



## Ultrasonic Flowmeter/ Monitor/Counter/Dosing Unit



measuring  
•  
monitoring  
•  
analysing

DUK



- Measuring range:  
0.08 - 20 ... 2.5 - 630 l/min
- Accuracy:  
0.7 % of reading + 0.7 % of full scale
- Range span: 250
- $p_{max}$ : 16 bar;  $t_{max}$ : 90 °C
- Connection:  
G 1/2 ... G 3, 1/2" ... 3" NPT female
- Material: brass or stainless steel 1.4408
- Analogue, frequency and switching outputs, compact electronic with digital display, dosing and counter electronic

SS



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KOBOLD Messring GmbH  
Nordring 22-24  
D-65719 Hofheim/Ts.  
Head Office:  
+49(0)6192 299-0  
+49(0)6192 23398  
info.de@kobold.com  
www.kobold.com

**Description**

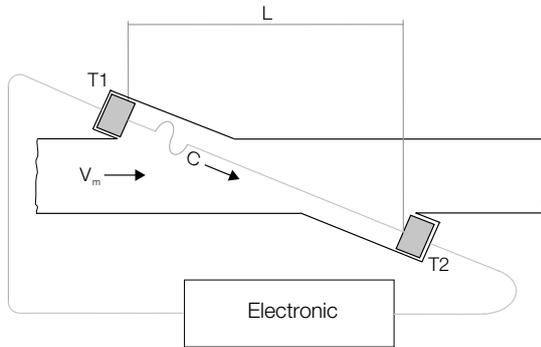
The new KOBOLD type DUK flowmeters are used for the measurement, monitoring, metering and dosing of low viscosity fluids.

The devices work on the principle of the difference in running times. This is based on the fact that ultrasonic waves in a medium are influenced by the speed of flow.

Two sensors mounted opposite one another in the pipeline function simultaneously as transmitter and receiver of ultrasound signals.

If there is no flow, then the running times of both signals are identical. If the medium is flowing, then the running time of the signal against the flow is longer than that with the flow.

The running time difference, which is determined by a microprocessor, is proportional to the speed of flow.



The devices can be equipped with a switching output, a frequency output or an analogue output. In addition, a compact circuit can be selected that features a digital display, a switching output and an analogue output.

The device series is rounded off by an optionally available dosing and meter circuit. The meter circuit indicates the momentary flow rate in the first line of the display and the partial or total quantity in the second line. A dosing circuit controls simple filling tasks and similarly measures flow rates, total amounts and filling amounts. The analogue output and two relay outputs can be used for further processing of the signals.

**Advantages**

- High range span of 1:250
- Small pressure loss
- High repeat accuracy ± 0.1 % of full scale
- Independent from density and temperature

**Areas of Application**

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

**Technical Details**

**Sensor**

- Measuring principle: ultrasonic
- Range: see table
- Medium: water with max. 1 % solid
- Viscosity: max. 5 mm<sup>2</sup>/s
- Accuracy: 0.7 % of reading + 0.7 % of full scale
- Repeat accuracy: ±0.1 % of full scale
- Mounting position: in all directions, flow in direction of the arrow (horizontal: electronic on top or below)
- In-/Outlet: 10 x DN
- Media temperature: -20...+90 °C
- Ambient temperature: -20 ... + 70 °C
- Response time t90: approx. 0.5...1 s at flow change > 10 % FS (depending on electronic version)
- Pressure: 0 ... 16 bar
- Pressure loss: max. 150 mbar at full scale
- Protection: IP 65
- Wetted Parts**
- Sensor housing: brass or stainless steel 1.4408
- Sensors: PEEK
- Seal: NBR, other on request

**Measuring Ranges and Weights**

Model	Measuring range [l/min]	Size [G/NPT]	DUK-...S30x DUK-...F3xo DUK-...Lxx3	DUK-...C3xx	DUK-...Exxx DUK-...Gxxx	DUK with ADI 24 V	DUK with ADI 230/115/48 V
DUK-1xx4	0.08 - 20	½"	approx. 850 g	approx. 1050 g	approx. 1000 g	approx. 2150 g	approx. 2700 g
DUK-1xx5	0.16 - 40	¾"	approx. 1050 g	approx. 1250 g	approx. 1200 g	approx. 2350 g	approx. 2900 g
DUK-1xx6	0.25 - 63	1"	approx. 1450 g	approx. 1650 g	approx. 1600 g	approx. 2750 g	approx. 3300 g
DUK-1xx8	0.6 - 150	1½"	approx. 2350 g	approx. 2550 g	approx. 2500 g	approx. 3650 g	approx. 4200 g
DUK-1xx9	1 - 250	2"	approx. 3800 g	approx. 4000 g	approx. 3950 g	approx. 5100 g	approx. 5650 g
DUK-1xxB	2.5 - 630	3"	approx. 7100 g	approx. 7300 g	approx. 7250 g	approx. 8400 g	approx. 8950 g



