

Smart Insertion Thermal Gas Mass Flow Meter

Features

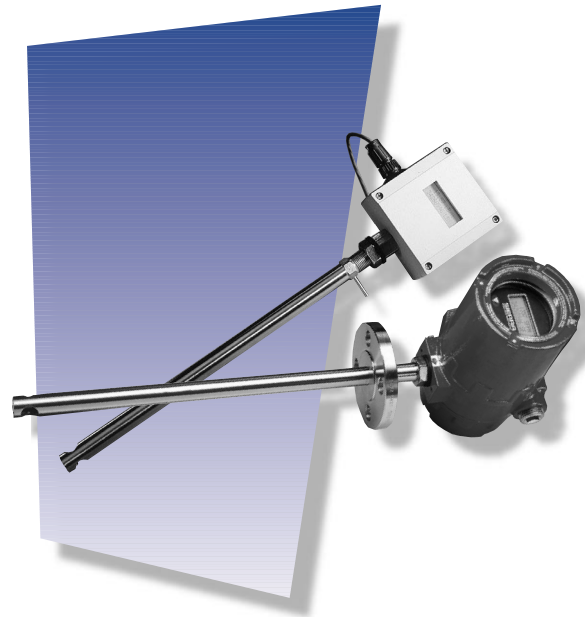
- Field adjustment of critical flow meter settings via on-board switches or Smart Interface™ (RS 232)
- Field validation of flow meter calibration
- Direct mass flow monitoring eliminates need for separate temperature and pressure inputs
- Outstanding rangeability
- One-second response to changes in flow rate
- FM, CSA and EEx certified for hazardous areas
- CE approved

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640S Series Steel-Mass™



Description

Sierra Instruments' Series 640S Smart Insertion Mass Flow Meter accommodates the changing measurement requirements and instrument-validation demands of industrial gas flow monitoring installations.

The versatile microprocessor-based transmitter integrates the functions of flow measurement, flow-range adjustment, meter validation and diagnostics, in either a probe-mounted or remote housing. Mass flow rate and totalized flow, as well as other configuration variables, are displayed on the meter's optional 2 x 12 LCD panel. The programmable transmitter is easily configured via an RS-232 communication port and interface software, or via the display and membrane switches on the instrument panel.

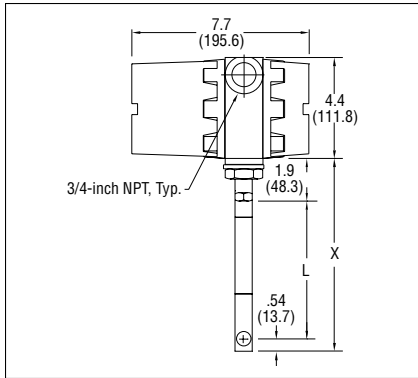
The Series 640S allows you to easily configure or change the following password protected parameters: flow range, totalizer, alarm settings, time response, zero flow cut-off and a calibration correction factor that compensates for flow profile variations.

Sierra's Smart Interface™ software guides you through a procedure to fully validate instrument performance. The meter is available with a variety of input power, output signal, mounting and packaging options.

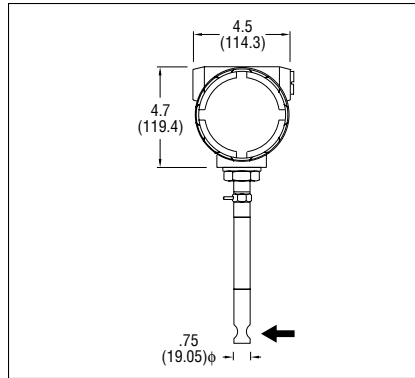
The information contained herein is subject to change without notice.

