

Q.Sonic[®]plus

Multi-path ultrasonic gas meter
for custody transfer measurement



Applications

- Custody transfer measurement of natural gas
- Gas exploration, transmission and distribution

Brief information

The ultrasonic gas flow meter Q.Sonic^{plus} is a six-path meter covered by an 'enhanced' Elster-Instromet patent, with extended functionality, bringing about new benefits for the end user, along with greater processing power that yields a lower measurement uncertainty.

The patented path configuration – a fully symmetrical layout of four swirl paths with double reflection and two single reflection paths – enables the measurement of both swirl and asymmetry, resulting in hitherto unequalled profile recognition and diagnostic possibilities.

Another innovation of the Q.Sonic^{plus} is that it can be equipped with an internal pressure and temperature measurement function. This means that the device measures both the gas pressure and temperature of the measuring tube. On the one hand, these measurements allow for a more accurate calculation of the Reynolds number for the flow profile analysis and on the other, they can be used to correct the meter body diameter and path geometry. This is useful if the process conditions differ massively from the conditions during the calibration process since both high pressure and high temperatures result in an increase in the tube cross-section and a change in path lengths and angles.

The electronics unit is a completely redeveloped modular hardware and software platform, which will be used in many Elster-Instromet devices in the future. It also provides sufficient computing power reserve to meet future requirements. The real-time operating system used in the device, INTEGRITY from Green Hills Software, is regarded as one of the most secure and reliable systems in the world.

The electronics are located in a flame-proof housing (Ex d) with a separate connection compartment for field wiring. Thanks to its modular hardware design with a free slot, the device is also prepared to tackle future requirements. For user operation the system is equipped with a graphical user interface with touch screen functionality.

The Q.Sonic^{plus} is supplied with SonicExplorer, an all-new PC software package for configuration, diagnostics and health care.

One of the unique features of SonicExplorer is the "Create Customer Service Pack" function. SonicExplorer collects a short log of the entire state of the ultrasonic flow meter including the device configuration, a present diagnostic snapshot, a pass/fail report, all diagnostic values as well as analyses of all acoustic signals and the noise spectrum. This information is sent to the Elster-Instromet support team for detailed investigation so that the on-site service engineer can be given efficient support.

Main features

- 6-path reflective technology
- Sizes 3" to 56" (DN 80 to DN 1400)
- Pressure ratings ANSI class 150 to 900 PN on request
- All-metal-encapsulated intrinsically safe transducers
- Internal temperature sensor
- Flow profile detection with swirl and asymmetry measurement
- No moving parts
- No pressure drop
- Bi-directional measurement
- SonicExplorer[®] PC software for configuration, diagnostics and health care
- OIML R137-1 compliant
- AGA 9 compliant
- MID approved

Options

- VDSL range extender for high-speed communication (TCP/IP)
- Pressure sensor (retrofit)
- Retraction tool for transducer exchange 'under pressure'

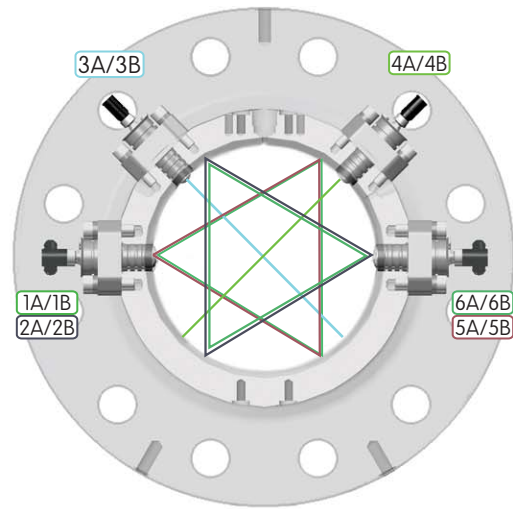
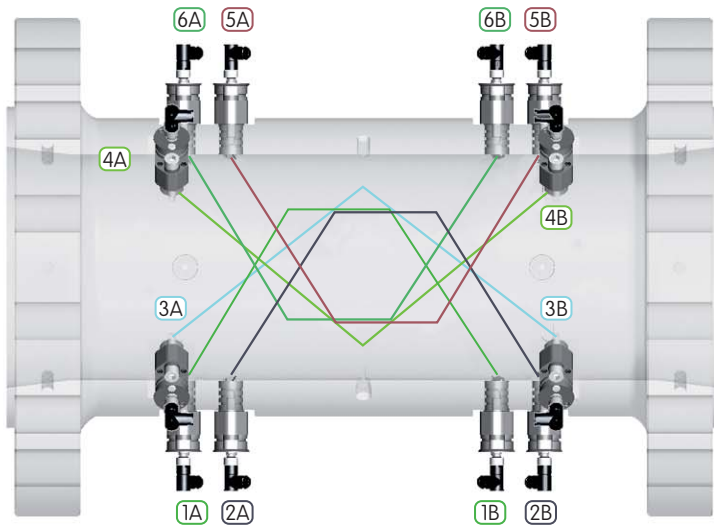
Path configuration

