/354),
rotary-piston meter DN 25 for industrial use (page 4/360),
rated pressure PN 63 according to operating pressure,
materials cast steel and cast iron according to the material
recommendations (page 4/348)

Order No. according to page 4/360	7MR1140-EE-47-0B-A0-Z
Flow direction downwards	0
With current output 4 ... 20 mA	47
Accessories mounted (necessary for the flow-proportional output signal and due to liquid temperature)	0B
Works test	A
Plane flanges, drilled to DIN	0

Liquid data acc. to page 4/370	Order code
Temperature 120°C	C12
Viscosity 25 mPa·s, rounded up to 30 mPa·s	G03
Max. flow rate 2 000 l/h ≈ 34 l/min	K34
Trade name	Y01 Liquid: heavy fuel oil S

Accessory modules

1 Pulsar with inductive pick-up, fitted directly on rotary piston meter, 100 pulses per revolution (technical specifications on page 4/396).

1 cooling attachment model 05 (page 4/398) as separate model acc. to (page 4/345).

Additionally required

1 electric flow register SITRANS F RA110 (technical specifications on page 4/392).

Order as follows:	
1 Rotary-piston meter DN 25	7MR1140-0EE47-0BA0-Z C12 + G03 + K34 + Y01 Liquid: heavy fuel oil S
1 Accessory model 70	7MV3070-1XA00
1 Electric flow register SITRANS F RA110	7MV1070-1BC10-0AA0
Mechanical registers and quantity preset registers (page 4/387)	

- Heating of mechanism through external heater tubes or electric heater cables on request.

Ordering example 2

The following is required:

Pipe connection flanges to DIN,
flow direction from left to right,
with display of flow and total value,
Flow-proportional output signal at full-scale value
20 mA, at start-of-scale value 4 mA.
Measuring range 500 to 5 000 l/h (6 to 100 l/min.),
operating pressure 9 bar,
max. temperature of fuel oil 60 °C,
viscosity of fuel oil in working condition 10 mPa·s

Selected:

acc. to application (page 4/343) and rated flow rate (page 4/354),
rotary-piston meter DN 25 for industrial use (page 4/360),
rated pressure PN 10 according to operating pressure,
Material, cast iron acc. to material recommendation (page 4/348)

Order No. according to page 4/360	7MR1110-EE-66-0B-A0-Z
flow direction from left to right	1
With current output 4 ... 20 mA	66
Accessories mounted (necessary for the flow-proportional output signal)	0B
Works test	A
Plane flanges, drilled to DIN	0

Liquid data acc. to page 4/370	Order code
Temperature 60 °C	C06
Viscosity 10 mPa·s	G01
Max. flow rate 6 000 l/h ≈ 100 l/min	L01
Trade name	Y01 Liquid: light oil

Accessory modules

1 Pulsar with inductive pick-up, fitted directly on rotary piston meter, 100 pulses per revolution (technical specifications on page 4/396).

Additionally required

1 electric flow register SITRANS F RA110 (page 4/392) with mounting bracket mounted on pulsar.

Order as follows:	
1 Rotary-piston meter DN 25	7MR1110-1EE66-0BA0-Z C06 + G01 + L01 + Y01 Liquid: light oil
1 Electric flow register SITRANS F RA110	7MV1070-1BC10-0AA0
Mechanical registers and quantity preset registers (page 4/387)	

- Heating of mechanism through external heater tubes or electric heater cables on request

When ordering a rotary-piston meter with digital display and pulse/current output you now only need two order items:

- Rotary-piston meter 7MR1..... with pulsar, poss. with cooling attachments, protective cover and mounting bracket and
- Electrical flow register SITRANS F RA110 7MV1070 -.....

SITRANS F flowmeters

SITRANS F R

Rotary-piston meters – Ordering data
DN 15 (1/2"), rated flow rate 20 l/min (5.3 USgpm)

Selection and Ordering data	Order No.	Order code
Rotary-piston meter DN 15 (1/2")	7MR1000 -	
Compact version: Pulsar mounted on the rotary-piston meter and locked with mounting bracket; SITRANS F RA110 (order separately, see product description on page 4/392) mounted on mounting bracket.		
10 pulses/revolution		
• max. material temperature 80 °C (176 °F), without cooling attachment		6 1 0 B
• max. material temperature 180 °C (356 °F), one cooling attachment		6 3 0 B
• max. material temperature 260 °C (500 °F), two cooling attachments		6 5 0 B
100 pulses/revolution		
• max. material temperature 80 °C (176 °F), without cooling attachment		6 6 0 B
• max. material temperature 180 °C (356 °F), one cooling attachment		6 7 0 B
• max. material temperature 260 °C (500 °F), two cooling attachments		6 8 0 B
Tests		
Works test		A
Works test certificate		B
Flanges		
Plane, drilled to EN 1092-1		0
Plane, drilled to specification		9 R 1 Y
With sealing ridge to specification		9 R 2 Y
The data of the liquid are always required: Temperature of the liquid, density, min. and max. flow rate, viscosity Please always specify in plain text or with Order code according to Selection and Ordering data table on page 4/370		
Heating systems on request		

4

Informations relevant for ordering

The informations relevant for ordering can be found in section „Introduction“ at the beginning of the chapter:

Application: see page 4/343

Function and design: see page 4/344

Configuration: see page 4/346 ff.

Operating limits: Permissible liquid temperatures and further technical specifications see page 4/354 ff.

Dimensional drawings: see page 4/371 (dimensions of flanges) and pages 4/372 ff.

Mounting position: as desired; note mounting position of register!

Certificates and approvals

Classification according to pressure equipment directive (DGRL 97/23/EG):

Fluquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice SEP)

Ordering example see page 4/357

Selection and Ordering data (continued)	Order No	Order code
Rotary-piston meter DN 25 (1")	7MR110 - ■■■■ - ■■■■ ■■■■	
Digital register with current/pulse output		
As separate model: Pulser mounted on the rotary-piston meter and locked with protective cover; SITRANS F RA110 (order separately, for product description, see page 392)		
10 pulses/revolution		
• max. material temperature 80 °C (176 °F), without cooling attachment		4 1 0 B
• max. material temperature 180 °C (356 °F), one cooling attachment		4 3 0 B
• max. material temperature 260 °C (500 °F), two cooling attachments		4 5 0 B
100 pulses/revolution		
• max. material temperature 80 °C (176 °F), without cooling attachment		4 6 0 B
• max. material temperature 180 °C (356 °F), one cooling attachment		4 7 0 B
• max. material temperature 260 °C (500 °F), two cooling attachments		4 8 0 B
Compact version: Pulser (page 4/395) mounted on the rotary-piston meter and locked with mounting bracket; SITRANS F RA110 (order separately, see product description on page 4/392) mounted on mounting bracket.		
10 pulses/revolution		
• max. material temperature 80 °C (176 °F), without cooling attachment		6 1 0 B
• max. material temperature 180 °C (356 °F), one cooling attachment		6 3 0 B
• max. material temperature 260 °C (500 °F), two cooling attachments		6 5 0 B
100 pulses/revolution		
• max. material temperature 80 °C (176 °F), without cooling attachment		6 6 0 B
• max. material temperature 180 °C (356 °F), one cooling attachment		6 7 0 B
• max. material temperature 260 °C (500 °F), two cooling attachments		6 8 0 B
Tests		
Works test		A
Works test certificate		B
Preliminary official test (only for vertical mechanism shaft and mech. register and quantity preset register)		D ¹⁾
Preliminary official test (only for vertical mechanism shaft and mech. register or quantity preset register <u>and</u> pulser (double pick-up) for current/pulse output); (not currently available in connection with SITRANS F RA110)		E ¹⁾
Flanges		
Plane, drilled to EN 1092-1		0
Plane, drilled to specification		9 R 1 Y
With sealing ridge to specification		9 R 2 Y
The data of the liquid are always required: Temperature of the liquid, density, min. and max. flow rate, viscosity Please always specify in plain text or with Order code according to Selection and Ordering data table on page 4/370		
Heating systems on request		

¹⁾ Not with PTFE and PCTFE pistons.

Accessories	Order No.
Instruction Manual	
7MR1110...	
• German	F) C73000-B5100-C15
• English	F) C73000-B5176-C15
7MR1120... and 7MR1140	
• German	F) C73000-B5100-C23
• English	F) C73000-B5176-C23
7MR1130...	
• German	F) C73000-B5100-C30
• English	F) C73000-B5176-C30

Informations relevant for ordering

The informations relevant for ordering can be found in section „Introduction“ at the beginning of the chapter:

Application: see page 4/343

Function and design: see page 4/344

Configuration: see page 4/346 ff.

Operating limits: Permissible liquid temperatures and further technical specifications see page 4/354 ff.

Dimensional drawings: see page 4/371 (dimensions of flanges) and pages 4/372 ff.

Mounting position: as desired; note mounting position of register!

Certificates and approvals

Classification according to pressure equipment directive (DGRL 97/23/EG):

Fliquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice SEP)

Ordering example see page 4/357

F) Subject to export regulations AL: 91999, ECCN: N.

SITRANS F flowmeters

SITRANS F R

Rotary-piston meters – Ordering data
DN 50 (2"), rated flow rate 500 l/min (132 USgpm)

Selection and Ordering data

Order No.

Order code

Rotary piston meter DN 50 (2")

Nom. press.	Materials		Rotary piston	Casing gasket	Weight appr. kg (lb)	Order code
	Housing	Meas. chamber				
PN 6 (87 psi)	Cast iron	Cast iron	• • • • •	Flat gasket AFM 34	31 (68,3)	7MR1410 - E
		CrNiMo steel	• • • • •			7MR1410 - D
PN 16 (232 psi)	CrNiMo steel	CrNiMo steel	• • • • •	FKM (O-ring)	45 (99.2)	7MR1410 - S
PN 25 (363 psi)	Spher. cast iron	Cast iron	• • • • •			Flat gasket AFM 34
		CrNiMo steel	• • • • •	7MR1420 - D		
PN 40 (580 psi)	Cast steel	Cast iron	• • • • •	FKM (O-ring)	60 (132)	7MR1430 - E
PN 63 (914 psi)	Cast steel	Cast iron	• • • • •	Flat gasket AFM 34	94 (207)	7MR1440 - E

Rotary piston material

						Max. permissible liquid temperature	Weight appr. kg (lb)
Carbon					•		0.9 (2.0)
Cast iron					•		3.5 (7.7)
Cast iron, grooved					•		3.4 (7.5)
Ni-resist					•		3.5 (7.7)
Ni-resist, grooved					•		3.4 (7.5)
Hard rubber			•			40 °C (104 °F)	0.7 (1.5)
Hard rubber, grooved			•			40 °C (104 °F)	
PTFE with graphite filling		•				40 °C (104 °F)	0.5 (1.1)
PTFE with graphite filling, grooved		•				40 °C (104 °F)	
PTFE with graphite filling		•				90 °C (194 °F)	
PTFE with graphite filling, grooved		•				90 °C (194 °F)	

Flow direction

Mechanism shaft vertical	From left to right	1
	From right to left	2
	From front to back	3
	From back to front	4
Mechanism shaft horizontal	From left to right	5
	From right to left	6
	Upwards	7
	Downwards	0

Mechanical registers/quantity preset registers

	Weight appr. kg (lb)	Order code
Single- pointer dial		
• Type 01	0.8 (1.76)	01
Double-pointer dial (note mounting position! see description on page 4/389)	1.5 (3.3)	11
• Type 11, vertical mounting		
• Type 12, horizontal mounting	2.5 (5.5)	12
Quantity preset register (only for vertical mechanism shaft, flow direction according to codes 1 ... 4)		
• Type 30	11 (24.3)	30
• Type 54, with electric switch	13.2 (29.1)	54

Value per revolution

• 10 l (2.65 USg)	2
• 100 l (26.5 USg)	3

Accessories (pulsers, cooling attachments)

For measuring temperatures over 80 °C, it is always necessary to order one cooling attachment (7MV3001-1XX00).
For measuring temperatures over 180 °C, it is always necessary to order two cooling attachments (7MV3001-1XX00) as separate items.

- None
- Mounted
- Pulsar already mounted above the intermediate gear:
 - 10 pulses/value per revolution
 - 100 pulses/value per revolution
- Pulsar already mounted below the intermediate gear:
 - 10 pulses/measuring chamber volume
 - 100 pulses/measuring chamber volume

K
E
B
N
C
G
D
F
L
R
M1
2
3
4
5
6
7
001
11
12
30
542
3A
BC
DG
H

SITRANS F flowmeters

SITRANS F R

Rotary-piston meters – Ordering data
DN 50 (2"), rated flow rate 500 l/min (132 USgpm)

Selection and Ordering data (continued)	Order No.	Order code
Rotary piston meter DN 50 (2")	7MR140 -	
Digital register with current/pulse output		
As separate model: Pulsar mounted on the rotary-piston meter and locked with protective cover; SITRANS F RA110 (order separately, for product description, see page 4/392)		
10 pulses/revolution		
• max. material temperature 80 °C (176 °F), without cooling attachment		41 0B
• max. material temperature 180 °C (356 °F), one cooling attachment		43 0B
• max. material temperature 260 °C (500 °F), two cooling attachments		45 0B
100 pulses/revolution		
• max. material temperature 80 °C (176 °F), without cooling attachment		46 0B
• max. material temperature 180 °C (356 °F), one cooling attachment		47 0B
• max. material temperature 260 °C (500 °F), two cooling attachments		48 0B
Compact version: Pulsar (page 4/395) mounted on the rotary-piston meter and locked with mounting bracket; SITRANS F RA110 (order separately, see product description on page 4/392) mounted on mounting bracket.		
10 pulses/revolution		
• max. material temperature 80 °C (176 °F), without cooling attachment		61 0B
• max. material temperature 180 °C (356 °F), one cooling attachment		63 0B
• max. material temperature 260 °C (500 °F), two cooling attachments		65 0B
100 pulses/revolution		
• max. material temperature 80 °C (176 °F), without cooling attachment		66 0B
• max. material temperature 180 °C (356 °F), one cooling attachment		67 0B
• max. material temperature 260 °C (500 °F), two cooling attachments		68 0B
Tests		
Works test		A
Works test certificate		B
Preliminary official test (only for vertical mechanism shaft and mech. register and quantity preset register)		D ¹⁾
Preliminary official test (only for vertical mechanism shaft and mech. register or quantity preset register and pulser (double pick-up) for current/pulse output); (not currently available in connection with SITRANS F RA110)		E ¹⁾
Flanges		
Plane, drilled to EN 1092-1		0
Plane, drilled to specification		9 R1Y
With sealing ridge to specification		9 R2Y
The data of the liquid are always required: Temperature of the liquid, density, min. and max. flow rate, viscosity Please always specify in plain text or with Order code according to Selection and Ordering data table on page 4/370		
Heating systems on request		

¹⁾ Not with PTFE and PCTFE pistons.

Accessories	Order No.	Informations relevant for ordering
Instruction Manual		
7MR1410...		The informations relevant for ordering can be found in section „Introduction“ at the beginning of the chapter:
• German	F) C73000-B5100-C15	Application: see page 4/343
• English	F) C73000-B5176-C15	Function and design: see page 4/344
7MR1420... and 7MR1440		Configuration: see page 4/346 ff.
• German	F) C73000-B5100-C23	Operating limits: Permissible liquid temperatures and further technical specifications see page 4/354 ff.
• English	F) C73000-B5176-C23	Dimensional drawings: see page 4/371 (dimensions of flanges) and pages 4/372 ff.
7MR1430...		Mounting position: as desired; note mounting position of register!
• German	F) C73000-B5100-C30	Certificates and approvals
• English	F) C73000-B5176-C30	Classification according to pressure equipment directive (DGRL 97/23/EG):
		• 7MR1410 and 7MR1420: for liquids of group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice SEP)
		• 7MR1430 and 7MR1440: for liquids of group 2; complies with requirements of article 3, paragraph 3 (sound engineering practice SEP); For liquids of fluid group 1 on request.
		Ordering example see page 4/357

F) Subject to export regulations AL: 91999, ECCN: N.

SITRANS F flowmeters

SITRANS F R

Rotary-piston meters – Ordering data
DN 80 (3"), rated flow rate 1000 l/min (264 USgpm)

Selection and Ordering data

Order No.

