Heavy Duty Differential Pressure Flowmeters

measuring • monitoring • analyzing

KEL

- Rugged Metal Construction
- Flow Rates up to 2000 GPM
- Linear Scales
- For Horizontal or Vertical Pipes
- Threaded or Wafer Style Fittings
- Able to Withstand High Pressure Surges
- Easy to Maintain
- Ranges Can Be Modified in the Field
- Optional Alarms and/or 4-20 mA/Frequency Outputs
- Analog Rate or Digital Rate/Total Displays
- Metric Ranges and BSP Threads Available

KOBOLD companies worldwide:

ARGENTINA, AUSTRIA, BELGIUM, BULGARIA, CANADA, CHILE, CHINA, COLOMBIA, CZECH REPUBLIC, EGYPT, FRANCE, GERMANY, GREAT BRITAIN, HUNGARY, INDIA, INDONESIA, ITALY, MALAYSIA, MEXICO, NETHERLANDS, PERU, POLAND, ROMANIA, SINGAPORE, SOUTH KOREA, SPAIN, SWITZERLAND, TAIWAN, THAILAND, TUNISIA, TURKEY, USA, VIETNAM

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Description

The KOBOLD KEL series flowmeters are designed specifically for applications with difficult environments. Metal housings, insensitivity to magnetic fields, and the ability to withstand large overpressures without damage, combine to make the KEL a tough performer. Designed with the industrial user in mind, the KEL is easy to use, read, and maintain.

Easy to Use

The KEL's design addresses three key usage issues. To protect the sensing mechanism; the pressure diaphragm's deflection is stopped by contact with the body of the sensor housing. This means that the membrane is not subject to mechanical damage during overpressure events such as surges or "water hammer." Aside from inlet/outlet requirements, location of meter installation is not an issue from a mechanical standpoint. The brass and brass-cast iron KEL meters feature an orifice mechanism which does not require recalibration after replacement. Repairs or scale changes can be made easily by the user in the field. There is no need to return the meter to the factory. On a KEL with switches, actuation occurs through direct contact with the pressure diaphragm's mechanical linkage. This reliance on direct contact, rather than magnetic coupling, makes the KEL ideal in applications which normally cause magnet failure due to the presence of large electro-magnetic fields.

Easy to Read

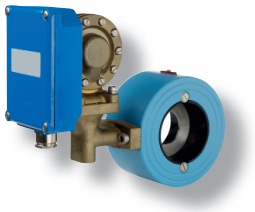
All KEL flowmeters are available with either a 5:1 max:min flow turndown or a 2:1 turndown version. The 5:1 meters are typically used in wide range metering applications. The 2:1 units are used in process monitoring situations, or in any installation requiring reduced pressure loss (see flow vs. pressure loss table.) This specialization offers superior scale resolution to a one-size-fits-all approach. To make the flow easy to read, the KEL has a large 4-1/2" dial face with the measurement units evenly spaced on it's perimeter. This even spacing is possible since the meter movement is linear with flow. The internal mechanism that linearizes the flow also dampens out needle vibration, making it possible to truly read the flow rate, rather than guess at it.

Easy to Maintain

The orifice portion of the KEL is connected to the pressure sensing section via ducts bored into the meter casing. Since the KEL requires no pulsation snubbers because of its built-in damping, these ducts are made large enough for easy cleaning. The larger ducts make the KEL less sensitive to fouling in the first place. With costly downtime in mind, most KEL models offer an optional isolation valve that allows the pressure sensing portion of the meter to be isolated from the orifice portion while the system is pressurized. This eliminates the need to interrupt the user's process. An isolation mechanism makes sure that no valuable operating time need be lost to perform unscheduled sensor maintenance.

