Data Sheet
D-FV-10A2235_3(US)

Variable Area Flowmeters
Ratosight™ Flow Rate Indicators
with Optional Ratolarm - 10A2235

- **Easily Cleaned** - Disassembly is simplified by O-ring construction
- **Virtually Maintenance-Free** - Cast bronze body and heavy-walled glass tube construction provide protection from mechanical and thermal stresses
- **Reliable** - “Fail Safe” alarm construction provides alarm actuation in the event of power failure
- **Versatile** - Relay contacts can be externally wired at installation for either normally open, normally closed, or both.
- **No False Alarms** - Vibration-proof switch prevents accidental actuation.

Ratosight™ Flow Rate Indicator with Optional Ratolarm™ Series 10A2235

RATOSIGHT™ FLOW RATE INDICATOR with OPTIONAL RATOLARM™

The ABBSeries 10A2235A Ratosight flow rate indicator is a rugged, low cost, glass tube, variable area flowmeter that provides stable and reliable operation while measuring liquid or gas flow rates. This indicator can be supplied with Ratoalarm extension (Series 10A2235-OA) for alarm actuation. The alarm unit can house one or two vibration-proof magnetic switches with relays. Each switch is fully adjustable over the entire operating range of the flowmeter.

To provide fail-safe operation, the Ratolarm relay is wired so that its coil is energized during normal flow. Upon power failure, the relay coil is de-energized causing the relay contacts to assume the alarm position. These relay contacts may be wired for normally open or normally closed alarm action or both, simply through connection to appropriate posts on the terminal strip. Typical applications include the automatic shutdown of heavy equipment when bearing lubricant flow becomes too low, the shut-down of electrical equipment when cooling water flow falls below a preset limit, or the actuation of auxiliary equipment such as pump motor starters or solenoid valves.

Materials of Construction

Metering Tube: Borosilicate glass

Float: Standard - brass for liquids, aluminum for gases; stainless steel float extension is used on alarm unit for liquids and gases. Optional - Monel float for liquids only.

Body: 85-5-5-5 bronze

O-rings: Standard - Buna-N; Optional - Viton A.

Alarm Extension Well: 316 stainless steel

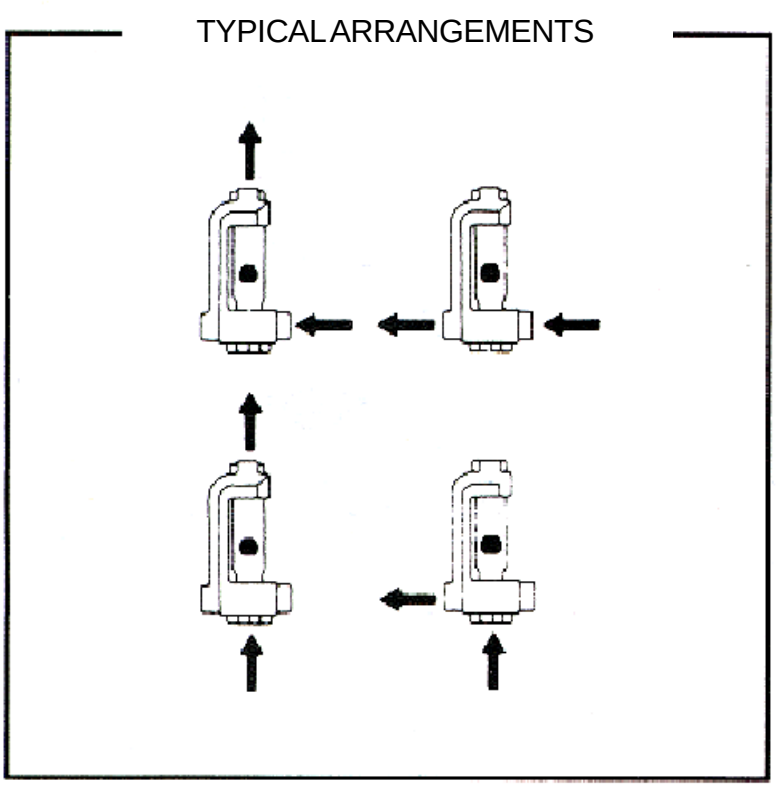
Alarm Base and Housing: Standard, weather tight aluminum

Scale: Directly on tube in either gpm water or scfm air at 14.7 psia and 70ºF (101 kPa & 21ºC). Other scales optionally available.

