DUK
COMPACT ULTRASONIC FLOWMETER

Flow
Pressure
Level
Temperature
Measurement
Monitoring
Control

- Measuring Ranges:
  0.02-5 GPM to 0.6-160 GPM
- Accuracy: ±1.5 % of F.S.
- Turndown Ratio: 250:1
- P_{max}: 230 PSI; T_{max}: 248° F
- Connections: ½ to 3 G or NPT
- Material: Brass or 1.4408 Stainless Steel
- Outputs: Analog, Frequency, Switching, Compact Electronics with Digital Displays, Batching and Totalizing Electronics

USA
KOBOLD Instruments Inc.
1801 Parkway View Drive
Pittsburgh, PA 15205
PH: +1 412-788-2830
FAX: +1 412-788-4890
E-MAIL: info@koboldusa.com

CANADA
KOBOLD Instruments Canada Inc.
9A Aviation
Pointe-Claire, QC H9R 4Z2
PH: +1 514-428-8090
FAX: +1 514-428-8899
E-MAIL: kobold@kobold.ca

MEXICO
Camino Dorado 131
Misión Cimatario
Querétaro 76087, Qro.
Mexico
PH/FAX: +52 (442) 295 1567
E-MAIL: contreras@kobold.com

Visit KOBOLD Online at
www.koboldusa.com

Model:
DUK

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Description

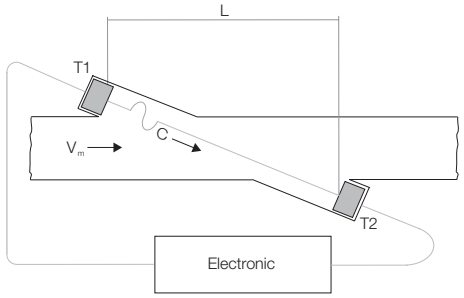
The new KOBOLD model DUK flow meters are used for measuring, monitoring, metering, and batching of low viscosity fluids.

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.

Advantages

- High turndown ratio: 250:1
- Small pressure loss
- Highly Repeatable
- Measurement independent of density and temperature changes

Areas of Application

- Machine building
- Automotive
- Robotic
- Cooling
- Hot water

Technical Details

Measuring principle:	Ultrasonic
Range:	See Table
Media:	Liquids with max. 1 % solid
Viscosity:	Max. 3 cSt
Accuracy:	±1.5 % of F.S.
Repeatability:	±0.5 % 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 to 194 °F -4 to 248 °F (High temperature version)
Ambient Temperature:	-4 to 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 / NEMA 4

Wetted Parts

Sensor Housing:	Brass or 1.4408 Stainless Steel
Sensors:	PEEK
Seal:	NBR (other on request)

Measuring Ranges and Weights

Model	Measuring range G [GPM]	Measuring range H [LPM]	Size [G/NPT]	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

DUK-...S300, DUK-...S30D

Display:	Bicolor 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 to 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 Oonnection:	Plug M 12, 5-pin

DUK-...F300, DUK-…F390

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 M 12, 5-pin

DUK-...L343

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 M 12x1

DUK-...L443 (Required with optional AUF-3000)

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(2) 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 M 12x1

DUK-...Ex4R (Totalizing Electronic)

Display:	LCD, 2 x 8 digit, illuminated rate, total and grand total, units selectable
Analog Output:	4-20 mA adjustable
Load:	Max. 500 Ω
Switching Output:	2 relays, max. 250 V/5 A/1000 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 M12 plug

More technical details see datasheet ZED in the brochure Z2

DUK-...Gx4R (Batching Electronic)

Display:	LCD, 2 x 8 digit, illuminated batching, total and grand total, units selectable
Analog Output:	4-20 mA adjustable
Load:	Max. 500 Ω
Switching Output:	2 relays, max. 250 V / 5A / 1000 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

More technical details see datasheet ZED in the brochure Z2

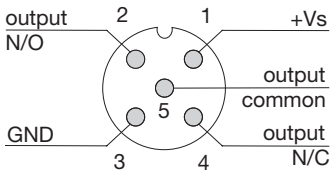
DUK with ADI Electronic

Display:	Bar graph and 3.5-digit digital combination display; batch system
Analog Output:	4-20 mA, 0 to 10 V
Switching Output:	2 x relays / SPDT max. 115 / 230 V_{AC}, 5A resistive load max. 30 V_{DC} / 5 A or 2 Open-Collector 5 - 50 V_{DC}, $I_{total.}$ = 50 mA
Settings:	Via 3 buttons
Power Supply:	230 / 115 V_{AC}, 24 V_{DC}
Electrical Connection:	Terminal block via cable gland