The Q.Sonic^{plus} uses two pairs of double and two single reflection paths. Taking the mean value of both pairs will result in a symmetrically weighted measurement.

The subtraction of the paired paths provides an indication of asymmetric flow along the mirror plane of the paths as an additional diagnostic feature.

Transducer path	
Path No.	Path type
1A / 1B	Swirl path (B1-CW *)
2A / 2B	Swirl path (B1-CCW**)
3A / 3B	Axial path (A1)
4A / 4B	Axial path (A2)
5A / 5B	Swirl path (B2-CW)
6A / 6B	Swirl path (B2-CCW)

* clockwise
** counter-clockwise



Components on the meter body



Ultrasonic transducers model NG

The transducers are all-metal encapsulated with titanium, which offers a smooth

surface to minimize contamination. The ultrasonic frequency of 200 kHz ensures a

good balance between resolution and attenuation/propagation of the signal.

Signal processing unit (SPU) series 6

The SPU electronic resides in a flame-proof housing with a separate compartment for the terminal connections. The boards are mounted in a card cage with one free slot for future extensions.

A colour graphic screen with 7 touch-sensitive sections allows easy operation by using a menu structure to access the data. Thanks to the built-in web server, this can also be done remotely when a network connection is available.

The heart of the system is the EnCore with up to 16 GB of data memory. Diagnostic and self-checking functions in conjunction with a flexible, user-configurable data archive and an event list allow a detailed analysis of the meter's performance and the metering situation at any time.

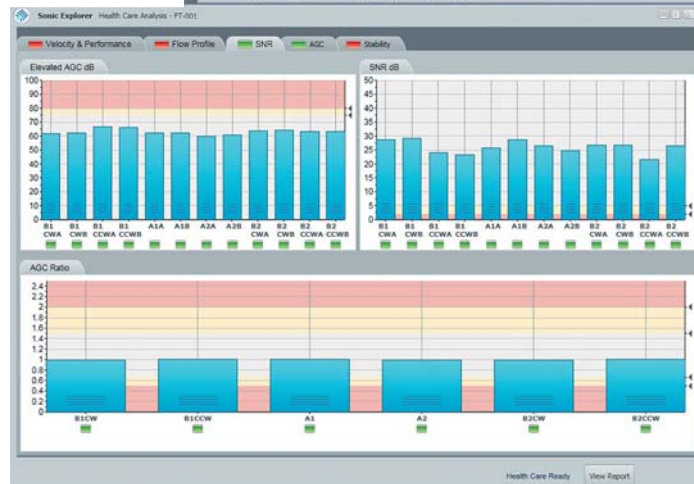


SonicExplorer®

Windows-based software package for the Q.SonicPlus for on-site and remote use. SonicExplorer is a tool that allows the health and performance of the device to be determined in situ so that informed decisions can be made in respect of maintenance or other tasks related to the ultrasonic flow meter.