Order code

Rotary piston meter DN 80 (3")

Nom. press.	Materials		Casing gasket	Weight appr. kg (lb)	Order No.	Order code
	Housing	Meas. chamber				
PN 6 (87 psi)	CrNiMo steel	CrNiMo steel	• • • •	Flat gasket 34	54 (119)	7MR1610 - S
PN 25 (363 psi)	Spher. cast iron	Cast iron	• • • •	Flat gasket 34	108 (238)	7MR1620 - E
		CrNiMo steel	• • • •			7MR1620 - D
PN 40 (580 psi)	Cast steel	Cast iron	• • • •	FKM (O-ring)	150 (331)	7MR1630 - E
PN 63 (914 psi)	Cast steel	Cast iron	• • • •	Flat gasket 34	186 (410)	7MR1640 - E

Rotary piston material

	Max. permissible liquid temperature	Weight appr. kg (lb)
Carbon	•	2 (4.4)
Cast iron	•	9.5 (21)
Cast iron, grooved	•	9.4 (20.7)
Ni-resist	•	10 (22)
Ni-resist, grooved	•	9.6 (21.2)
Hard rubber	•	40 °C (104 °F)
Hard rubber, grooved	•	40 °C (104 °F)

Flow direction

Mechanism shaft vertical	From left to right	1
	From right to left	2
	From front to back	3
	From back to front	4
Mechanism shaft horizontal	From left to right	5
	From right to left	6
	Upwards	7
	Downwards	0

Mechanical registers/quantity preset registers

	Weight appr. kg (lb)	Order code
Single- pointer dial		
• Type 01	0.8 (1.76)	0 1
Double-pointer dial (note mounting position! see description on page 4/389)		
• Type 11, vertical mounting	1.5 (3.3)	1 1
• Type 12, horizontal mounting	2.5 (5.5)	1 2
Quantity preset register (only for vertical mechanism shaft, flow direction according to codes 1 ... 4)		
• Type 30	11 (24.3)	3 0
• Type 54, with electric switch	13.2 (29.1)	5 4

Value per revolution

• 100 l (26.5 USg)	3
• 1000 l (265 USg)	4

Accessories (pulsers, cooling attachments)

For measuring temperatures over 80 °C, it is always necessary to order one cooling attachment (7MV3001-1XX00).

For measuring temperatures over 180 °C, it is always necessary to order two cooling attachments (7MV3001-1XX00) as separate items.

- None
- Mounted
- Pulsar already mounted above the intermediate gear:
 - 10 pulses/value per revolution
 - 100 pulses/value per revolution
- Pulsar already mounted below the intermediate gear:
 - 10 pulses/measuring chamber volume
 - 100 pulses/measuring chamber volume

K
E
B
N
C
G
D1
2
3
4
5
6
7
00 1
1 1
1 2
3 0
5 43
4A
BC
DG
H

SITRANS F flowmeters

SITRANS F R

Rotary-piston meters – Ordering data
DN 80 (3"), rated flow rate 1000 l/min (264 USgpm)

Selection and Ordering data (continued)	Order No.	Order code
Rotary piston meter DN 80 (3")	7MR16■0 - ■■■■ - ■■■■ ■■■■	
Digital register with current/pulse output		
As separate model: Pulsar mounted on the rotary-piston meter and locked with protective cover; SITRANS F RA110 (order separately, for product description, see page 4/392)		
10 pulses/revolution		
• max. material temperature 80 °C (176 °F), without cooling attachment		41 0B
• max. material temperature 180 °C (356 °F), one cooling attachment		43 0B
• max. material temperature 260 °C (500 °F), two cooling attachments		45 0B
100 pulses/revolution		
• max. material temperature 80 °C (176 °F), without cooling attachment		46 0B
• max. material temperature 180 °C (356 °F), one cooling attachment		47 0B
• max. material temperature 260 °C (500 °F), two cooling attachments		48 0B
Compact version: Pulsar (page 4/395) mounted on the rotary-piston meter and locked with mounting bracket; SITRANS F RA110 (order separately, see product description on page 4/392) mounted on mounting bracket.		
10 pulses/revolution		
• max. material temperature 80 °C (176 °F), without cooling attachment		61 0B
• max. material temperature 180 °C (356 °F), one cooling attachment		63 0B
• max. material temperature 260 °C (500 °F), two cooling attachments		65 0B
100 pulses/revolution		
• max. material temperature 80 °C (176 °F), without cooling attachment		66 0B
• max. material temperature 180 °C (356 °F), one cooling attachment		67 0B
• max. material temperature 260 °C (500 °F), two cooling attachments		68 0B
Tests		
Works test		A
Works test certificate		B
Preliminary official test (only for vertical mechanism shaft and mech. register and quantity preset register)		D ¹⁾
Preliminary official test (only for vertical mechanism shaft and mech. Register or quantity preset register and pulsar (double pick-up) for current/pulse output); (not currently available in connection with SITRANS F RA110)		E ¹⁾
Flanges		
Plane, drilled to EN 1092-1		0
Plane, drilled to specification		9 R1 Y
With sealing ridge to specification		9 R2 Y
The data of the liquid are always required: Temperature of the liquid, density, min. and max. flow rate, viscosity Please always specify in plain text or with Order code according to Selection and Ordering data table on page 4/370		
Heating systems on request		

¹⁾ Not with PTFE and PCTFE pistons.

Accessories	Order No.
Instruction Manual	
7MR1610...	
• German	F) C73000-B5100-C15
• English	F) C73000-B5176-C15
7MR1620... and 7MR1640	
• German	F) C73000-B5100-C23
• English	F) C73000-B5176-C23
7MR1630...	
• German	F) C73000-B5100-C30
• English	F) C73000-B5176-C30

Informations relevant for ordering

The informations relevant for ordering can be found in section „Introduction“ at the beginning of the chapter:

Application: see page 4/343

Function and design: see page 4/344

Configuration: see page 4/346 ff.

Operating limits: Permissible liquid temperatures and further technical specifications see page 4/354 ff.

Dimensional drawings: see page 4/371 (dimensions of flanges) and pages 4/371 ff.

Mounting position: as desired; note mounting position of register!

Certificates and approvals

Classification according to pressure equipment directive (DGRL 97/23/EG):

- 7MR1610-■ E ■■■■ and 7MR1610-■ D ■■■■, cast iron housing: for liquids of fluid group 2; complies with requirements of article 3, para. 3 (sound engineering practice SEP)
- 7MR1610-■ S ■■■■, stainless steel housing: for liquids of fluid group 1; complies with requirements of article 3, para. 3 (SEP)
- 7MR1620, 7MR1630 and 7MR1640: for liquids of fluid group 2; complies with requirements of article 3, para. 3 (SEP)

Ordering example see page 4/357

F) Subject to export regulations AL: 91999, ECCN: N.

SITRANS F flowmeters

SITRANS F R

Rotary-piston meters – Ordering data – DN 25 (1"),
acid-resistant, rated fl. rate 100 l/min (26.5 USgpm)

Selection and Ordering data						Order No.
Rotary-piston meter DN 25 (1"), acid-resistant						
Nom. press.	Materials			Max. permissible liquid temperature	Weight approx. kg (lb)	
	Housing	Measuring chamber ¹⁾	Rotary piston			
PN 10 (145 psi)	Cast iron	Duroplast	Carbon	80 °C (176 °F)	28 (61.7)	7MR 1 1 1 1 - PK - - - - Z
			PCTFE	40 °C (104 °F)		7MR 1 1 1 1 - PH - - - - Z
Flow direction						
Mechanism shaft vertical		From left to right				1
		From right to left				2
		From front to back				3
		From back to front				4
Register					Weight approx. kg (lb)	
Single pointer dial						
• Type 01					0.8 (1.76)	0 1
• Double pointer dial (note mounting position! Description on page 4/389)						
• Type 11					1.5 (3.3)	1 1
• Type 12					2.5 (5.5)	1 2
Quantity preset register (only for vertical mechanism shaft, flow direction according to codes 1 ... 4)						
Value per revolution						
1 l (0.26 USg)						1
10 l (2.65 USg) ²⁾						2
Pastest pointer or fastest drum						
Accessories (pulsers, cooling attachments)						
For measuring temperatures over 80 °C, it is always necessary to order <u>one</u> cooling attachment (7MV3001-1XX00). For measuring temperatures over 180 °C, it is always necessary to order <u>two</u> cooling attachments (7MV3001-1XX00) as separate items.						
• None						A
• Mounted						B
• Pulsar already mounted <u>above</u> the intermediate gear:						
- 10 pulses/value per revolution						C
- 100 pulses/value per revolution						D
• Pulsar already mounted <u>below</u> the intermediate gear:						
- 10 pulses/measuring chamber volume						G
- 100 pulses/measuring chamber volume						H
Tests						
Works test						A
Works test certificate						B
Gasket						
Viton ³⁾						1
Kalrez						2

¹⁾ In order to avoid the measurement chamber components becoming misshapen, the pressure loss should not exceed 0.5 bar (7.25 psi).

²⁾ Not possible with rotary-piston meters with quantity preset register!

³⁾ Consider durability of Viton!

Accessories	Order No.
Instruction Manual	
7MR1111...	
• German	F) C73000-B5100-C23
• English	F) C73000-B5176-C23

Informations relevant for ordering

The informations relevant for ordering can be found in section „Introduction“ at the beginning of the chapter:

Application: see page 4/343

Function and design: see page 4/344

Configuration: see page 4/346 ff.

Operating limits: Permissible liquid temperatures and further technical specifications see page 4/354 ff.

Dimensional drawings: see page 4/371 (dimensions of flanges) and pages 4/371 ff.

Mounting position: as desired; note mounting position of register!

Certificates and approvals

Classification according to pressure equipment directive (DGRL 97/23/EG):

Fliquids of fluid group1; complies with requirements of article 3, paragraph 3 (sound engineering practice SEP)

Ordering example see page 4/357

F) Subject to export regulations AL: 91999, ECCN: N.

SITRANS F flowmeters

SITRANS F R

Rotary-piston meters - Ordering data
Automatic batchmeter DN 25 (1")

Selection and Ordering data						Order No.	Order code
Automatic batchmeter DN 25 (1")							
With mechanical shut-off valve downstream of metering mechanism (upstream of metering mechanism see page 4/370)							
Nom. press.	Materials	Meas. chamber	Rotary piston			Weight appr. kg (lb)	
PN 10 (145 psi)	Cast iron	Cast iron	•	•	•	•	•
		CrNiMo steel	•	•	•	•	•
	CrNiMo steel	CrNiMo steel	•	•	•	•	•
			↓	↓	↓	↓	↓
Rotary piston material						Max. permissible liquid temperature	Weight appr. kg (lb)
Carbon							0.15 (0.3)
Cast iron							0.55 (1.2)
Cast iron, grooved							0.5 (1.1)
Ni-resist							0.55 (1.2)
Ni-resist, grooved							0.5 (1.1)
Hard rubber						40 °C (104 °F)	0.1 (0.2)
Hard rubber, grooved						40 °C (104 °F)	
PTFE with graphite filling						40 °C (104 °F)	0.3 (0.7)
PTFE with graphite filling, grooved						40 °C (104 °F)	
PTFE with graphite filling						90 °C (194 °F)	
PTFE with graphite filling, grooved						90 °C (194 °F)	
PCTFE						40 °C (104 °F)	0.16 (0.4)
PCTFE, grooved						40 °C (104 °F)	
CrNiMo with carbon contact surface							0.4 (0.9)
CrNiMo with PTFE contact surface							
Tappet bushing							
• With maintenance-free sealed bushing						2	
• With bellows ¹⁾						3	
Flow direction							
Mechanism shaft always vertical							
• From left to right, valve right						1	
• From right to left, valve left						2	
Quantity preset register							
(description on page 4/389)							
• Type 30						3 0	
• Type 30, ex-protected switch						5 4	
Value per revolution and adjustment step							
1 l/0,1 : 0,1 l						1	
10 l/1 : 1 l						2	
Accessories (description on page 4/394)							
Without							A
Mounted (separate Order No. required, see Selection and Ordering data table on page 4/369)							B
Tests							
Works test							A
Works test certificate							B
Preliminary official test up to 50 l/min (13.2 USgpm)							C ²⁾
Flanges							
Plane, drilled to EN 1092-1							0
Plane, drilled to specification							9 R 1 Y
With sealing ridge to specification							9 R 2 Y
The data of the liquid are always required: Temperature of the liquid, density, min. and max. flow rate, viscosity Please always specify in plain text or with Order code according to Selection and Ordering data table on page 4/370.							
Note: If pressure impacts are likely, the valve should be before the automatic batchmeter in the direction of flow. (See supplement A04, page 4/370)							

¹⁾ Restricted operating conditions (max. 40 °C (104 °F), max. 3 bar (43.5 psi))

²⁾ Not with PTFE and PCTFE pistons.

Accessories	Order No.	Informations relevant for ordering
Instruction Manual		see page 4/369
7MR111...		
• German	F) C73000-B5100-C20	
• English	F) C73000-B5176-C20	

F) Subject to export regulations AL: 91999, ECCN: N.

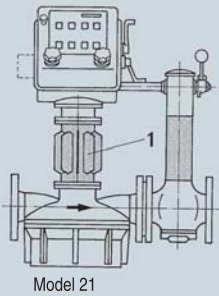
SITRANS F flowmeters

SITRANS F R

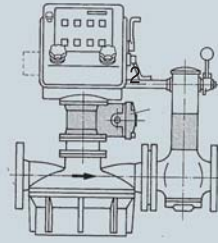
Rotary-piston meters - Ordering data
Accessories for automatic batchmeters

Order No.

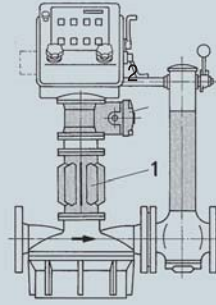
Accessories for automatic batchmeters



Model 21



Model 22



Model 23

- 1 Insulation attachment(s)
- 2 Pulser above intermediate gear

Design	Quantity preset register	Pulser with NAMUR output (8 V DC supply required from external unit)	Number of cooling attachments	Weight appr. kg (lb)	To order as accessory
			Permissible liquid temperature 80 °C (176 °F) 180 °C (356 °F) 300 °C (572 °F)		
21	With	Without	0 80 °C (176 °F)		Included in meter
21	With	Without	1 180 °C (356 °F)	1.3 (2.9)	7MV3021-1XX00
21	With	Without	2 300 °C (572 °F)	2.6 (5.7)	7MV3021-2XX00
22	With	With	0 80 °C (176 °F)	1.2 (2.7)	7MV3022-0■X00
23	With	With	1 180 °C (356 °F)	2.6 (5.7)	7MV3023-1■X00
23	With	With	2 300 °C (572 °F)	2.5 (5.5)	7MV3023-2■X00
Pulser (with inductive pick-up, page 4/395) mounted between rotary-piston meter and quantity preset register					
<ul style="list-style-type: none"> • 1 pick-up • 2 pick-ups 					A
10 pulses/revolution					B
<ul style="list-style-type: none"> • 1 pick-up • 2 pick-ups 					C
					D

Informations relevant for ordering

The informations relevant for ordering can be found in section „Introduction“ at the beginning of the chapter:

Application: see page 4/343

Function and design: see page 4/344

Configuration: see page 4/346 ff.

Operating limits:

- DN 25 (1"), flow rate 100 l/min (26.5 USgpm)
- DN 50 (2"), flow rate 500 l/min (132 USgpm)

Perm. liquid temp. and further Technical spec. see page 4/354 ff.

Dimensional drawings: see page 4/371 (dimensions of flanges) and pages 4/385 ff.

Mounting position: mechanism shaft vertical

Certificates and approvals

Classification according to pressure equipment directive (DGRL 97/23/EG):

For liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice SEP)

Ordering example see page 4/357

SITRANS F flowmeters

SITRANS F R

Rotary-piston meters - Ordering data Information on liquid / Further designs

Information on liquid

Order No. of rotary-piston meter according to pages 4/358 ff.
7MR1■■■■ - ■■■■■ - ■■■■■ - Z

Note:

If the Z options are missing in an order (Order Code for viscosity and required flow variable in operating mode), the ordered item is set to 1 mPa · s (cp) and the nominal flow rate.

