CheckSonic^{vx}

Multi-path ultrasonic gas meter
for upstream, shale and harsh environments

Applications

Shale gas gathering points, coal seam, flare, wellhead and other harsh environment applications

Brief information

CheckSonic^{vx} is a robust, durable, easy to operate and maintain platform for shale and unconventional gas, transmission gas and processed gas applications.

CheckSonic^{vx} is a multipath ultrasonic gas flow meter utilizing the most robust acoustic path configurations available to the market. The CheckSonic^{vx} employs durable transducer design with extended diagnostic functionality and capability to measure regardless of extensive liquid and dirt contamination found in typical shale gas gathering points, coal seam applications, flare and wellhead measurements. This robustness brings operational confidence to the end user of a reliable and superior measurement.

The 6 path configuration is a fully symmetrical layout of two direct cross pairs X paths in the same plane and two diametrical axial V bounce diagnostics paths. This V-X configuration provides highest measurement durability along with highly informative process diagnostics.

The CheckSonic^{vx} proves its vital connection between the process and the operators by sampling the gas stream up to 30 times per second and per path to create an accurate image of the flowing profile. The operational diagnostics continuously monitor the presence of liquid or dirt build up in the meter body indicating if the meter should be taken out of service for maintenance or cleaning.

The CheckSonic^{vx} provides additional measurement confidence by offering an internal pressure and temperature sensors for a more accurate calculation of Reynolds and Mach number resulting in a repeatable and accurate flow measurement, even when process conditions vary or differ from calibrated conditions.

Encrypted data is managed by the real time operating system (RTOS) philosophy pioneered by Green Hills Software. Integrity RTOS provides one of the most reliable operating platforms in the world delivering piece of mind with the highest security level that is currently achievable for a real time operating system.

SonicExplorer, a PC based software package, for the operator, service, technician and engineering world is used to configure, diagnose, and monitor the CheckSonic^{vx} flow meter either local or remote. One of the unique features of SonicExplorer is the "create customer service pack". At the sign of any warning or alarm the operator can initiate SonicExplorer to immediately collect a log containing the entire state of the ultrasonic flow meter including all diagnostics, configuration and spectral noise analysis. The customer service pack is automatically compressed, and directed to a preselected e-mail recipient for support at Elster or Engineer/Technician of your choice.

* depending on meter size and medium

Main features

- 6-path, direct and reflective technology (3 path optional)
- Sizes 3" to 56" (DN 80 to DN 1400)
- Operational pressure range 1 bar (a)* to 430 bar (a)
- Pressure ratings: ANSI class 150 to 2500 PN on request
- All titanium-encapsulated intrinsically safe transducers
- Robust path design for wet and dirty gas applications
- Turbulence and asymmetry detection
- Diagnostic detection of liquid and dirt build up
- No moving parts
- No pressure drop
- Symmetrical, bidirectional measurement (6 path)
- SonicExplorer® PC Software for configuration, diagnostics and health care
- AGA 9 compliant

Options

- VDSL modem for high speed long distance TCP/IP communication
- Pressure sensors for Reynolds and Mach corrections
- Retraction tool for transducer exchange 'under pressure'
- Reduced bore

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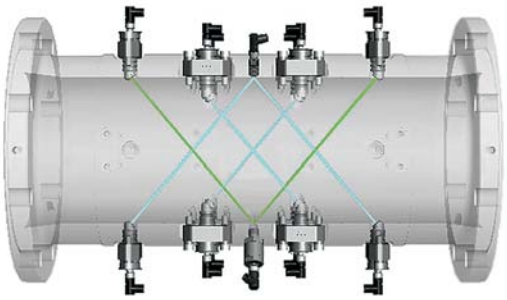
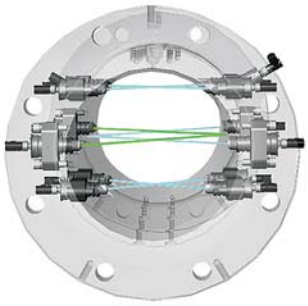
Path configuration

The CheckSonic^{vx} 6 path uses two pairs of direct cross X paths in the same plane and two axial diameter single reflection V paths delivering a sophisticated acoustic imaging and interrogation of the gas stream.