Function overview:

- Meter data base
- Configuration, setting and documentation
- Diagnostics
- Health care reporting
- Customer service pack (automated collection of relevant data for off-site analysis)



Flow ranges metric												
Type	Size		Flange connection		Spool diameter		Internal diameter	Q _{min}	Flow [m ³ /h]		Turndown	
	[Inch]	DN	ANSI schedule	EN1092-1	ANSI flange max ID [mm]	PN flange max ID [mm]			Q _t	Q _{max}		
Reduced bore Fixed inner diameter	3	80	STD – XS	PN 10 – PN 100	77.90	82.50	73	11	60	600	56	
			XS – 160		73.70		70		55			550
	4	100	STD – XS	PN 10 – PN 100	102.30	107.10	97	13	100	1000	79	
			XS – 120		97.20		90		90			900
	6	150	STD – XS	PN 10 – PN 100	154.10	159.30	146	18	220	2200	124	
			XS – 120		146.30		139		200			2000
	8	200	STD – XS	PN 10 – PN 100	202.70	206.50	190	30	400	4000	133	
			XS – 120		193.70		180		27			350
	10	250	STD – 80	PN 10 – PN 100	254.50	260.40	240	48	590	5900	123	
80 – 120			242.80		230		44		540			5400
12	300	30 – 60	PN 10 – PN 100	307.00	309.70	295	73	860	8600	118		
		60 – 100		295.30		280		66			780	7800
14	350	30 – 60	PN 10 – PN 100	336.50	341.40	325	85	1000	10000	118		
		60 – 100		325.40		305		75			900	9000
16	400	30 – 60	PN 10 – PN 100	387.30	392.20	370	115	1300	13000	113		
		60 – 100		373.00		350		100			1150	11500
Full bore Customized	18	450	STD 120	PN 10 – PN 40		442.80	max. 437.90	165	1800	18000	109	
							min. 387.10		120		1350	13500
	20	500	STD 120	PN 10 – PN 100			493.80	max. 488.90	200	2100	21000	105
								min. 431.80		160		1600
	24	600	STD 100	PN 10 – PN 63			594.00	max. 590.90	295	3000	30000	102
								min. 532.22		240		2400
	26	650	STD S = 25.4	n/a				max. 640.90	330	3300	33000	100
								min. 609.20		275		2750
	30	750	STD S = 31.75	n/a				max. 742.90	460	4600	46000	100
			min. 730.30					370		3700		37000
36	900	STD S = 31.75	PN 10 – PN 63			889.00	max. 894.90	670	6700	67000	100	
							min. 850.50		525		5250	52500
42	1050	STD S = 31.75	n/a				max. 1047.90	920	8300	83000	90	
							min. 1003.50		750		6750	67500
48	1200	STD S = 31.75	PN 10 – PN 63			1194.00	max. 1199.90	1200	11000	110000	92	
							min. 1155.50		1000		9100	91000
56	1400	STD S = 12.7 S = 31.75	PN 10 – PN 40			1393.60	max. 1396.60	1650	15000	150000	91	
							min. 1358.50		1600		14300	143000