Hazardous-Area Location Enclosure Dimensional Specifications

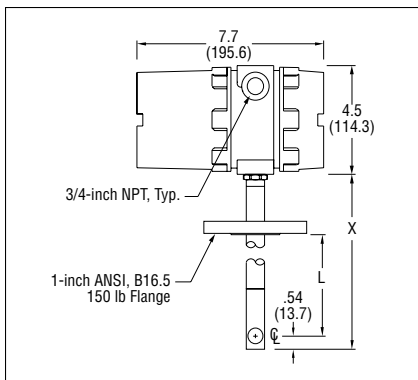
Compression Fitting—Side View



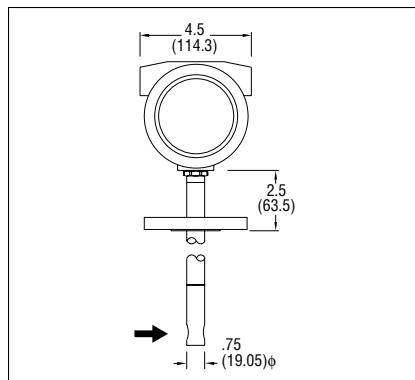
Compression Fitting—Front View



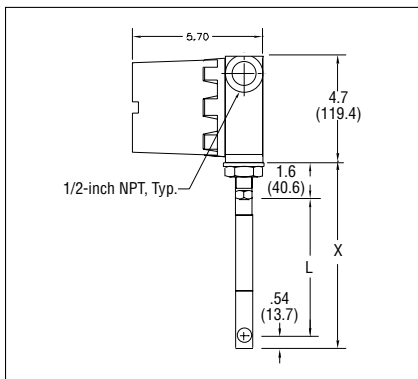
Flange Mounting—Side View



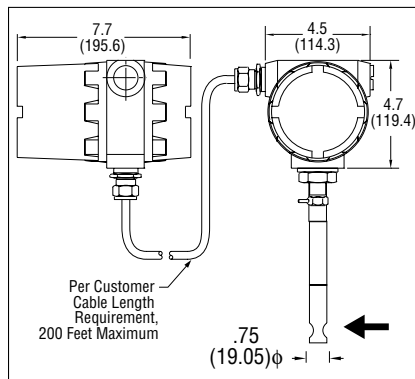
Flange Mounting—Front View



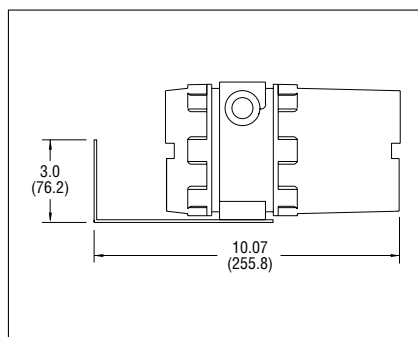
Remote Mount Junction Box—Side View



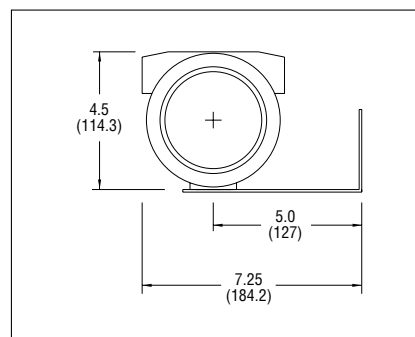
Remote Mount Junction Box—Front View



Remote Rear Bracket Mounted Electronics



Remote Side Bracket Mounted Electronics



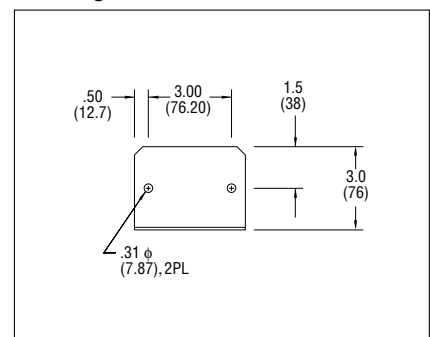
Tables

Length Chart		
Code	L	X
L06	6.0 (152.4)	7.5 (190.5)
L09	9.0 (228.6)	10.5 (266.7)
L13	13.0 (330.2)	14.5 (368.3)
L18	18.0 (457.2)	19.5 (495.3)
L24	24.0 (609.6)	25.5 (647.7)
L36	36.0 (914.4)	37.5 (952.5)

Length Chart		
Code	L	X
L06	6.0 (152.4)	9.0 (228.6)
L09	9.0 (228.6)	12.0 (304.8)
L13	13.0 (330.2)	16.0 (406.4)
L18	18.0 (457.2)	21.0 (533.4)
L24	24.0 (609.6)	27.0 (685.8)
L36	36.0 (914.4)	39.0 (990.6)

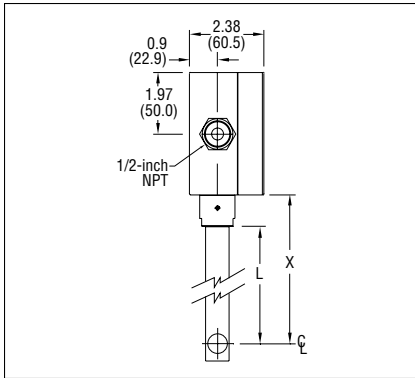
Length Chart		
Code	L	X
L06	6.0 (152.4)	7.5 (190.5)
L09	9.0 (228.6)	10.5 (266.7)
L13	13.0 (330.2)	14.5 (368.3)
L18	18.0 (457.2)	19.5 (495.3)
L24	24.0 (609.6)	25.5 (647.7)
L36	36.0 (914.4)	37.5 (952.5)

