

CALDON

Product Specifications

LEFM® 280C

Ultrasonic Flow Meters

- ✓ *Master Meter Performance*
- ✓ *Compact measurement solution*
- ✓ *Ideally suited for:*
 - *pay & check metering*
 - *complete condition monitoring*
- ✓ *Provable*
- ✓ *Superior flow stream and performance diagnostics*





SIZES, MAXIMUM FLOW RATES and K FACTORS

Meter Construction

The Caldon LFM 280C meter body is designed and manufactured in accordance with ASME B31.3 Process Piping Code or the Pressure Equipment Directive (PED) 97/23/EC and is suitable for handling pressurized liquid hydrocarbons. It has sixteen (16) piezoelectric transducer modules (typically 0.5MHz, 1.0MHz or 1.6MHz) forming eight (8) chordal paths. These are mounted in pressure containing housings and can be replaced while the meter body is under operating conditions.

Electrical Approvals

The meter meets the requirements of NFPA 70 for use in Class 1, Division 1, Groups C and D hazardous locations and is classified by UL/cUL. It meets the requirements for NEMA 4X and NEMA 7. It is certified by ATEX (CENELEC IIB) for use in EExd IIB flame-proof applications and has an ingress protection rating of IP66.

Remote Wall Mounted Transmitter



Meter Body



SIZE		NOMINAL MAXIMUM FLOW BPH	K FACTOR P/Bbl	NOMINAL MAXIMUM FLOW m ³ /h	K FACTOR P/m ³
INCHES	DN				
4	100	2,050	2,000	325	12,600
6	150	4,650	1,000	740	6,300
8	200	8,150	500	1,290	3,150
10	250	12,800	350	2,030	2,200
12	300	19,300	250	3,070	1,570
14	350	23,600	200	3,750	1,000
16	400	28,700	150	4,560	940
18	450	41,000	100	6,500	630
20	500	50,000	85	7,900	530
24	600	72,000	60	11,500	380
26	650	87,000	45	13,900	280
28	700	100,000	40	16,200	240
30	750	115,000	35	18,700	220
32	800	130,000	30	21,300	185
34	850	150,000	25	24,200	165
36	900	165,000	25	27,200	145
40	1,000	205,000	20	32,600	125

K Factor is based on ~ 1.1 KHz at max. nom. rate. Other K factors can be programmed but must be between 4Hz and 10 KHz at all operating flow rates.

STANDARD MATERIALS of CONSTRUCTION

Meter Body	Stainless Steel	Carbon Steel
Flanges	316 Forged Stainless Steel	Forged Carbon Steel – ASTM A105
Body	Cast Stainless Steel – CF8M (316)	Cast Carbon Steel – ASTM A216 Gr WCB
Manifold	304 Stainless Steel	304 Stainless Steel
Manifold Covers	316 Stainless Steel	316 Stainless Steel
Transducer Housings	316 Stainless Steel	316 Stainless Steel
Junction Boxes	Epoxy Painted Copper-Free Aluminum	Epoxy Painted Copper-Free Aluminum

Remote Wall Mounted Transmitter Enclosures (2)

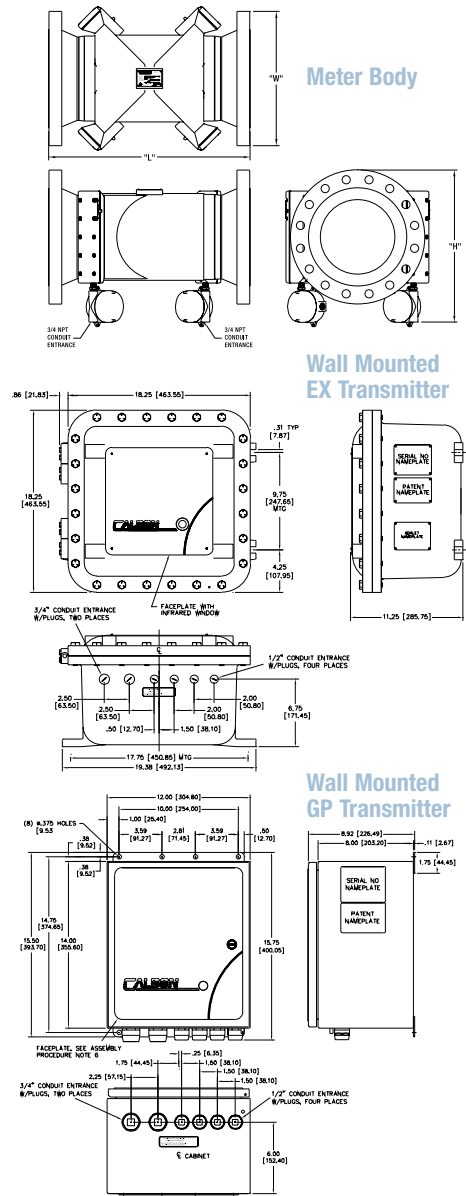
GP – NEMA 4X	304 Stainless Steel	304 Stainless Steel
EX – NEMA 7	Copper-Free Aluminum	Copper-Free Aluminum