Order codes

		■■■ + ■■■ + ■■■ + ■■■	
Temperature	°C (°F)		
In operating condition	10 (50)	C01	
	20 (68)	C02	
	30 (86)	C03	
	·	·	
	·	·	
In steps of ten up to	300 (572)	C30	
Viscosity ¹⁾	mPa·s (cp)		
In operating condition	0.1	F01	
(1 mPa·s = 1 cp)	0.2	F02	
	0.3	F03	
	·	·	
	·	·	
In steps of 0.1 up to	9.9	F99	
	10	G01	
	20	G02	
	30	G03	
	·	·	
	·	·	
In steps of 10 up to	990	G99	
	1 000	H01	
	2 000	H02	
	3 000	H03	
	·	·	
	·	·	
In steps of 1000 up to	99 000	H99	
> 99000 mPa · s (cp) on request			
Flow rate	l/min (USgpm)		
In operating condition	1 (0.26)	K01	
	2 (0.53)	K02	
	3 (0.79)	K03	
	·	·	
	·	·	
In steps of 1 up to	99 (26.2)	K99	
	100 (26.4)	L01	
	200 (52.8)	L02	
	300 (79.2)	L03	
	·	·	
	·	·	
In steps of 100 up to	1 000 (264)	L10	

¹⁾ If the viscosity exceeds 60 mPa·s (cp) (order code G06 ... G99), constructional details of the shut-off valve cone must be changed.

Further designs

Order code

Order No. of the rotary-piston meter according to page 4/358 ff.; 7MR1■■■■ - ■■■■■ - ■■■■■ - Z

Mechanical shut-off valve

In flow direction in front of the rotary-piston meter (only with the automatic batchmeters 7MR111■■... and 7MR141■■... if pressure surges are to be expected)

A04

Material acceptance test to EN 10 204-3.1

E01

Stainless steel rating plate

fixed with stainless steel wire

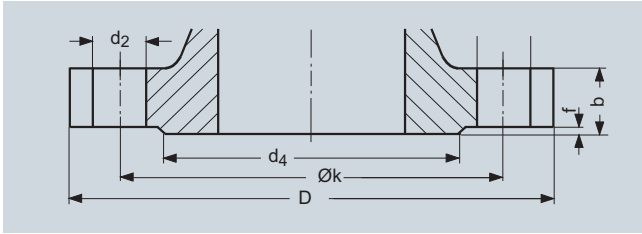
Y17

Order code for temperature, viscosity, flow and medium must be specified in plain text:

Y17:

Dimensional drawings

Dimensions of flanges



Dimensions of flanges

Dimensions of flanges drilled according to EN

Order No.	Material	Nom. diameter DN	Nom. pressure PN	Dimensions of flanges with plain sealing					Additional dimensions for flanges with raised face							
				Ø D	Ø k	n holes	Ø d ₂	b	Ø d ₄	f						
				mm	mm		mm	mm	mm	mm						
7MR1020	E/D/S	15	25	95	65	4	14	16	45	2						
7MR1030	E/D		40													
7MR1110/111■	E/D/S	25	10	115	85	4	14	16	68	2						
7MR1120	E/D		25					18								
7MR1130	E/D		40													
7MR1140	E/D		63					140			100	4	18	24	68	2
7MR1410/141■	E/D	50	6	165	125	4	18	17	102	3						
7MR1410/141■	S		16													
7MR1420	E/D/C		25					20								
7MR1430	E/D		40													
7MR1440	E		63					180			135	4	22	26	–	–
7MR1610/161■	E/D	80	4	190	150	4	18	18	128	3						
7MR1610/161■	S		6													
7MR1620	E/D		25					200			160	8	18	22	138	3
7MR1630	E/D		40													
7MR1640	E		63					215			170	8	22	28	138	3

Dimensions of flanges drilled according to ASME

Order No.	Material	Nom. diameter	Rated pressure MWP	Dimensions of flanges with plain sealing					Additional dimensions for flanges with raised face							
				Ø D	Ø k	n holes	Ø d ₂	b	Ø d ₄	f						
		inch	inch	inch	inch		inch	inch	inch	inch						
7MR1020	E/D/S	1/2	300 ... 600	3 ³ / ₄	2 ⁵ / ₈	4	5 ⁵ / ₈	16	1 ³ / ₈	1 ¹ / ₁₆						
7MR1030	E/D															
7MR1110/111■	E/D/S	1	150	4 ¹ / ₄	3 ¹ / ₈	4	5 ⁵ / ₈	16	2	1 ¹ / ₁₆						
7MR1120	E/D		300 ... 600					4 ⁷ / ₈			3 ¹ / ₂	4	3 ³ / ₄	18	2	1 ¹ / ₁₆
7MR1130	E/D															
7MR1140	E/D		900 ... 1 500					5 ⁷ / ₈			4	4	1	24	2	1 ¹ / ₄
7MR1410/141■	E/D/S	2	150	6	4 ³ / ₄	4	3 ³ / ₄	17	3 ⁵ / ₈	1 ¹ / ₁₆						
7MR1420	E/D/C		300 ... 600					6 ¹ / ₂			5	8	3 ³ / ₄	20	3 ⁵ / ₈	1 ¹ / ₁₆
7MR1430	E/D															
7MR1440	E		900 ... 1 500					8 ¹ / ₂			6 ¹ / ₂	8	1	26	3 ⁵ / ₈	1 ¹ / ₄
7MR1610/161■	E/D/S	3	150	7 ¹ / ₂	6	4	3 ³ / ₄	18	5	1 ¹ / ₁₆						
7MR1620	E/D		300 ... 600					8 ¹ / ₄			6 ⁵ / ₈	8	7 ⁷ / ₈	22	5	1 ¹ / ₁₆
7MR1630	E/D															
7MR1640	E		900 ... 1 500					10 ¹ / ₂			8	8	1 ¹ / ₄	28	5	1 ¹ / ₄

SITRANS F flowmeters

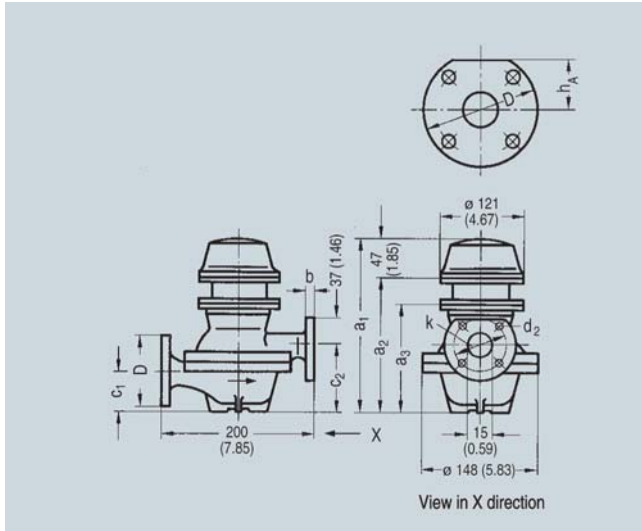
SITRANS F R

Rotary-piston meters - Dimensional drawings

Rotary-piston meter DN 15 (1/2")

Rotary-piston meter DN 15 (1/2")

Rotary-piston meter DN 15 (1/2") without accessories

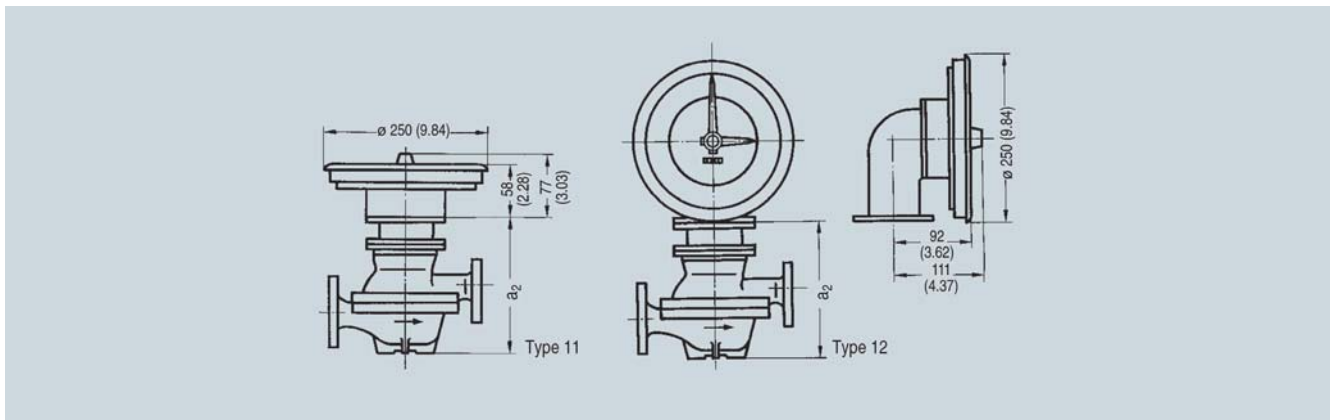


Rotary-piston meter DN 15 (1/2") with single-pointer dial type 01, without heating device, dimensions in mm (inch)

Rotary-piston meter with single-pointer dial type 01, (PN 25 (MWP 363 psi))

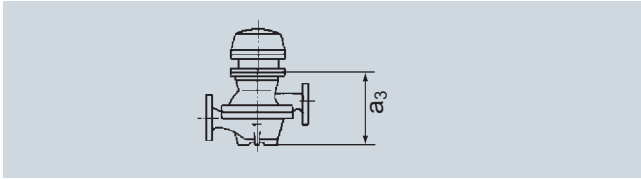
Dimensions	Heating system		
	with	without	
	PN 25 (MWP 363 psi)	PN 25 (MWP 363 psi)	PN 40 (MWP 580 psi)
	mm (inch)	mm (inch)	mm (inch)
a ₁	224 (8.82)	247 (9.72)	249 (9.80)
a ₂	177 (6.97)	200 (7.87)	202 (7.95)
a ₃	140 (5.51)	163 (6.42)	165 (6.50)
c ₁	50 (1.97)	66 (2.60)	68 (2.68)
c ₂	83,5 (3.29)	106 (4.17)	108 (4.25)
g	-	100 (3.94)	92 (3.62)
h	-	G ^{3/4}	G ^{3/8}
h _A	37 (1.46)	37 (1.46)	37 (1.46)
l	-	22 (0.87)	26 (1.02)

Dimensions of flanges see page 4/371



Rotary-piston meter DN 15 (1/2") with double-pointer dial, dimensions in mm (inch)

Rotary-piston meter DN 15 (1/2") with accessories, other heights/footprints also available



Rotary piston meter DN 15 (1/2") without accessories

Mechanical registers

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/372), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

Addition of	$a_3 +$
Intermediate gear	37 (1.46)
Single-pointer dial type 01	47 (1.85)
Double-pointer dial type 11	58 (2.28)
Double-pointer dial type Typ 12	250 (9.84)
Pulser	82 (3.23)
1 additional insulation attachment (up to 180°C (176°F))	159 (6.26)
2 additional insulation attachments	318 (12.52)

Digital displays with current/pulse output

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/372), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

Addition of	$a_3 +$
Pulser and protective cover	85 (3.35)
Pulser, mounting bracket and SITRANS F RA110	260 (10.24)
1 additional insulation attachment	159 (6.26)
2 additional insulation attachments	318 (12.52)

SITRANS F flowmeters

SITRANS F R

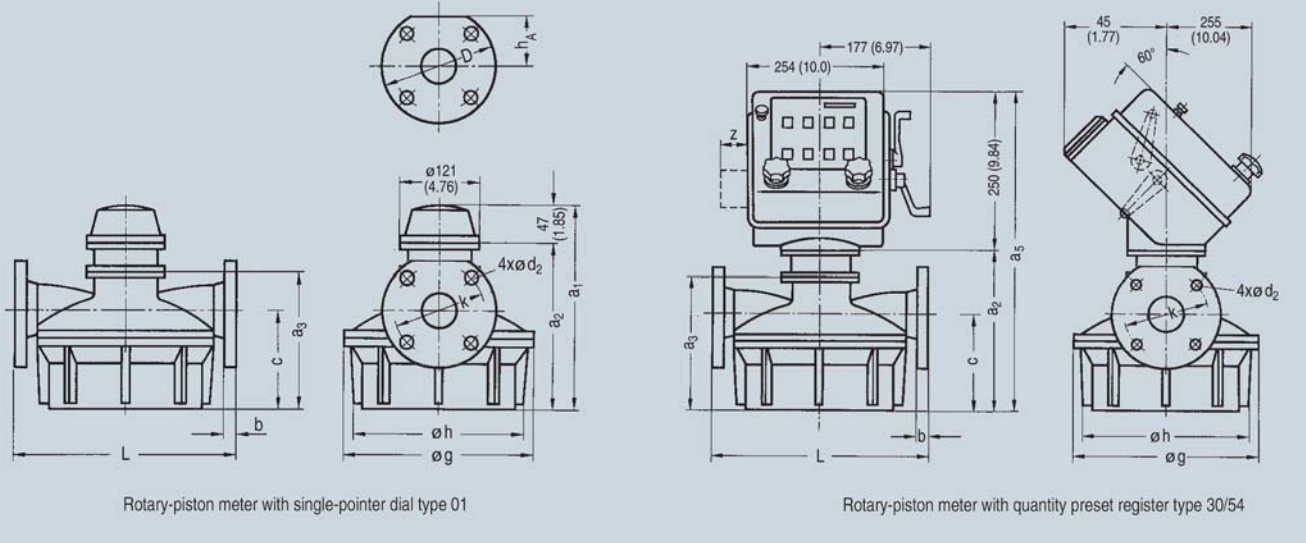
Rotary-piston meters - Dimensional drawings

Rotary-piston meter DN 25 (1")

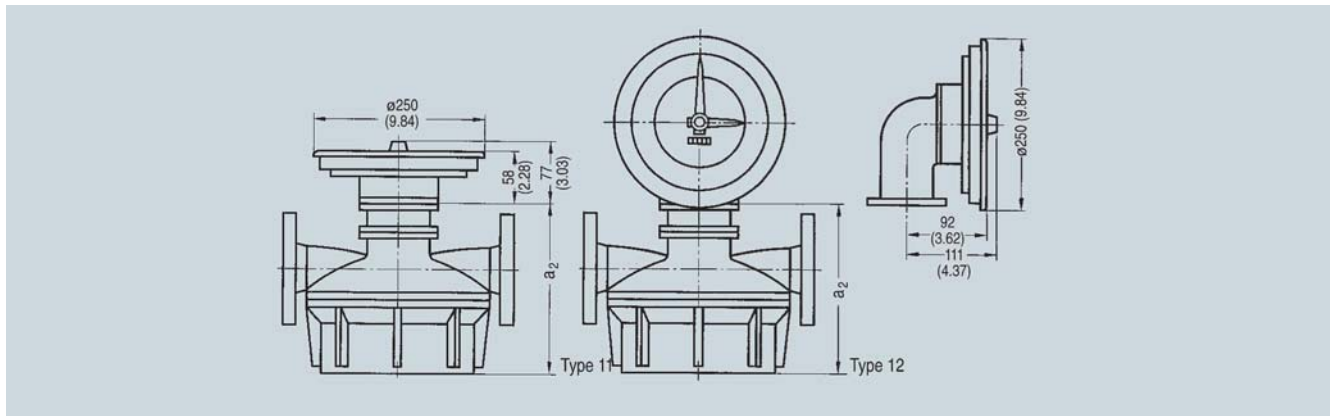
Rotary-piston meter DN 25 (1")

Rotary-piston meter DN 25 (1") without accessories

For PN 10 and PN 16 (MWP 145 psi and 232 psi)



Rotary-piston meter DN 25 (1") for PN 10 and PN 16 (MWP 145 psi and 232 psi) with single-pointer, with quantity preset register, dimensions in mm (inch)



Rotary-piston meter DN 25 (1") for PN 10 and PN 16 (MWP 145 psi and 232 psi) with double pointer dial, dimensions in mm (inch)

Rotary-piston meter DN 25 (1") for PN 10 and PN 16 (MWP 145 psi and 232 psi) without accessories, dimensions in mm (inch)

