



## 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;  $t_{\max}$ : 120°C
- Connection: G ½ ... G 3, ½ ... 3 NPT female
- Material: brass or stainless steel 1.4408
- Analogue, frequency and switching outputs, compact electronic with digital display, dosing and counter electronic



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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**

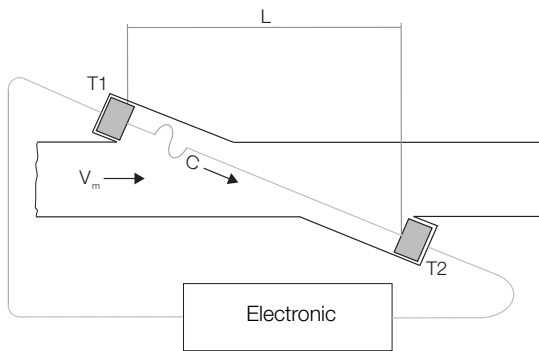
The new KOBOLD type DUK flow meters are used for the measurement, monitoring, metering and dosing of low viscosity fluids.

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 micro-processor, 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  $\pm 0,1$  % of full scale
- Independent from density and temperature

**Areas of Application**

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

**Technical Data**

**Sensor**

- Measuring principle: ultrasonic
- Range: see table
- Medium: liquids with max. 1 % solid
- Viscosity: max. 5 mm<sup>2</sup>/s
- Accuracy: 0,7 % of reading + 0,7 % of full scale
- Repeat accuracy:  $\pm 0,1$  % 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  
-20 ... +120 °C (high temp. version)
- Ambient temperature: -20 ... + 70 °C
- Response time t<sub>90</sub>: 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  
high temp. version FPM

**Measuring Ranges and Weights**

| Model    | Measuring range [L/min] | Size [G/NPT] | DUK-...S30x<br>DUK-...F3x0<br>DUK-...Lxx3 | DUK-...C3xx    | DUK-...Exxx<br>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): aktiv 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 M12, 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 M12, 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 M12x1  
 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 M12x1

#### 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. 250 V/5 A/1000 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 in the brochure Z2.*

#### 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. 250 V/5 A/1000 VA  
 Settings: via 4 buttons  
 Funktionen: 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 in the brochure Z2.*

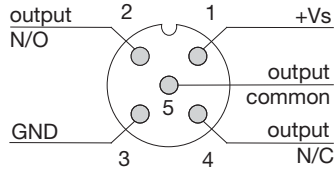
#### DUK with ADI electronic

Display: bar graph and 5-digit digital display  
 Analogausgang: 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

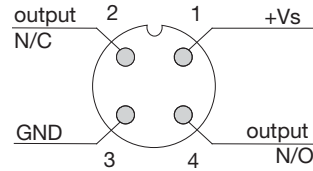
*See brochure Z2 for more technical details on ADI evaluating electronics.*

**Electrical Connection**

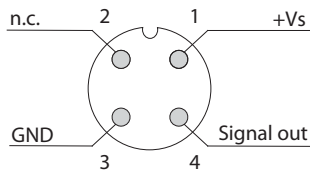
**DUK-...S300**



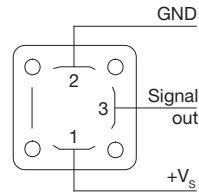
**DUK-...S30D**



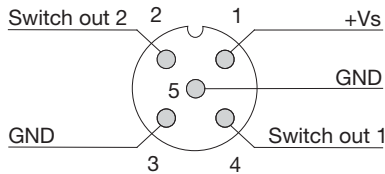
**DUK-...F3x0, DUK-...L3x3**



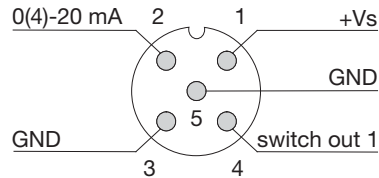
**DUK-...L443**



**DUK-...C30\***



**DUK-...C34\***

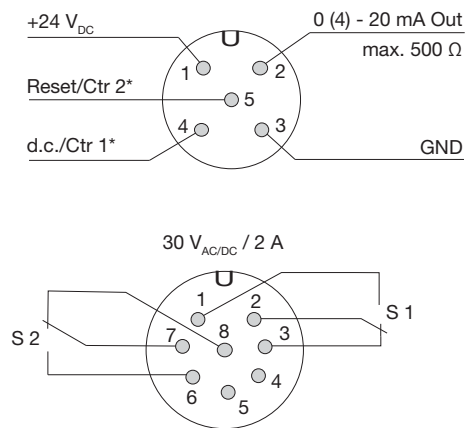


**DUK-...E14R, DUK-...G14R Cable Connection**

| 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)

