Compact Ultrasonic Flowmeter

measuring • monitoring • analyzing

DUK

- Measuring Ranges:
  0.02...5 GPM to 0.6...160 GPM
- Accuracy: ±0.7 % of Reading + ±0.7% of F.S.
- Turndown Ratio: 250:1
- P_{max}: 230 PSI; T_{max}: 248° F
- Connections: ½"...3" NPT or G Thread
- Material: Brass or 316 Stainless Steel
- Outputs: Analog, Frequency, Switching, Compact Electronics with Digital Displays, Batching and Totalizing Electronics

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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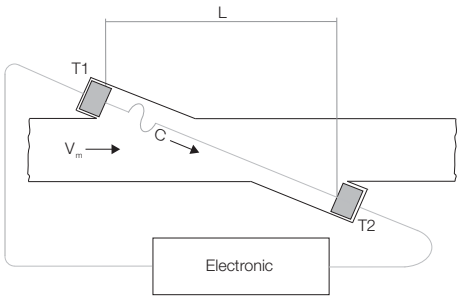
Description

The KOBOLD model DUK flow meters are used for measuring, monitoring, metering, and batching of low viscosity liquids. They are highly repeatable, feature a small pressure loss, and offer measurement independent of density and temperature changes. The devices work on the principle of run time difference. Ultrasonic waves in the media are influenced by the rate of flow. Two sensors mounted opposite one another in the pipeline function simultaneously as transmitter and receiver of the ultrasonic signals. If there is no flow, the run times of both signals are identical. If the media is flowing, then the run time of the signal against the flow is longer than the signal with flow. The run time difference, which is determined by a microprocessor, is proportional to the rate of flow.
The devices can be equipped with a switching output, a frequency output, or an analog output. In addition, a compact electronic can be selected that features a digital display, a switching output, and an analog output. The device series is rounded off by an optionally available batching or totalizing electronic. The meter electronic indicates the momentary flow rate in the first line of the display and the partial or total flow in the second line. A batching electronic controls simple filling tasks and similarly measures flow rates, total amounts, and filling amounts. The analog output and two relay outputs can be used for further processing of the signals. Common applications include: machine building, automotive, robotics, cooling, and hot water.



Technical Details

Measuring Principle:	Ultrasonic
Range:	See Table
Media:	Liquids with Max. 1 % Solid
Viscosity:	Max. 3 cSt
Accuracy:	±0.7% of Reading + ±0.7% of F.S.
Repeatability:	±0.1% of F.S.
Mounting Position:	Universal: Flow in Direction of the Arrow (Horizontal: Electronic on Top or Below)
Straight Piping:	10 x Pipe Diameter In/Out

Media Temperature:	4...194 °F - 4...248 °F (High Temp Version)
Ambient Temperature:	4...158 °F
Response Time:	Approx. 0.5...1 s (Depending on Electronic Version)
Max Pressure:	230 PSI
Pressure Loss:	Max. 2.2 PSI at F.S.
Protection:	IP 65
Wetted Parts	
Sensor Housing:	Brass or 316 Stainless Steel
Sensors:	PEEK
Seal:	NBR for Standard Version FKM for High Temp Version (Others upon Request)

Measuring Ranges and Weights

Model	Measuring Range "G" (GPM)	Measuring Range "H" (LPM)	Size (NPT/G)	DUK-...S30x DUK-...F3x0 DUK-...Lx43	DUK-...C3xx	DUK-...Ex4R DUK-...Gx4R	DUK with ADI 24 V_{DC}	DUK with ADI 230/115 V_{AC}
DUK-xxx4	0.02...5	0.08...20	½	1.87 LB	2.31 LB	2.20 LB	4.74 LB	5.95 LB
DUK-xxx5	0.04...10	0.16...40	¾	2.31 LB	2.76 LB	2.65 LB	5.18 LB	6.39 LB
DUK-xxx6	0.06...16	0.25...63	1	3.20 LB	3.64 LB	3.53 LB	6.06 LB	7.28 LB
DUK-xxx8	0.16...40	0.6...150	1½	5.18 LB	5.62 LB	5.51 LB	8.05 LB	9.26 LB
DUK-xxx9	0.25...65	1...250	2	8.38 LB	8.81 LB	8.71 LB	11.24 LB	12.46 LB
DUK-xxxB	0.6...160	2.5...630	3	15.65 LB	16.09 LB	15.98 LB	18.52 LB	19.73 LB

Electrical Specifications

DUK-..S300, DUK-..S30D (Switching Output)

