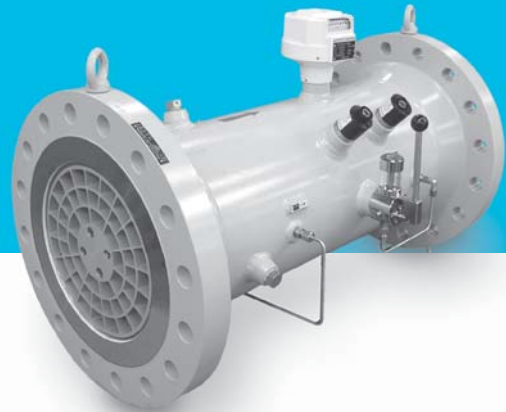


SM-RI-X

Turbine gas meters DN50 - 600
for custody transfer
in transmission and distribution



Applications

Gas measurement at low and high operating pressures

Brief information

Elster Instromet SM-RI-X turbine gas meters are robust meters for use under demanding conditions. Over decades they have proved themselves to be highly accurate and reliable devices for measuring the flow of many of gases.

The Elster Instromet SM-RI-X is unique, because of its good metrological performance and long-term stability. SM-RI-X are widely used for custody transfer of natural gas in transmission stations, distribution stations and as master reference meters.

Principle: The gas flow through the meter sets a turbine wheel in motion and the number of revolutions of the wheel is proportional to the passed volume.

The flow passes the patented X4X flow conditioner taking away any potential flow disturbances such as swirl or asymmetric flow.

When the gas passes through the flow conditioner, the flow velocity is increased and, consequently, the driving impulse on the turbine wheel is also increased. This results in a highly accurate measurement within the permissible error limits, even with low flow rates. The shaft of the wheel is mounted on robust ball bearings.

A gear reduces the revolutions of the turbine wheel. Via a magnetic coupling, a transmission shaft drives the 8-digit mechanical roller counter located in the index head. After the gas has passed the turbine wheel, it flows through a specific outlet channel, designed for optimum pressure recovery.

Conformity: Elster-Instromet SM-RI-X meters are manufactured in accordance with DIN EN ISO 9001:2000 (DIN EN ISO 14001). They are designed, produced and tested in accordance with the following guidelines, standards and references:

- PED 97/23/EC, strength calculation according to ASME B31.8, class 2
- ATEX directive 94/9/EC, type approval Ex II 2 G c IIC T6
- Applied German and European standards (et al. EN 12261)
- OIML provision R 32
- ISO 9951

All manufactured meters are tested on official, PTB and NMI approved test facilities.

Test certificates in accordance with PED requirements are available for pressure tests and strength tests.

Material: The housings are made of GGG-40 (ductile iron) or steel. The meters meet the highest safety standards

Main features

- Meter types G 40 - 16000
- Flow range 8 - 25000 m³/h
- Diameters DN 50 - 600 (2" - 24")
- Pressure rates PN 10 - 100 and ANSI 150 - 600 (further pressure rates on request)
- Temperature range -10°C to +65°C (further temperature ranges on request)
- Compact installation, inlet pipe length $L \geq 2$ DN
- Length 3 DN
- Thermowell built into meter housing (optional)
- Integrated HF-pulser (optional)
- Absolute-ENCODER S1 (optional)
- Automatic lubrication system (optional)
- EC and different national approvals (e.g. PTB, NMI)
- Media: natural gas, petroleum gas, town gas, butane, air, nitrogen, further gases on request

SM-RI-X: Turbine gas meters for custody transfer

Multi-Index

A robust metal index, standard fitted with an internal LF Reed contact, which provides low frequency pulses.

Standard MI-2

- Index head with metal cover
- Pulser IN-S15 with 1 x LF Reed + Protection against tampering (PCM)
- Mechanical drive as option (Type 25H7 accordant to EN 12261)



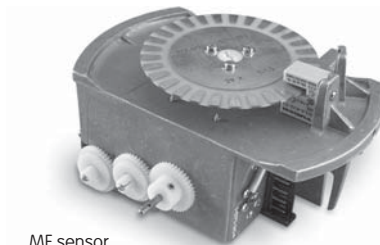
Multi-index 2 (standard)



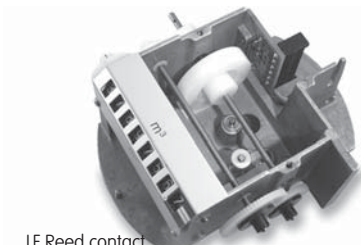
Multi-Index 1 (for options)

Options MI-1

- MF initiator
- Reverse flow barrier
- Binder male, Harting female connection box with PG fitting
- "Cryo" extension for operating with sub-zero temperature gas is combined with an aluminium silicate cartridge



MF sensor



LF Reed contact

Absolute-Encoder S1

The Absolute-ENCODER S1 is a mechanical index, whereby the meter reading is opto-electronically scanned and transferred to the supplementary device via an electrical interface (e.g. EK260 volume corrector). Thus the Absolute-ENCODER index is an ideal combination of the advantages of mechanical and electronic indexes.