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

Display: Duo-LED for switch status  
 Switching output (..S300): relay SPDT max. 1 A/30 V<sub>DC</sub>  
 Switching output (..S30D): aktive 24 V<sub>DC</sub>, N/C and N/O  
 Switch point: 10...90% FS in 10% - steps that can be configured by the customer using a rotary switch  
 Power supply: 24 V<sub>DC</sub> ± 20 %  
 Power consumption: 30 mA  
 Electrical connection: plug M 12, 5-pin  
 Meas. range overflow: flash of the DUO-LED (red/green) from 105 % of full scale

### DUK-...F300, DUK-...F390

Impulse output: PNP, open collector, max. 200 mA  
 Frequency at F.S.: 500 Hz (...F300)  
 50 ... 1000 Hz (...F390) proportional to flowrate  
 Power supply: 24 V<sub>DC</sub> ± 20 %  
 Power consumption: 25 mA  
 Electrical connection: plug M 12, 5-pin  
 Meas. range overflow: F<sub>out</sub> approx. 2 kHz from 105 % of full scale

### DUK-...L303; DUK-...L343

Output: 0(4)-20 mA, 3-wire  
 Load: max. 500 Ω  
 Power supply: 24 V<sub>DC</sub> ± 20 %  
 Power consumption: max. 45 mA  
 Electrical connection: plug M 12x1  
 Meas. range overflow: I<sub>out</sub> approx. 20.5 mA from 103 % of full scale

### DUK-...L443 (usage with AUF-3000)

Output: 4 - 20 mA, 3-wire  
 Load: max. 500 Ω  
 Power supply: 24 V<sub>DC</sub> ± 20 %  
 Power consumption: max. 45 mA  
 Electrical connection: plug DIN 43650  
 Meas. range overflow: I<sub>out</sub> approx. 20.5 mA from 103 % of full scale

### DUK-...C3xx (Compact electronic)

Display: 3-digit LED  
 Analogue output: 0(4)...20 mA adjustable (only DUK-...C34x)  
 Load: max. 500 Ω  
 Switching output: 1(2) semiconductor PNP or NPN, set at factory  
 Contact function: N/C-N/O-frequency programmable (approx. 1400 Hz at F.S., uncalibrated)  
 Settings: via 2 buttons  
 Power supply: 24 V<sub>DC</sub> ± 20 %  
 Power consumption: approx. 100 mA  
 Electrical connection: plug M 12x1

### DUK-...Exxx (Counter electronic)

Display: LCD, 2 x 8 digit, illuminated total, part and flow quantities, units selectable  
 Analogue output: 0(4)...20 mA adjustable  
 Load: max. 500 Ω  
 Switching output: 2 relays, max. 30 V<sub>AC/DC</sub>/2 A/60 VA  
 Settings: via 4 buttons  
 Functions: reset, MIN/MAX memory, flow monitor, monitoring for part and total quantity, language  
 Power supply: 24 V<sub>DC</sub> ± 20 %, 3-wire  
 Power consumption: approx. 170 mA  
 Electrical connection: cable connection or M12 plug

*More technical details see data sheet ZED.*

### DUK-...Gxxx (Dosing electronic)

Display: LCD, 2 x 8 digit, illuminated dosing-, total-, and flow quantity, units selectable  
 Analogue output: 0(4)...20 mA adjustable  
 Load: max. 500 Ω  
 Switching output: 2 relays, max. 30 V<sub>AC/DC</sub>/2 A/60 VA  
 Settings: via 4 buttons  
 Functions: dosing (relay S2), start, stop, reset, fine dosing, correction amount, flow switch, total quantity, language  
 Power supply: 24 V<sub>DC</sub> ± 20 %, 3-wire  
 Power consumption: approx. 170 mA  
 Electrical connection: cable connection or M12 plug