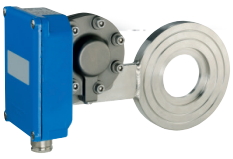
Specifications

Blind Flow Transmitter - R Series



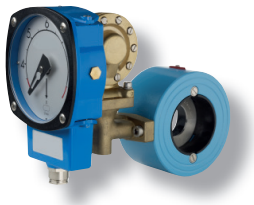
Accuracy:	±3% of full scale
Repeatability:	2% of actual
Maximum Pressure:	230 PSIG or ANSI Cl B16.5
Maximum Temperature:	
Ambient:	150 °F
Media:	150 °F; higher media temps available with remote control unit option - see order details
Enclosure:	IP65 (NEMA 4)
Power Supply:	24 VDC±10%
Outputs:	4-20 mA and frequency 200-1000 Hz

Blind Flow Switch - V Series



Repeatability:	2% of actual
Maximum Pressure:	230 PSIG or ANSI Cl B16.5
Maximum Temperature:	
Ambient:	190 °F, 250 °F Optional
Media:	190 °F, 250 °F Optional Higher media temps available with remote control unit option - see order details
Enclosure:	IP65 (NEMA 4)
Output:	Micro-switch SPDT 15A @ 125, 250, 480 VAC 2A @ 30 VDC 0.4A @ 125 VDC 0.2A @ 230 VDC
Hystersis:	10%

Visual Analog Flowmeter - KEL-Q, with Switch - KEL-S Series

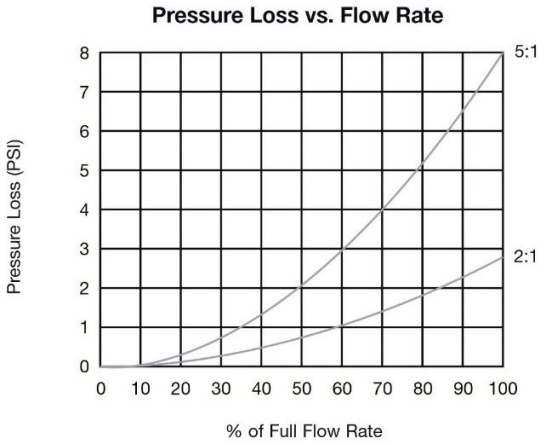


Accuracy:	±5% 20...80% of full scale ±10% at 100% of full scale
Repeatability:	2% of actual
Maximum Pressure:	230 PSIG or ANSI Cl B16.5
Maximum Temperature:	
Ambient:	190 °F, 250 °F Optional
Media:	190 °F, 250 °F Optional Higher media temps available with remote control unit option - see order details
Enclosure:	IP43 (NEMA 3R) IP65 (NEMA 4) Optional
Output:	2x Micro-switch SPDT 15A @ 125, 250, 480 VAC 2A @ 30 VDC 0.4A @ 125 VDC 0.2A @ 230 VDC
Hystersis:	10%

Digital Flowmeter, Transmitter, Switch with Bargraph - KEL-D Series

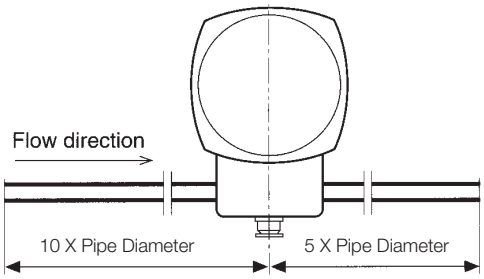
Accuracy:	±3% of full scale
Maximum Pressure:	230 PSIG or ANSI Cl B16.5
Maximum Temperature:	
Ambient:	150 °F
Media:	150 °F ; higher media temps available with remote control unit option - see order details
Enclosure:	IP65 (NEMA 4)
Power Supply:	18 ... 30 VDC
Local Display:	Backlit graphical, rotatable
Totalizer:	Re-settable volume flow
Switch Output:	2x Relay, 50 VDC/VAC max 30W max, 1mA 5 VDC min
Analog Output:	4-20 mA, 500 ohm max
Frequency Output:	200 ... 1000 Hz
Current Consumption:	100mA max