Connections: Threaded NPTI

Mounting & Piping: Indicator can be mounted in horizontal or vertical piping runs using any of the four arrangements shown below. Horizontal standard - other arrangements optional.

TYPICAL ARRANGEMENTS



Engineering Specifications

TABLE 1 . PERFORMANCE

Connection Pipe Size	Safe Working Pressure		Approximate Scale Length		Reproducibility % Full Scale	Std. Acuracy % Full Scale	Opt. Accuracy w/calib. % Full Scale
	psig	kPa	inches	mm			
0.5" NPT	175	1206	1.5	38	± 2%	± 10 %	± 5 %
1" NPT	125	861	2.5	63	± 2%	± 5 %	± 3 %
1.5" NPT	100	689	3.5	90	± 2%	± 5 %	± 3 %
2" NPT	75	518	4	100	± 2%	± 5 %	± 3 %

Maximum Temperature Rating 250 °F (121 °C)
Minimum Recommended Temperature 32 °F (0 °C)

TABLE 2. CAPACITIES
Flow Rate Indicator -- 10A2235A

Connection Pipe Size	Capacities									
	gpm* Water					scfm ** Air at 14.7 psia and 70ºF				
	Min.	Max.	H_2O DP(1)		Model No. (2)	Min.	Max.	H_2O DP(1)		Model No. (2)
			Inch	mm				Inch	Mm	
0.5" NPT	0.02	0.36	6.5	165	B	0.05	0.6	1.4	36	B
	0.05	0.6	17	432	C	0.1	1.3	4.6	117	C
	0.1	1	7	178	D	0.2	2	1.4	36	D
	0.2	2	21	583	F	0.5	4.5	5.5	140	F
	0.4	3	34	864	G	0.5	7	10	254	G
	0.6	4	59	1499	H	1.5	9	14.5	368	K
1" NPT	0.5	6	13	330	J	1	14	4.5	114	L
	0.5	8	21	533	K	2	20	8	203	N
	1	11	35	889	L	2	26	13	330	P
1.5" NPT	1	15	18	457	M	4	36	8.5	215	Q
	2	20	29	737	N	5	50	12	305	R
	2	24	44	1118	P	5	60	19	483	S
2" NPT	3	35	22	559	Q	8	80	8	203	T
	4	50	45	1143	R	10	110	15	381	U

NOTE: {1} DP values in above table are maximum pressure drop using horizontal connections.
When vertical connections are used, the pressure losses are approximately 25% lower.
(2) Use this code to complete model number.

* gpm x 3.785 = Liters per minute or l/min.

** scfm x 0.0284 = cubic meters per minute or m^3/min.

WARNING

All gas applications at pressures **exceeding 50 psig** and all flashing liquid applications should be handled by using either all metal meters or glass tube meters with an externally installed operator protection shield. This precaution is recommended because of the danger of accidental breakage of the glass tube under pressure.