The reflective V paths interrogating the centre of the flow are sensitive indicators and enable the meter to be the "first to detect" dirt and grime deposited by process in the meter body. Conversely the direct paths provide extremely robust measurement under dramatic operating conditions typically seen in shale gas gathering points, coal seam, flare, wellhead and other harsh applications.

Transducer path		
Path No.		Path type
6 path	3 path	
1	1	Direct cross path
2	2	Direct cross path
3	3	Single reflection path
4	-	Single reflection path
5	-	Direct cross path
6	-	Direct cross path

Model NG ultrasonic transducers

The NG transducers are fully encapsulated within a titanium body for robust operation from atmospheric applications to extended process pressures. The titanium body also offers a smooth surface that abates dirt and grime build-up. The NG transducers operate over a range of 200 kHz ensuring exceptional balance between measurement resolution and signal strength.

Signal processing unit (SPU) series 6

The signal processing unit (SPU) resides in a flame-proof cast aluminium alloy housing mounted in a slotted card cage with room for future expansion. Field connections are located in a segregated back compartment of the SPU housing, where the terminal board and the optional VDSL modem reside.
The colour graphics touch user interface allows easy monitoring of flow meter operation, diagnostics and performance for a detailed analysis of meter health. Extended operational data and diagnostics can be sent to networks and PC's via a built in web server. The series 6 electronics boast an enCore central processing unit with 32 GB storage memory, which enables mandated, user configurable data archives, event logging as well as historic data at your fingertips.

Components on the meter body

- Signal processing unit (SPU) electronics and interactive touch screen
- Pressure tap for external transmitter located on the meter body.
- Temperature and optional pressure sensor for a more accurate calculation of Reynolds and Mach number correction
- Transducer and mounting plate with retractable transducer under process conditions; optional mechanical extraction tool

Flow ranges metric

Type	Size		Flange connection		Spool diameter		Internal	Flow [m³/h]			Turndown
	[Inch]	DN	ANSI schedule	EN1092-1	ANSI flange max ID [mm]	PN flange max ID [mm]	diameter [mm]	Q_{min}	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	10	55	550	56
	4	100	STD – XS	PN 10 – PN 100	102.30	107.10	97	13	100	1000	79
			XS – 120		97.20		90	11	90	900	80
	6	150	STD – XS	PN 10 – PN 100	154.10	159.30	146	18	220	2200	124
			XS – 120		146.30		139	16	200	2000	125
	8	200	STD – XS	PN 10 – PN 100	202.70	206.50	190	30	400	4000	133
			XS – 120		193.70		180	27	350	3500	130
	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	123
	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	118
	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	120
	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	115
Full bore Customized	18	450	STD	PN 10 – PN 40		442.80	max. 437.90	165	1800	18000	109
			120				min. 387.10	120	1350	13500	113
	20	500	STD	PN 10 – PN 100		493.80	max. 488.90	200	2100	21000	105
			120				min. 431.80	160	1600	16000	100
	24	600	STD	PN 10 – PN 63		594.00	max. 590.90	295	3000	30000	102
			100				min. 532.22	240	2400	24000	100
	26	650	STD	n/a			max. 640.90	330	3300	33000	100
			S = 25.4				min. 609.20	275	2750	27500	100
	30	750	STD	n/a			max. 742.90	460	4600	46000	100
			S = 31.75				min. 730.30	370	3700	37000	100
	36	900	STD	PN 10 – PN 63		889.00	max. 894.90	670	6700	67000	100
			S = 31.75				min. 850.50	525	5250	52500	100
	42	1050	STD	n/a			max. 1047.90	920	8300	83000	90
			S = 31.75				min. 1003.50	750	6750	67500	90
	48	1200	STD	PN 10 – PN 63		1194.00	max. 1199.90	1200	11000	110000	92
			S = 31.75				min. 1155.50	1000	9100	91000	91
	56	1400	S = 12.7	PN 10 – PN 40		1393.60	max. 1396.60	1650	15000	150000	91
			S = 31.75				min. 1358.50	1600	14300	143000	89