With single-pointer dial type 01 or with double pointer dial

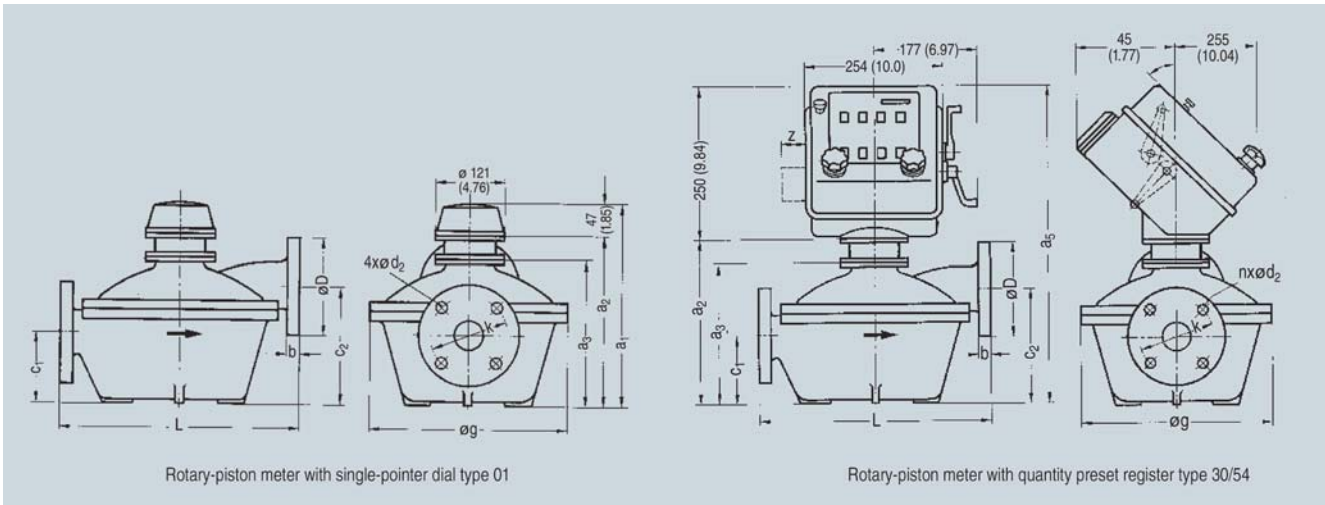
a_1	a_2	a_3	c	d_1	e	g	h	h_A	L
237 (9.33)	190 (7.48)	153 (6.02)	90 (3.54)	14 (0.55)	115 (4.53)	155 (6.10)	140 (5.51)	48 (1.89)	210 (8.27)

With quantity preset register type 54

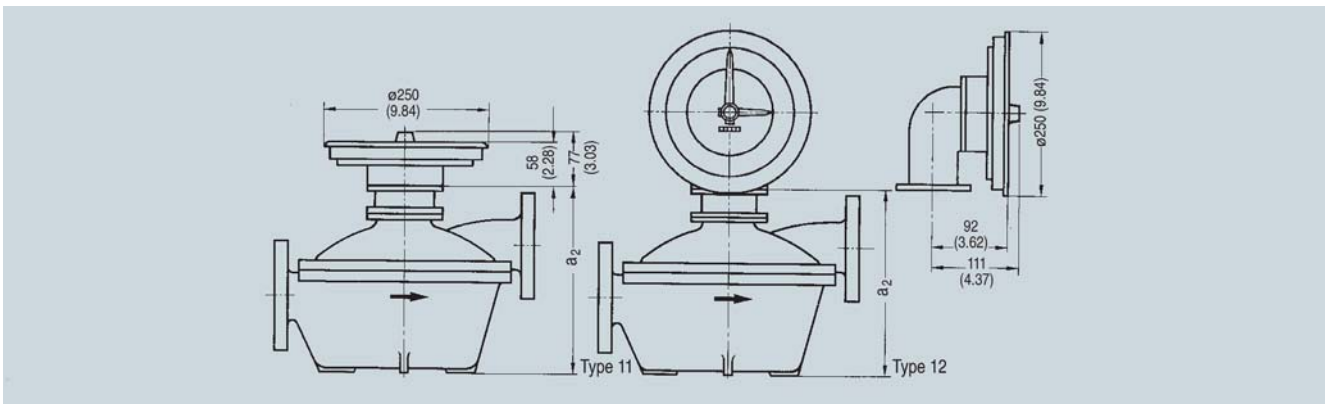
a_2	a_3	a_5	c	g	h	h_A	L	z
190 (7.48)	153 (6.02)	440 (17.32)	90 (3.54)	155 (6.10)	140 (5.51)	48 (1.89)	210 (8.27)	54 (2.10) for electric switch

Dimension of flanges see page 4/371

For rated pressure PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi)



Rotary-piston meters DN 25 (1") for PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi) with single-pointer dial or with quantity preset register, dimensions in mm (inch)



Rotary-piston meter DN 25 (1") for PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi) with double pointer dial, dimensions in mm (inch)

Rotary-piston meters DN 25 (1") for PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi) without accessories, dimensions in mm (inch)

With single-pointer dial type 01 or with double pointer dial

	a_1	a_2	a_3	c_1	c_2	g	L
• PN 25, PN 40 (MWP 363 psi, 580 psi)	292 (11.50)	245 (9.65)	208 (8.19)	80 (3.15)	144 (5.67)	205 (8.07)	270 (10.63)
• PN 63 (MWP 914 psi)	308 (12.13)	261 (10.28)	224 (8.82)	82 (3.23)	157 (6.18)	230 (9.06)	300 (11.81)

With quantity preset register type 54

	a_2	a_3	a_5	c_1	c_2	g	L	z
• PN 25, PN 40 (MWP 363 psi, 580 psi)	245 (9.65)	208 (8.19)	495 (19.48)	80 (3.15)	144 (5.67)	205 (8.07)	270 (10.63)	54 (2.10) for electric switch
• PN 63 (MWP 914 psi)	261 (10.28)	224 (8.82)	511 (20.12)	82 (3.23)	157 (6.18)	230 (9.06)	300 (11.81)	54 (2.10) for electric switch

Dimension of flanges see page 4/371

SITRANS F flowmeters

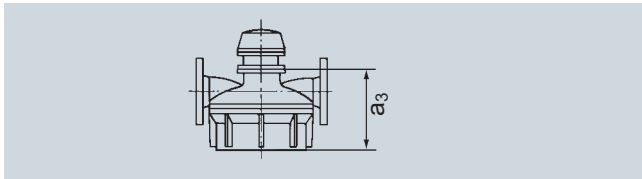
SITRANS F R

Rotary-piston meters - Dimensional drawings

Rotary-piston meter DN 25 (1")

Rotary-piston meter DN 25 (1") with accessories, other heights/footprints also available

For rated pressure PN 10 and PN 16 (MWP 145 psi and 232 psi)



Rotary piston meter DN 25 (1") without accessories

Mechanical registers

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/374), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

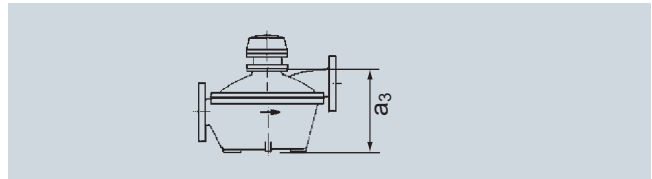
Addition of	$a_3 +$
Intermediate gear	37 (1.46)
Single-pointer dial type 01	47 (1.85)
Double-pointer dial type 11	58 (2.28)
Double-pointer dial type Typ 12	250 (9.84)
Pulser	82 (3.23)
1 additional insulation attachment (up to 180°C (176°F))	159 (6.26)
2 additional insulation attachments	318 (12.52)
Intermediate gear	287 (11.30)

Digital displays with current/pulse output

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/374), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

Addition of	$a_3 +$
Pulser and protective cover	85 (3.35)
Pulser, mounting bracket and SITRANS F RA110	260 (10.24)
1 additional insulation attachment	159 (6.26)
2 additional insulation attachments	318 (12.52)

For rated pressure PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi)



Rotary piston meter DN 25 (1") without accessories

Mechanical registers

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/375), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

Addition of	$a_3 +$
Intermediate gear	37 (1.46)
Single-pointer dial type 01	47 (1.85)
Double-pointer dial type 11	58 (2.28)
Double-pointer dial type Typ 12	250 (9.84)
Pulser	82 (3.23)
1 additional insulation attachment (up to 180°C (176°F))	159 (6.26)
2 additional insulation attachments	318 (12.52)
Intermediate gear	287 (11.30)

Digital displays with current/pulse output

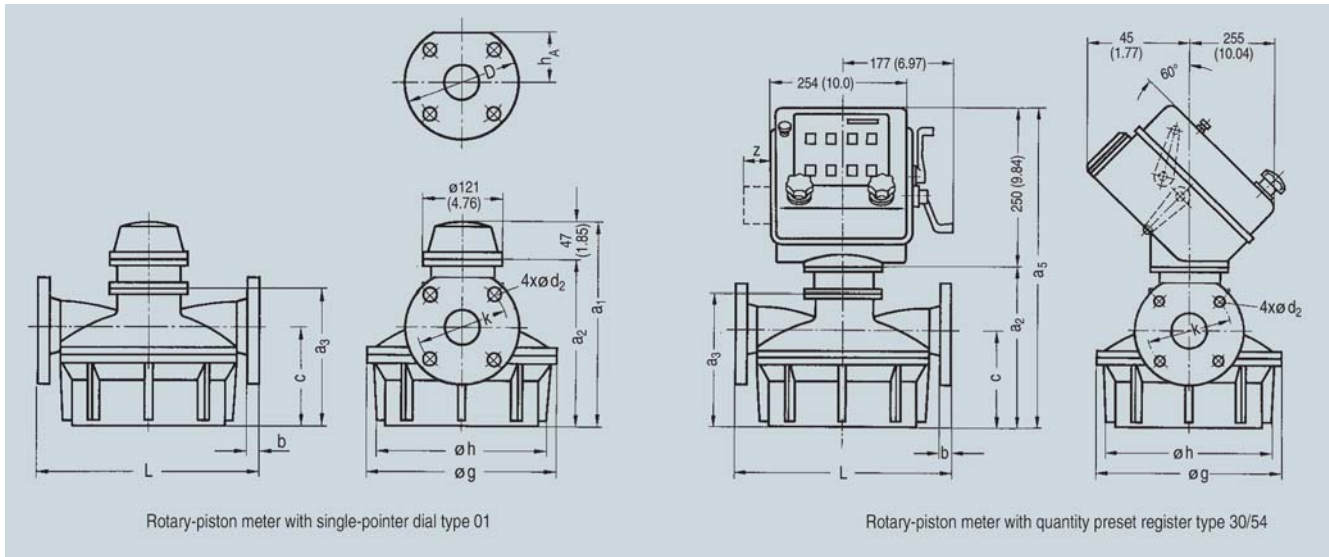
In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/375), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

Addition of	$a_3 +$
Pulser and protective cover	85 (3.35)
Pulser, mounting bracket and SITRANS F RA110	260 (10.24)
1 additional insulation attachment	159 (6.26)
2 additional insulation attachments	318 (12.52)

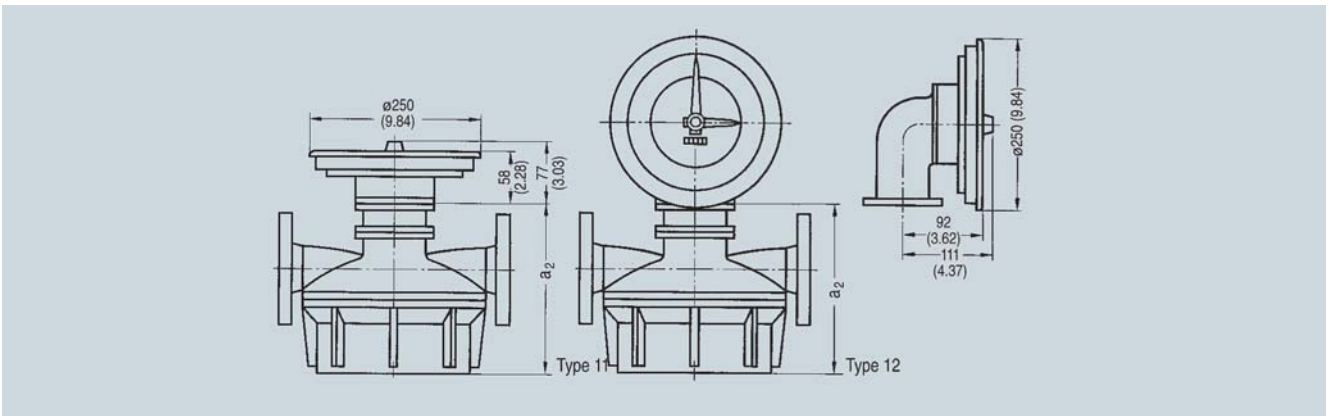
Rotary-piston meter DN 50 (2")

Rotary-piston meter DN 50 (2") without accessories

For rated pressure PN 6 and PN 16 (MWP 87 psi and 232 psi)



Rotary-piston meter DN 50 (2") for PN 6 and PN 16 (MWP 87 psi and 232 psi) with single-pointer dial bzw. with quantity preset register, dimensions in mm (inch)



Rotary-piston meter DN 50 (2") for PN 6 and PN 16 (MWP 87 psi and 232 psi) with double-pointer dial, dimensions in mm (inch)

Rotary-piston meter DN 50 (2") for PN 6 and PN 16 (MWP 87 psi and 232 psi) without accessories, dimensions in mm (inch)

with single-pointer dial Typ 01 bzw. with double-pointer dial

a ₁	a ₂	a ₃	c	d ₁	e	g	h	h _A	L
289 (11.38)	242 (9.53)	205 (8.07)	147 (5.79)	18 (0.71)	165 (6.50)	275 (10.83)	250 (9.84)	75 (2.95)	325 (12.80)

with quantity preset register Typ 54

a ₂	a ₃	a ₅	c	g	h	h _A	L	z
242 (9.53)	205 (8.07)	492 (19.37)	147 (5.79)	275 (10.83)	250 (9.84)	75 (2.95)	325 (12.80)	54 (2.10) for electric switch

Dimension of flanges see page 4/371

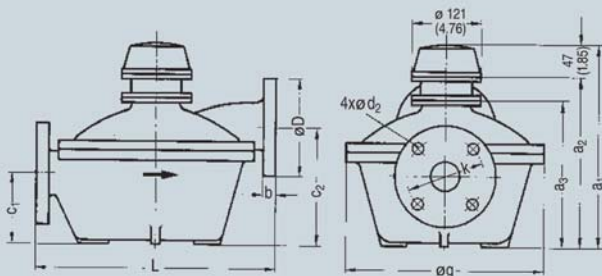
SITRANS F flowmeters

SITRANS F R

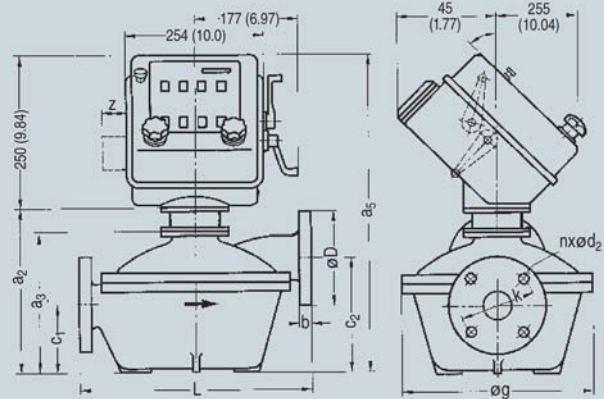
Rotary-piston meters - Dimensional drawings

Rotary-piston meter DN 50 (2")

For rated pressure PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi)

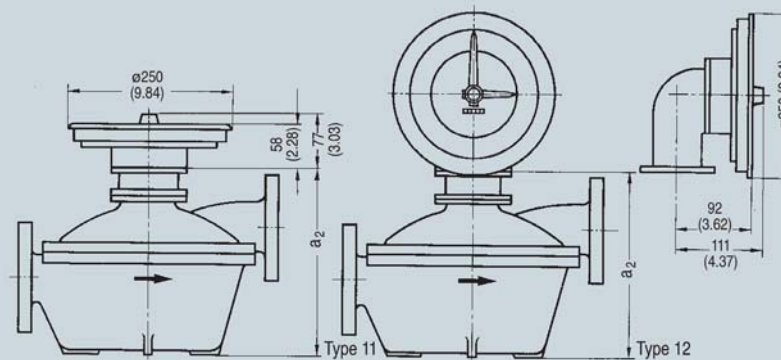


Rotary-piston meter with single-pointer dial type 01



Rotary-piston meter with quantity preset register type 30/54

Rotary-piston meter DN 50 (2") for PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi) with single-pointer dial bzw. with quantity preset register, dimensions in mm (inch)