The procedure is certified by the German PTB.

The Absolute-ENCODER S1 does not require a power supply as the input is provided via the electrical interface of the supplementary device.

Available interface variations: NAMUR, M-Bus and SCR

The Absolute-ENCODER S1 is also available as a clip-on index for a mechanical drive.



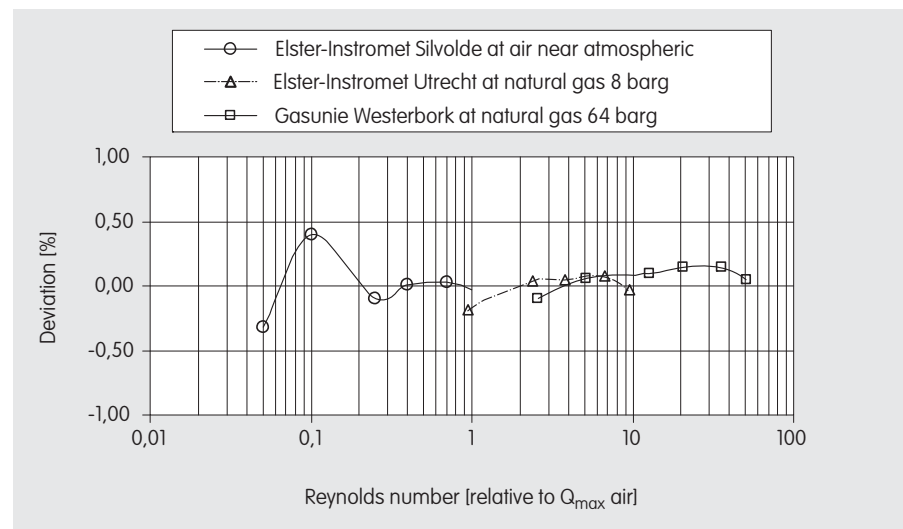
Accuracy, metrology

The SM-RI-X turbine gas meters in their metrological behaviour conform to the specifications of the European standard for turbine gas meters EN 12261. The measuring errors are smaller than half the fixed limits.

The standard specification of error limits are as follows:

- $\pm 0.5\%$ for $0.2Q_{max}$ to Q_{max}
- $\pm 2.0\%$ for Q_{min} to $0.2Q_{max}$

Smaller limits on request



Typical characteristics of measurement errors

Each SM-RI-X meter is tested with atmospheric air to traceable calibrated references. Optionally, meters can be calibrated with air or natural gas on test facilities traceable to primary international standards.

Example:

For DN 250 and meter size G 1000, range 1:30, a minimum natural gas overpressure of $p_{\min} = 16$ bar is necessary.

atm = atmospheric pressure (air)