Pressure Loss



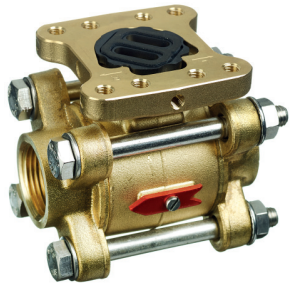
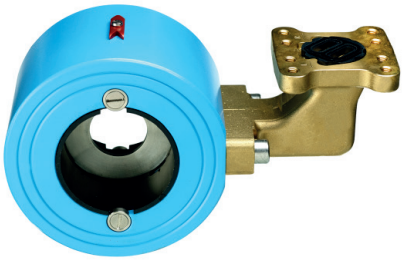
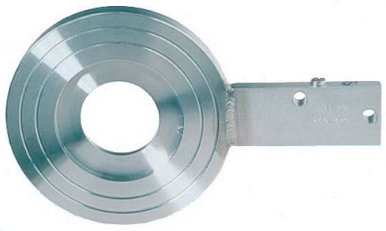
The KEL determines the rate of flow by measuring the pressure loss across a calibrated orifice. The total pressure loss through the meter is as shown above. This pressure loss data reflects the use of water as the media. Meters have either a 5:1 or a 2:1 turn-down. Please contact your KOBOLD representative for further details.

Piping Requirements



To function properly, all models of the KEL require lengths of straight piping to be plumbed into the units at the inlet and outlet fittings. The inlet length must be 10 times the pipe diameter. The outlet length must be 5 times the pipe diameter.

Available KEL Process Fittings

Threaded: Brass	
	Available Sizes: 1/2"...1-1/2" NPT Standard Wetted Parts: Brass, SS, NBR, Nylon® Optional Wetted Parts: FKM, EPDM User Modifiable Ranges Optional Indicator Isolation Mechanism
Threaded: Stainless Steel	
	Available Sizes: 1/2"...1" NPT Standard Wetted Parts: SS, FKM Optional Wetted Parts: NBR, EPDM Excellent Resistance to Corrosive Chemicals Unitized Body and Orifice
Wafer-Style Flange: Brass/Cast Iron	
	Available Sizes: 1/2"...8" ANSI Flange Standard Wetted Parts for 1/2"...1-1/2" Flanges: Brass, SS, NBR, Nylon® Optional Wetted Parts for 1/2"...1-1/2" Flanges: FKM, EPDM Standard Wetted Parts for 2"...8" Flanges: Brass, Epoxy Coated Cast Iron, NBR, Nylon® Optional Wetted Parts for 2"...8" Flanges: FKM, EPDM Optional Indicator Isolation Mechanism
Wafer-Style Flange: Stainless Steel	
	Available Sizes: 1/2"..8" ANSI Flange Standard Wetted Parts: SS, FKM Optional Wetted Parts: NBR, EPDM Excellent Resistance to Corrosive Chemicals Unitized Body and Orifice Optional Indicator Isolation Mechanism

Order Details (Ex: **KEL-R 2 2 N 20 N**)

Model	Turndown	Body Material	Fitting Style	Piping Size	Options
KEL-R.. = Blind Flow Transmitter, 4-20 mA Output **KEL-V..** = Blind Flow Switch, SPDT Micro-switch **KEL-Q..** = Analog Display Flowmeter Rate **KEL-S..** = Analog Display Flowmeter Rate with 2 SPDT Micro-switches **KEL-D..** = Back-lit Digital Rate/ Total Bargraph Display with 4-20 mA Output	**..2..** = 2:1 **..5..** = 5:1	**..1..** = Brass or Brass/ Cast Iron **..2..** = Stainless Steel	**..N..** = NPT **..G..** = BSP **..A..** = ANSI **..D..** = DIN	**..15** = 1/2" **..20** = 3/4" **..25** = 1" **..40** = 1-1/2" **..50** = 2" **..80** = 3" **..1H** = 4" **..1F** = 6" **..2H** = 8"	**..D** = IP65 (for KEL-S and KEL-Q only) **..HT** = High Temperature Switch(es) (250 °F max) (KEL-V and KEL-S series only) **..R1** = Remote Indicator, Brass, 5.5 ft Polyamide Tubing (maximum media temperature of 250 °F) **..R2** = Remote Indicator, SS, NoTubing Included (maximum media temperature of 480 °F) **..G** = Gold Plated Contact(s) **..F** = FKM Seals (for Brass Unit Only) **..E** = EPDM Seals (for Brass or SS Units) **..N** = NBR Seals (for SS Units Only)