Rotary-piston meter DN 50 (2") for PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi) with double-pointer dial, dimensions in mm (inch)

Rotary-piston meter DN 50 (2") for PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi) without accessories, dimensions in mm (inch)

with single-pointer dial Typ 01 bzw. with double-pointer dial

	a ₁	a ₂	a ₃	c ₁	c ₂	g	L
• PN 25, PN 40 (MWP 363 psi, 580 psi)	347 (13.66)	300 (11.81)	263 (10.35)	120 (4.7)	205 (8.1)	330 (12.99)	400 (15.75)
• PN 63 (MWP 914 psi)	369 (14.53)	322 (12.68)	285 (11.22)	120 (4.7)	230 (9.1)	385 (15.16)	470 (18.50)

with quantity preset register Typ 54

	a ₂	a ₃	a ₅	c ₁	c ₂	g	L	z
• PN 25, PN 40 (MWP 363 psi, 580 psi)	300 (11.8)	263 (10.4)	550 (21.7)	120 (4.7)	205 (8.1)	330 (12.99)	400 (15.75)	54 (2.10) for electric switch
• PN 63 (MWP 914 psi)	332 (12.7)	285 (11.2)	572 (22.5)	120 (4.7)	230 (9.1)	385 (15.2)	470 (18.50)	54 (2.10) for electric switch

Dimension of flanges see page 4/371

SITRANS F flowmeters

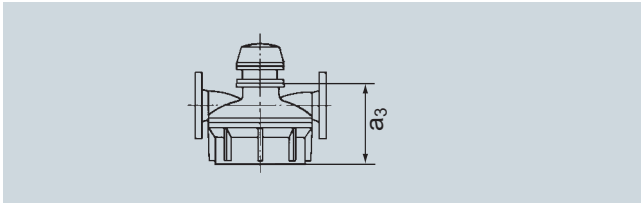
SITRANS F R

Rotary-piston meters - Dimensional drawings

Rotary-piston meter DN 50 (2")

Rotary-piston meter DN 50 (2") with accessories, other heights/footprints also available

For rated pressure PN 6 and PN 16 (MWP 87 psi and 232 psi)



Rotary piston meter DN 50 (2") without accessories

Mechanical registers

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/377), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

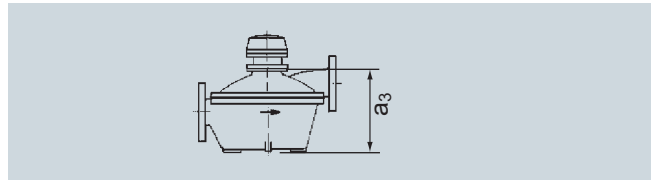
Addition of	$a_3 +$
Intermediate gear	37 (1.46)
Single-pointer dial type 01	47 (1.85)
Double-pointer dial type 11	58 (2.28)
Double-pointer dial type Typ 12	250 (9.84)
Pulser	82 (3.23)
1 additional insulation attachment (up to 180°C (176°F))	159 (6.26)
2 additional insulation attachments	318 (12.52)
Intermediate gear	287 (11.30)

Digital displays with current/pulse output

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/377), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

Addition of	$a_3 +$
Pulser and protective cover	85 (3.35)
Pulser, mounting bracket and SITRANS F RA110	260 (10.24)
1 additional insulation attachment	159 (6.26)
2 additional insulation attachments	318 (12.52)

For rated pressure PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi)



Rotary piston meter DN 50 (2") without accessories

Mechanical registers

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/378), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

Addition of	$a_3 +$
Intermediate gear	37 (1.46)
Single-pointer dial type 01	47 (1.85)
Double-pointer dial type 11	58 (2.28)
Double-pointer dial type Typ 12	250 (9.84)
Pulser	82 (3.23)
1 additional insulation attachment (up to 180°C (176°F))	159 (6.26)
2 additional insulation attachments	318 (12.52)
Intermediate gear	287 (11.30)

Digital displays with current/pulse output

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/378), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

Addition of	$a_3 +$
Pulser and protective cover	85 (3.35)
Pulser, mounting bracket and SITRANS F RA110	260 (10.24)
1 additional insulation attachment	159 (6.26)
2 additional insulation attachments	318 (12.52)

SITRANS F flowmeters

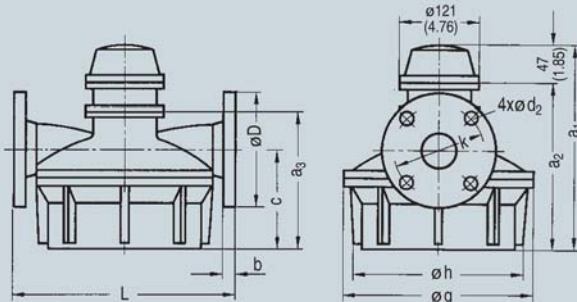
SITRANS F R

Rotary-piston meters - Dimensional drawings

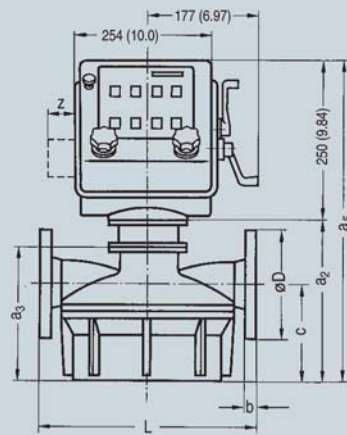
Rotary-piston meter DN 80 (3")

Rotary-piston meter DN 80 (3") without accessories

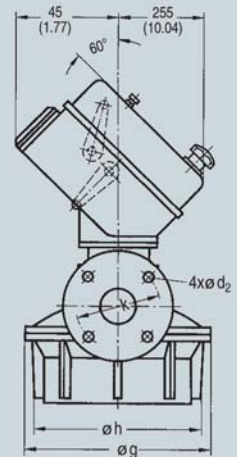
For rated pressure PN 6 (MWP 58 psi and 87 psi)



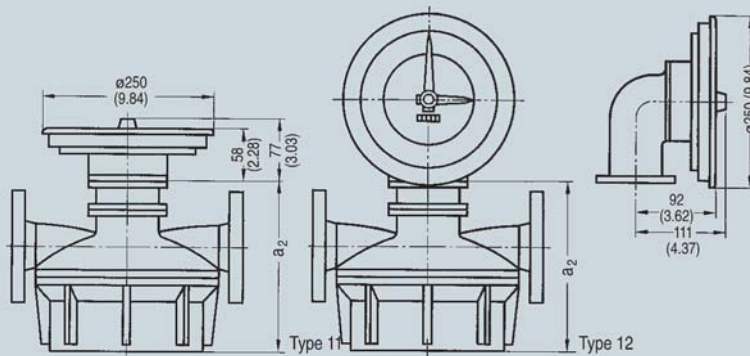
Rotary-piston meter with single-pointer dial type 01



Rotary-piston meter with quantity preset register type 30/54



Rotary-piston meter DN 80 (3") for PN 6 (MWP 58 psi and 87 psi) with single-pointer dial bzw. with quantity preset register, dimensions in mm (inch)



Rotary-piston meter DN 80 (3") for PN 6 (MWP 58 psi and 87 psi) with double-pointer dial, dimensions in mm (inch)

Rotary-piston meter DN 80 (3") for PN 4 and PN 6 (MWP 58 psi and 87 psi) without accessories, dimensions in mm (inch)

with single-pointer dial Typ 01 bzw. with double-pointer dial

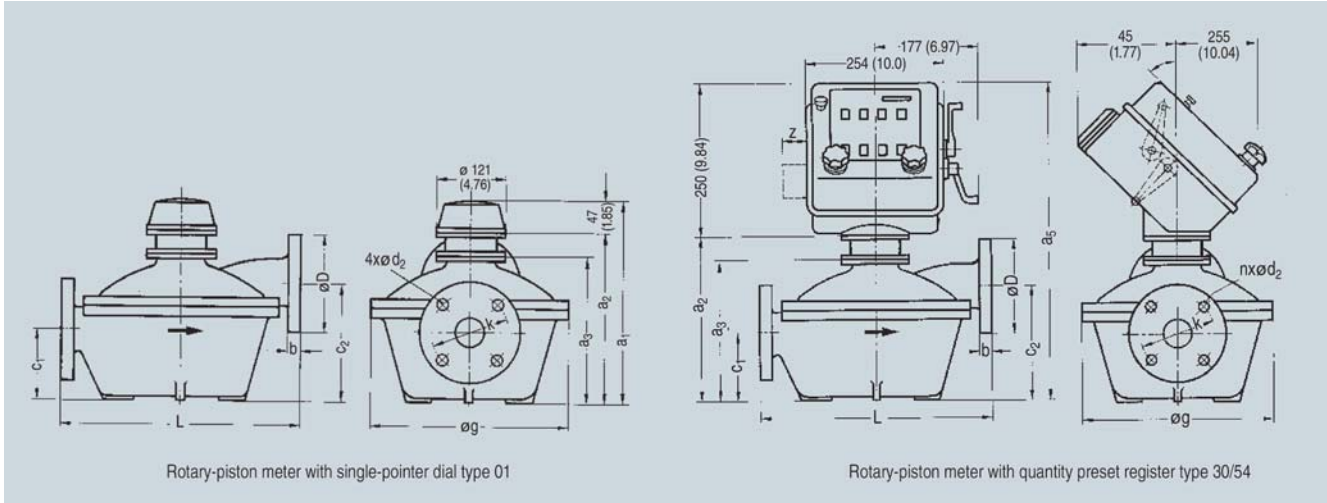
a_1	a_2	a_3	c	d_1	e	g	h	L
328 (12.91)	281 (11.06)	244 (9.61)	185 (7.28)	18 (0.71)	190 (7.48)	365 (14.37)	340 (13.39)	410 (16.14)

with quantity preset register Typ 54

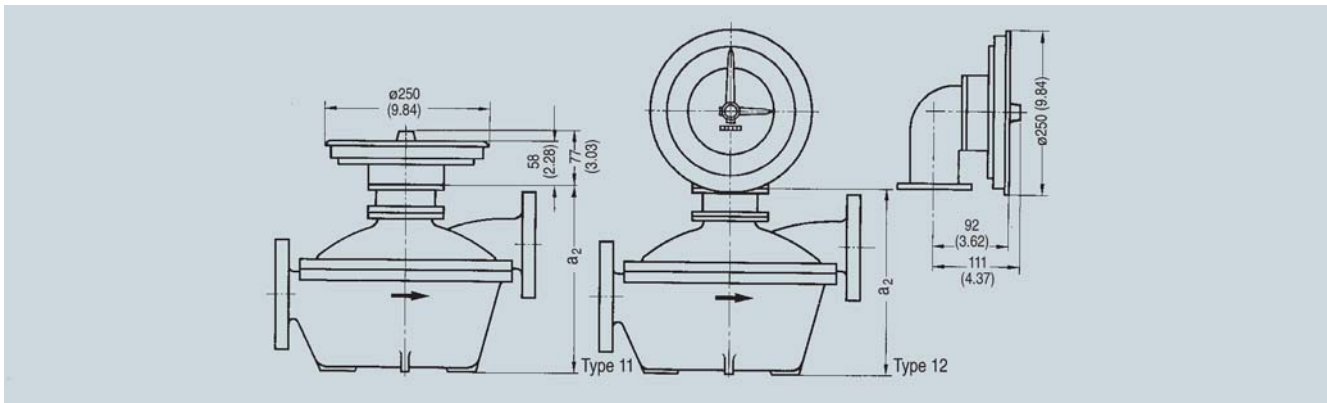
a_2	a_3	a_5	c	e	g	h	L	z
281 (11.06)	244 (9.61)	531 (20.91)	185 (7.28)	190 (7.48)	365 (14.37)	340 (13.39)	410 (16.14)	54 (2.10) for electric switch

Dimension of flanges see page 4/371

For rated pressure PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi)



Rotary-piston meter DN 80 (3") for PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi) with single-pointer dial bzw. with quantity preset register, dimensions in mm (inch)



Rotary-piston meter DN 80 (3") for PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi) with double-pointer dial, dimensions in mm (inch)

Rotary-piston meter DN 80 (3") for PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi) without accessories, dimensions in mm (inch)

with single-pointer dial Typ 01 bzw. with double-pointer dial

	a ₁	a ₂	a ₃	c ₁	c ₂	g	L
• PN 25, PN 40 (MWP 363 psi, 580 psi)	415 (16.34)	368 (14.49)	331 (13.03)	155 (6.10)	271 (10.67)	450 (17.72)	540 (21.26)
• PN 63 (MWP 914 psi)	471 (18.54)	424 (16.69)	387 (15.24)	177 (6.97)	312 (12.28)	515 (20.28)	600 (23.62)

with quantity preset register Typ 54

	a ₂	a ₃	a ₅	c ₁	c ₂	g	L	z
• PN 25, PN 40 (MWP 363 psi, 580 psi)	368 (14.48)	331 (13.03)	618 (24.33)	155 (6.10)	271 (10.67)	450 (17.72)	540 (21.26)	54 (2.10) for electric switch
• PN 63 (MWP 914 psi)	424 (16.69)	387 (15.24)	674 (26.54)	177 (6.97)	312 (12.28)	515 (20.28)	600 (23.62)	54 (2.10) for electric switch

Dimension of flanges see page 4/371

SITRANS F flowmeters

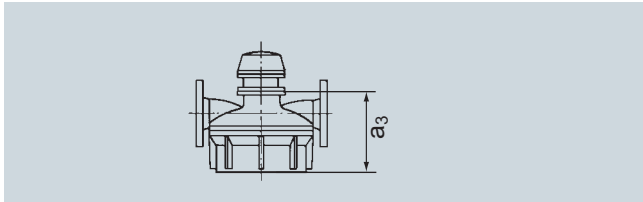
SITRANS F R

Rotary-piston meters - Dimensional drawings

Rotary-piston meter DN 80 (3")

Rotary-piston meter DN 80 (3") with accessories, other heights/footprints also available

For rated pressure PN 6 and PN 16 (MWP 87 psi and 232 psi)



Rotary piston meter DN 80 (3") without accessories

Mechanical registers

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/380), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

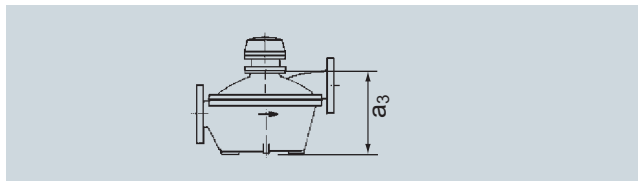
Addition of	$a_3 +$
Intermediate gear	37 (1.46)
Single-pointer dial type 01	47 (1.85)
Double-pointer dial type 11	58 (2.28)
Double-pointer dial type Typ 12	250 (9.84)
Pulser	82 (3.23)
1 additional insulation attachment (up to 180°C (176°F))	159 (6.26)
2 additional insulation attachments	318 (12.52)
Intermediate gear	287 (11.30)

Digital displays with current/pulse output

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/380), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

Addition of	$a_3 +$
Pulser and protective cover	85 (3.35)
Pulser, mounting bracket and SITRANS F RA110	260 (10.24)
1 additional insulation attachment	159 (6.26)
2 additional insulation attachments	318 (12.52)

For rated pressure PN 25, PN 40 and PN 63 (MWP 363 psi, 580 psi and 914 psi)



Rotary piston meter DN 80 (3") without accessories

Mechanical registers

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/381), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

Addition of	$a_3 +$
Intermediate gear	37 (1.46)
Single-pointer dial type 01	47 (1.85)
Double-pointer dial type 11	58 (2.28)
Double-pointer dial type Typ 12	250 (9.84)
Pulser	82 (3.23)
1 additional insulation attachment (up to 180°C (176°F))	159 (6.26)
2 additional insulation attachments	318 (12.52)
Intermediate gear	287 (11.30)