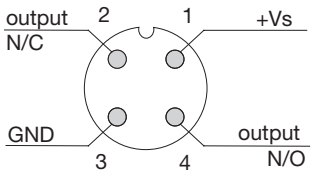
More technical details see datasheet ADI electronic in the brochure Z2

Electrical Connection

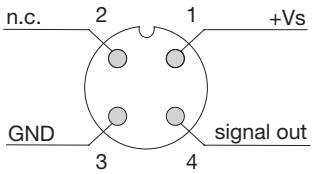
DUK-...S300



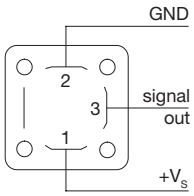
DUK-...S30D



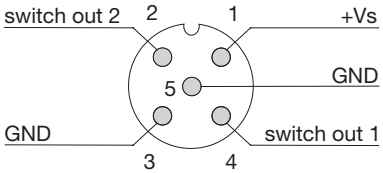
DUK-…F3x0, DUK-...L343



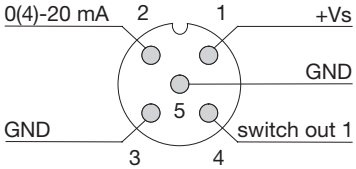
DUK-...L443



DUK-...C30*



DUK-...C34*

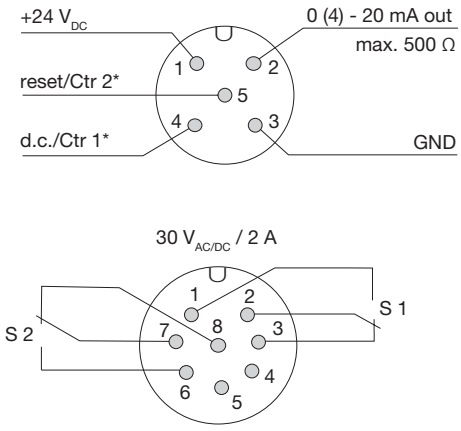


DUK-...E14R, DUK-...G14R Cable Connection

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



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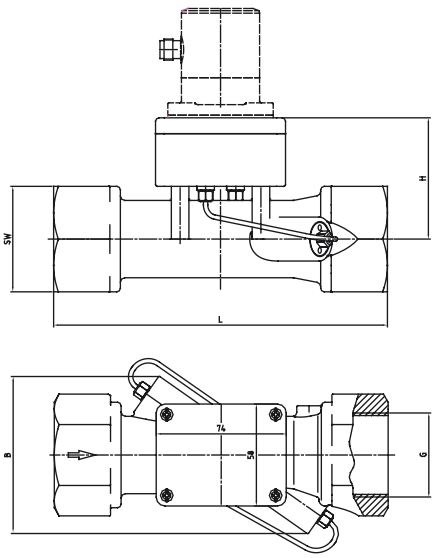
Order Details (Example: DUK-11 N4 G S300 L)

Model / Housing Material	Connection	Range	Output / Electronic	Flow Direction
DUK-11 = Brass **DUK-12** = St. St. **DUK-21** = High Temp Brass **DUK-22** = High Temp St. St.	**G4** = G ½ **G5** = G ¾ **G6** = G 1 **G8** = G 1½ **G9** = G 2 **GB** = G 3 **N4** = ½" NPT **N5** = ¾" NPT **N6** = 1" NPT **N8** = 1½" NPT **N9** = 2" NPT **NB** = 3" NPT	**G** = GPM **H** = LPM	**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** = 2 x Open Collector, PNP **C30M** = 2 x Open Collector, NPN **C34P** = 4-20 mA, 1 x Open Collector, PNP **C34N** = 4-20 mA, 1 x Open Collector, NPN **ADI Electronic** **Display:** **K** = bar graph/ digital display; **A** = batching unit **Power Supply:** **0** = 230 V_{AC}; **4** = 115 V_{AC}; **3** = 24 V_{DC} **Output:** **0** = without; **1** = 0-10 V; **4** = 4-20 mA **Contacts:** **0** = without; **2** = 2 relay SPDT; **6** = 2 Open Collector **Totalizing Electronic** **E14R** = LCD, 4-20 mA, 2 x relays, 1 m cable **E34R** = LCD, 4-20 mA, 2 x relays, M12-plug **Batching Electronic** **G14R** = LCD, 4-20 mA, 2 x relays, 1 m cable **G34R** = LCD, 4-20 mA, 2 x relays, M12-plug	**L** = from left to right **R** = from right to left **T** = from top to bottom **B** = from bottom to top