Display:	Bi-color LED for Switch Status
Switching Output (..S300):	SPDT Relay, max. 1 A / 30 V_{DC}
Switching Output (..S30D):	Active 24 V_{DC}, N/C and N/O
Switch Point:	10...90 % of f.s. in 10 % Steps, Configurable by the Customer Using a Rotary Switch
Power Supply:	24 V_{DC} ±20 %
Power Consumption:	30 mA
Electrical Connection:	Plug M12x1
Max Range Overflow:	Flashing Bi-color LED from 105% of full scale

DUK-..F300, DUK-..F390 (Frequency Output)

Pulse Output:	PNP, Open Collector, max. 200 mA
Frequency at F.S.:	500 Hz (..F300) 50 to 1000 Hz (..F390) User Specified
Power Supply:	24 V_{DC} ±20 %
Power Consumption:	25 mA
Electrical Connection:	Plug M12x1
Max Range Overflow:	Frequency output approx 2k from 105% of full scale

DUK-..L343 (Analog Output)

Analog Output:	4-20 mA, 3-wire
Load:	Max. 500 Ω
Power Supply:	24 V_{DC} ±20 %
Power Consumption:	Max. 45 mA
Electrical Connection:	Plug M12x1

DUK-..L443 (Analog Output)

Output:	4 - 20 mA, 3-wire
Load:	Max. 500 Ω
Power Supply:	24 V_{DC} ±20 %
Power Consumption:	Max. 45 mA
Electrical Connection:	Plug DIN 43650

DUK-..C3xx (Compact Electronic)

Display:	3-digit LED
Analog Output:	4-20 mA Adjustable (only DUK-..C34x)
Load:	Max. 500 Ω
Switching Output:	1(2x) Semiconductor PNP or NPN
Contact Function:	N/C-N/O-Frequency Programmable (Approx. 1400 Hz at F.S., Uncalibrated)
Settings:	Via 2 Buttons
Power Supply:	24 V_{DC} ±20 %
Power Consumption:	Approx. 100 mA
Electrical Connection:	Plug M12x1

DUK-..Ex4R (Totalizing Electronic)

Display:	LCD, 2 x 8 Digits, Illuminated Rate, Total and Grand Total, Units Selectable
Analog Output:	4-20 mA Adjustable
Load:	Max. 500 Ω
Switching Output:	Relay (2x), Max. 30 V/2 A, 60 VA
Settings:	Via 4 Buttons
Functions:	Reset, MIN/MAX Memory, Flow Rate, Total and Grand Total, Language
Power Supply:	24 V_{DC} ±20 %, 3-wire
Power Consumption:	Approx. 170 mA
Electrical Connection:	Cable Connection or M12x1 Plug

DUK-..Gx4R (Batching Electronic)

Display:	LCD, 2 x 8 Digits, Illuminated Batching, Total and Grand Total, Units Selectable
Analog Output:	4-20 mA, Adjustable
Load:	Max. 500 Ω
Switching Output:	Relay (2x), Max. 30 V/2 A, 60 VA
Settings:	Via 4 Buttons
Functions:	Batching (Relay S2), Start, Stop, Reset, Fine Batching, Correction Amount, Flow Switch, Total Quantity, Language
Power Supply:	24 V_{DC} ±20 %, 3-wire
Power Consumption:	Approx. 170 mA
Electrical Connection:	Cable Connection or M12 Plug

DUK-..Kxx2 (ADI-1 Electronic)

Display:	Bar Graph and 5-Digit Digital Combination Display; Batch System
Analog Output:	4-20 mA, 0-10 V
Switching Output:	2x Relays/SPDT Max. 250 V_{AC}, 5A Resistive Load Max. 30 V_{DC}/5 A
Settings:	Via 4 Buttons
Power Supply:	100-240 V_{AC}, ±10% or 18-30 V_{AC}/10-40 V_{DC}
Electrical Connection:	Terminal Block via Cable Gland

Order Details (Example: **DUK-11 N4 G S300 L**) Note: Flow range determined by fitting size and can be referenced on the measuring range and weight table located on page 2