TABLE 3. FLOW RATE INDICATOR WITH ALARM 10A2235A - OA

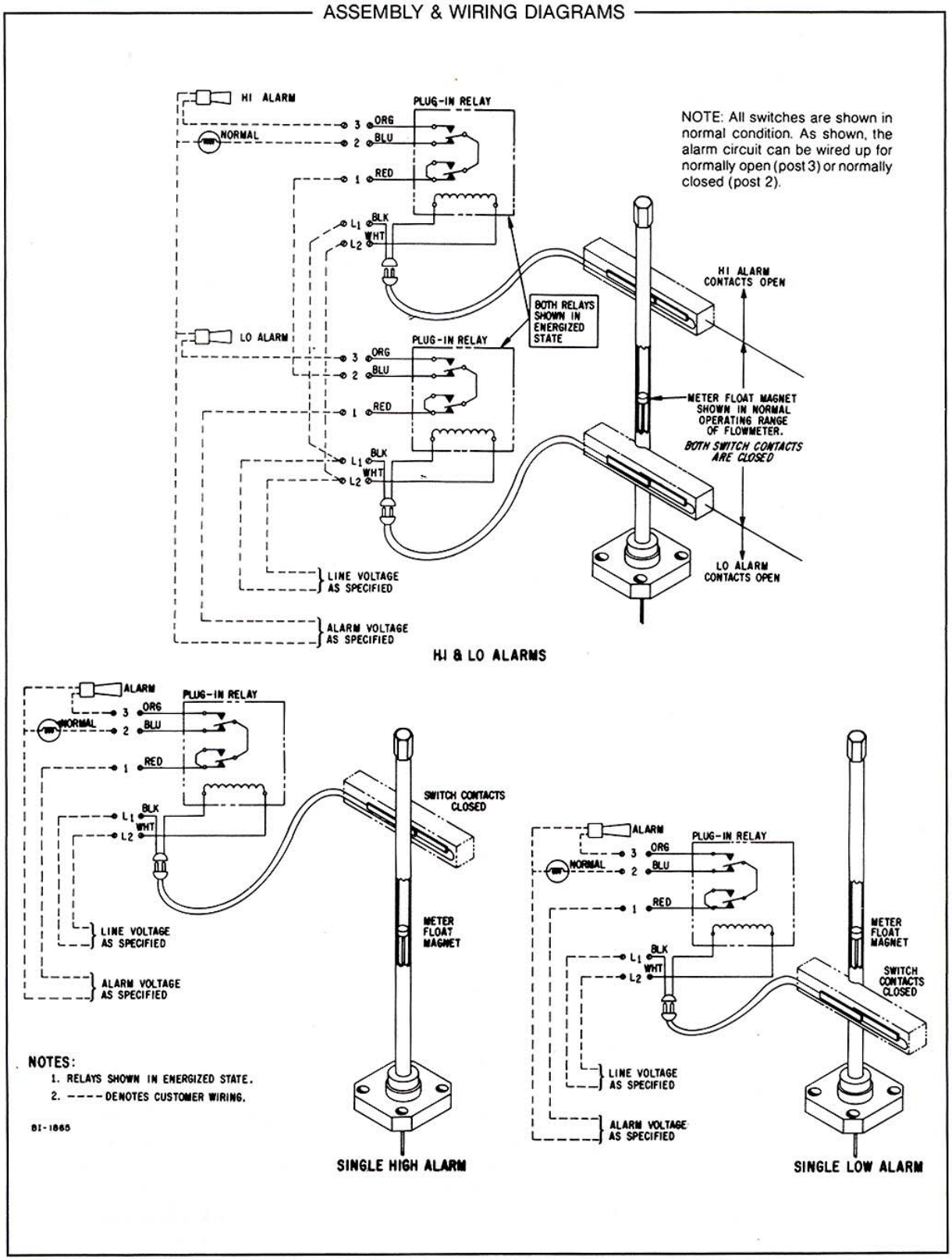
Connection Pipe Size	Capacities									
	gpm* Water					scfm ** Air at 14.7 psia & 70ºF (101 kPa & 21ºC)				
	Min.	Max.	H_2O DP(1)		Model No.(2)	Min.	Max.	H_2O DP(1)		Model No. (2)
			Inch	mm				Inch	mm	
0.5" NPT	0.1	1.3	7.5	191	E	0.5	5.5	7.5	191	F
	0.2	2	16	406	F	0.5	8.5	16	406	H
	0.6	4	59	1499	H	1	9	59	1499	J
1" NPT	0.5	6	13	330	J	1	14	13	330	L
	0.5	8	21	533	K	2	19	21	533	M
	1	11	35	889	L	2	26	35	889	P
1.5" NPT	1	15	22	559	M	4	36	8.5	216	Q
	2	20	29	737	N	5	50	12	305	R
	2	24	44	1118	P	5	60	19	483	S
2" NPT	3	35	22	559	Q	8	80	8	203	T
	4	50	45	1143	R	10	110	15	381	U

Notes: {1) ΞP values in above table are maximum pressure drop using horizontal connections.
When vertical connections are used, the pressure losses are approximately 25% lower.
(2) Use this code to complete model number.
* gpm x 3.785 = Liters per minute or L/min.
** scfm x 0.0284 = cubic meters per minute or M^3/min.