Flow ranges imperial

Type	Size		Flange connection		Spool diameter		Internal	Flow [MC F D]			Turndown
	[Inch]	DN	ANSI schedule	EN1092-1	ANSI flange max ID [inch]	PN flange max ID [inch]	diameter [inch]	Q_{min}	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	466	56
	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	763	80
	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	1695	125
	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	2966	130
	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	123
	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	118
	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	120
	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	115
Full bore Customized	18	450	STD	PN 10 – PN 40		17.43	max. 17.24	140	1526	15256	109
			120				min. 15.24	102	1144	11442	113
	20	500	STD	PN 10 – PN 100		19.44	max. 19.25	170	1780	17799	105
			120				min. 17	136	1356	13561	100
	24	600	STD	PN 10 – PN 63		23.39	max. 23.26	250	2543	25427	102
			100				min. 20.95	203	2034	20341	100
	26	650	STD	n/a			max. 25.23	280	2797	27969	100
			S = 25.4				min. 23.98	233	2331	23308	100
	30	750	STD	n/a			max. 29.25	390	3899	38987	100
			S = 31.75				min. 28.75	314	3136	31359	100
	36	900	STD	PN 10 – PN 63		35.00	max. 35.23	568	5679	56786	100
			S = 31.75				min. 33.48	445	4450	44496	100
	42	1050	STD	n/a			max. 41.26	780	7035	70347	90
			S = 31.75				min. 39.51	636	5721	57210	90
	48	1200	STD	PN 10 – PN 63		47.01	max. 47.24	1017	9323	93231	92
			S = 31.75				min. 45.49	848	7713	77127	91
	56	1400	S = 12.7	PN 10 – PN 40		54.87	max. 54.98	1398	12713	127133	91
			S = 31.75				min. 53.48	1356	12120	121200	89

Sonic Explorer

SonicExplorer is a Windows-based PC software for on-site and remote communication with the CheckSonic^{vx} flow meter as well as off line data analysis and flow meter pre commissioning configuration. SonicExplorer is a tool that allows the end user to view the health and performance of the meter either in real time or from historical archives. SonicExplorer focuses on providing intuitive yet detailed data so that informed decisions can be made with respect to maintenance and recalibration.

- Function overview
- Health care reporting
- Customer Service pack
- Real time and historical diagnostics analysis
- Multiple meter data base
- Fingerprint reference cases
- Spectral noise analysis
- Configuration capability
  (if security features are deactivated)
- Configuration documentation

Technical data	
Measurement principle	Ultrasonic transit time measurement
Sizes	3" to 56" (DN 80 to DN 1400)
Pressure range	Atmospheric to 420 barg (2175 psig), minimum pressure depending on size and gas composition
Process temperature range	Standard: -40 °C to +80 °C (-40 F to +176 F) Extended: -50 °C to +80 °C (-58 F to +176 F)
Ambient temperature range	Standard: -40 °C to +60 °C (-40 F to +140 F) Extended: -50 °C to +80 °C (-58 F to +140 F)
Repeatability	0.1% [1]
Typical uncertainty	0.5 – 1 % depending on the application [1]
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
Body construction details	≤ 16": reduced bore, tapering angle 7° (forged) ≥ 18": full bore (machined and welded)
Material certificate	EN 10204 3.1 (3.2 on request)
Pressure reference point	½" NPT (G½ on request)
Electronic enclosure material	Copper free aluminium, 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" widescreen graphical colour display with 7 capacitive soft keys (touch)
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[2] - 2 analogue outputs[2] - 1 USB port (device)
Communications protocol	- Modbus (ASCII, RTU, TCP/IP) - UNIFORM - UNIFORM Series IV 4-path compatibility mode - MMS (Manufacturing Message Specification) - Built-in web server
Hazardous area approvals	ATEX: 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, Group A to D T6 / Ex d [ia] IIC T6 (pending)
Ingress protection	IP66 / IP67 /NEMA 4X

[1] Q_t to Q_{max} – dry and uncontaminated gas
[2] Analogue outputs and digital outputs sharing the terminal clamps

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ChSonicvx EN01
A12.04.2013

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