KEL 5:1 Range/Piping Size Table GPM Water

Pipe Size	Range (GPM)	Pipe Size	Range (GPM)	Pipe Size	Range (GPM)
1/2"	0.1…0.5	**1-1/2"**	2…10*	**4"**	20…100
1/2"	0.25…1.25	**1-1/2"**	5…25*	**4"**	40…200
1/2"	0.5…2.5	**1-1/2"**	10…50*	**4"**	60…300
1/2"	1…5	**1-1/2"**	15…75*	**4"**	100…500
1/2"	1.5…7.5	Wafer only		**6"**	50…250
1/2"	2…10	**2"**	2…10	**6"**	100…500
3/4"	1…5	**2"**	10…50	**6"**	150…750
3/4"	1.5…7.5	**2"**	20…100	**6"**	200…1000
3/4"	2…10	**2"**	25…125	**8"**	100…500
3/4"	4…20	**3"**	10…50	**8"**	150…750
1"	1.5…7.5	**3"**	20…100	**8"**	250…1250
1"	3…15	**3"**	40…200	**8"**	400…2000
1"	4…20	**3"**	50…250		
1"	5…25				
1"	6…30				

KEL 2:1 Range/Piping Size Table GPM Water

Pipe Size	Range (GPM)	Pipe Size	Range (GPM)	Pipe Size	Range (GPM)	Pipe Size	Range (GPM)
1/2"	0.15…0.3	**3/4"**	4.0…8.0	**1-1/2"**	25…50*	**4"**	50...100
1/2"	0.2…0.4	**3/4"**	5.0…10	Wafer only		**4"**	75...150
1/2"	0.3…0.6	**3/4"**	6.0…12	**2"**	5.0…10	**4"**	100...200
1/2"	0.4...0.8	**1"**	2.0…4.0	**2"**	8.0…16	**4"**	150...300
1/2"	0.5…1.0	**1"**	3.0...6.0	**2"**	10…20	**6"**	150...300
1/2"	0.75…1.5	**1"**	4.0…8.0	**2"**	15…30	**6"**	200...400
1/2"	1.0…2.0	**1"**	5.0…10	**2"**	20…40	**6"**	300...600
1/2"	1.5…3.0	**1"**	6.0…12	**2"**	30…60	**6"**	400...800
1/2"	2.0…4.0	**1"**	8.0…16	**2"**	40…80	**8"**	200...400
1/2"	3.0…6.0	**1"**	10…20	**3"**	30…60	**8"**	300...600
1/2"	4.0…8.0	**1-1/2"**	5.0…10*	**3"**	40…80	**8"**	400...800
3/4"	1.0…2.0	**1-1/2"**	8.0…16*	**3"**	60…120	**8"**	600...1200
3/4"	1.5…3.0	**1-1/2"**	10…20*	**3"**	80...160		
3/4"	2.0…4.0	**1-1/2"**	15...30*	**3"**	90...180		
3/4"	3.0…6.0	**1-1/2"**	20...40*	**4"**	40...80		

*Ranges associated with 1-1/2" pipe size are are not available in the stainless steel threaded versions

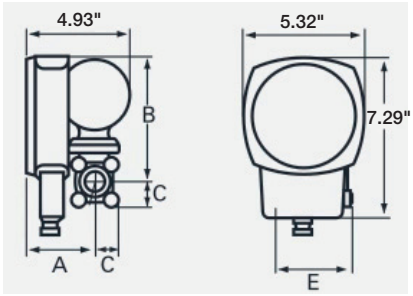
Note: The following information MUST be specified on your purchase order along with the selected item number

A flow range as listed in one of the above tables, the media, the operating and maximum pressure, the operating and maximum temperature, and the flow direction. Please note, if the media is other than water, you must specify the density and viscosity. A range adjustment may be necessary to accomodate the media. Alternate units of measure (i.e. GPH, LPM, M^3/H) are available upon request.