TABLE 4. WEIGHTS

Connection Pipe Size	10A2235		10A2235A-OA	
	Pound	Kilogram	Pound	Kilogram
0.5"	4	1.8	7	3.2
1"	9	4	12	5.4
1.5"	14	6	19	8.5
2"	30	13.5	35	16

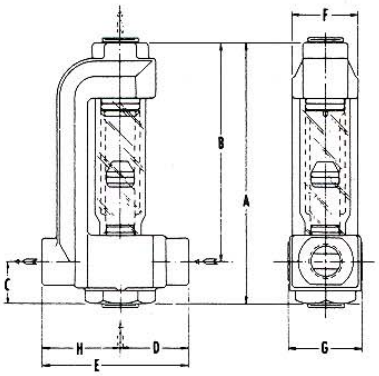
Assembly & Wiring Diagrams



DIMENSIONS

INDICATOR ONLY

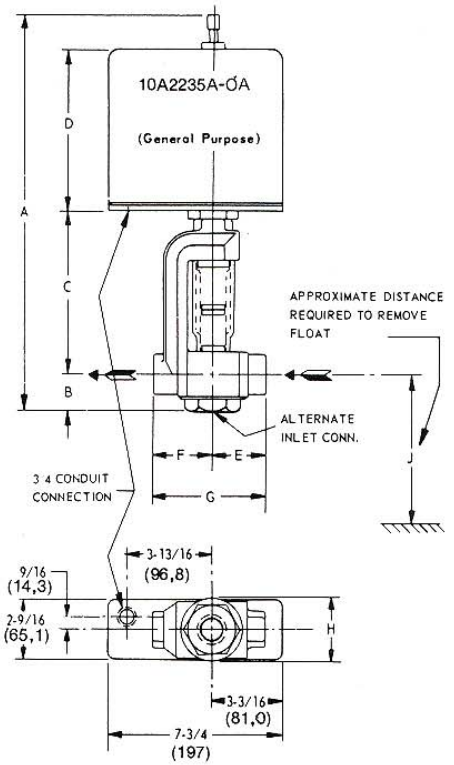
All Dimensions in Inches and (mm)



METER SIZE (in.)	CONN SIZE NPTI	A		B		C		D	
		in	mm	in	mm	in	mm	in	mm
1/2	1/2	5-3/4	146	4-13/16	122	15/16	23,8	1-9/16	39,7
1	1	7-5/8	194	6-5/16	160	1-5/16	33,3	2-1/16	52,4
1-1/2	1-1/2	9-1/2	241	7-3/4	197	1-3/4	44,5	2-3/4	69,9
2	2	13-1/4	337	11-3/16	284	2-1/16	52,4	3-3/8	85,7

METER SIZE (in.)	CONN SIZE NPTI	E		F		G		H	
		in	mm	in	mm	in	mm	in	mm
1/2	1/2	3-1/2	88,9	1-5/8	41,3	2	50,8	1-15/16	49,2
1	1	4-1/2	114	2-1/4	57,2	2-3/4	69,9	2-7/16	61,9
1-1/2	1-1/2	6	152	3-1/8	79,4	3-5/8	92,1	3-1/4	82,9
2	2	7-3/8	187	3-1/2	88,9	4-1/2	114	4	102

INDICATOR WITH ALARM



METER & CONN SIZE NPTI	A				B		C		D			
	Single Alarm		Double Alarm						Single Alarm		Double Alarm	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
1/2	13-1/16	332	15-15/16	405	15/16	23,8	5-1/4	133	5-11/16	145	8-1/2	216
1	14-7/8	378	17-13/16	452	1-5/16	33,3	6-3/4	172	5-11/16	145	8-1/2	216
1-1/2	19-5/8	499	19-5/8	499	1-3/4	44,5	8-1/4	210	8-1/2	216	8-1/2	216
2	23-3/8	594	23-3/8	594	2-1/16	52,4	11-11/16	297	8-1/2	216	8-1/2	216

METER & CONN SIZE NPTI	E		F		G		H		J	
	in	mm	in	mm	in	mm	in	mm	in	mm
1/2	1-9/16	39,7	1-15/16	49,2	3-1/2	88,9	2	50,8	8	203
1	2-1/16	52,4	2-7/16	61,9	4-1/2	114	2-3/4	69,9	10	254
1-1/2	2-3/4	69,9	3-1/4	82,6	6	152	3-5/8	92,1	13	330
2	3-3/8	85,7	4	102	7-3/8	187	4-1/2	114	14	356

Accessory Alarm & Relay Specifications

Relays (Maximum of two per meter)
Standard: Dustproof Construction

Relay Switch Action
Standard: Single pole, double throw
Optional: Double pole, double throw
(requires special relay base)

Relay Holding Coil Voltage
Standard: 120 Vac, 50/60 Hz

Relay Contact Rating (Resistive Load)
Standard: 120 Vac, 50/60 Hz, 10A
(SPDT switch), 5A (DPDT switch)

Alarm Switch Contact Rating
Applicable only when relay is omitted (resistive load) 15 VA, 1A (max.), 250 V (max.) AC. Arc suppression should be used on inductive loads.