Mounting Holes for Remote Bracket

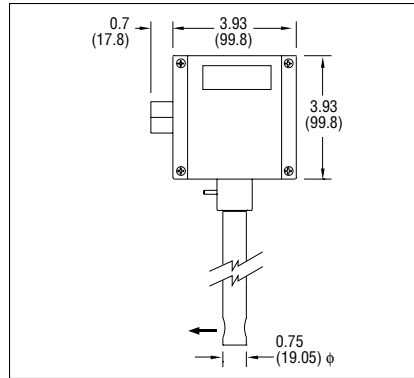


NEMA 4X Dimensional Specifications

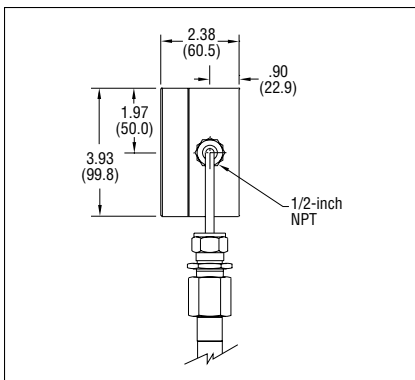
Compression Fitting—Side View



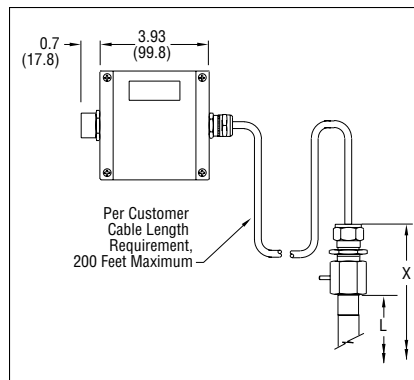
Compression Fitting—Front View



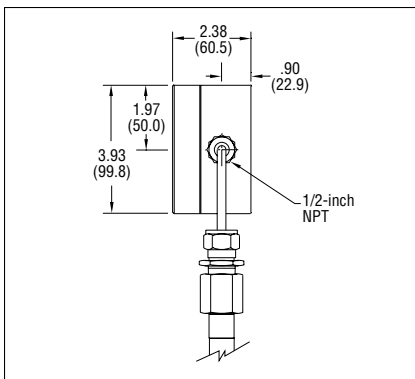
Remote Mount—Side View



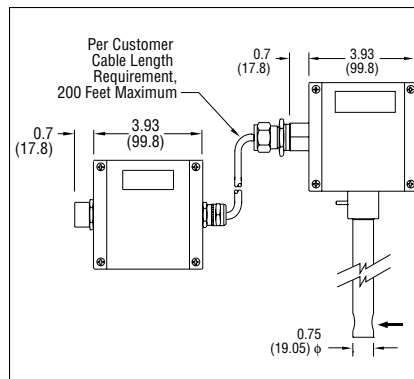
Remote Mount – Front View



Remote Mount Junction Box—Side View



Remote Mount Junction Box—Front View



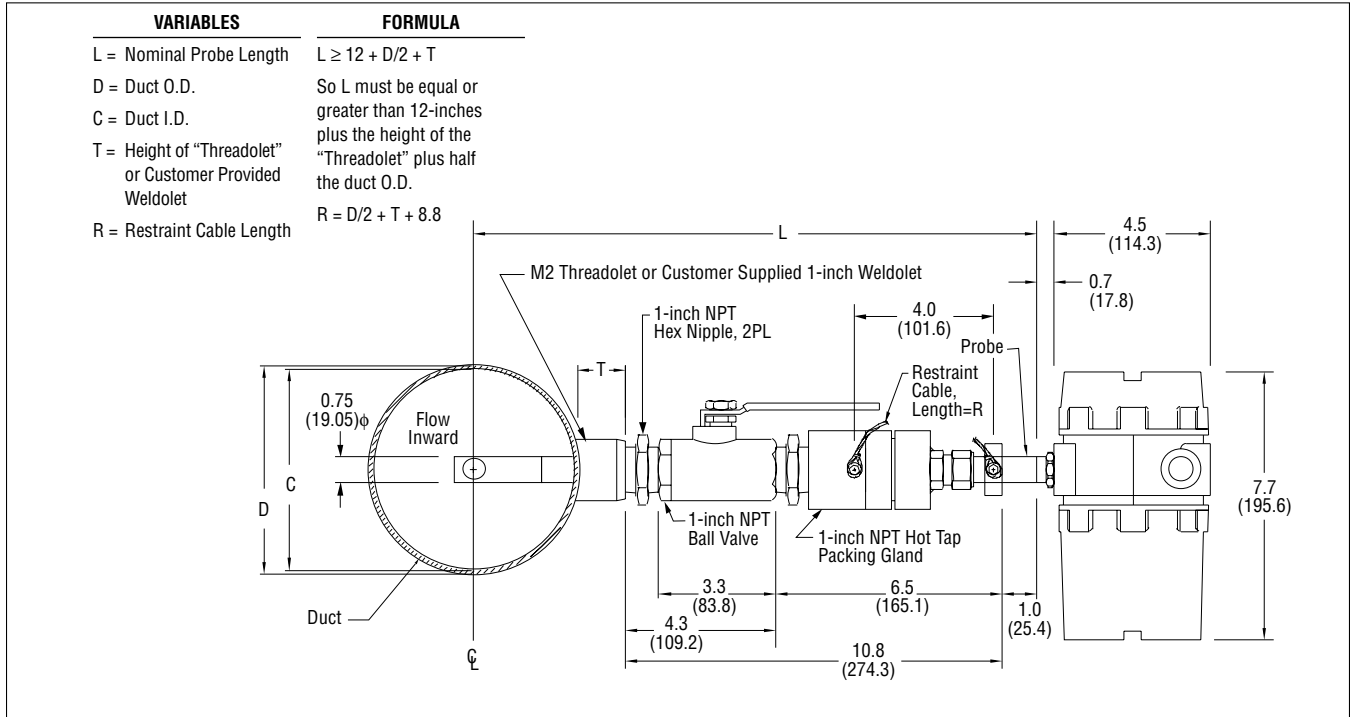
Tables

Length Chart		
Code	L	X
L06	6.1 (154.9)	7.1 (180.3)
L09	9.1 (231.1)	10.1 (256.5)
L13	13.1 (332.7)	14.1 (358.1)
L18	18.1 (459.7)	19.1 (485.1)
L24	24.1 (612.1)	25.1 (637.5)
L36	36.1 (916.9)	37.1 (942.3)