Model / Housing Material	Connection*	Output / Electronic	Flow Direction
DUK-11.. = Brass **DUK-12..** = SS **DUK-21..** = High Temp. Brass **DUK-22..** = High Temp. SS	**..N4G..** = ½" NPT **..N5G..** = ¾" NPT **..N6G..** = 1" NPT **..N8G..** = 1½" NPT **..N9G..** = 2" NPT **..NBG..** = 3" NPT **..G4G..** = G ½ **..G5G..** = G ¾ **..G6G..** = G 1 **..G8G..** = G 1½ **..G9G..** = G 2 **..GBG..** = G 3	**Switching Output** **..S300..** = Relay, M12-Plug **..S30D..** = Active 24 V_{DC}, M12-Plug **Frequency Output** **..F300..** = M12-Plug, 500 Hz **..F390..** = M12-Plug, 50 to 1000 Hz (User Specified) **Analog Output** **..L343..** = M12-Plug, 4-20 mA **..L443..** = DIN-Plug, 4-20 mA **Compact Electronic** **..C30R..** = Open Collector, PNP (2x) **..C30M..** = Open Collector, NPN (2x) **..C34P..** = 20 mA, Open Collector, PNP **..C34N..** = 4-20 mA, Open Collector, NPN **ADI Electronic** **Totalizing Electronic** **..E14R..** = LCD, 4-20 mA, Relay (2x), 1 m Cable **..E34R..** = LCD, 4-20 mA, Relay (2x), M12-Plug (2x) **Batching Electronic** **..G14R..** = LCD, 4-20 mA, Relay (2x), 1 m Cable **..G34R..** = LCD, 4-20 mA, Relay (2x), M12-Plug (2x)	**..L** = from Left to Right **..R** = from Right to Left **..T** = from Top to Bottom **..B** = from Bottom to Top

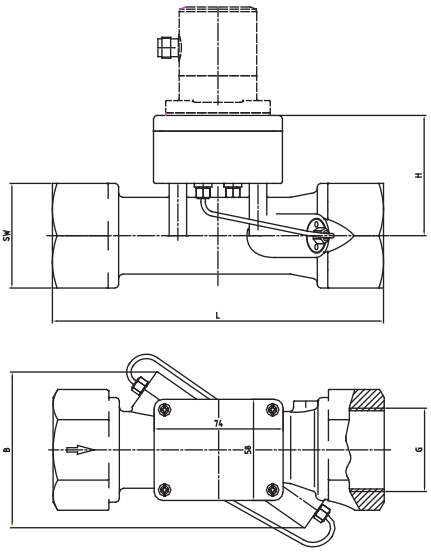
Display	Power Supply	Output	Contacts
K = Bar Graph/ digital display	**0** = 100-230 $V_{AC/DC}$ **3** = 18-30 V_{AC} 0-40 V_{DC}	**0** = without **4** = 4-20 mA, 0-10 VDC	**2** = (2x) Relay SPDT

Accessories: **P/N 807.037** = 4-Pin Micro-DC Connector with 6-foot Cable for Output Types F300, F390, L 343, & S30D
P/N 807.007 = 5-Pin Micro-DC Connector with 6-foot Cable for Output Types C3xx, S300, E34R, & G34R
P/N 807.087 = 8-Pin Micro-DC Connector with 6-foot Cable for Output Types E34R & G34R

*Standard display in G/min, optional display L/min (code H instead of G)

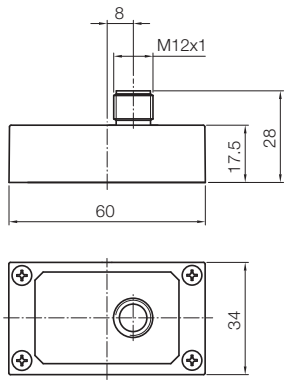
Dimensions DUK-Sensor

Model	G/NPT	SW (inch)	H (inch)	L (inch)	B (inch)
DUK-xxx4	½	1.18	2.24	4.49	ca.2.83
DUK-xxx5	¾	1.42	2.32	4.98	ca. 2.99
DUK-xxx6	1	1.81	2.48	5.75	ca. 3.15
DUK-xxx8	1½	2.36	2.72	7.48	ca. 3.54
DUK-xxx9	2	2.99	2.91	9.37	ca. 3.82
DUK-xxxB	3	4.13	3.31	12.05	ca. 4.80

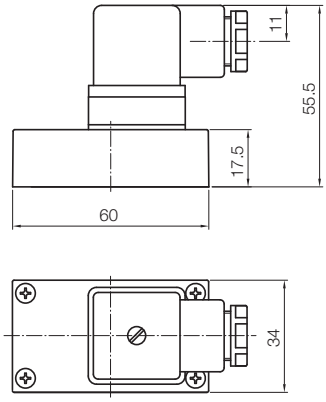


Dimensions (mm)