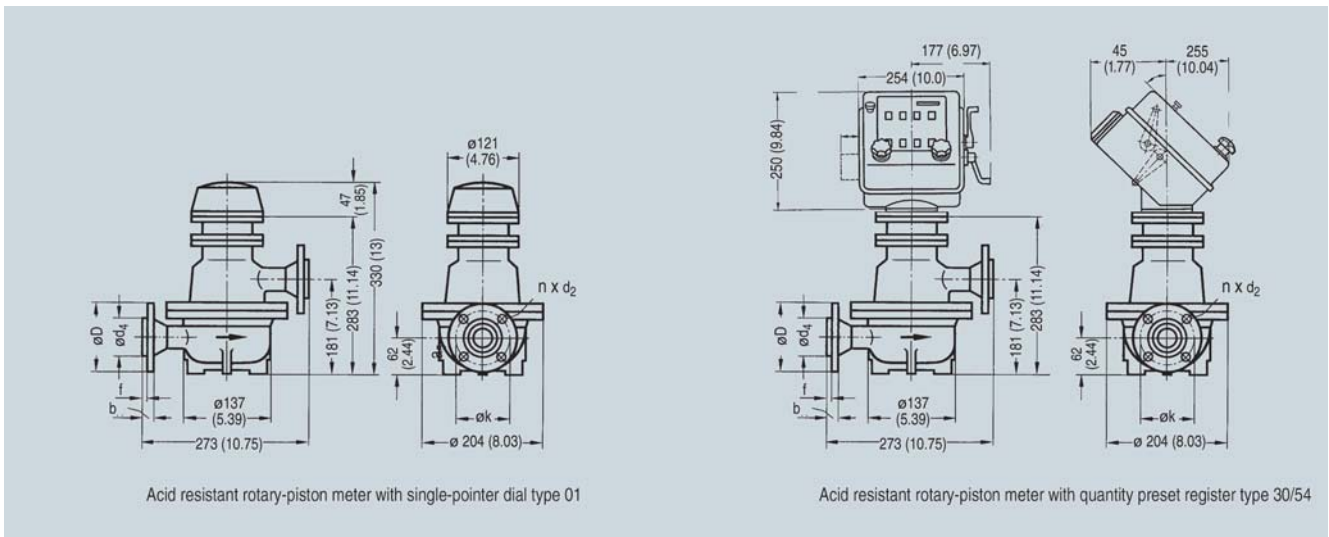
Digital displays with current/pulse output

In addition to dimension a_3 (lower part to top part of enclosure, cf. table on page 4/381), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

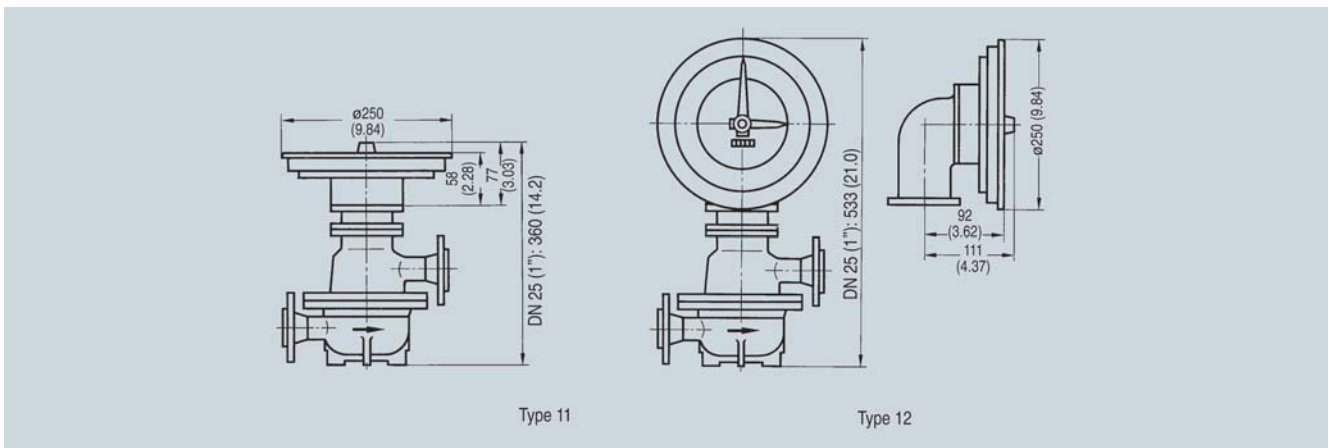
Addition of	$a_3 +$
Pulser and protective cover	85 (3.35)
Pulser, mounting bracket and SITRANS F RA110	260 (10.24)
1 additional insulation attachment	159 (6.26)
2 additional insulation attachments	318 (12.52)

Acid resistant rotary-piston meter DN 25 (1")

Acid resistant rotary-piston meter DN 25 (1") without accessories



Acid resistant rotary-piston meter DN 25 (1") for PN 10 (MWP 145 psi) with single-pointer dial or quantity preset register, dimensions in mm (inch), dimensions of flanges see page 4/371



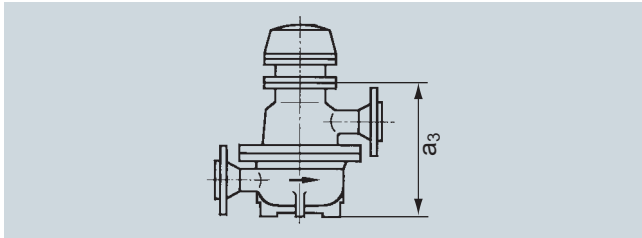
Acid resistant rotary-piston meter DN 25 (1") for PN 10 (MWP 145 psi) with double-pointer dial, dimensions in mm (inch), dimensions of flanges see page 4/371

SITRANS F flowmeters

SITRANS F R

Rotary-piston meters - Dimensional drawings Acid resistant rotary-piston meter DN 25 (1")

Acid resistant rotary-piston meter DN 25 (1") with accessories,
other heights/footprints also available



Rotary piston meter DN 80 (3") without accessories

Mechanical registers

In addition to dimension a_3 (lower part to top part of enclosure, cf. fig. on page 4/383), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

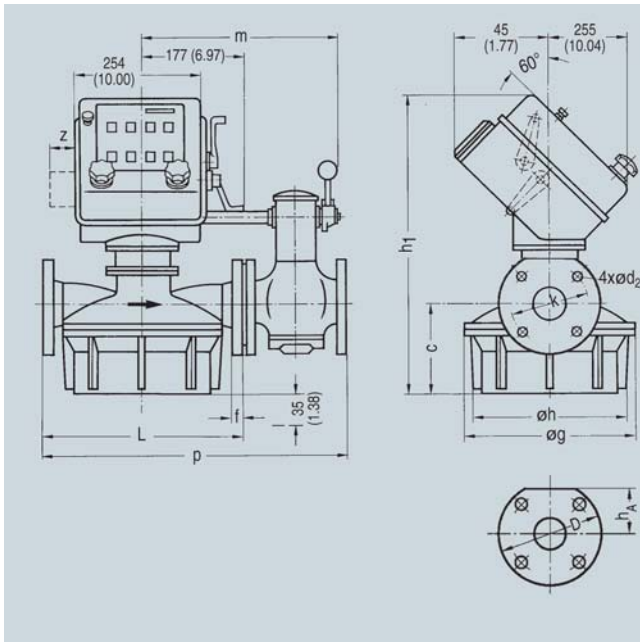
Addition of	$a_3 +$
Intermediate gear	37 (1.46)
Single-pointer dial type 01	47 (1.85)
Double-pointer dial type 11	58 (2.28)
Double-pointer dial type Typ 12	250 (9.84)
Pulser	82 (3.23)
1 additional insulation attachment (up to 180°C (176°F))	159 (6.26)
2 additional insulation attachments	318 (12.52)
Intermediate gear	287 (11.30)

Digital displays with current/pulse output

In addition to dimension a_3 (lower part to top part of enclosure, cf. fig. on page 4/383), the following dimensions need to be added (dimensions in mm (inch)) for extra add-on components.

Addition of	$a_3 +$
Pulser and protective cover	85 (3.35)
Pulser, mounting bracket and SITRANS F RA110	260 (10.24)
1 additional insulation attachment	159 (6.26)
2 additional insulation attachments	318 (12.52)

Automatic batchmeter DN 25 (1")



Automatic batchmeter DN 25 (1") for PN 10 (MWP 145 psi) with quantity preset register, dimensions in mm (inch)

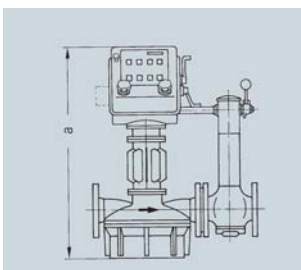
Automatic batchmeter DN 25 (1") for PN 10 (MWP 145 psi) with quantity preset register type 30, without accessories, dimensions in mm (inch)

c	g	h	h _A	h ₁	L	m	p	z
90 (3.54)	155 (6.10)	140 (5.51)	48 (1.89)	440 (17.32)	210 (8.27)	241 (9.49)	345 (13.58)	54 (2.1) for electric switch

See page 4/371 for flange dimensions

Automatic batchmeter DN 25 (1") with accessories; dimensions in mm (inch)

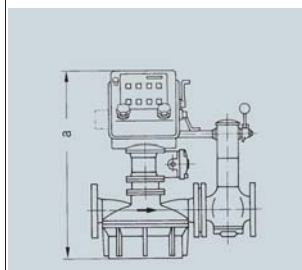
Model 21



Dimension a for automatic batchmeter with 1 heat insulation attachment

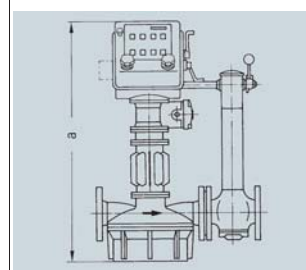
599 (23.58)

Model 22



522 (20.55)

Model 23



681 (26.81)

Dimension a for automatic batchmeter with 2 heat insulation attachments

758 (29.84)

-

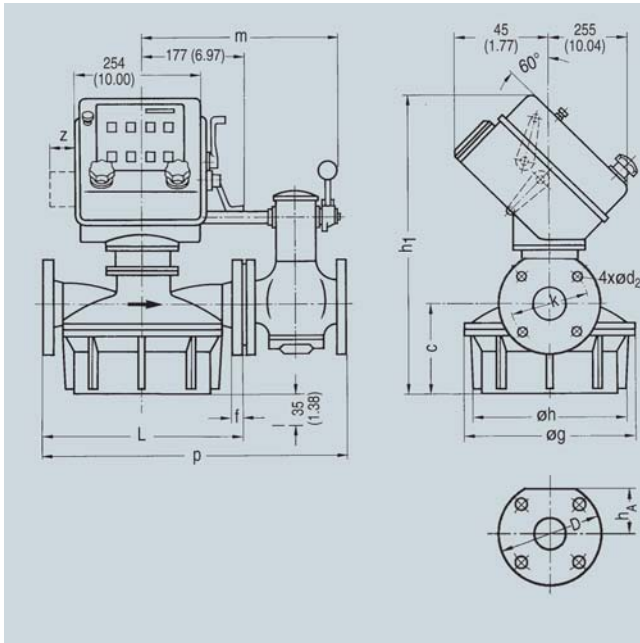
840 (33.07)

SITRANS F flowmeters

SITRANS F R

Rotary-piston meters - Dimensional drawings Automatic batchmeter DN 50 (2")

Automatic batchmeter DN 50 (2")



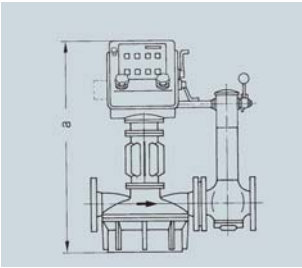
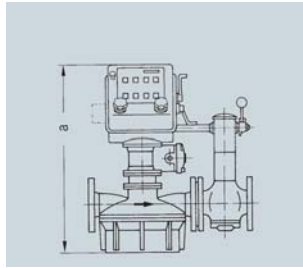
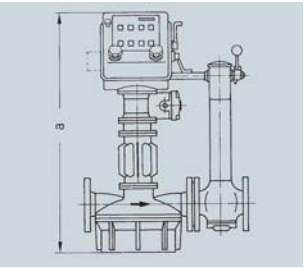
Automatic batchmeter DN 50 (2") with quantity preset register;
dimensions in mm (inch)

Automatic batchmeter DN 50 (2") for PN 6 and PN 10 (MWP 87 psi and 145 psi) with quantity preset register type 30, without accessories, dimensions in mm (inch)

c	g	h	h _A	h ₁	L	m	p	z
147 (5.79)	275 (10.83)	250 (9.84)	75 (2.96)	492 (19.37)	325 (12.80)	318 (12.52)	500 (19.68)	54 (2.1) for electric switch

See page 4/371 for flange dimensions

Automatic batchmeter DN 50 (2") for PN 6 and PN 10 (MWP 87 psi and 145 psi), with accessories, dimensions in mm (inch)

Model 21	Model 22	Model 23
		
Dimension a for automatic batchmeter with 1 heat insulation attachment 651 (25.63)	574 (22.60)	733 (28.86)
Dimension a for automatic batchmeter with 2 heat insulation attachments 810 (31.89)	-	892 (35.12)

Overview

Register and quantity preset registers



Registers

Single-pointer dial

Type 01

- Non-resettable pointer dial
- Non-resettable 5-digit drum-type counter



Double-pointer dial

Type 11
Type 12

- Resettable pointer dial
- Non-resettable 5-digit totalizer

Accessories

- Hand lever
- Electric and pneumatic switches



Quantity preset registers

4-digit quantity preset register

Type 30

Resettable 6-digit drum-type counter

Type 54



Electric flow registers SITRANS F RA110

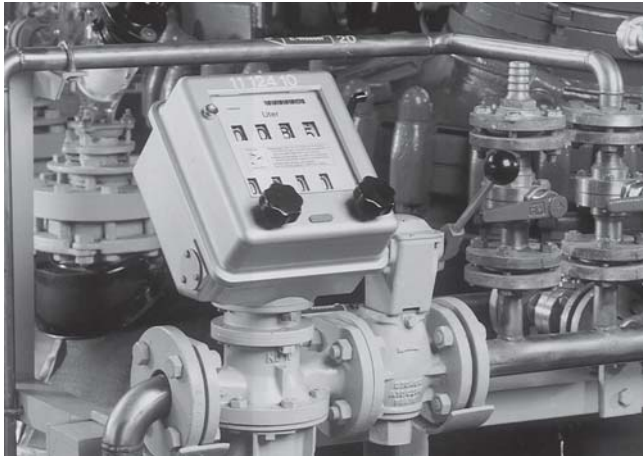
- Large LCD for displaying the current value, total value and accumulated total
- Remote design

SITRANS F flowmeters

SITRANS F R

Rotary-piston meters
Registers and quantity preset registers

Design



Automatic batchmeter for solvent in a chemical plant

All registers and quantity preset registers have a transmission ratio of 1:1 and differ only in the scale inscriptions (value per revolution). The dimension of the value per revolution corresponds to the scale inscription. The value per revolution is formed by a separate intermediate gear belonging to the meter mechanism. The intermediate gears are normally assembled with the metering mechanism into one unit - the meter. The registers and quantity preset registers are also available as separate instruments since they are often installed separately from the metering mechanism, e.g. in a central control room.

All registers and quantity preset registers have a standard mounting flange which fits all metering mechanisms and accessories. The registers and quantity preset registers can be mounted in four positions, displaced at 90° around the line joining the register (quantity preset register) to the metering mechanism.

The following types are available:

- Pointer dials
- Quantity preset registers

Pointer dials

The following 2 types are available.

Non-resettable single-pointer dial with 5-digit drum-type counter: One revolution of the pointer corresponds to an advance of one figure on the fastest roller of the drum-type counter. Individual quantities are determined from the difference of two readings.

Resettable double-pointer dial with non-resettable 5-digit drum-type counter:

The small pointer indicates the full value per revolution of the large pointer. One revolution of the large pointer corresponds to one revolution of the fastest roller of the totalizer.