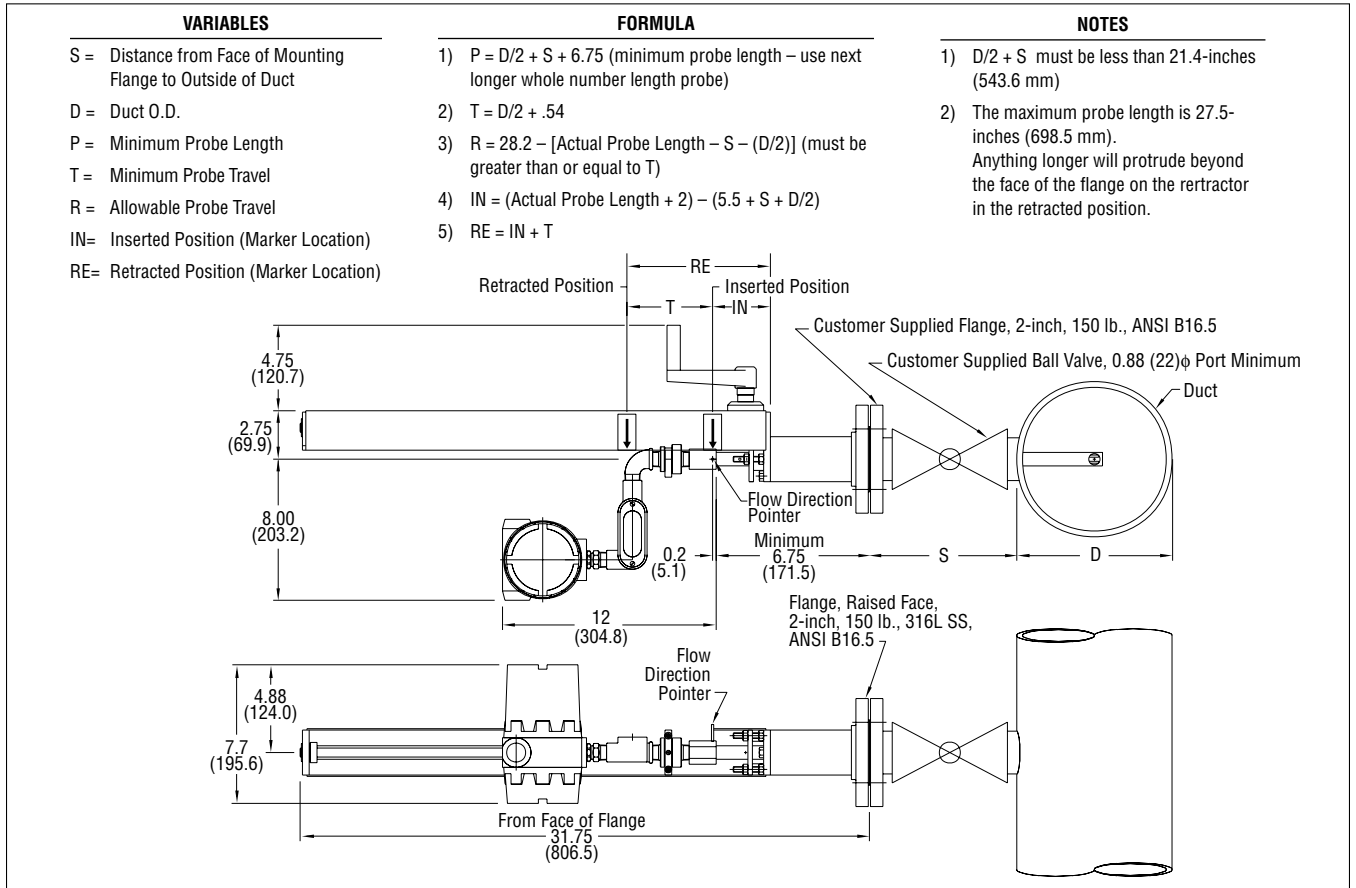
Length Chart		
Code	L	X
L06	6.0 (152.4)	8.6 (218.4)
L09	9.0 (228.6)	11.6 (294.6)
L13	13.0 (330.2)	15.6 (396.2)
L18	18.0 (457.2)	20.6 (523.2)
L24	24.0 (609.6)	26.6 (675.6)
L36	36.0 (914.4)	38.6 (980.4)

Hot Tap Dimensional Specifications

Low Pressure – Side View



High Pressure with Retractor – Side View



Performance Specifications

Accuracy of Point Velocity

± 2% of reading from 10 to 100% of calibrated range
± 0.5% of full scale below 10% of calibrated range

Repeatability

± 0.2% of full scale

Temperature Coefficient

± 0.02% of reading per °F within ± 50° F of customer specified conditions
± 0.03% of reading per °F within ± 50° F to 100° F of customer specified conditions
± 0.04% of reading per °C within ± 25° C of customer specified conditions
± 0.06% of reading per °C within ± 25° C to 50° C of customer specified conditions

Pressure Coefficient

.02% per psi for air, consult factory for other gases

Response Time

One second to 63% of final velocity value

Operating Specifications

Gases

Most gases compatible with 316 L stainless steel

Gas Pressure (2 limitations)

Mechanical design pressure:
Compression fittings: 500 psig (34 barg)
1-inch 150 lb flange (-40° to 250° F): 185 psig (12.8 barg)
Low Pressure Hot Tap: 100 psig (7 barg)
High Pressure Hot Tap: 1000 psig (70 barg)
Application gas pressure:
See mass flow range tables for maximum application gas pressures

Pressure Drop

Negligible for pipes three inches in diameter or larger

Gas & Ambient Temperature

Gas 15° F to 250° F (-10° C to 120° C) Gas dependent.
See mass flow range tables for details
Ambient -5° F to 120° F (-20° C to 50° C)

Leak Integrity

5 x 10⁻⁹ cc/sec of helium maximum

Power Requirements

18 to 30 VDC (regulated), 625 mA maximum
100 to 240 VAC, 50/60 Hz, 15 watts maximum