*More technical details see data sheet ZED.*

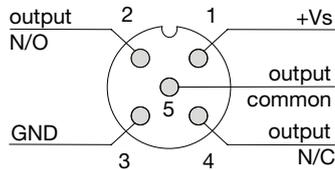
### DUK with ADI electronic

Display: bar graph and 5-digit digital display  
 Analogue output: 0(4) ... 20 mA, 0 ... 10 V<sub>DC</sub>  
 2 Switching outputs: relay /changeover contact max. 250 V<sub>AC</sub>, 5 A resistive load max. 30 V<sub>DC</sub>/5 A  
 Settings: via 4 buttons  
 Power supply: 100 ... 240 V<sub>AC</sub> ± 10% or 18 ... 30 V<sub>AC</sub>/10 ... 40 V<sub>DC</sub>  
 Electrical connection: pluggable terminal block via cable gland

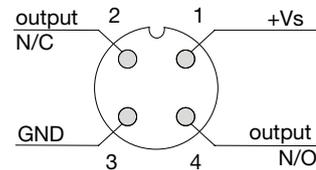
*More technical details see data sheet ADI.*

**Electrical Connection**

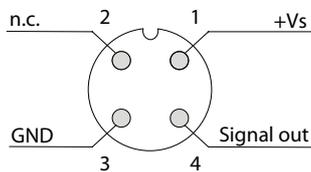
DUK-...S300



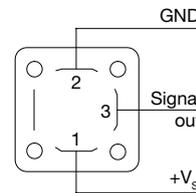
DUK-...S30D



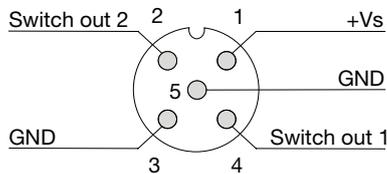
DUK-...F3x0, DUK-...L3x3



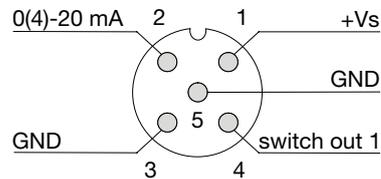
DUK-...L443



DUK-...C30\*



DUK-...C34\*

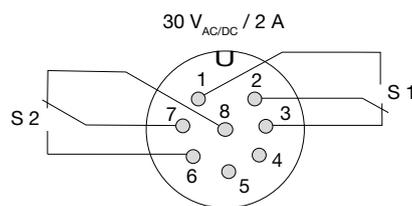
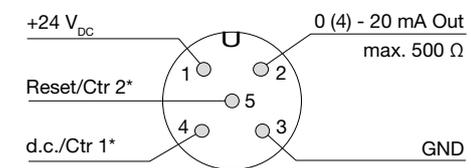


**DUK-...E14R, DUK-...G14R Cable Connection**

Wire number	DUK-...E14R counter electronic	DUK-...G14R dosing electronic
1	+24 V <sub>DC</sub>	+24 V <sub>DC</sub>
2	GND	GND
3	0(4)-20 mA	0(4)-20 mA
4	GND	GND
5	reset part quantity	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-Dosing  
 Control 2 <-> GND: Stop-Dosing  
 Control 1 <-> Control 2 <-> GND: Reset-Dosing