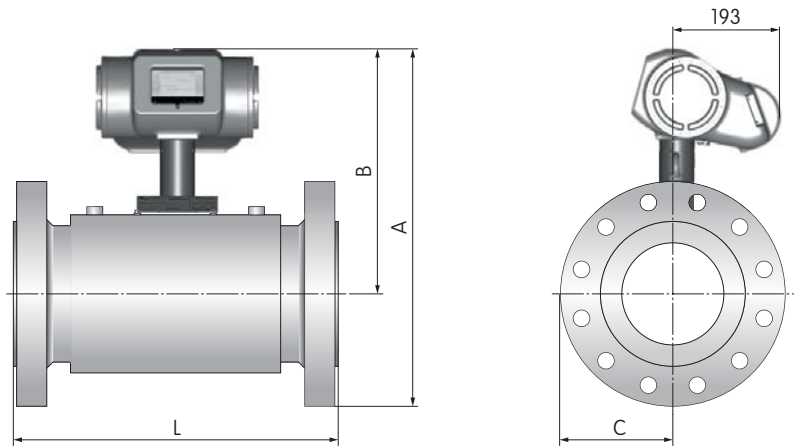
Flow ranges imperial												
Type	Size		Flange connection		Spool diameter		Internal diameter	Q _{min}	Flow [MCF/D]		Turndown	
	[Inch]	DN	ANSI schedule	EN1092-1	ANSI flange max ID [inch]	PN flange max ID [inch]			Q _t	Q _{max}		
Reduced bore Fixed inner diameter	3	80	STD – XS	PN 10 – PN 100	3.07	3.25	2.87	9	51	509	56	
			XS – 160		2.90		2.76		8			47
	4	100	STD – XS	PN 10 – PN 100	4.03	4.22	3.82	11	85	848	79	
			XS – 120		3.83		3.54		9			76
	6	150	STD – XS	PN 10 – PN 100	6.07	6.27	5.75	15	186	1865	124	
			XS – 120		5.76		5.47		14			170
	8	200	STD – XS	PN 10 – PN 100	7.98	8.13	7.48	25	339	3390	133	
			XS – 120		7.63		7.09		23			297
	10	250	STD – 80	PN 10 – PN 100	10.02	10.25	9.45	41	500	5001	123	
80 – 120			9.56		9.06		37		458			4577
12	300	30 – 60	PN 10 – PN 100	12.09	12.19	11.61	62	729	7289	118		
		60 – 100		11.63		11.02		56			661	6611
14	350	30 – 60	PN 10 – PN 100	13.25	13.44	12.80	72	848	8476	118		
		60 – 100		12.81		12.01		74			763	7628
16	400	30 – 60	PN 10 – PN 100	15.25	15.44	14.57	97	1102	11018	113		
		60 – 100		14.69		13.78		85			975	9747
Full bore Customized	18	450	STD 120	PN 10 – PN 40		17.43	max. 17.24	140	1526	15256	109	
							min. 15.24		102		1144	11442
	20	500	STD 120	PN 10 – PN 100			19.44	max. 19.25	170	1780	17799	105
								min. 17		136		1356
	24	600	STD 100	PN 10 – PN 63			23.39	max. 23.26	250	2543	25427	102
								min. 20.95		203		2034
	26	650	STD S = 25.4	n/a				max. 25.23	280	2797	27969	100
								min. 23.98		233		2331
	30	750	STD S = 31.75	n/a				max. 29.25	390	3899	38987	100
			min. 28.75					314		3136		31359
36	900	STD S = 31.75	PN 10 – PN 63			35.00	max. 35.23	568	5679	56786	100	
							min. 33.48		445		4450	44496
42	1050	STD S = 31.75	n/a				max. 41.26	780	7035	70347	90	
							min. 39.51		636		5721	57210
48	1200	STD S = 31.75	PN 10 – PN 63			47.01	max. 47.24	1017	9323	93231	92	
							min. 45.49		848		7713	77127
56	1400	STD S = 12.7 S = 31.75	PN 10 – PN 40			54.87	max. 54.98	1398	12713	127133	91	
							min. 53.48		1356		12120	121200

For MID approved sizes and flow ranges, please also refer to the latest EC Type- examination Certificate T10335

Material specifications ANSI 150 - 900 (flow cell)

LTCS forging	ASTM A350-LF2 Cl.1
LTCS welding	ASTM A333 grade 6 / ASTM A350-LF2 Cl.1
SS forging	ASTM A182-F316
SS welding	ASTM A312-TP316L / ASTM A182-F316L
LTCS/SS	size > 24" as per customer specification
Material certificate 3.1	