Output Signal

Linear 0–5 VDC or 0-10 VDC, 1000 ohms minimum load resistance or
Linear 4–20 mA proportional to mass flow rate,
700 ohms maximum resistance power supply dependent
User-selectable . . . Active non-galvanically separated or
Passive galvanically separated (loop power required)

Alarms

Hard contact user-adjustable high and low
Dead band adjustable with Smart Interface™ software
Relay ratings Maximum 42 VAC or 42 VDC, 140 mA

Displays

Alphanumeric 2 x 12 digit backlit LCD
Adjustable variables via on-board switches (password protected)
or with Smart Interface™ software
Adjustable variables . . Full scale (50 to 100 %)
Time Response (1 to 7 seconds)
Correction factor setting (0.5 to 5)
Zero and span
High and low alarm settings

Totalizer

Eight digits (99,999,999) in engineering units
Resettable by software, on-board switches or external magnet

Software

Smart Interface™ Windows 95®-based software
Minimum 8 MB of RAM, preferred 16 MB of RAM
RS 232 communication
Additional features . . . Alarm dead band adjustment
Zero cut-off adjustment
Linearization adjustment
Save / Load configurations
Virtual recorder
Data collection to Excel®
Flow meter validation

Physical Specifications

Wetted Materials

316L stainless steel

Enclosure

Hazardous-Area Location Enclosure (IP67) or NEMA 4X (IP65)
Both are powder-coated cast aluminum

Electrical Connections

Two 3/4 inch NPT . . . Hazardous-Area Location Enclosure (IP67)
One 1/2 inch NPT . . . NEMA 4X Enclosure (IP65)

Mounting (optional)

ANSI 1-inch 150 lb flange
3/4-inch tube compression fitting with 1-inch male NPT
Hot tap systems

Certifications

CE (All enclosures)
CSA (Explosion proof for Class I, Division 1, Groups B, C, D)
EEx (EEx d IIC T6 . . . T2) Cenelec
FM (Explosion proof for Class I, Division 1, Groups B, C, D)

Mass Flow Ranges

640S - Air - Gas Code 0 Application Temp. = 15-250° F

Spec (%rdg)	Pipe Size	Area (SqFt)	Max Vel (SFPM)	Max (SCFM)	Max nm3/hr	Max PSIG
standard accuracy	1"	0.0060	20,000	120	189	120
standard accuracy	1-1/2"	0.0142	20,000	284	448	120
standard accuracy	2"	0.0233	20,000	466	735	120
standard accuracy	3"	0.0513	20,000	1026	1618	120
standard accuracy	4"	0.0884	20,000	1768	2788	120
standard accuracy	6"	0.2010	20,000	4020	6340	120
standard accuracy	8"	0.3470	20,000	6940	10945	120
standard accuracy	10"	0.5480	20,000	10960	17285	120
standard accuracy	12"	0.7770	20,000	15540	24508	120
standard accuracy	14"	0.9390	20,000	18780	29618	120
standard accuracy	16"	1.2270	20,000	24540	38703	120
standard accuracy	18"	1.5530	20,000	31060	48985	120
standard accuracy	24"	2.7920	20,000	55840	88066	120
standard accuracy	36"	6.4920	20,000	129840	204773	120

640S - Argon - Gas Code 1 Application Temp. = 15-250° F

Spec (%rdg)	Pipe Size	Area (SqFt)	Max Vel (SFPM)	Max (SCFM)	Max nm3/hr	Max PSIG
standard accuracy	1"	0.0060	28,000	168	265	120
standard accuracy	1-1/2"	0.0142	28,000	398	627	120
standard accuracy	2"	0.0233	28,000	652	1029	120
standard accuracy	3"	0.0513	28,000	1436	2265	120
standard accuracy	4"	0.0884	28,000	2475	3904	120
standard accuracy	6"	0.2010	28,000	5628	8876	120
standard accuracy	8"	0.3470	28,000	9716	15324	120
standard accuracy	10"	0.5480	28,000	15344	24199	120
standard accuracy	12"	0.7770	28,000	21756	34312	120
standard accuracy	14"	0.9390	28,000	26292	41466	120
standard accuracy	16"	1.2270	28,000	34356	54184	120
standard accuracy	18"	1.5530	28,000	43484	68579	120
standard accuracy	24"	2.7920	28,000	78176	123293	120
standard accuracy	36"	6.4920	28,000	181776	286683	120

640S - CO₂ - Gas Code 2 Application Temp. = 15-250° F

Spec (%rdg)	Pipe Size	Area (SqFt)	Max Vel (SFPM)	Max (SCFM)	Max nm3/hr	Max PSIG
standard accuracy	1"	0.0060	19,800	119	187	120
standard accuracy	1-1/2"	0.0142	19,800	281	443	120
standard accuracy	2"	0.0233	19,800	461	728	120
standard accuracy	3"	0.0513	19,800	1016	1602	120
standard accuracy	4"	0.0884	19,800	1750	2760	120
standard accuracy	6"	0.2010	19,800	3980	6277	120
standard accuracy	8"	0.3470	19,800	6871	10836	120
standard accuracy	10"	0.5480	19,800	10850	17112	120
standard accuracy	12"	0.7770	19,800	15385	24263	120
standard accuracy	14"	0.9390	19,800	18592	29322	120
standard accuracy	16"	1.2270	19,800	24295	38316	120
standard accuracy	18"	1.5530	19,800	30749	48495	120
standard accuracy	24"	2.7920	19,800	55282	87186	120
standard accuracy	36"	6.4920	19,800	128542	202726	120