STANDARD END CONNECTIONS and MAXIMUM WORKING PRESSURES

Maximum Working Pressure -20° F to 100° F (-29° C to 38° C)

ANSI B16.5 Raised Face	Stainless Steel	Carbon Steel
Class 150	275 psi (18.96 Bars)	285 psi (19.65 Bars)
Class 300	720 psi (49.64 Bars)	740 psi (51.02 Bars)
Class 600	1,440 psi (99.29 Bars)	1,480 psi (102.05 Bars)
Class 900	2,160 psi (148.93 Bars)	2,220 psi (153.07 Bars)
Class 1500	3,600 psi (248.22 Bars)	3,705 psi (255.46 Bars)

DIMENSIONS and WEIGHTS for LEFM 280C										
Pipe Size Inches (DN)	ANSI Class	L		W		H		Un-Packed Weight		
		Inches	(mm)	Inches	(mm)	Inches	(mm)	lbs.	(kg)	
4 (100)	150	18.0	(457)	11.0	(280)	13.5	(344)	185	(84)	
	300	18.8	(477)	11.0	(280)	14.0	(357)	202	(92)	
	600	20.5	(521)	11.0	(280)	14.4	(366)	236	(107)	
	900	21.5	(546)	11.5	(292)	14.8	(376)	254	(115)	
	1500	22.3	(565)	12.3	(311)	15.2	(385)	298	(135)	
6 (150)	150	20.5	(521)	12.8	(324)	15.4	(390)	279	(126)	
	300	21.3	(540)	12.8	(324)	16.1	(409)	313	(142)	
	600	23.2	(590)	14.0	(356)	16.9	(428)	391	(177)	
	900	25.0	(635)	15.0	(381)	17.4	(441)	449	(204)	
	1500	27.5	(699)	15.5	(394)	17.6	(447)	559	(253)	
8 (200)	150	24.0	(610)	14.8	(375)	17.6	(447)	474	(215)	
	300	24.8	(629)	15.0	(381)	18.4	(466)	530	(240)	
	600	27.0	(686)	16.5	(419)	19.1	(485)	636	(289)	
	900	29.3	(743)	18.5	(470)	20.1	(511)	746	(338)	
	10 (250)	150	26.0	(660)	17.0	(432)	19.9	(506)	714	(324)
300		27.2	(692)	17.5	(445)	20.7	(525)	792	(359)	
600		30.5	(775)	20.0	(508)	21.9	(557)	990	(449)	
900		33.0	(838)	21.5	(546)	22.7	(576)	1130	(513)	
12 (300)		150	29.5	(749)	19.0	(483)	22.4	(569)	987	(448)
	300	30.7	(781)	20.5	(521)	23.2	(588)	1107	(502)	
	600	33.2	(844)	22.0	(559)	23.9	(607)	1277	(579)	
	900	36.8	(934)	24.0	(610)	24.9	(633)	1477	(670)	
	14 (350)	150	32.0	(813)	21.0	(533)	24.0	(611)	1265	(574)
300		33.2	(844)	23.0	(584)	25.0	(636)	1405	(637)	
600		35.5	(902)	23.8	(603)	25.4	(646)	1605	(728)	
900		39.3	(997)	25.3	(641)	26.2	(665)	1845	(837)	
16 (400)		150	33.5	(851)	23.5	(597)	26.4	(671)	1467	(666)
	300	35.0	(889)	25.5	(648)	27.4	(696)	1687	(765)	
	600	38.0	(965)	27.0	(686)	28.2	(715)	1967	(892)	
	900	41.5	(1054)	27.8	(705)	28.5	(725)	2177	(988)	
	18 (450)	150	37.0	(940)	25.0	(635)	28.2	(716)	1614	(732)
300		38.5	(978)	28.0	(711)	29.7	(754)	1954	(887)	
600		41.0	(1041)	29.3	(743)	30.3	(770)	2264	(1027)	
900		44.5	(1130)	31.0	(787)	31.2	(792)	2674	(1213)	
20 (500)		150	39.4	(1000)	27.5	(699)	29.8	(757)	1640	(744)
	300	40.8	(1035)	30.5	(775)	31.3	(795)	2080	(943)	
	600	43.5	(1105)	32.0	(813)	32.0	(814)	2460	(1116)	
	900	48.0	(1219)	33.8	(857)	32.9	(836)	2940	(1333)	
	24 (600)	150	44.0	(1118)	32.0	(813)	34.0	(865)	1991	(903)
300		45.2	(1149)	36.0	(914)	36.0	(915)	2631	(1194)	
600		48.5	(1232)	37.0	(940)	36.5	(928)	3131	(1420)	
900		55.5	(1410)	41.0	(1041)	38.5	(979)	4471	(2028)	
26 (650)		150	43.5	(1105)	34.3	(870)	36.2	(919)	2204	(1000)
	300	48.5	(1232)	38.3	(972)	38.2	(969)	2814	(1276)	
	28 (700)	150	45.9	(1165)	36.5	(927)	38.3	(973)	2414	(1095)
		300	51.5	(1308)	40.8	(1035)	40.4	(1027)	3214	(1458)
		30 (750)	150	48.8	(1239)	38.8	(984)	39.7	(1007)	2632
300			54.5	(1384)	43.0	(1092)	41.8	(1061)	3572	(1620)
32 (800)			150	51.4	(1305)	41.8	(1060)	42.2	(1071)	2949
	300		57.5	(1461)	45.3	(1149)	43.9	(1115)	3949	(1791)
	34 (850)		150	53.8	(1366)	43.8	(1111)	44.2	(1122)	3127
		300	60.2	(1530)	47.5	(1207)	46.0	(1169)	4337	(1967)
		36 (900)	150	56.4	(1432)	46.0	(1168)	46.3	(1176)	3435
300			63.0	(1600)	50.0	(1270)	48.3	(1227)	4705	(2134)