LTCS: Low temperature carbon steel
Other materials on request



Flange rating ANSI 150 metric

Meter size [inch]	Meter size [mm]	Dimensions [mm]				Flow cell material	Weight forged [kg]	Weight welded [kg]	Length
		A	B	C	L				
3"	DN 80	517	422	147	320	LTCS/SS	47	-	4D
4"	DN 100	546	431	153	400	LTCS/SS	61	-	4D
6"	DN 150	570	430	184	450	LTCS/SS	84	-	3D
8"	DN 200	625	452	205	600	LTCS/SS	134	-	3D
10"	DN 250	680	477	252	750	LTCS/SS	195	-	3D
12"	DN 300	747	505	280	900	LTCS/SS	280	-	3D
14"	DN 350	802	535	310	1050	LTCS/SS	-	247	3D
16"	DN 400	859	561	336	1200	LTCS/SS	-	341	3D
18"	DN 450	903	586	331	1350	LTCS/SS	-	351	3D
20"	DN 500	961	611	356	1500	LTCS/SS	-	447	3D
24"	DN 600	1069	662	407	1800	LTCS/SS	-	687	3D
30"	DN 750	1230	738	492	2250	LTCS/SS	-	781	3D
32"	DN 800	1294	764	530	2400	LTCS/SS	-	929	3D
36"	DN 900	1399	814	584	2700	LTCS/SS	-	1354	3D
40"	DN 1000	1510	865	645	3000	LTCS/SS	-	1650	3D

Flange rating ANSI 150 imperial

Meter size [inch]	Meter size [mm]	Dimensions [inch]				Flow cell material	Weight forged [lb]	Weight welded [lb]	Length
		A	B	C	L				
3"	DN 80	20.3543	16.6142	5.7874	12.5984	LTCS/SS	102.63	-	4D
4"	DN 100	21.4961	16.9685	6.0236	15.7480	LTCS/SS	133.42	-	4D
6"	DN 150	22.4409	16.9291	7.2441	17.7165	LTCS/SS	184.55	-	3D
8"	DN 200	24.6063	17.7953	8.0709	23.6220	LTCS/SS	295.20	-	3D
10"	DN 250	26.7717	18.7795	9.9213	29.5276	LTCS/SS	430.12	-	3D
12"	DN 300	29.4094	19.8819	11.0236	35.4331	LTCS/SS	616.85	-	3D
14"	DN 350	31.5748	21.0630	12.2047	41.3386	LTCS/SS	-	544.41	3D
16"	DN 400	33.8189	22.0866	13.2283	47.2441	LTCS/SS	-	751.47	3D
18"	DN 450	35.5512	23.0709	13.0315	53.1496	LTCS/SS	-	774.79	3D
20"	DN 500	37.8346	24.0551	14.0157	59.0551	LTCS/SS	-	984.76	3D
24"	DN 600	42.0866	26.0630	16.0236	70.8661	LTCS/SS	-	1513.69	3D
30"	DN 750	48.4252	29.0551	19.3701	88.5827	LTCS/SS	-	1722.58	3D
32"	DN 800	50.9449	30.0787	20.8661	94.4882	LTCS/SS	-	2048.14	3D
36"	DN 900	55.0787	32.0472	22.9921	106.2992	LTCS/SS	-	2985.76	3D
40"	DN 1000	59.4488	34.0551	25.3937	118.1102	LTCS/SS	-	3638.29	3D

Flange rating ANSI 300 metric									
Meter size [inch]	Meter size [mm]	Dimensions [mm]				Flow cell material	Weight forged [kg]	Weight welded [kg]	Length
		A	B	C	L				
3"	DN 80	527	422	147	320	LTCS/SS	51	-	4D
4"	DN 100	558	431	153	400	LTCS/SS	70	-	4D
6"	DN 150	589	430	184	450	LTCS/SS	101	-	3D
8"	DN 200	643	452	205	600	LTCS/SS	155	-	3D
10"	DN 250	700	477	252	750	LTCS/SS	226	-	3D
12"	DN 300	765	505	280	900	LTCS/SS	320	-	3D
14"	DN 350	827	535	310	1050	LTCS/SS	-	319	3D
16"	DN 400	884	561	336	1200	LTCS/SS	-	430	3D
18"	DN 450	941	586	356	1350	LTCS/SS	-	473	3D
20"	DN 500	999	611	388	1500	LTCS/SS	-	591	3D
24"	DN 600	1120	662	457	1800	LTCS/SS	-	911	3D
30"	DN 750	1284	738	546	2250	LTCS/SS	-	1252	3D
32"	DN 800	1339	764	575	2400	LTCS/SS	-	1575	3D
36"	DN 900	1449	814	635	2700	LTCS/SS	-	2159	3D
40"	DN 1000	1485	865	619	3000	LTCS/SS	-	2096	3D