640S - Chlorine - Gas Code 3 Application Temp. = 50-90° F

Spec (%FS)	Pipe Size	Area (SqFt)	Max Vel (SFPM)	Max (SCFM)	Max nm3/hr	Max PSIG
5% correlation	1"	0.0060	3,261	1.5	2	120
5% correlation	1-1/2"	0.0142	3,333	6.5	10	120
5% correlation	2"	0.0233	3,380	12.0	19	120
5% correlation	3"	0.0513	3,333	20	32	120
5% correlation	4"	0.0884	3,169	45	71	120
5% correlation	6"	0.2010	3,219	75	118	120
5% correlation	8"	0.3470	3,411	175	276	120

640S - Digester - Gas Code 4 Application Temp. = 15-250° F

Spec (%rdg)	Pipe Size	Area (SqFt)	Max Vel (SFPM)	Max (SCFM)	Max nm3/hr	Max PSIG
standard accuracy	1"	0.0060	17,200	103	163	30
standard accuracy	1-1/2"	0.0142	17,200	244	385	30
standard accuracy	2"	0.0233	17,200	401	632	30
standard accuracy	3"	0.0513	17,200	882	1392	30
standard accuracy	4"	0.0884	17,200	1520	2398	30
standard accuracy	6"	0.2010	17,200	3457	5452	30
standard accuracy	8"	0.3470	17,200	5968	9413	30
standard accuracy	10"	0.5480	17,200	9426	14865	30
standard accuracy	12"	0.7770	17,200	13364	21077	30
standard accuracy	14"	0.9390	17,200	16151	25472	30
standard accuracy	16"	1.2270	17,200	21104	33284	30
standard accuracy	18"	1.5530	17,200	26712	42127	30
standard accuracy	24"	2.7920	17,200	48022	75737	30
standard accuracy	36"	6.4920	17,200	111662	176105	30

640S - Digester - Gas Code 5 Application Temp. = 15-250° F

Spec (%rdg)	Pipe Size	Area (SqFt)	Max Vel (SFPM)	Max (SCFM)	Max nm3/hr	Max PSIG
4% correlation	1"	0.0060	17,200	103	163	120
4% correlation	1-1/2"	0.0142	17,200	244	385	120
4% correlation	2"	0.0233	17,200	401	632	120
4% correlation	3"	0.0513	17,200	882	1392	120
4% correlation	4"	0.0884	17,200	1520	2398	120
4% correlation	6"	0.2010	17,200	3457	5452	120
4% correlation	8"	0.3470	17,200	5968	9413	120
4% correlation	10"	0.5480	17,200	9426	14865	120
4% correlation	12"	0.7770	17,200	13364	21077	120
4% correlation	14"	0.9390	17,200	16151	25472	120
4% correlation	16"	1.2270	17,200	21104	33284	120
4% correlation	18"	1.5530	17,200	26712	42127	120
4% correlation	24"	2.7920	17,200	48022	75737	120
4% correlation	36"	6.4920	17,200	111662	176105	120

640S - Helium - Gas Code 6 Application Temp. = 15-250° F

Spec (%rdg)	Pipe Size	Area (SqFt)	Max Vel (SFPM)	Max (SCFM)	Max nm3/hr	Max PSIG
standard accuracy	1"	0.0060	12,400	74	117	120
standard accuracy	1-1/2"	0.0142	12,400	176	278	120
standard accuracy	2"	0.0233	12,400	289	456	120
standard accuracy	3"	0.0513	12,400	636	1003	120
standard accuracy	4"	0.0884	12,400	1096	1729	120
standard accuracy	6"	0.2010	12,400	2492	3931	120
standard accuracy	8"	0.3470	12,400	4303	6786	120
standard accuracy	10"	0.5480	12,400	6795	10717	120
standard accuracy	12"	0.7770	12,400	9635	15195	120
standard accuracy	14"	0.9390	12,400	11644	18363	120
standard accuracy	16"	1.2270	12,400	15215	23996	120
standard accuracy	18"	1.5530	12,400	19257	30371	120
standard accuracy	24"	2.7920	12,400	34621	54601	120
standard accuracy	36"	6.4920	12,400	80501	126959	120

Mass Flow Ranges

640S-Hydrogen - Gas Code 7 Application Temp. = 15-250° F

Spec (%FS)	Size	Area (SqFt)	Max Vel (SFPm)	Max (SCFM)	Max nm3/hr	Max PSIG
standard accuracy	1"	0.0060	9,600	58	91	135
standard accuracy	1-1/2"	0.01420	7,042	100	158	135
standard accuracy	2"	0.02330	4,290	100	158	135
standard accuracy	3"	0.05130	1,950	100	158	135
standard accuracy	4"	0.08840	1,130	100	158	135
standard accuracy	6"	0.20100	500	100	158	135
standard accuracy	8"	0.34700	290	100	158	135
See chart below for flows greater than 100 SCFM						
standard accuracy	1-1/2"	0.01420	9,600	136	215	85
standard accuracy	2"	0.02330	9,600	224	354	85
standard accuracy	3"	0.05130	4,873	250	395	85
standard accuracy	4"	0.08840	2,828	250	395	85
standard accuracy	6"	0.20100	1,243	250	395	85
standard accuracy	8"	0.34700	720	250	395	85
See chart below for flows greater than 250 SCFM						
standard accuracy	3"	0.05130	7,797	400	630	ambient
standard accuracy	4"	0.08840	4,525	400	630	ambient
standard accuracy	6"	0.20100	1,990	400	630	ambient
standard accuracy	8"	0.34700	1,153	400	630	ambient