Quantity preset register

4-digit preset register with resettable 6-digit drum-type counter. The graduations on the fifth number drum make it possible to display an exact figure. When the filling processes is complete, the graduation is transferred by activation of the lever on the sixth number drum (graduation drum) and at the same time all the number drums are lined up exactly.

This guarantees optimum readability. The green/red status display indicates whether the volume meter is available or not.

A non-resettable 8-digit totalizer adds all the output volumes on an ongoing basis (control function).

The quantity preset register can be mounted individually with electric signal transmitters for separate shut-off valves or on the meter with a mechanical shut-off valve.

The latter version – the automatic batchmeter – enables any quantity of liquid to be preselected and automatically delivered without the need for an additional power supply. In this case, the quantity to be delivered is preset on the register before metering. The drum-type counter is at zero. Delivery commences when the shut-off valve is opened. The quantity preset register runs backwards towards zero, the drum-type counter counts forwards. The flow rate is throttled automatically, step by step, down to approx. 15 % of the initial value when the preset quantity has almost been reached. The valve closes completely when the preset quantity has been reached.

In emergencies, the filling process can be interrupted by pressing a stop button.

It is often necessary to locate the valve separate from the quantity preset register. In this case, the turn-on and turn-off movements of the quantity preset register must be transmitted to the valve by a control unit and a supplementary force.

Desiccant device

Quantity preset registers are always supplied with a desiccant device. This consists of a desiccant chamber and a replaceable desiccant cartridge. The cartridge contains silica gel.

The color of the silica gel changes from blue to pinkish red as soon as moisture is absorbed. The shade indicates the degree of saturation of the cartridge.



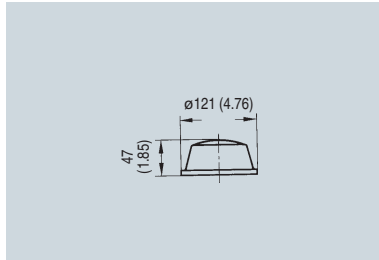
Quantity preset register with desiccant cartridge removed

Registers, Technical specifications and Selection and Ordering data

Order No.

Non-resettable single-pointer dial

Scale diameter 100 mm (3.94 inch), permissible operating temperature 90 °C (194 °F), any mounting position, weight approx. 0.8 kg (1.76 lb)

Type 01

Single-pointer dial
Drum-type counter

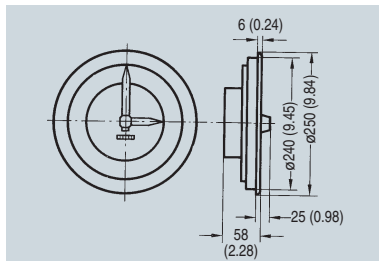
Value per revolution Minimum delivery of the pointer quantity

Value per revolution End value of fastest roller

 1 l 0.01 l
 10 l 0.1 l
 100 l 1 l
 1 m³ 0.01 m³

 10 l 99 999 l
 100 l 999 999 l
 1 000 l 9 999 999 l
 10 m³ 99 999 m³
7MV1001-1A
7MV1001-2A
7MV1001-3A
7MV1001-4A
Resettable double-pointer dial

Scale diameter 200 mm (7.87 inch), permissible operating temperature 60 °C (140 °F), without return flow lock

Type 11


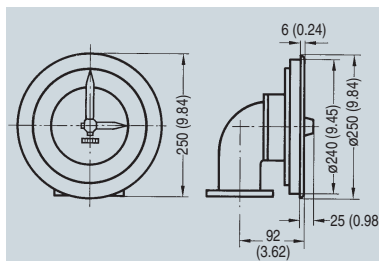
Scale vertical, any mounting position, weight approx. 1.5 kg (3.3 lb)

Double-pointer counter
Totalizer

Value per revolution Smallest scale large/small pointer division

Value per revolution End value of fastest roller

 1/50 l 0.005 l
 10/500 l 0.05 l
 100/5 000 l 0.5 l
 1/50 m³ 0.005 m³

 10 l 9 999 l
 100 l 99 999 l
 1 000 l 999 999 l
 10 m³ 9 999 9 m³
7MV1011-0A
7MV1011-1A
7MV1011-2A
7MV1011-3A
Type 12


Scale vertical, mounting with axis of mechanism vertical, weight approx. 2.5 kg (5.5 lb)

Double-pointer counter
Totalizer

Value per revolution Smallest scale large/small pointer division

Value per revolution End value of fastest roller

 1/50 l 0.005 l
 10/500 l 0.05 l
 100/5 000 l 0.5 l
 1/50 m³ 0.005 m³

 10 l 9 999 l
 100 l 99 999 l
 1 000 l 999 999 l
 10 m³ 9 999.9 m³
7MV1012-0A
7MV1012-1A
7MV1012-2A
7MV1012-3A

SITRANS F flowmeters

SITRANS F R

Rotary-piston meters Registers and quantity preset registers

Quantity preset register, Technical specifications and Selection and Ordering data

Order No.

4-digit preset register; 4-digit resettable drum-type counter and 7-digit non-resettable totalizer

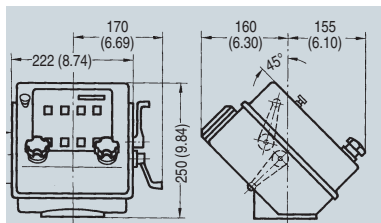
Drum-type counter and totalizer run synchronously. One desiccant cartridge is included in delivery.

Permissible operating temperature max. 60 °C (140 °F), scale inclined at 45°, mounting with axis of mechanism vertical

- **Type 30:** Without accessories (order accessories of choice with separate Order No. acc. to page 4/391), weight appr. 10 kg (22 lb)
- **Type 54:** With electrical switch (explosion-proof) (see page 4/391), weight approx. 10.6 kg (23.4 lb)

7MV1030-

7MV1054-



Preset register			Totalizer	
Value per revolution of fastest drum	Adjustment step	Largest setting quantity	Value per revolution of fastest drum	End value
1 l	0.1 : 0.1 l	999.9 l	1 l	999 999 l
10 l	1 : 1 l	9 999 l	10 l	9 999 999 l
100 l	10 : 10 l	99 990 l	100 l	99 999 990 l
1 m ³	100 : 100 l	999 m ³	1 m ³	999 999.9 m ³

1 A

2 A

3 A

4 A

Notes:

The stated mounting position relates to the connecting line from register or quantity preset register to mechanism (axis of mechanism).

Step sheets can be supplied printed or unprinted and are easy to replace. Operator notices are available in various languages.

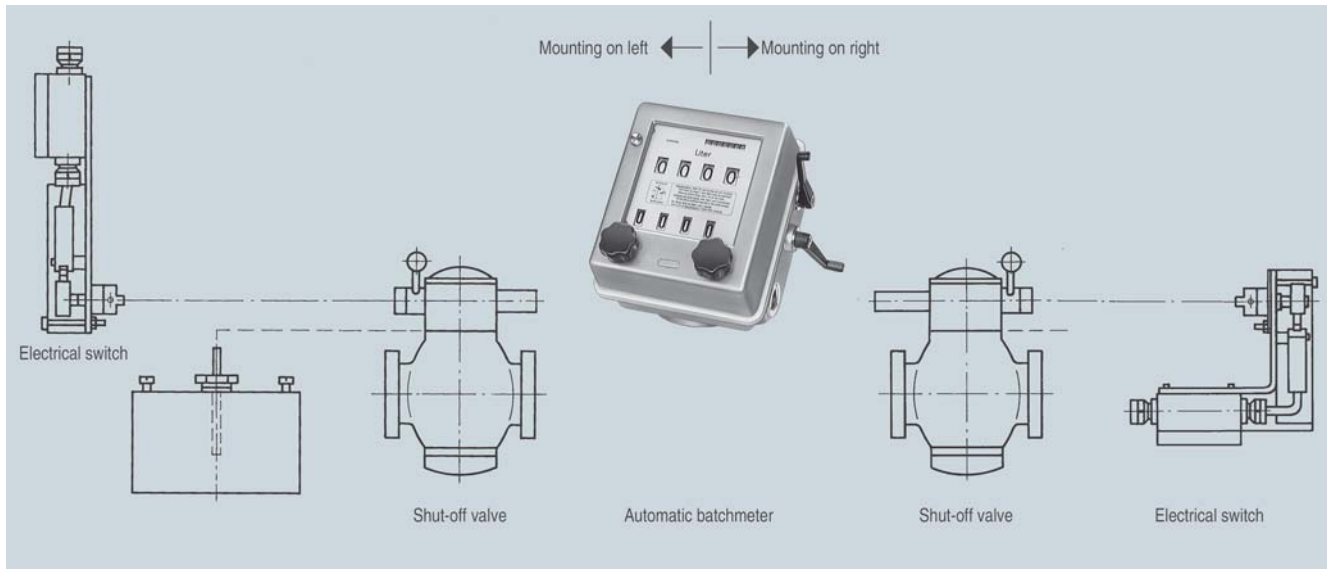
Should a register or quantity preset register be ordered together with an intermediate gear, then the value per revolution must be specified in plain text in order to obtain the correct decimal indication.

Ordering of spare parts

Should a register or quantity preset register be ordered separately, then a separate intermediate gear (see page 4/397) should be ordered with it. This intermediate gear is to be selected in accordance with the existing meter mechanism size and the desired value per revolution.

Accessories	Order No.	
	German	English
Instruction Manual		
Pointer dials		
• 7MV1001- ...	F) C73000-B5100-C8	F) C73000-B5176-C8
• 7MV101.	F) C73000-B5100-C16	F) C73000-B5176-C16
Quantity preset register		
• 7MV1030-... and 7MV1054-...	F) C73000-B5100-C6	F) C73000-B5176-C6

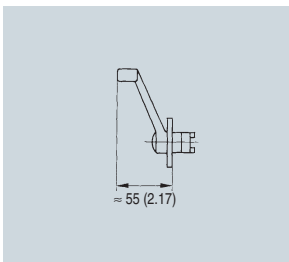
Accessory devices for quantity preset registers with mechanical shut-off valve (automatic batchmeter)



Selection and Ordering data

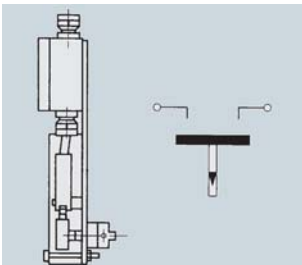
Order No.

Hand lever

F) **C70428-A17-B160**

To initiate the filling process, the control shaft of the quantity preset counter must be turned to the initial position with the hand lever, while the shut-off valve is opened through a control unit. The hand lever is mounted on the right. The hand lever is not required if the quantity preset counter is equipped with a pneumatic multi-stage switch or a mechanical shut-off valve (automatic batchmeter).

Electrical switch (explosion-protected)



Degree of protection	EC-Type Examination Certificate PTB 00 ATEX 1093X Ex 2G Ex d IIC
Contact	One normally-open contact
Switching voltage	Max. 380 V AC
Switching current	Max. 6 A
Electrical connection	Screwed gland Pg 16
Ambient temperature	Max. 60 °C (140 °F)
Mounting	On the left On the right

F) **C74315-A19-A21**F) **C74315-A19-A22**

SITRANS F flowmeters

SITRANS F R

Rotary-piston meters
Electric flow register SITRANS F RA110

Overview



Application

The display of the electric flow register is a universal LCD for converting the measured value and displaying the current value, total value and accumulated total. Depending on the design, the flow register can be provided with a scaleable pulse output for the total value and/or a current output of 0/4 to 20 mA.

Design

The electric flow register is fitted with a large, extremely clear LCD (90 x 40 mm in size), where the flow and total value are displayed with seven 17 mm digits and 8 mm digits respectively. Units, time units, flow trend and device status are displayed in addition.

The electronics is fitted in a rugged aluminium housing (IP67) with three large keys. The alphanumeric menu structure in English or German permits simple configuring and can be used for many applications.

Models 61, 63, 65 and 66, 67, 68 are supplied with the electric flow register already mounted on the pulser.

Function

The flow register of the SITRANS F RA110 receives, e.g. from a pulser, information on the current flow. This information is converted into the flow per second, minute, hour or day using a programmable 7-digit K-factor. Conversion is also carried out for the total values and accumulated totals. The units for the flow and accumulated total are completely independent.

The total value can be reset by pressing the "CLEAR" key twice. The accumulated total cannot be reset and is displayed with 11 digits.

The standard configuration displays the total value (17 mm digits) and the flow (8 mm digits) simultaneously. It is also possible to output the current value on the 17 mm digits. In this case, the total value is displayed by pressing "SELECT". The electric register has inputs for Namur sensors. Connection is possible to practically every available sensor system.

The active and passive 0/4 to 20 mA analog output has a resolution of 12 bits and can be connected to a load of 750 Ω .

The pulse output can be exactly defined, e.g. to generate one pulse per 3.5 liters. The pulse lengths can be set to 1 to 9 999 ms. The maximum output frequency is limited to 500 Hz. The transistor can switch max. 50 V DC/ 300 mA.

All configuration parameters are saved in an EEPROM. The total value and the accumulated total are saved once a minute, so that only a minimum amount of information is lost in the event of a power failure.

The SITRANS F RA110 can be ordered with powerful LED background lighting for use under unfavorable viewing conditions.

The menu language of the displays can be set to German or English.

Technical specifications

Input

Pulse input	NAMUR signal
Frequency	NAMUR: 0 ... 500 Hz
Sensor supply	8.2 V or 24 V DC

Output

Pulse output	Max. frequency 500 Hz, pulse width 1 ... 9999 ms adjustable. Type: Transistor output, max. load 24 V DC/170 mA (active) and 50 V DC/300 mA (passive)
Analog output	Range 0/4 ... 20 mA, accuracy: $\pm 0.1\%$, resolution 12 bit, response time (10 ... 90 %): 100 ms, load max. 750 Ω , active or passive, function: flow 0/4 ... 20 mA freely adjustable

Functionality

Operator	The total value and flow are displayed. The total value is deleted by double-pressing the "CLEAR" key. The total value and the accumulated total are displayed by pressing the "SELECT" key.
Total value	17 mm (0.67 inch) high, 7 digits, max. 3 decimal places; the total value can not be deleted. Units: l, m ³ , gal, USg, kg, lb, bbl or none K-factor: 7-digit 0.000010 to 9 999 999 Settings independent of flow
Accumulated total	8 mm high (0.31 inch), max. 11 digits, max. 3 decimal places, the accumulated total cannot be reset
Flow rate	8 mm (0.31 inch) or 17 mm (0.65 inch) high, max. 7 digits, max. 3 decimal places Units: ml, l, m ³ , mg, g, kg, ton, NI, Nm ³ , scf, ref, cf, lb, bbl, gal or none Time units: second, minute, hour, day

Rated conditions

Operating temperature	-40 ... +80 °C (-40 ... +176 °F)
Degree of protection	IP67 (NEMA 4)

Design

Material	Housing: aluminium, UV-resistant powder coating Window: Polycarbonate Gasket material: Silicone
Dimensions	See dimensional drawings

Power supply

Power supply with	24 V AC/DC $\pm 10\%$ or 115/230 V AC $\pm 10\%$
Power consumption	Max. 9 W

Certificate and approvals

Ex protection	EEx ia IIB/IIC T4
For official calibration inspections	In preparation

SITRANS F flowmeters

SITRANS F R

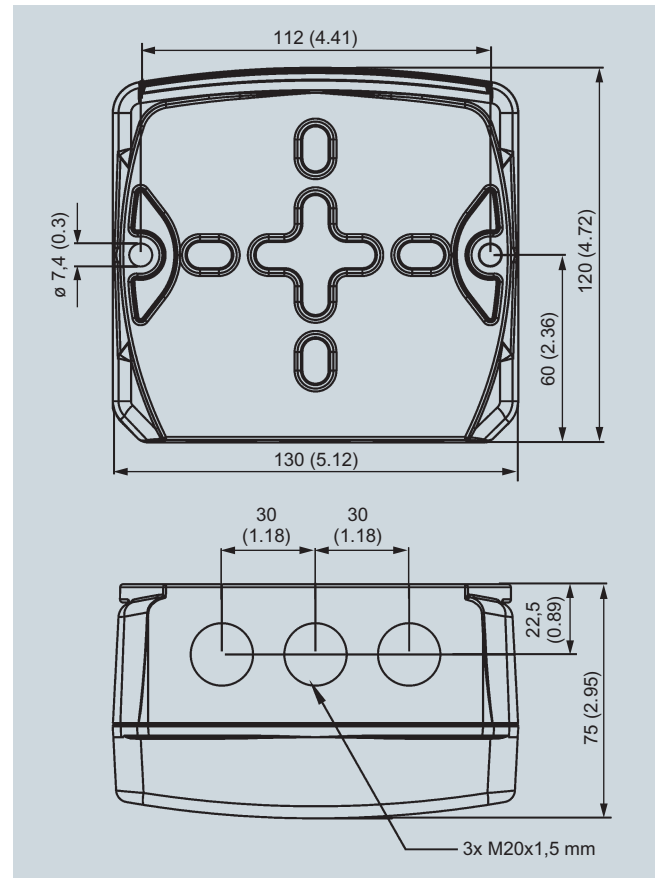
Rotary-piston meters
Electric flow register SITRANS F RA110

Selection and Ordering data	Order No.
Electric flow register SITRANS F RA110	7MV1070-
Electric register in aluminium housing for display of flow and total quantity, 7-digit LCD, IP67 (NEMA 4), without explosion protection, menu language German/English	A 0
Signal input	
NAMUR signal	1
Power supply	
Incl. sensor supply 8.2 V DC	A
24 V AC/DC ¹⁾	B
230 V AC ¹⁾	C
16 ... 30 V DC ²⁾	
Function (output)	
Display of flow and total value	A 0
Additional active pulse output ¹⁾	B 1
Additional passive pulse output	B 2
Additional active pulse output and current output ¹⁾	C 1
Additional passive pulse output and current output	C 2
Installation	
For wall mounting	0
Explosion protection	
without	0
EEx ia IIB/IIC T4 up to max. 100 °C	1
LED background lighting	
without	A
with background lighting	B

- 1) Not for ATEX version
2) For ATEX version only

Note:
Cable glands for M20 are not included in delivery.