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





**Order Details** (Example: DUK-11 G4H S300 L 0)

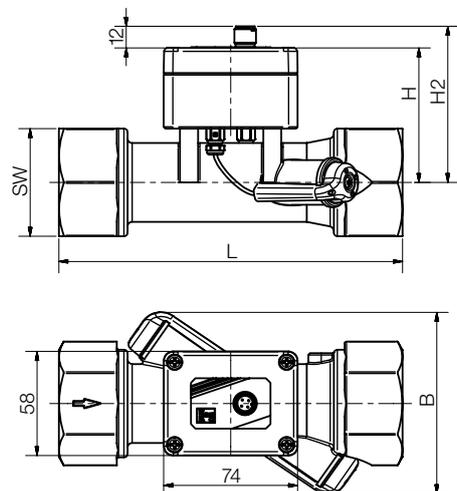
Model / Housing material	Connection <sup>1)</sup>	Electronic	Flow direction	Options								
<b>DUK-11</b> = brass <b>DUK-12</b> = st. steel 1.4408	<b>G4H</b> = G ½ female <b>G5H</b> = G ¾ female <b>G6H</b> = G 1 female <b>G8H</b> = G 1½ female <b>G9H</b> = G 2 female <b>GBH</b> = G 3 female  <b>N4H</b> = ½" NPT female <b>N5H</b> = ¾" NPT female <b>N6H</b> = 1" NPT female <b>N8H</b> = 1½" NPT female <b>N9H</b> = 2" NPT female <b>NBH</b> = 3" NPT female	<b>Switching output</b> <b>S300</b> = relay, M12-plug <b>S30D</b> = aktiv 24 V <sub>DC</sub> , M12-plug  <b>Frequency output</b> <b>F300</b> = M12-plug, 500 Hz <b>F390</b> = M12-plug, 50...1000 Hz  <b>Analogue output</b> <b>L303</b> = M12-plug, 0-20 mA <b>L343</b> = M12-plug, 4-20 mA <b>L443</b> = DIN-plug, 4-20 mA  <b>Compact electronic</b> <b>C30R</b> = 2x open collector, PNP <b>C30M</b> = 2x open collector, NPN <b>C34P</b> = 0(4)-20 mA, 1x open collector, PNP <b>C34N</b> = 0(4)-20 mA, 1x open collector, NPN  <b>ADI electronic</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Display</th> <th>Power supply</th> <th>Output</th> <th>Contacts</th> </tr> </thead> <tbody> <tr> <td>K = bar graph/digital display</td> <td>0 = 100-240 V<sub>AC/DC</sub> 3 = 18-30 V<sub>AC</sub>, 10-40 V<sub>DC</sub></td> <td>0 = without 4 = 0(4)-20 mA, 0-10 V</td> <td>2 = 2 change-over contacts</td> </tr> </tbody> </table> <b>Counter electronic</b> <b>E14R</b> = LCD, 0(4)-20 mA, 2 x relays, 1.5 m cable <b>E34R</b> = LCD, 0(4)-20 mA, 2 x relays, M12-plug <b>E94R</b> = LCD, 0(4)-20 mA, 2 x relays, cable >1.5 m <sup>2)</sup>  <b>Dosing electronic</b> <b>G14R</b> = LCD, 0(4)-20 mA, 2 x relays, 1.5 m cable <b>G34R</b> = LCD, 0(4)-20 mA, 2 x relays, M12-plug <b>G94R</b> = LCD, 0(4)-20 mA, 2 x relays, cable >1.5 m <sup>2)</sup>	Display	Power supply	Output	Contacts	K = bar graph/digital display	0 = 100-240 V <sub>AC/DC</sub> 3 = 18-30 V <sub>AC</sub> , 10-40 V <sub>DC</sub>	0 = without 4 = 0(4)-20 mA, 0-10 V	2 = 2 change-over contacts	<b>L</b> = from left to right <b>R</b> = from right to left <b>T</b> = from top to bottom <b>B</b> = from bottom to top	<b>0</b> = without <b>Y</b> = special option (specify in clear text) <b>M</b> = pressure compensation filter for reducing condensation
Display	Power supply	Output	Contacts									
K = bar graph/digital display	0 = 100-240 V <sub>AC/DC</sub> 3 = 18-30 V <sub>AC</sub> , 10-40 V <sub>DC</sub>	0 = without 4 = 0(4)-20 mA, 0-10 V	2 = 2 change-over contacts									

<sup>1)</sup> Standard display in l/min, optional: display GPM (code G instead of H)  
<sup>2)</sup> While ordering please specify cable length in metres

**Dimensions**

DUK-...S30x, DUK-...F3x0, DUK-...L3x3

Model	G/ NPT	SW [mm]	H [mm]	H2 [mm]	L [mm]	B [mm]
DUK-xxx4	½"	30	63	75	114	85
DUK-xxx5	¾"	36	65	77	126,5	89
DUK-xxx6	1"	46	69	81	146	93
DUK-xxx8	1½"	60	75	87	190	103
DUK-xxx9	2"	76	80	92	238	114
DUK-xxxB	3"	105	90	102	306	135

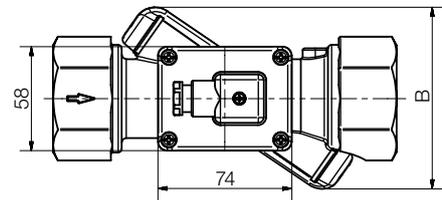
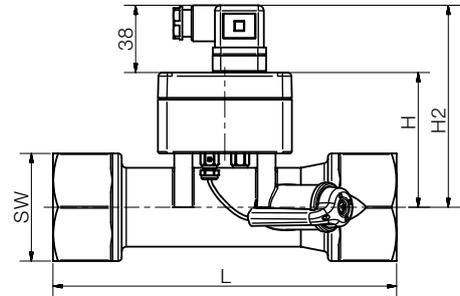