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

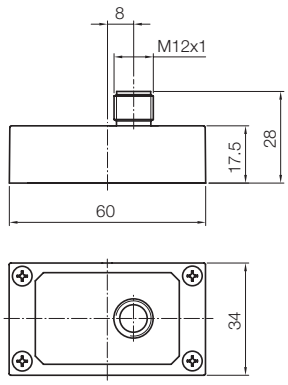
Dimensions DUK-Sensor

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

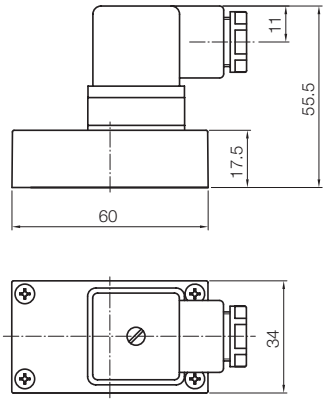


Dimensions

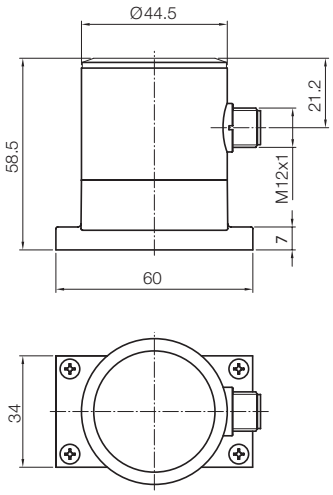
DUK-…S30x, DUK-…F3x0, DUK-…L343



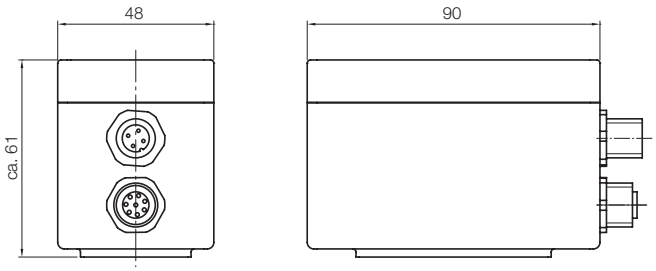
DUK-…L443



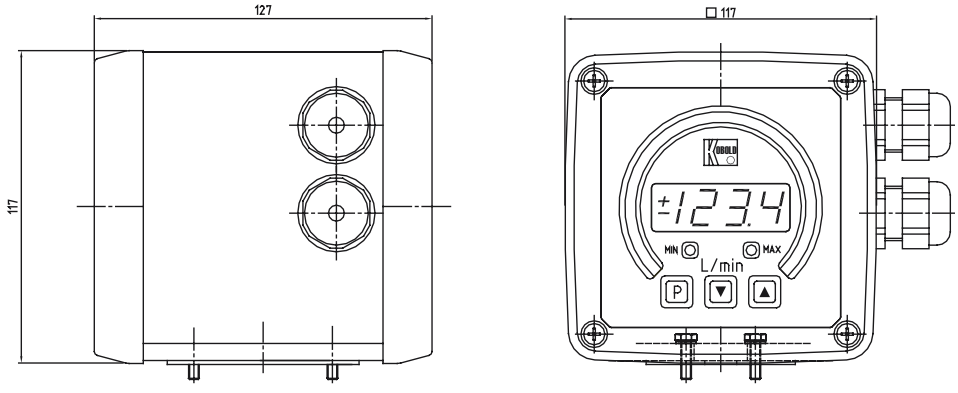
DUK-…C3xx



DUK-…Ex4R, DUK-…Gx4R



DUK with ADI Electronic



Dimensions in mm