Dimensional drawings



Electric flow register SITRANS F RA110, dimensions in mm (inch)

SITRANS F flowmeters

SITRANS F R

Rotary-piston meters
Accessory modules

Overview

Accessory modules



Pulser with inductive pick-up

- For quantity measurements in conjunction with electromechanical and electronic pulse counters
- As transmitter with output signal for further electronic processing
- As transmitter for measuring points in potentially explosive atmospheres



Intermediate gear¹⁾ and protective cover

Is employed if, for example: Several accessories with different values per revolution are driven by one mechanism.

The protective cover is used to cover the pulser if no register is employed.

¹⁾ always required with mechanical displays



Cooling attachment

- For preventing heat transfer from the metering mechanism to the dial mechanism or pulser

No diagram

Extension shafts

- For shut-off valves

Rotary-piston meters - Accessory modules

Pulser with inductive pick-up

Overview



Pulser with inductive pick-up

The pulser is used for quantity metering in conjunction with electromechanical pulse counters as a transmitter with output signals for electronic data processing.

Using the pulser, quantity measurements from volumetric meters can be converted into electrical pulses for remote transmission.

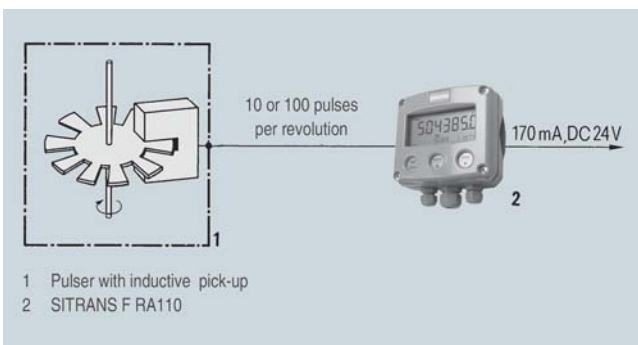
Design

- Electronic design
- High pulse frequency ($\leq 3\,000$ Hz)
- Electronic output
 - 170 mA, 24 V DC (delivering current) for electromechanical pulse counters
 - 2 mA, 24 V DC (absorbing current) for electronic processing

Function

Pulse valence with quantity measurements

Conversion of metered quantities into electrical pulses



Measuring system for remote metering and digital data processing

The metering shaft of the volumetric meter drives a pulse disk. The vanes of the pulse disk successively enter the air gap of an inductive pick-up, thus changing the coupling between two coils. This causes a change in resistance that is converted into a pulse by the subsequent pulse amplifier, which also powers the pick-up.

The pulser operates without contacts. No measurable force is exerted on the disk. Hence the system is free from feed-backs.

Depending on the design, 10 or 100 pulses are produced for each revolution of the drive. The pulse amplifier amplifies the incoming pulses. A timing circuit prevents a continuous output pulse.

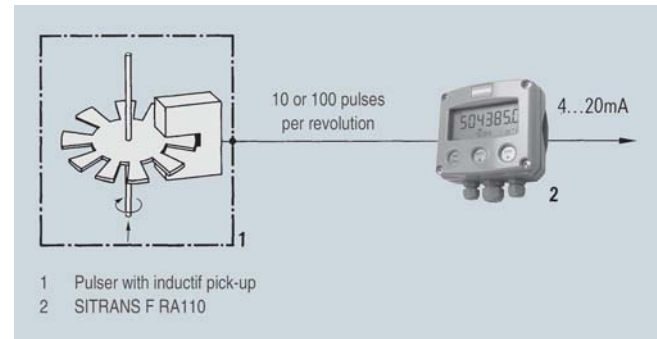
The quantitative value associated with one pulse depends on the value per revolution of the drive (pulses per liter or gallon) or on the respective volume of the measuring chamber of the drive.

The selection of the pulser – whether 10 or 100 pulses per drive revolution – is to be made according to the desired resolution.

Pulsers with two inductive pick-ups are available for systems for custody transfer since at present the PTB regulations specify a duplicated transmission system with pulse comparison.

Pulse valence with flow rate measurements

Conversion of metered quantities into electrical pulses



Measuring system for flow-rate measurement

During flow measurements, the change in resistance is converted to pulses by SITRANS F RA110. Each pulse corresponds to a given quantity of metered liquid. The number of pulses per unit in time (the frequency) is a measure of the flow rate.

SITRANS F RA110 converts the incoming NAMUR signals into load-independent direct current.

The electric pulser is available for 10 or 100 pulses per revolution. The choice depends on the smallest flow rate still to be indicated.

SITRANS F flowmeters

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Rotary-piston meters - Accessory modules

Pulser with inductive pick-up

Technical specifications

Slot initiator	Sensor SJ 3,5 -N-K37
Power supply (from pulse amplifier)	8 V DC, R_i approx. 1 k Ω (DIN 19234) $C_i = 40$ nF; $L_i = 160$ μ H
Change in current consumption on pulse	≤ 1 mA / ≤ 3 mA (DIN 19234)
Permissible line impedance between pick-up and amplifier	≤ 50 Ω (DIN 19234)
Number of pulses per revolution of the drive	10 or 100
Phase position of the channels of the double pick-up	180° : $180^\circ \pm 30^\circ$ Electrically offset $90^\circ \pm 30^\circ$
Duty factor	1 : 1 $\pm 17\%$
Max. pulse frequency	3000 Hz
Pulse valence	Dependent on value per revolution of the drive of the respective meter
Permissible ambient temperature	-25 ... +100 °C (-13 ... +212 °F)
Degree of protection	IP43 to EN 60529 with register P65 to EN 60529 with protective cover This pulser has the EC-Type Examination Certificate PTB 99 ATEX 2219X.
Mounting position	Any
Weight approx.	1.2 kg (2.65 lb)
Ex approval	IIG EEx ia IIC T6

Selection and Ordering data

Order No.

Pulser with inductive pick-up

Weight approx. 1.2 kg (2.65 lb)

Single pick-up

- 10 pulses/revolution
- 100 pulses/revolution

7MV1105-1AA00
7MV1105-2AA00

Double pick-up ¹⁾

(for custody transfer installations)

- 10 pulses/revolution
- 100 pulses/revolution

7MV1105-3AA01
7MV1105-4AA01

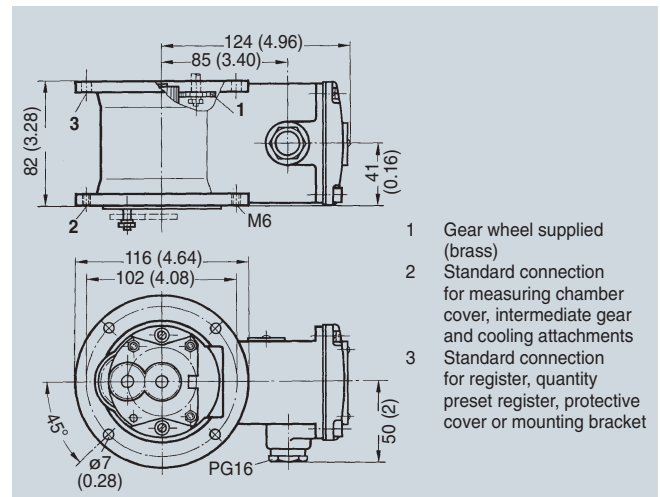
Instruction Manual

German/English

F) **C73000-B5174-C25**

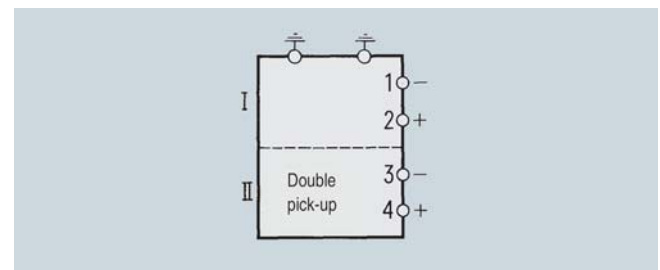
¹⁾ Pulse channels electrically offset by 90°

Dimensional drawings



Pulser with inductive pick-up, dimension in mm (inch)

Schematics



Pulser with inductive pick-up, connection diagram for clockwise rotation; pick-up 1 to terminals 3 and 4 for counter-clockwise rotation

SITRANS F flowmeters

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Rotary-piston meters - Accessory modules Intermediate gear and protective cover

Overview



Intermediate gear

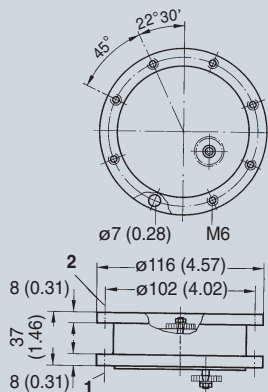
The capacity of the measuring chamber, which differs according to the meter size, can be adapted to the decimal values per revolution using the intermediate gear. The intermediate gear is included in the delivery of the meter mechanism.

The intermediate gear is also suitable for the installation of other ratios, e.g. factor X : 1, kg indication, etc.

Separate ordering is necessary

- if a register is ordered as a spare part or
- if accessories (pulsers) are subsequently ordered to extend the system and the meter mechanism does not yet have a separate modular intermediate gear.

Dimensional drawings



- 1 Standard connection for measuring chamber cover
- 2 Standard connection for pulser, cooling attachment, register or quantity preset register

Intermediate gear, dimensions in mm (inch)

Overview



Protective cover for pulser without register

The protective cover can be used to cover a pulser when no register is used.

Selection and Ordering data

Order No.

Protective cover

F) C70401-A26-C18

Selection and Ordering data

Order No.

Intermediate gear for rotary-piston meter

Weight approx. 0.6 kg (1.32 lb)

Power supply Value per revolution
(output drive intermediate gear)

DN 15 (½")	1 l (0.26 USg)	7MV1211-1B
DN 25 (1")	1 l (0.26 USg)	7MV1211-2B
	10 l (2.6 USg)	7MV1211-3B
DN 50 (2")	10 l (2.6 USg)	7MV1211-4B
	100 l/0.1 m ³ (26.4 USg)	7MV1211-5B
DN 80 (3")	100 l/0.1 m ³ (26.4 USg)	7MV1211-6B
	1 m ³ (264 USg)	7MV1211-7B

F) Subject to export regulations AL: 9I999, ECCN: N.

SITRANS F flowmeters

SITRANS F R

Rotary-piston meters - Accessory modules

Cooling attachment

Overview



Cooling attachment

When liquids are metered at high temperatures, the transmission of heat from the meter mechanism to the register or accessory can be reduced by the cooling attachment and thus the operating temperature of these units can be kept within the permissible limits.

The housing is comprised of cast light alloy with cooling fins. The lower flange is equipped with a projecting disk for protection against radiant heat.

If an existing meter has to be modified at a later date, the replaceable gearwheel of the meter mechanism must be replaced by the coupling disk supplied and mounted at the top of the shaft of the insulation attachment.

Technical specifications

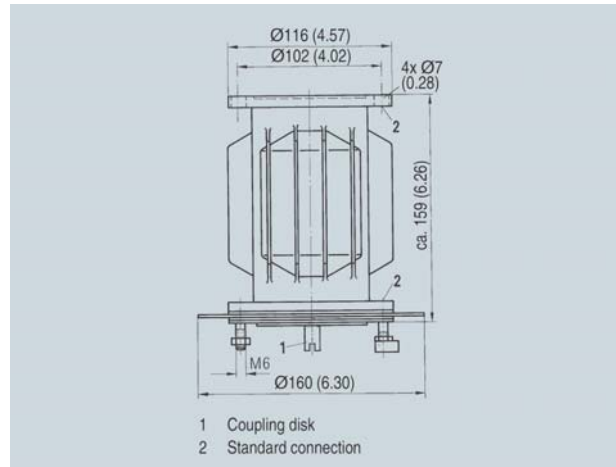
Attached accessory or register	Max. permissible liquid temperature		
		Cooling attachment	
	Without	1	2
Pulsar with inductive pick-up, all registers except type 01	80 °C (176 °F)	180 °C (356 °F)	300 °C (572 °F)
Single-pointer dial type 01	90 °C (194 °F)	250 °C (482 °F)	300 °C (572 °F)

The above limits only apply if the meter mechanism is insulated (lagged) for liquid temperatures ≥ 150 °C (302 °F) (this applies to an ambient temperature up to 40 °C (104 °F)).

Weight approx.

1.3 kg (2.9 lb)

Dimensional drawings



Cooling attachment, dimensions in mm (inch)

Selection and Ordering data

Cooling attachment

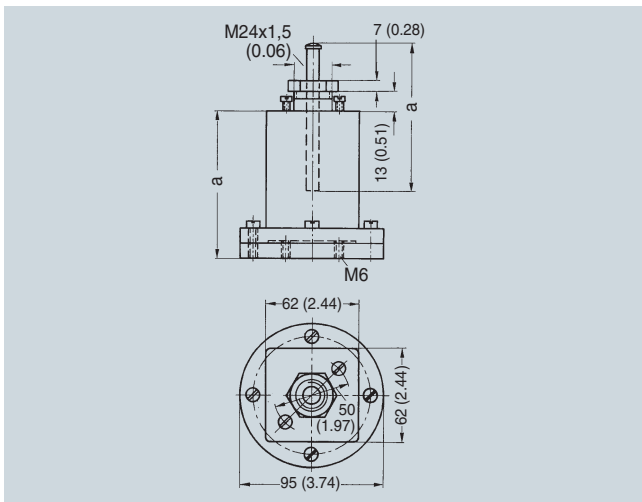
Order No.

7MV3001-1XX00

Overview

For extending the actuator linkage of the mechanical shut-off valve on the automatic batchmeter, which is directly connected to the quantity preset register. The extension is always needed when accessories such as a cooling attachment or pulser are installed between the quantity preset register and the metering mechanism.

Dimensional drawings



Extension for mechanical shut-off valve DN 25 (1") and DN 50 (2"), dimensions in mm (inch)

Selection and Ordering data

Order No.

Extension for shut-off valve

DN 25 (1") and DN 50 (2")

Overall height „a“
in mm (inch)

Weight approx. in kg
(lb)

- | | | |
|-------------|-----------|---------------------------|
| • 82 (3.2) | 1.0 (2.2) | F) C70144-A336-A35 |
| • 159 (6.3) | 1.4 (3.1) | F) C70144-A336-A37 |

SITRANS F flowmeters



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