KEL-Q and KEL-S Dimensions (Inches)

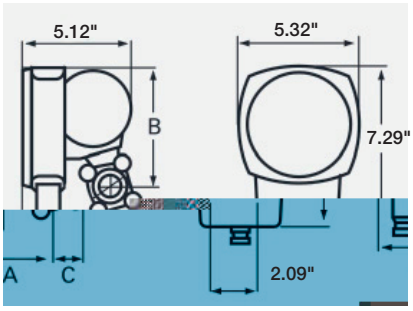
Threaded Brass Meters

Fitting (Threaded)	Dimensions				Weight (lbs)
	A	B	C	E	
1/2"	3.35	5.91	1.18	3.15	7.9
3/4"	3.35	5.91	1.18	3.15	7.9
1"	3.35	5.91	1.18	3.15	7.9
1-1/2"	3.74	6.30	1.57	3.54	9.9



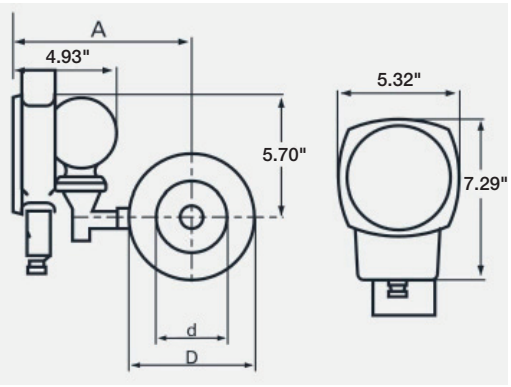
Threaded Stainless Steel Meters

Fitting (Threaded)	Dimensions			Weight (lbs)
	A	B	C	
1/2"	4.33	5.12	1.38	7.3
3/4"	4.33	5.12	1.38	7.3
1"	4.33	5.12	1.38	7.3



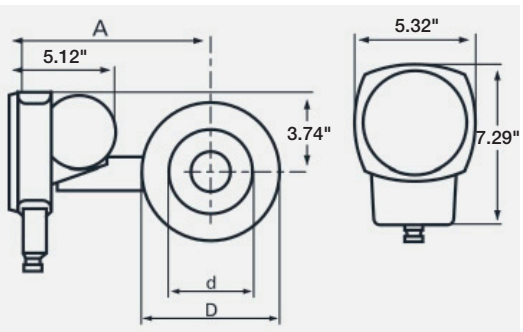
Brass/Cast Iron Wafer Style Meters

Fitting (Wafer)		Dimensions for use with schedule 40 piping						Weight (lbs)
(ANSI)	(DIN)	d (DIN)	d (ANSI)	D (DIN)	D (ANSI)	A (DIN)	A (ANSI)	
1/2"	15	0.63	0.63	2.09	1.77	6.30	6.02	9.2
3/4"	20	0.87	0.87	2.48	2.17	6.46	6.26	10.3
1"	25	1.18	1.02	2.87	2.52	6.73	6.50	10.8
1-1/2"	40	1.69	1.61	3.70	3.27	7.17	6.93	13.0
2"	50	2.17	2.09	4.29	4.02	7.48	7.32	13.9
3"	80	3.23	3.07	5.67	5.28	8.15	7.95	17.3
4"	100	4.21	4.02	6.46	6.77	8.54	8.70	19.8
6"	150	6.26	6.26	8.62	8.62	9.65	9.65	24.9
8"	200	8.15	8.15	10.79	10.79	10.75	10.75	33.5

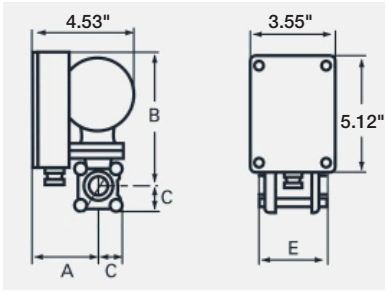


Stainless Steel Wafer Style Meters

Fitting (Wafer)		Dimensions for use with schedule 40 piping						Weight (lbs)
(ANSI)	(DIN)	d (DIN)	d (ANSI)	D (DIN)	D (ANSI)	A (DIN)	A (ANSI)	
1/2"	15	0.63	0.63	2.09	1.77	7.04	6.97	6.8
3/4"	20	0.87	0.83	2.48	2.17	7.28	7.09	7.0
1"	25	1.18	1.06	2.87	2.52	7.60	7.24	7.3
1-1/2"	40	1.69	1.61	3.70	3.27	8.07	7.64	7.7
2"	50	2.17	2.09	4.29	4.02	8.66	8.07	8.1
3"	80	3.23	3.07	5.67	5.24	9.37	8.74	9.2
4"	100	4.21	4.02	6.46	6.73	9.76	9.53	9.9
6"	150	6.26	6.06	8.62	8.62	10.87	10.87	12.3
8"	200	8.15	7.99	10.79	10.87	11.93	11.97	15.4