* Only metering range 1 : 10 possible

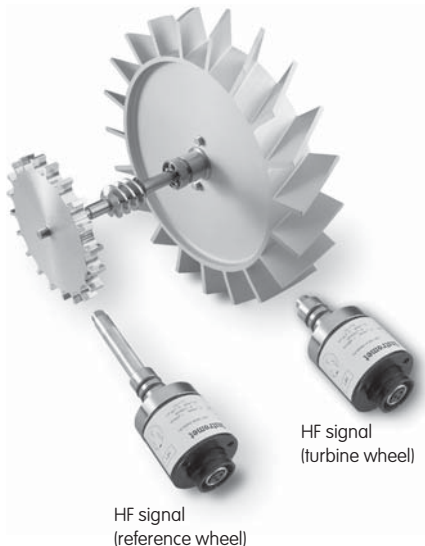
High pressure measuring range

Diameter	Meter size	Measuring range		
		1 : 20	1 : 30	1 : 50
		Minimum overpressure (p_{\min}) natural gas [bar]		
DN 50 2"	G 40 *	-	-	-
	G 65	16	-	-
DN 80 3"	G 100	8	-	-
	G 160	atm	8	-
	G 250	atm	8	-
DN 100 4"	G 160	atm	-	-
	G 250	atm	8	8
	G 400	atm	8	-
DN 150 6"	G 400	atm	-	-
	G 650	atm	8	-
	G 1000	atm	8	38
DN 200 8"	G 650	atm	12	30
	G 1000	atm	8	20
	G 1600	atm	8	20
DN 250 10"	G 1000	atm	16	30
	G 1600	atm	4	16
	G 2500	atm	atm	8
DN 300 12"	G 1600	atm	8	16
	G 2500	atm	4	8
	G 4000	atm	atm	4
DN 400 16"	G 2500	atm	8	8
	G 4000	atm	4	4
	G 6500	atm	4	8
DN 500 20"	G 4000	atm	8	16
	G 6500	atm	4	8
	G 10000	atm	4	8
DN 600 24"	G 6500	atm	8	16
	G 10000	atm	4	8
	G 16000	atm	4	8

Pressure loss

The average pressure loss of the SM-RI-X turbine meter using atmospheric natural gas with a density of 0.8 is measured at one (1) diameter upstream to one (1) diameter downstream of the meter on straight pipe of the same size as the meter.

Pulse data



Diameter	Meter size	Q_{\min} - Q_{\max} [m ³ /h]	Pressure loss [mbar] *	LF [1/m ³]**	MF [Hz at Q_{\max}]		HF
					MI-1	MI-2	[Hz at Q_{\max}]
DN 50 2"	G 40	13 - 65	3	10/100	135	74	1690 ***
	G 65	10 - 100	6.5	10/100	210	116	2600 ***
DN 80 3"	G 100	16 - 160	3	1/10	105	58	1280 ***
	G 160	13 - 250	8	1/10	160	88	2000 ***
	G 250	20 - 400	21	1/10	150	83	1800 ***
DN 100 4"	G 160	13 - 250	2	1/10	100	55	1100 ***
	G 250	20 - 400	5	1/10	160	88	1760 ***
	G 400	32 - 650	13	1/10	145	80	1570 ***
DN 150 6"	G 400	32 - 650	3.5	1/10	150	83	1180
	G 650	50 - 1000	7	1/10	130	72	1060
	G 1000	80 - 1600	16.5	1/10	210	116	1700
DN 200 8"	G 650	50 - 1000	1.5	0.1/1	55	30	770
	G 1000	80 - 1600	3	0.1/1	85	47	1180
	G 1600	130 - 2500	8	0.1/1	83	46	1060
DN 250 10"	G 1000	80 - 1600	1.5	0.1/1	88	49	825
	G 1600	130 - 2500	4.5	0.1/1	140	77	1320
	G 2500	200 - 4000	10	0.1/1	125	69	1200
DN 300 12"	G 1600	130 - 2500	1.5	0.1/1	48	26	810
	G 2500	200 - 4000	5	0.1/1	76	42	1270
	G 4000	320 - 6500	14	0.1/1	70	39	1175
DN 400 16"	G 2500	200 - 4000	1.5	0.1/1	160	88	660
	G 4000	320 - 6500	5	0.1/1	255	141	1055
	G 6500	500 - 10000	13	0.1/1	220	121	890
DN 500 20"	G 4000	320 - 6500	1.5	0.1/1	130	72	530
	G 6500	500 - 10000	6.5	0.1/1	210	116	865
	G 10000	800 - 16000	15	0.1/1	190	105	770
DN 600 24"	G 6500	500 - 10000	1.5	0.01/0.1	48	26	470
	G 10000	800 - 16000	5	0.01/0.1	75	41	720
	G 16000	1300 - 25000	10.5	0.01/0.1	68	38	650