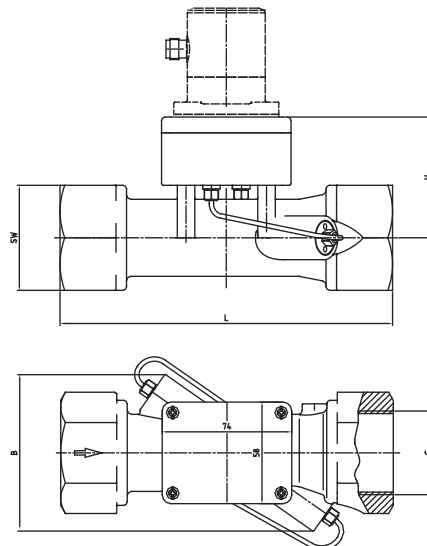
| Model / Housing material  | Connection*   | Electronic  | Flow direction                    |              |        |          |                                      |   |   |                                   |   |
|---|---|---|-----------------------------------|--------------|--------|----------|--------------------------------------|---|---|-----------------------------------|---|
| <p><b>DMH-11</b> = brass</p> <p><b>DUK-12</b> = st. steel 1.4408</p> <p><b>DUK-21</b> = high temp. version brass</p> <p><b>DUK-22</b> = st. steel 1.4408 high temp. version</p> | <p><b>G4H</b> = G ½ female</p> <p><b>G5H</b> = G ¾ female</p> <p><b>G6H</b> = G 1 female</p> <p><b>G8H</b> = G 1½ female</p> <p><b>G9H</b> = G 2 female</p> <p><b>GBH</b> = G 3 female</p> <p><b>N4H</b> = ½ NPT female</p> <p><b>N5H</b> = ¾ NPT female</p> <p><b>N6H</b> = 1 NPT female</p> <p><b>N8H</b> = 1½ NPT female</p> <p><b>N9H</b> = 2 NPT female</p> <p><b>NBH</b> = 3 NPT female</p> | <p><b>Switching output</b><br/> <b>S300</b> = relay, M12-plug<br/> <b>S30D</b> = aktiv 24 V<sub>DC</sub>, M12-plug</p> <p><b>Frequency output</b><br/> <b>F300</b> = M12-plug, 500 Hz<br/> <b>F390</b> = M12-plug, 50...1000 Hz</p> <p><b>Analogue output</b><br/> <b>L303</b> = M12-plug, 0-20 mA<br/> <b>L343</b> = M12-plug, 4-20 mA<br/> <b>L443</b> = DIN-plug, 4-20 mA</p> <p><b>Compact electronic</b><br/> <b>C30R</b> = 2x open collector, PNP<br/> <b>C30M</b> = 2x open collector, NPN<br/> <b>C34P</b> = 0(4)-20 mA, 1x open collector, PNP<br/> <b>C34N</b> = 0(4)-20 mA, 1x open collector, NPN</p> <p><b>ADI electronic</b></p> <table border="1"> <thead> <tr> <th>Display</th> <th>Power supply</th> <th>Output</th> <th>Contacts</th> </tr> </thead> <tbody> <tr> <td><b>K</b> = bar graph/digital display</td> <td><b>0</b> = 100-230 V<sub>AC/DC</sub><br/><b>3</b> = 18-30 V<sub>AC</sub>, 10-40 V<sub>DC</sub></td> <td><b>0</b> = without<br/><b>4</b> = 0(4)-20 mA, 0-10 V</td> <td><b>2</b> = 2 change-over contacts</td> </tr> </tbody> </table> <p><b>Counter electronic</b><br/> <b>E14R</b> = LCD, 0(4)-20 mA, 2 x relays, 1 m cable<br/> <b>E34R</b> = LCD, 0(4)-20 mA, 2 x relays, M12-plug</p> <p><b>Dosing electronic</b><br/> <b>G14R</b> = LCD, 0(4)-20 mA, 2 x relays, 1 m cable<br/> <b>G34R</b> = LCD, 0(4)-20 mA, 2 x relays, M12-plug</p> | Display                           | Power supply | Output | Contacts | <b>K</b> = bar graph/digital display | <b>0</b> = 100-230 V <sub>AC/DC</sub><br><b>3</b> = 18-30 V <sub>AC</sub> , 10-40 V <sub>DC</sub> | <b>0</b> = without<br><b>4</b> = 0(4)-20 mA, 0-10 V | <b>2</b> = 2 change-over contacts | <p><b>L</b> = from left to right</p> <p><b>R</b> = from right to left</p> <p><b>T</b> = from top to bottom</p> <p><b>B</b> = from bottom to top</p> |
| Display   | Power supply  | Output  | Contacts                          |              |        |          |                                      |   |   |                                   |   |
| <b>K</b> = bar graph/digital display  | <b>0</b> = 100-230 V <sub>AC/DC</sub><br><b>3</b> = 18-30 V <sub>AC</sub> , 10-40 V <sub>DC</sub>   | <b>0</b> = without<br><b>4</b> = 0(4)-20 mA, 0-10 V   | <b>2</b> = 2 change-over contacts |              |        |          |                                      |   |   |                                   |   |