Alarm Switch Differential (Fixed)
Maximum 8% of full scale

Electrical Consumption
1-1/2 to 2W per alarm

Safety Classification
The alarm, with a hermetically sealed relay is non-incendive for Class I, Division 2, Groups A, B, C&D.

Ordering Information

Specify:
Model Number
Capacity
Standard or Special Scale. If flow of fluid other than water or air is being measured also specify the fluid, operating temperature and pressure, density and liquid viscosity.
Connection - Orientation (Standard is horizontal inlet and outlet)

For detailed specifications, refer to Products specifications D-FV-10A2235 Product Code: A
Standard scales are in "gpm" water or "scfm" air for the capacities listed in the specification sheet.

		Code
Ratiosight Flow Rate Indicator with Optional Ratolarm		**10A2235A**
For quantity greater than 10 call		

1 : Model Type

Indicator Only		**XXX**
General Purpose Alarm (Not Available with Monel Floats)		**XXA**

2 : Meter Size

1/4 in.		**2**
1/2 in.		**3**
1 in.		**4**
1-1/2 in.		**5**
2 in.		**6**

3 : Application

0.02 ... 0.36 GPM Water	(Notes: 1, 2)	**1B**
0.05 ... 0.60 GPM Water	(Notes: 1, 2)	**1C**
0.1 ... 1.0 GPM Water	(Notes: 3, 2)	**1D**
0.1 ... 1.3 GPM Water	(Notes: 3, 4)	**1E**
0.2 ... 2.0 GPM Water	(Note: 3)	**1F**
0.4 ... 3.0 GPM Water	(Notes: 3, 2)	**1G**
0.6 ... 4.0 GPM Water	(Note: 3)	**1H**
0.5 ... 6.0 GPM Water	(Note: 5)	**1J**
0.5 ... 8.0 GPM Water	(Note: 5)	**1K**
1.0 ... 11.0 GPM Water	(Note: 5)	**1L**
1.0 ... 15.0 GPM Water	(Note: 6)	**1M**
2.0 ... 20.0 GPM Water	(Note: 6)	**1N**
2.0 ... 24.0 GPM Water	(Note: 6)	**1P**
3.0 ... 35.0 GPM Water	(Note: 7)	**1Q**
4.0 ... 50.0 GPM Water	(Note: 7)	**1R**
0.05 ... 0.60 SCFM Air @ STP	(Notes: 1, 2)	**2B**
0.1 ... 1.3 SCFM Air @ STP	(Notes: 1, 2)	**2C**
0.2 ... 2.0 SCFM Air @ STP	(Notes: 3, 2)	**2D**
0.5 ... 4.5 SCFM Air @ STP	(Notes: 3, 2)	**2E**
0.5 ... 5.5 SCFM Air @ STP	(Notes: 3, 4)	**2F**
0.5 ... 7.0 SCFM Air @ STP	(Notes: 3, 2)	**2G**
0.5 ... 8.5 SCFM Air @ STP	(Notes: 3, 4)	**2H**
1.0 ... 9.0 SCFM Air @ STP	(Notes: 3, 2)	**2J**
1.5 ... 9.0 SCFM Air @ STP	(Notes: 3, 2)	**2K**
1.0 ... 14.0 SCFM Air @ STP	(Note: 5)	**2L**
2.0 ... 19.0 SCFM Air @ STP	(Notes: 5, 4)	**2M**
2.0 ... 20.0 SCFM Air @ STP	(Notes: 5, 2)	**2N**
2.0 ... 26.0 SCFM Air @ STP	(Note: 5)	**2P**
4.0 ... 36.0 SCFM Air @ STP	(Note: 6)	**2Q**
5.0 ... 50.0 SCFM Air @ STP	(Note: 6)	**2R**
5.0 ... 60.0 SCFM Air @ STP	(Note: 6)	**2S**
8.0 ... 80.0 SCFM Air @ STP	(Note: 7)	**2T**
10.0 ... 110.0 SCFM Air @ STP	(Note: 7)	**2U**