640S - CH₄ - Gas Code 8 Application Temp. = 15-250° F

Spec (%rdg)	Pipe Size	Area (SqFt)	Max Vel (SFPm)	Max (SCFM)	Max nm3/hr	Max PSIG
standard accuracy	1"	0.0060	16,000	96	151	30
standard accuracy	1-1/2"	0.0142	16,000	227	358	30
standard accuracy	2"	0.0233	16,000	373	588	30
standard accuracy	3"	0.0513	16,000	821	1295	30
standard accuracy	4"	0.0884	16,000	1414	2231	30
standard accuracy	6"	0.2010	16,000	3216	5072	30
standard accuracy	8"	0.3470	16,000	5552	8756	30
standard accuracy	10"	0.5480	16,000	8768	13828	30
standard accuracy	12"	0.7770	16,000	12432	19607	30
standard accuracy	14"	0.9390	16,000	15024	23695	30
standard accuracy	16"	1.2270	16,000	19632	30962	30
standard accuracy	18"	1.5530	16,000	24848	39188	30
standard accuracy	24"	2.7920	16,000	44672	70453	30
standard accuracy	36"	6.4920	16,000	103872	163819	30

640S - CH₄ - Gas Code 9 Application Temp. = 15-250° F

Spec (%rdg)	Pipe Size	Area (SqFt)	Max Vel (SFPm)	Max (SCFM)	Max nm3/hr	Max PSIG
4% correlation	1"	0.0060	16,000	96	151	120
4% correlation	1-1/2"	0.0142	16,000	227	358	120
4% correlation	2"	0.0233	16,000	373	588	120
4% correlation	3"	0.0513	16,000	821	1295	120
4% correlation	4"	0.0884	16,000	1414	2231	120
4% correlation	6"	0.2010	16,000	3216	5072	120
4% correlation	8"	0.3470	16,000	5552	8756	120
4% correlation	10"	0.5480	16,000	8768	13828	120
4% correlation	12"	0.7770	16,000	12432	19607	120
4% correlation	14"	0.9390	16,000	15024	23695	120
4% correlation	16"	1.2270	16,000	19632	30962	120
4% correlation	18"	1.5530	16,000	24848	39188	120
4% correlation	24"	2.7920	16,000	44672	70453	120
4% correlation	36"	6.4920	16,000	103872	163819	120

640S - Nitrogen - Gas Code 10 Application Temp. = 15-250° F

Spec (%rdg)	Pipe Size	Area (SqFt)	Max Vel (SFPm)	Max (SCFM)	Max nm3/hr	Max PSIG
standard accuracy	1"	0.0060	19,800	119	187	120
standard accuracy	1-1/2"	0.0142	19,800	281	443	120
standard accuracy	2"	0.0233	19,800	461	728	120
standard accuracy	3"	0.0513	19,800	1016	1602	120
standard accuracy	4"	0.0884	19,800	1750	2760	120
standard accuracy	6"	0.2010	19,800	3980	6277	120
standard accuracy	8"	0.3470	19,800	6871	10836	120
standard accuracy	10"	0.5480	19,800	10850	17112	120
standard accuracy	12"	0.7770	19,800	15385	24263	120
standard accuracy	14"	0.9390	19,800	18592	29322	120
standard accuracy	16"	1.2270	19,800	24295	38316	120
standard accuracy	18"	1.5530	19,800	30749	48495	120
standard accuracy	24"	2.7920	19,800	55282	87186	120
standard accuracy	36"	6.4920	19,800	128542	202726	120

640S - Oxygen - Gas Code 11 Application Temp. = 15-250° F

Spec (%rdg)	Pipe Size	Area (SqFt)	Max Vel (SFPm)	Max (SCFM)	Max nm3/hr	Max PSIG
4% correlation	1"	0.0060	19,800	119	187	120
4% correlation	1-1/2"	0.0142	19,800	281	443	120
4% correlation	2"	0.0233	19,800	461	728	120
4% correlation	3"	0.0513	19,800	1016	1602	120
4% correlation	4"	0.0884	19,800	1750	2760	120
4% correlation	6"	0.2010	19,800	3980	6277	120
4% correlation	8"	0.3470	19,800	6871	10836	120
4% correlation	10"	0.5480	19,800	10850	17112	120
4% correlation	12"	0.7770	19,800	15385	24263	120
4% correlation	14"	0.9390	19,800	18592	29322	120
4% correlation	16"	1.2270	19,800	24295	38316	120
4% correlation	18"	1.5530	19,800	30749	48495	120
4% correlation	24"	2.7920	19,800	55282	87186	120
4% correlation	36"	6.4920	19,800	128542	202726	120