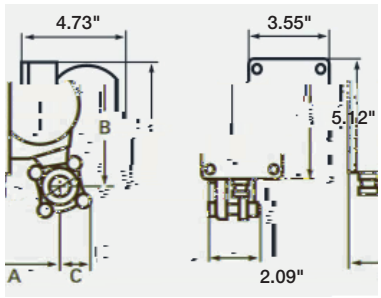


KEL-D, KEL-R, KEL-V Dimensions (Inches)



Threaded Brass Meters

Fitting (Threaded)	Dimensions				Weight (lbs)
	A	B	C	E	
1/2"	2.95	5.90	1.18	3.15	6.7
3/4"	2.95	5.90	1.18	3.15	6.7
1"	2.95	5.90	1.18	3.15	6.7
1-1/2"	2.16	6.30	1.57	3.54	8.8

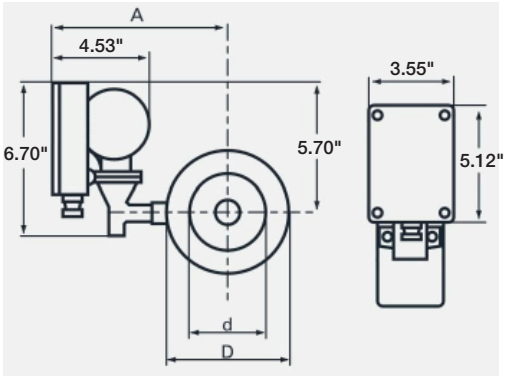


Threaded Stainless Steel Meters

Fitting (Threaded)	Dimensions			Weight (lbs)
	A	B	C	
1/2"	3.97	5.12	1.38	6.7
3/4"	3.97	5.12	1.38	6.7
1"	3.97	5.12	1.38	6.7

Brass/Cast Iron Wafer Style Meters

Fitting (Wafer)		Dimensions for use in schedule 40 piping						Weight (lbs)
(ANSI)	(DIN)	d (DIN)	d (ANSI)	D (DIN)	D (ANSI)	A (DIN)	A (ANSI)	
1/2"	15	0.63	0.63	2.08	1.77	5.90	6.02	8.8
3/4"	20	0.87	0.87	2.48	2.17	6.06	6.26	9.9
1"	25	1.18	1.02	2.87	2.52	6.33	6.50	9.9
1-1/2"	40	1.69	1.61	3.70	3.27	6.77	6.93	13.2
2"	50	2.17	2.09	4.29	4.02	7.08	7.32	13.2
3"	80	3.23	3.07	5.67	5.28	7.75	7.95	17.6
4"	100	4.21	4.02	6.46	6.77	8.15	8.70	17.6
6"	150	6.26	6.26	8.62	8.62	9.25	9.25	24.3
8"	200	8.15	8.15	10.79	10.79	10.35	10.35	33.1



Stainless Steel Wafer Style Meters

Fitting (Wafer)		Dimensions for use in schedule 40 piping						Weight (lbs)
(ANSI)	(DIN)	d (DIN)	d (ANSI)	D (DIN)	D (ANSI)	A (DIN)	A (ANSI)	
1/2"	15	0.63	0.63	2.08	1.77	6.42	6.46	6.7
3/4"	20	0.87	0.83	2.48	2.17	6.69	6.57	6.7
1"	25	1.18	1.06	2.87	2.52	6.93	6.73	6.7
1-1/2"	40	1.69	1.61	3.70	3.27	7.40	7.13	6.7
2"	50	2.17	2.09	4.29	4.02	7.72	7.56	6.7
3"	80	3.23	3.07	5.67	5.24	8.46	8.23	7.7
4"	100	4.21	4.02	6.46	6.73	8.86	9.02	8.8
6"	150	6.26	6.06	8.62	8.62	10.31	10.35	11.0
8"	200	8.15	7.99	10.79	10.87	11.42	11.46	14.3