4 : Alarm Type

Not Required	(Note: 2)	**X**
Single Low	(Note: 4)	**1**
Single High	(Note: 4)	**2**
Double, High / Low	(Note: 4)	**3**
Double, Low / Low	(Note: 4)	**4**
Double, High / High	(Note: 4)	**5**

10A2235A

		Code

5 : Relay Wiring

Not Required	(Note: 2)	**X**
Ratolarm without Relay(s)	(Note: 4)	**B**
Single Pole, Double Throw (SPDT)	(Note: 4)	**C**
Double Pole, Double Throw (DPDT)	(Note: 4)	**D**

6 : Type of Relay

Not Required		**X**
Standard Dust-Proof		**1**

7 : Relay Coil Voltage

Not Required		**X**
120 V AC		**B**

8 : Inlet Orientation

Vertical		**B**
Horizontal		**L**

9 : Outlet Orientation

Vertical (Non-Extension Type only)	(Note: 2)	**T**
Horizontal		**L**

10 : Scale Type

Direct Reading, Water	(Note: 8)	**A**
Direct Reading, Air	(Note: 9)	**B**
Direct Reading Non-Standard		**E**

11 : Float Material, Application

Brass, Liquid Only	(Note: 8)	**1**
Aluminum, Gas Only	(Note: 9)	**2**
Monel, Liquid Only (Indicators only)	(Notes: 2, 8)	**3**

Additional ordering information

12 : Calibrations Includes Certificates of Calibration

Standard; uncalibrated accuracy		**C1**
Calibrated accuracy; Liquids at 1 ctks. Viscosity	(Note: 8)	**C2**
Calibrated accuracy; Liquids at viscosity up to 100 ctks. (1/2 In., 3/4 In. & 1 In.)	(Notes: 10, 8)	**C3**
Calibrated accuracy; Liquids at viscocity up to 100 ctks. (1 1/2 In. & 2 In.)	(Notes: 11, 8)	**C4**
Calibrated accuracy; Gas Service	(Note: 9)	**C6**

13 : Preparation Procedure

Oxygen cleaning per ABB 3BUJ980096	**P1**

14 : Certifications

Certificate of Conformance; per order	**D1**

15 : Material Certifications

Material Certifications; "typicals", per material	**M1**

16 : Pressure Test

Hydrostatic pressure test; 1/8 In. … 1/2 In. diameter	(Note: 12)	**H1**
Hydrostatic pressure test; 3/4 In. … 1 In. diameter	(Note: 5)	**H2**
Hydrostatic pressure test, 1 1/2 In. … 2 In. diameter	(Note: 11)	**H3**

17 : Tags

Stainless steel tags (wired on) per meter	**T1**

Table 10A2235A-A

10A2235A Relay Wiring Single Pole, Double Throw (SPDT)

Alarm Type
Not Required
Single Low
Single High
Double, High / Low
Double, Low / Low
Double, High / High

10A2235A Relay Wiring Double Pole, Double Throw (DPDT)

Alarm Type
Not Required
Single Low
Single High
Double, High / Low
Double, Low / Low
Double, High / High

Note 1: Not available with Meter Size code 3, 4, 5, 6
Note 2: Not available with Model Type code XXA
Note 3: Not available with Meter Size code 2, 4, 5, 6
Note 4: Not available with Model Type code XXX
Note 5: Not available with Meter Size code 2, 3, 5, 6
Note 6: Not available with Meter Size code 2, 3, 4, 6
Note 7: Not available with Meter Size code 2, 3, 4, 5
Note 8: Not available with Application code 2B, 2C, 2D, 2E, 2F, 2G, 2H, 2J, 2K, 2L, 2M, 2N, 2P, 2Q, 2R, 2S, 2T, 2U
Note 9: Not available with Application code 1B, 1C, 1D, 1E, 1F, 1G, 1H, 1J, 1K, 1L, 1M, 1N, 1P, 1Q, 1R
Note 10: Not available with Meter Size code 2, 5, 6
Note 11: Not available with Meter Size code 2, 3, 4
Note 12: Not available with Meter Size code 4, 5, 6

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