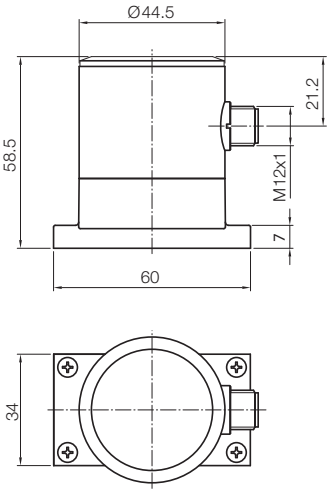
DUK-..S30x, DUK-..F3x0, DUK-..L343



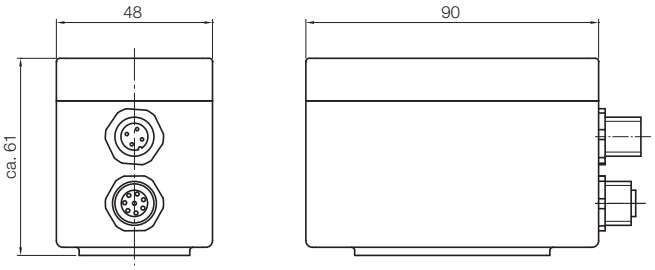
DUK-..L443



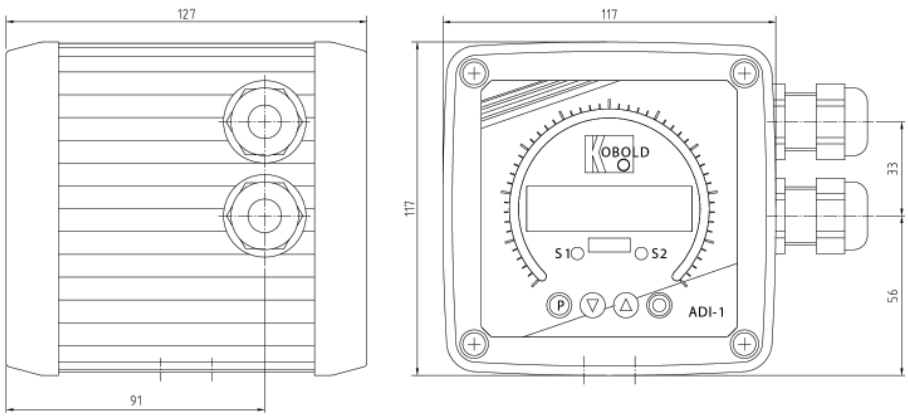
DUK-..C3xx



DUK-..Ex4R, DUK-..Gx4R

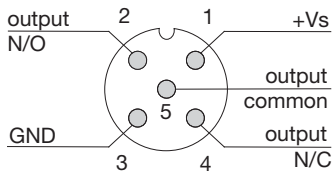


DUK with ADI Electronic

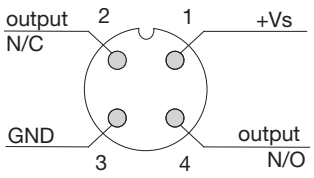


Electrical Connection

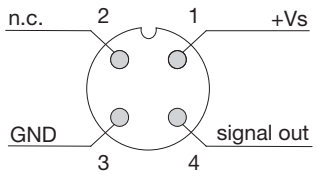
DUK-..S300



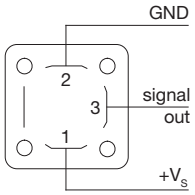
DUK-..S30D



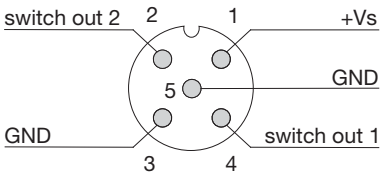
DUK-..F3x0, DUK-..L343



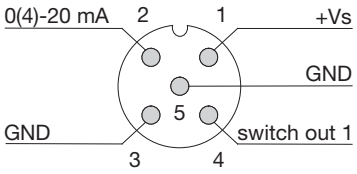
DUK-..L443



DUK-..C30*



DUK-..C34*



DUK-...E14R, DUK-...G14R Cable Connection

Wire Number	DUK-..E14R Totalizing Electronic	DUK-..G14R Batching Electronic
1	24 V_{DC}	24 V_{DC}
2	GND	GND
3	4-20 mA	4-20 mA
4	GND	GND
5	Reset Total Part	Control 1*
6	n. c.	Control 2*
7	Relay S1	Relay S1
8	Relay S1	Relay S1
9	Relay S2	Relay S2
10	Relay S2	Relay S2

* Control 1 <-> GND: Start-Batching
Control 2 <-> GND: Stop-Batching
Control 1 <-> Control 2 <-> GND: Reset-Batching

DUK-..E34R, DUK-..G34R Plug Connection