Dimensions (continued)

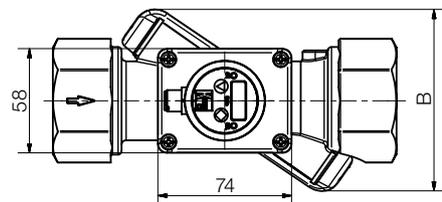
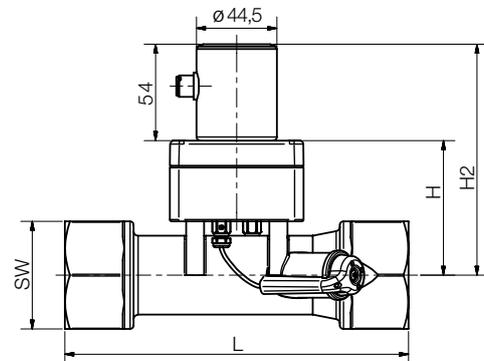
DUK-...L443

Model	G/ NPT	SW [mm]	H [mm]	H2	L [mm]	B [mm]
DUK-xxx4	1/2"	30	63	101	114	85
DUK-xxx5	3/4"	36	65	103	126,5	89
DUK-xxx6	1"	46	69	107	146	93
DUK-xxx8	1 1/2"	60	75	113	190	103
DUK-xxx9	2"	76	80	118	238	114
DUK-xxxB	3"	105	90	128	306	135



DUK-...C3xx

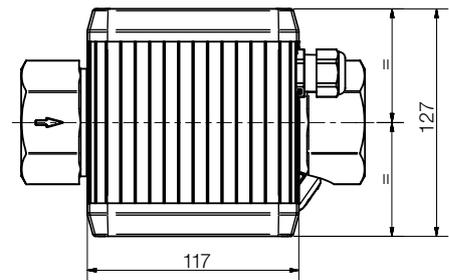
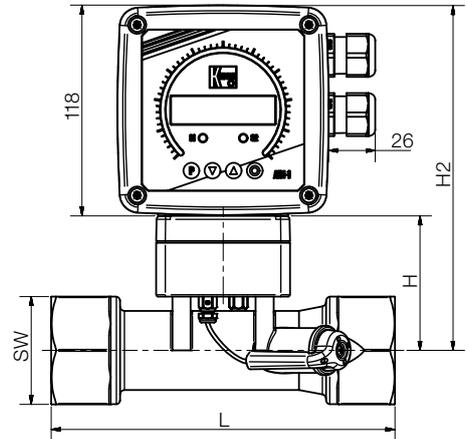
Model	G/ NPT	SW [mm]	H [mm]	H2	L [mm]	B [mm]
DUK-xxx4	1/2"	30	63	117	114	85
DUK-xxx5	3/4"	36	65	119	126,5	89
DUK-xxx6	1"	46	69	123	146	93
DUK-xxx8	1 1/2"	60	75	129	190	103
DUK-xxx9	2"	76	80	134	238	114
DUK-xxxB	3"	105	90	144	306	135



Dimensions (continued)

DUK-...Kxx2

Model	G/ NPT	SW [mm]	H [mm]	H2	L [mm]	B [mm]
DUK-xxx4	1/2"	30	63	181	114	85
DUK-xxx5	3/4"	36	65	183	126,5	89
DUK-xxx6	1"	46	69	187	146	93
DUK-xxx8	1 1/2"	60	75	193	190	103
DUK-xxx9	2"	76	80	198	238	114
DUK-xxxB	3"	105	90	208	306	135



DUK-...ExxR, DUK-...GxxR

Model	G/ NPT	SW [mm]	H [mm]	H2	L [mm]	B [mm]
DUK-xxx4	1/2"	30	63	125	114	85
DUK-xxx5	3/4"	36	65	127	126,5	89
DUK-xxx6	1"	46	69	131	146	93
DUK-xxx8	1 1/2"	60	75	137	190	103
DUK-xxx9	2"	76	80	142	238	114
DUK-xxxB	3"	105	90	152	306	135