Flange rating ANSI 300 imperial									
Meter size [inch]	Meter size [mm]	Dimensions [inch]				Flow cell material	Weight forged [lb]	Weight welded [lb]	Length
		A	B	C	L				
3"	DN 80	20.7480	16.6142	5.7874	12.5984	LTCS/SS	112.06	-	4D
4"	DN 100	21.9685	16.9685	6.0236	15.7480	LTCS/SS	154.06	-	4D
6"	DN 150	23.1890	16.9291	7.2441	17.7165	LTCS/SS	221.76	-	3D
8"	DN 200	25.3150	17.7953	8.0709	23.6220	LTCS/SS	341.47	-	3D
10"	DN 250	27.5591	18.7795	9.9213	29.5276	LTCS/SS	499.02	-	3D
12"	DN 300	30.1181	19.8819	11.0236	35.4331	LTCS/SS	706.47	-	3D
14"	DN 350	32.5591	21.0630	12.2047	41.3386	LTCS/SS	-	702.53	3D
16"	DN 400	34.8031	22.0866	13.2283	47.2441	LTCS/SS	-	947.79	3D
18"	DN 450	37.0472	23.0709	14.0157	53.1496	LTCS/SS	-	1043.18	3D
20"	DN 500	39.3307	24.0551	15.2756	59.0551	LTCS/SS	-	1302.87	3D
24"	DN 600	44.0945	26.0630	17.9921	70.8661	LTCS/SS	-	2008.74	3D
30"	DN 750	50.5512	29.0551	21.4961	88.5827	LTCS/SS	-	2761.20	3D
32"	DN 800	52.7165	30.0787	22.6378	94.4882	LTCS/SS	-	3472.04	3D
36"	DN 900	57.0472	32.0472	25.0000	106.2992	LTCS/SS	-	4760.79	3D
40"	DN 1000	58.4646	34.0551	24.3701	118.1102	LTCS/SS	-	4621.40	3D


Flange rating ANSI 600 metric									
Meter size [inch]	Meter size [mm]	Dimensions [mm]				Flow cell material	Weight forged [kg]	Weight welded [kg]	Length
		A	B	C	L				
3"	DN 80	527	422	147	320	LTCS/SS	53	-	4D
4"	DN 100	568	431	153	400	LTCS/SS	82	-	4D
6"	DN 150	608	430	185	500	LTCS/SS	134	-	3.33D
8"	DN 200	662	452	210	600	LTCS/SS	200	-	3D
10"	DN 250	731	477	254	750	LTCS/SS	312	-	3D
12"	DN 300	784	505	280	900	LTCS/SS	424	-	3D
14"	DN 350	837	535	310	1050	LTCS/SS	-	455	3D
16"	DN 400	903	561	343	1200	LTCS/SS	-	641	3D
18"	DN 450	957	586	372	1350	LTCS/SS	-	666	3D
20"	DN 500	1018	611	407	1500	LTCS/SS	-	853	3D
24"	DN 600	1132	662	470	1800	LTCS/SS	-	1311	3D
30"	DN 750	1304	738	565	2250	LTCS/SS	-	1932	3D
32"	DN 800	1361	764	597	2400	LTCS/SS	-	2266	3D
36"	DN 900	1472	814	657	2700	LTCS/SS	-	2956	3D
40"	DN 1000	1526	865	661	3000	LTCS/SS	-	3334	3D