Installation

To obtain the best possible performance for an LEFM 280C, there are some basic minimum installation requirements. The meter should have upstream straight pipe of the same schedule as the meter. Process temperature and pressure should be measured downstream of the meter. It is generally recommended that the LEFM 280C meter be installed with 5 diameters of straight piping upstream of the meter for most applications. When there is a partially open valve, or internal diameter reduction piping (such as an asymmetric reducer) upstream then 15 diameters of straight piping is recommended. There should be at least 3 to 5 diameters of straight pipe of the same nominal diameter as the meter downstream. Where installation guidelines cannot be met, or for recommendations for specific applications, consult with Caldon to determine acceptable options.

GENERAL SPECIFICATIONS

		Wall Mounted Electronics	Meter Body
Voltage		120VAC, 240VAC 24VDC	
Power		80W each (160W total)	
Relative Humidity		0-100%	0-100%
Operating Temperature		-30F to 140F (-35C to 60C) Interconnecting Cable -40F to 140F (-40C to 60C)	-328F to 464F (-200C to 240C)
Hazardous Area Approval	ATEX	-58F to 140F (-50C to 60C)	-58F to 199F (-50C to 93C)
	Class I, Div. I Groups C, D	-40F to 140F (-40C to 60C)	-31F to 284F (-35C to 140C)
Local Display		No	
Remote Mounting From Meter		328 Feet (100 meters)	
Analog Input(s)		Up to Three, 4-20mA Configured for temperature, pressure or density.	
Analog Output(s)		Up to Four, 4-20mA Any process variable measured by the meter is available as an analog output.	
Pulse Output(s)		Three 0-5V (continuous 50/50 duty cycle, programmable K factor). One output is 90° out of phase for flow indication.	
Digital Output(s)		0 or 5V for flow direction and 0 or 5V for alarm.	
Serial Communication		ModBus RTU: RS-485/RS-232 (2) – Up to 3,900 feet (1,200 meters)	

GENERAL PERFORMANCE

Linearity	± 0.12% over Nominal Flow Range with recommended flow conditioning
Repeatability	± 0.027% (API MPMS, Chapter 5.8, Table B-1)
Nominal Flow Range¹	10:1 or greater for sizes 4 in. to 8 in. (DN100 – DN200) from max flow; 15:1 or greater for sizes 10 in. (DN250) and larger from max. flow
Long Term Stability	Linearity is unaffected by usage
Water in Oil²	For water volumes up to 10% and velocities above 6.5 fps (2.0 mps), the meter will measure the total volume with no change in performance. Below 6.5 fps (2.0 mps) the performance depends on the separation of the water
Extended Ranges	Contact Caldon for applications with viscosity above 500 cSt for applicability
Custody Transfer Performance Approval (Pending)	OIML R 117 Edition 1995 (E) Accuracy Class 0.3

¹ Nominal Flow Range will increase for values of linearity > 0.12%

² Call Caldon for special applications outside these ranges.

U.S. Patents: 5546813, 5597962, 5639972, 5705753; Korea Patent: 208678; Canada Patent: 2107.750; Taiwan Patents: NI-080038, UM-119114. U.S. and foreign patents pending.

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