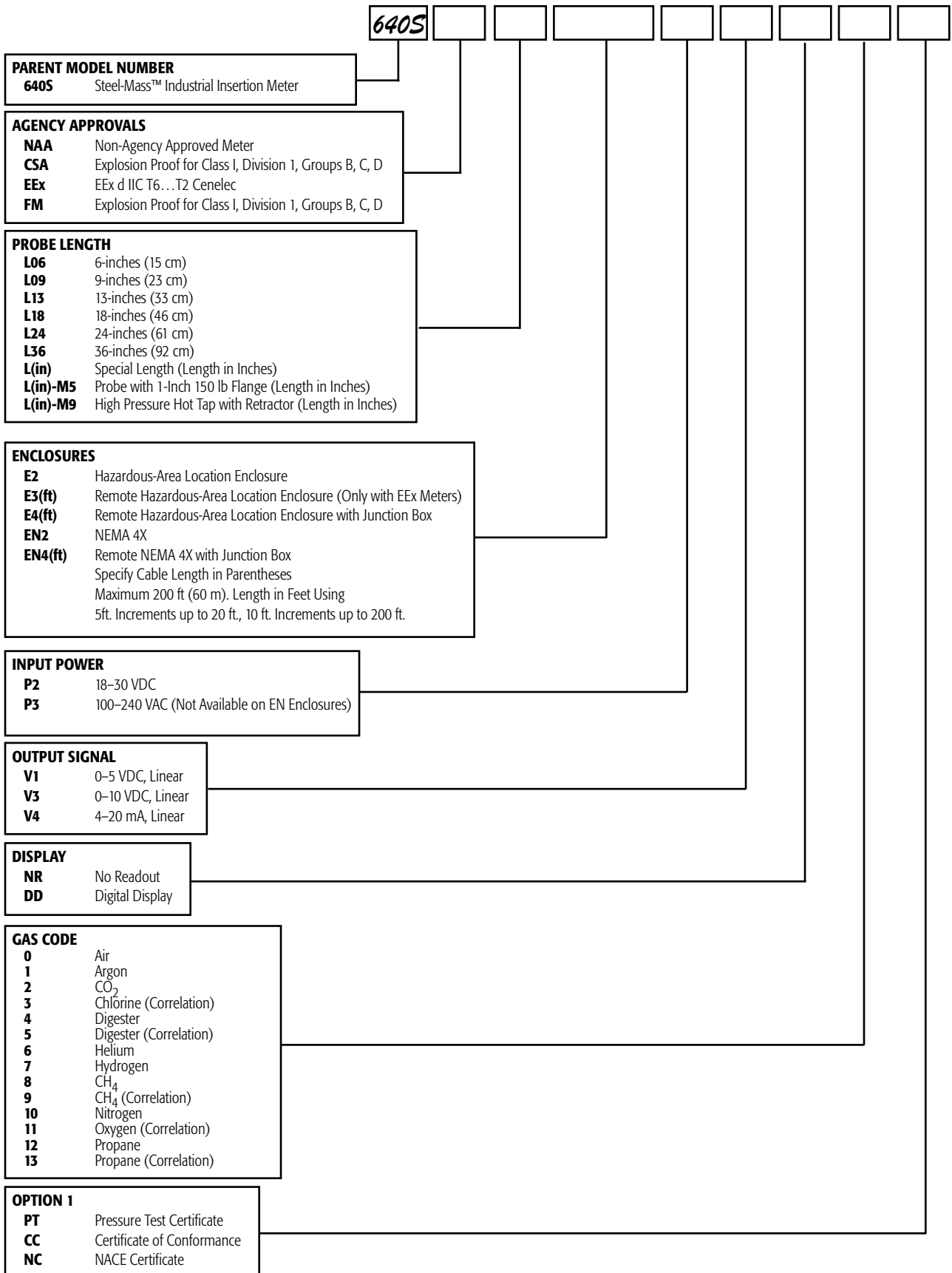
640S - Propane - Gas Code 12 Application Temp. = 50-90° F

Spec (%rdg)	Pipe Size	Area (SqFt)	Max Vel (SFPm)	Max (SCFM)	Max nm3/hr	Max PSIG
standard accuracy	1"	0.0060	13,200	79	125	30
standard accuracy	1-1/2"	0.0142	13,200	187	296	30
standard accuracy	2"	0.0233	13,200	308	485	30
standard accuracy	3"	0.0513	13,200	677	1068	30
standard accuracy	4"	0.0884	13,200	1167	1840	30
standard accuracy	6"	0.2010	13,200	2653	4184	30
standard accuracy	8"	0.3470	13,200	4580	7224	30
standard accuracy	10"	0.5480	13,200	7234	11408	30
standard accuracy	12"	0.7770	13,200	10256	16176	30
standard accuracy	14"	0.9390	13,200	12395	19548	30
standard accuracy	16"	1.2270	13,200	16196	25544	30
standard accuracy	18"	1.5530	13,200	20500	32330	30
standard accuracy	24"	2.7920	13,200	36854	58124	30
standard accuracy	36"	6.4920	13,200	85694	135150	30

640S - Propane - Gas Code 13 Application Temp. = 15-250° F

Spec (%rdg)	Pipe Size	Area (SqFt)	Max Vel (SFPm)	Max (SCFM)	Max nm3/hr	Max PSIG
4% correlation	1"	0.0060	13,200	79	125	120
4% correlation	1-1/2"	0.0142	13,200	187	296	120
4% correlation	2"	0.0233	13,200	308	485	120
4% correlation	3"	0.0513	13,200	677	1068	120
4% correlation	4"	0.0884	13,200	1167	1840	120
4% correlation	6"	0.2010	13,200	2653	4184	120
4% correlation	8"	0.3470	13,200	4580	7224	120
4% correlation	10"	0.5480	13,200	7234	11408	120
4% correlation	12"	0.7770	13,200	10256	16176	120
4% correlation	14"	0.9390	13,200	12395	19548	120
4% correlation	16"	1.2270	13,200	16196	25544	120
4% correlation	18"	1.5530	13,200	20500	32330	120
4% correlation	24"	2.7920	13,200	36854	58124	120
4% correlation	36"	6.4920	13,200	85694	135150	120

Ordering the Model 640S



ACCESSORIES (Consult Factory)