Flange rating ANSI 600 imperial									
Meter size [inch]	Meter size [mm]	Dimensions [inch]				Flow cell material	Weight forged [lb]	Weight welded [lb]	Length
		A	B	C	L				
3"	DN 80	20.7480	16.6142	5.7874	12.5984	LTCS/SS	116.93	-	4D
4"	DN 100	22.3622	16.9685	6.0236	15.7480	LTCS/SS	179.79	-	4D
6"	DN 150	23.9370	16.9291	7.2441	19.6850	LTCS/SS	295.42	-	3.33D
8"	DN 200	26.0630	17.7953	8.2677	23.6220	LTCS/SS	441.85	-	3D
10"	DN 250	28.7795	18.7795	10.0000	29.5276	LTCS/SS	688.08	-	3D
12"	DN 300	30.8661	19.8819	11.0236	35.4331	LTCS/SS	934.56	-	3D
14"	DN 350	32.9528	21.0630	12.2047	41.3386	LTCS/SS	-	1002.31	3D
16"	DN 400	35.5512	22.0866	13.5039	47.2441	LTCS/SS	-	1412.90	3D
18"	DN 450	37.6772	23.0709	14.6457	53.1496	LTCS/SS	-	1467.93	3D
20"	DN 500	40.0787	24.0551	16.0236	59.0551	LTCS/SS	-	1879.99	3D
24"	DN 600	44.5669	26.0630	18.5039	70.8661	LTCS/SS	-	2890.37	3D
30"	DN 750	51.3386	29.0551	22.2441	88.5827	LTCS/SS	-	4259.22	3D
32"	DN 800	53.5827	30.0787	23.5039	94.4882	LTCS/SS	-	4995.65	3D
36"	DN 900	57.9528	32.0472	25.8661	106.2992	LTCS/SS	-	6515.85	3D
40"	DN 1000	60.0787	34.0551	26.0236	118.1102	LTCS/SS	-	7349.42	3D

Flange rating ANSI 900 metric									
Meter size [inch]	Meter size [mm]	Dimensions [mm]				Flow cell material	Weight forged [kg]	Weight welded [kg]	Length
		A	B	C	L				
3"	DN 80	542	422	147	320	LTCS/SS	62	-	4D
4"	DN 100	576	431	153	400	LTCS/SS	89	-	4D
6"	DN 150	620	430	190	600	LTCS/SS	167	-	4D
8"	DN 200	687	452	235	800	LTCS/SS	281	-	4D
10"	DN 250	750	477	273	750	LTCS/SS	360	-	3D
12"	DN 300	810	505	305	900	LTCS/SS	508	-	3D
14"	DN 350	856	535	321	1050	LTCS/SS	-	561	3D
16"	DN 400	913	561	323	1200	LTCS/SS	-	726	3D
18"	DN 450	980	586	394	1350	LTCS/SS	-	896	3D
20"	DN 500	1040	611	429	1500	LTCS/SS	-	1148	3D
24"	DN 600	1183	662	521	1800	LTCS/SS	-	1918	3D
30"	DN 750	1354	738	616	2250	LTCS/SS	-	2929	3D
32"	DN 800	1421	764	657	2400	LTCS/SS	-	3444	3D
36"	DN 900	1545	814	731	2700	LTCS/SS	-	4493	3D
40"	DN 1000	1621	865	756	3000	LTCS/SS	-	5135	3D

Flange rating ANSI 900 imperial									
Meter size [inch]	Meter size [mm]	Dimensions [inch]				Flow cell material	Weight forged [lb]	Weight welded [lb]	Length
		A	B	C	L				
3"	DN 80	21.3386	16.6142	5.7874	12.5984	LTCS/SS	136.00	-	4D
4"	DN 100	22.6772	16.9685	6.0236	15.7480	LTCS/SS	196.83	-	4D
6"	DN 150	24.4094	16.9291	7.4803	23.6220	LTCS/SS	367.29	-	4D
8"	DN 200	27.0472	17.7953	9.2520	31.4961	LTCS/SS	619.68	-	4D
10"	DN 250	29.5276	18.7795	10.7480	29.5276	LTCS/SS	792.98	-	3D
12"	DN 300	31.8898	19.8819	12.0079	35.4331	LTCS/SS	1120.68	-	3D
14"	DN 350	33.7008	21.0630	12.6378	41.3386	LTCS/SS	-	1235.87	3D
16"	DN 400	35.9449	22.0866	12.7165	47.2441	LTCS/SS	-	1599.61	3D
18"	DN 450	38.5827	23.0709	15.5118	53.1496	LTCS/SS	-	1974.57	3D
20"	DN 500	40.9449	24.0551	16.8898	59.0551	LTCS/SS	-	2530.18	3D
24"	DN 600	46.5748	26.0630	20.5118	70.8661	LTCS/SS	-	4228.09	3D
30"	DN 750	53.3071	29.0551	24.2520	88.5827	LTCS/SS	-	6457.76	3D
32"	DN 800	55.9449	30.0787	25.8661	94.4882	LTCS/SS	-	7593.07	3D
36"	DN 900	60.8268	32.0472	28.7795	106.2992	LTCS/SS	-	9905.28	3D
40"	DN 1000	63.8189	34.0551	29.7638	118.1102	LTCS/SS	-	11320.72	3D