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

Dimensions DUK-Sensor

| Model    | G/NPT | SW [mm] | H [mm] | H* [mm] | L [mm] | B [mm]      |
|----------|-------|---------|--------|---------|--------|-------------|
| DUK-xxx4 | ½     | 30      | 57,5   | 77,5    | 114    | approx. 72  |
| DUK-xxx5 | ¾     | 36      | 59,5   | 79,5    | 126,5  | approx. 76  |
| DUK-xxx6 | 1     | 46      | 63,5   | 83,5    | 146    | approx. 80  |
| DUK-xxx8 | 1½    | 60      | 69,5   | 89,5    | 190    | approx. 90  |
| DUK-xxx9 | 2     | 76      | 74,5   | 94,5    | 238    | approx. 97  |
| DUK-xxxB | 3     | 105     | 84,5   | 104,5   | 306    | approx. 122 |

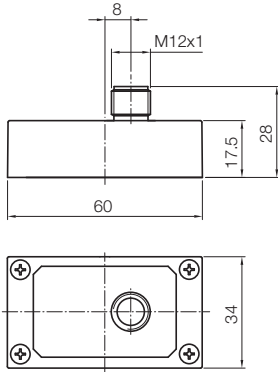
\* High Temp.-Version



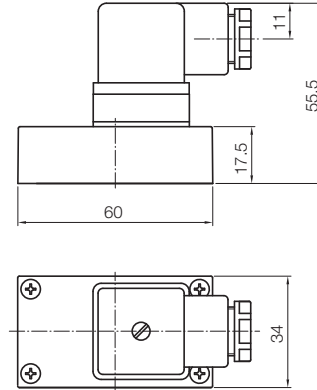


**Dimensions**

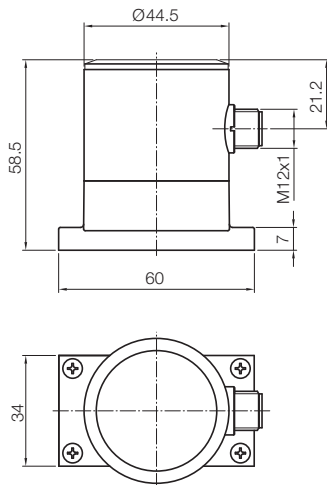
DUK-...S30x, DUK-...F3x0, DUK-...L3x3



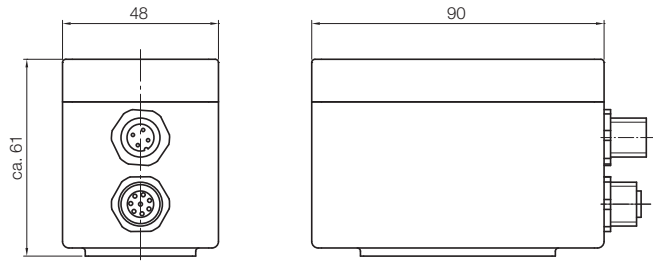
DUK-...L443



DUK-...C3xx



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



DUK with ADI electronic