* at Q_{\max} natural gas = 0.8 kg/m³

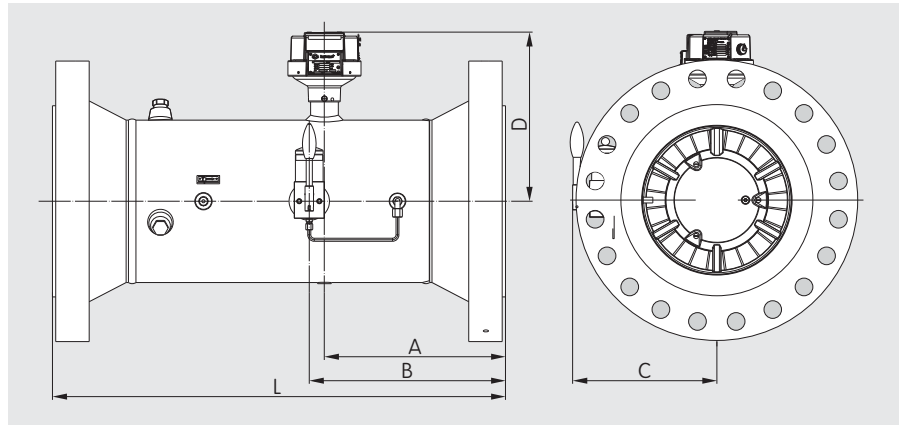
** Pulses with 1 or 10 magnets

*** HF sensor on reference wheel not available

Indicated MF and HF pulse values are nominal, actual values are specific

SM-RI-X: Turbine gas meters for custody transfer

Dimensions and weights



Diameter	Meter size	Dimensions [mm]					Weight [kg]					
		A	B	C	D	L	PN pressure rates	Housing material	Weight	ANSI pressure rates	Housing material	Weight
DN 50 2"	G 40 G 65	60	N.A.	N.A.	235	150	PN 10/16	GGG-40 (Steel)	10 (20)	ANSI150	GGG-40 (Steel)	10 (18)
							PN 25/40	Steel	20	ANSI300	Steel	20
							PN 64	Steel	23	ANSI400	Steel	20
							PN 100	Steel	26	ANSI600	Steel	20
DN 80 3"	G 100 G 160 G 250	96	N.A.	N.A.	205	240	PN 10/16	GGG-40 (Steel)	15 (26)	ANSI150	GGG-40 (Steel)	15 (24)
							PN 25/40	Steel	26	ANSI300	Steel	28
							PN 64	Steel	30	ANSI400	Steel	28
							PN 100	Steel	34	ANSI600	Steel	28
DN 100 4"	G 160 G 250 G 400	120	130	210	218	300	PN 10/16	GGG-40 (Steel)	28 (30)	ANSI150	GGG-40 (Steel)	28 (35)
							PN 25/40	Steel	38	ANSI300	Steel	42
							PN 64	Steel	40	ANSI400	Steel	42
							PN 100	Steel	46	ANSI600	Steel	50
DN 150 6"	G 400 G 650 G 1000	180	180	247	273	450	PN 10/16	GGG-40 (Steel)	40 (42)	ANSI150	GGG-40 (Steel)	44 (48)
							PN 25/40	Steel	50	ANSI300	Steel	66
							PN 64	Steel	72	ANSI400	Steel	77
							PN 100	Steel	87	ANSI600	Steel	98
DN 200 8"	G 650 G 1000 G 1600	240	240	273	298	600	PN 10	GGG-40 (Steel)	70 (77)	ANSI150	GGG-40 (Steel)	70 (91)
							PN 16	GGG-40 (Steel)	70 (77)	ANSI300	Steel	117
							PN 25	Steel	89	ANSI400	Steel	135
							PN 40	Steel	98	ANSI600	Steel	155
							PN 64	Steel	125			
							PN 100	Steel	161			
DN 250 10"	G 1000 G 1600 G 2500	300	360	327	314	750	PN 10	Steel	90	ANSI150	Steel	108
							PN 16	Steel	95	ANSI300	Steel	148
							PN 25	Steel	108	ANSI400	Steel	170
							PN 40	Steel	128	ANSI600	Steel	236
							PN 64	Steel	156			
							PN 100	Steel	220			
DN 300 12"	G 1600 G 2500 G 4000	360	390	352	338	900	PN 10	Steel	120	ANSI150	Steel	160
							PN 16	Steel	130	ANSI300	Steel	210
							PN 25	Steel	150	ANSI400	Steel	240
							PN 40	Steel	180	ANSI600	Steel	290
							PN 64	Steel	240			
							PN 100	Steel	340			
DN 400 16"	G 2500 G 4000 G 6500	480	510	395	380	1200	PN 10	Steel	350	ANSI150	Steel	400
							PN 16	Steel	380	ANSI300	Steel	460
							PN 25	Steel	410	ANSI400	Steel	490
							PN 40	Steel	460	ANSI600	Steel	580
							PN 64	Steel	510			
DN 500 20"	G 4000 G 6500 G 10000	600	630	445	431	1500	PN 10	Steel	550	ANSI150	Steel	650
							PN 16	Steel	600	ANSI300	Steel	800
							PN 25	Steel	640	ANSI400	Steel	830
							PN 40	Steel	690	ANSI600	Steel	980
DN 600 24"	G 6500 G 10000 G 16000	720	750	495	482	1800	PN 10	Steel	900	ANSI150	Steel	1050
							PN 16	Steel	950	ANSI300	Steel	1300
							PN 25	Steel	1000	ANSI400	Steel	1350
								Steel		ANSI600	Steel	1500

N.A. = not applicable (push button pump only)

GGG-40 = ductile iron

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