Q.Sonic^{plus}: Multi-path ultrasonic gas meter for custody transfer measurement

Technical data	
Measurement principle	Ultrasonic transit time measurement
Sizes	3" to 56" (DN 80 to DN 1400)
Pressure range	2 bar (g) (29 psig) to 150 bar (g) (2175 psig); minimum pressure depending on size and gas composition
Process temperature ranges ⁴⁾	Standard: -40 °C to +85 °C (-40 °F to +185 °F) Extended: -50 °C to +85 °C (-58 °F to +185 °F) MID: -40 °C to +85 °C (-40 °F to +185 °F)
Ambient temperature ranges ⁴⁾	Standard: -40 °C to +60 °C (-40 °F to +140 °F) Extended: -50 °C to +60 °C (-58 °F to +140 °F) MID: -40 °C to +55 °C (-40 °F to +131 °F)
Repeatability	0.05% ¹⁾
Typical uncertainty	0.5% of reading after dry calibration ²⁾ 0.2% of reading after flow calibration ²⁾ 0.1% of reading after flow calibration and linearization ²⁾
Body materials	Low-temperature carbon steel ≤ 12": ASTM A350-LF2 Cl.1 ≥ 14": ASTM A333 grade 6 / ASTM A350-LF2 Cl.1 Stainless steel ≤ 12": ASTM A182-F316 ≥ 14": ASTM A312-TP316L / ASTM A182-F316L Other materials on request
Material certificate	EN 10204 3.1 (3.2 on request)
Body construction details	≤ 16": reduced bore, tapering angle 7° ≥ 18": full bore
Pressure reference points	½" NPT (G½ on request)
Electronic enclosure material	Cast aluminium alloy. Optional stainless steel.
Power supply	Nominal 24 V DC (18 – 30 V DC), 10 – 20 W (depending on installed optional cards)
Local display	GUI, 4.3" (10.9 cm) widescreen graphical colour display with 7 capacitive soft keys (touch), LEDs for power and status
Interfaces	- 2 serial ports (RS 232/485 configurable) - 1 Ethernet port / high speed VDSL (VDSL option replaces Ethernet port) - 2 frequency outputs, 0 to 3 kHz - 2 digital outputs ³⁾ - 2 analogue outputs ³⁾ - 1 USB port (device, for service purpose only)
Communications protocol	- Modbus (ASCII, RTU, TCP/IP) - UNIFORM - UNIFORM Series IV 4-path compatibility mode - MMS (Manufacturing Message Specification) - Built-in web server
Metrological approval	MID T10335 (optional)
MID Accuracy Class	Class 1.0
Hazardous area approvals	ATEX:  II 2 G Ex d ia [ia] IIB+H2 T6 Gb IECEX: Ex d ia [ia] IIB+H2 T6 Gb FM: Class I, Division 1, Group A to D T6 CSA: Class I, Division 1, Groups B, C and D T6; Ex d ia [ia] IIB+H2 T6
Ingress protection	IP 66 / NEMA Type 4X

¹⁾ Q_i to Q_{max}

²⁾ Q_i to Q_{max} with straight inlet/outlet spool of 10D/3D

³⁾ Analogue outputs and digital outputs sharing the terminal clamps

⁴⁾ Ranges: subject to application and (hazardous area) approval

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