

## Ultrasonic Flowmeter/ -Monitor/-Counter/-Dosing Unit

**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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## Description

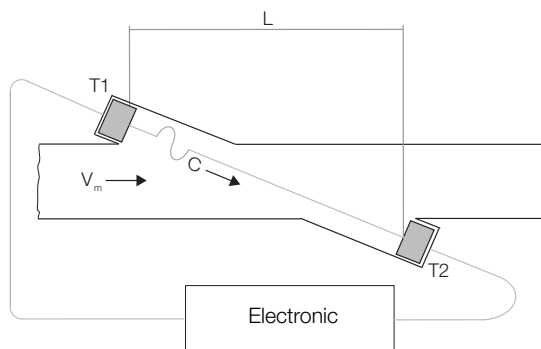
The new KOBOLD type DUK flow meters are used for the measurement, monitoring, metering and dosing of low viscosity fluids.

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
<b>Wetted Parts</b>	
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 DUK-...F3x0 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): 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

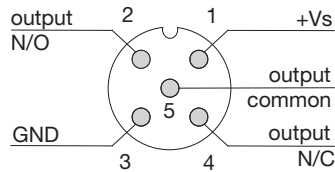
Display: bar graph and 5-digit digital display  
 Analogue output: 0(4)...20 mA, 0...10 V<sub>DC</sub>  
 2 Switching outputs: relay /changeover contact  
 max. 250 V<sub>AC</sub>, 5 A resistive load  
 max. 30 V<sub>DC</sub>/5 A  
 Settings: via 4 buttons  
 Power supply: 100...240 V<sub>AC</sub> ±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

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

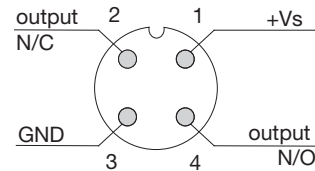


## Electrical Connection

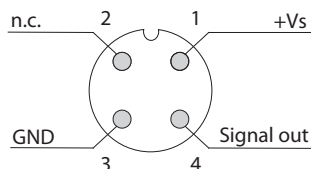
### DUK-...S300



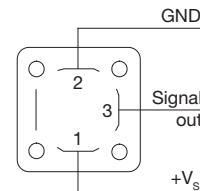
### DUK-...S30D



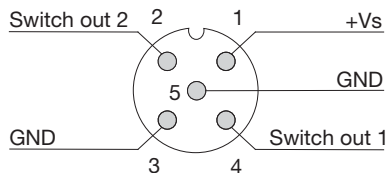
### DUK-...F3x0, DUK-...L3x3



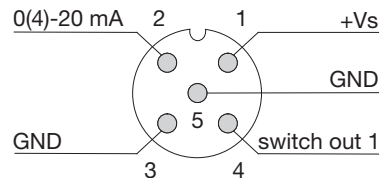
### DUK-...L443



### DUK-...C30\*



### DUK-...C34\*

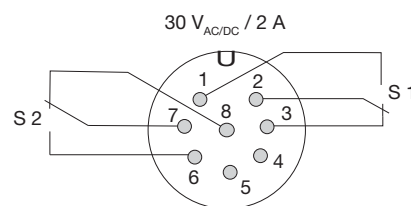
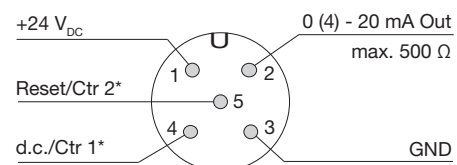


### DUK-...E14R, DUK-...G14R Cable Connection

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)

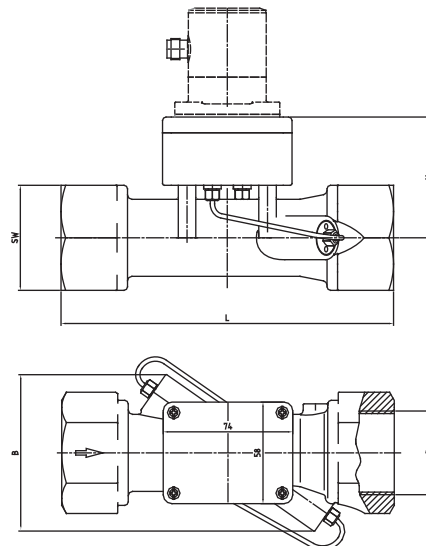
Model / Housing material	Connection*	Electronic	Flow direction								
<b>DUK-11</b> = brass <b>DUK-12</b> = st. steel 1.4408 <b>DUK-21</b> = high temp. version brass <b>DUK-22</b> = st. steel 1.4408 high temp. version	<b>G4H</b> = G ½ female <b>G5H</b> = G ¾ female <b>G6H</b> = G 1 female <b>G8H</b> = 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"> <tr> <th>Display</th><th>Power supply</th><th>Output</th><th>Contacts</th></tr> <tr> <td><b>K</b> = bar graph/digital display</td><td><b>0</b> = 100-230 V<sub>AC/DC</sub> <b>3</b> = 18-30 V<sub>AC</sub>, 10-40 V<sub>DC</sub></td><td><b>0</b> = without <b>4</b> = 0(4)-20 mA, 0-10 V</td><td><b>2</b> = 2 change-over contacts</td></tr> </table> <b>Counter electronic</b> <b>E14R</b> = LCD, 0(4)-20 mA, 2 x relays, 1 m cable <b>E34R</b> = LCD, 0(4)-20 mA, 2 x relays, M12-plug  <b>Dosing electronic</b> <b>G14R</b> = LCD, 0(4)-20 mA, 2 x relays, 1 m cable <b>G34R</b> = LCD, 0(4)-20 mA, 2 x relays, M12-plug	Display	Power supply	Output	Contacts	<b>K</b> = bar graph/digital display	<b>0</b> = 100-230 V <sub>AC/DC</sub> <b>3</b> = 18-30 V <sub>AC</sub> , 10-40 V <sub>DC</sub>	<b>0</b> = without <b>4</b> = 0(4)-20 mA, 0-10 V	<b>2</b> = 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
Display	Power supply	Output	Contacts								
<b>K</b> = bar graph/digital display	<b>0</b> = 100-230 V <sub>AC/DC</sub> <b>3</b> = 18-30 V <sub>AC</sub> , 10-40 V <sub>DC</sub>	<b>0</b> = without <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

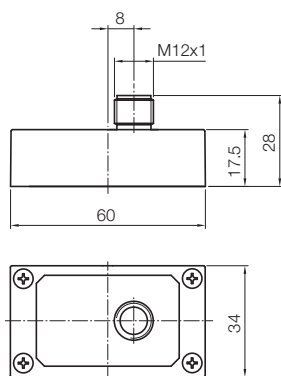
\* High Temp.-Version



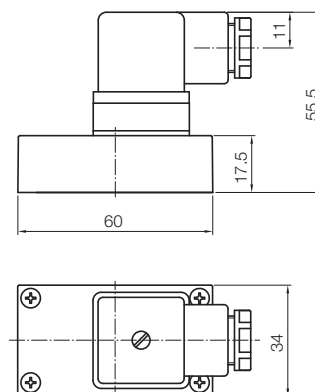


## Dimensions

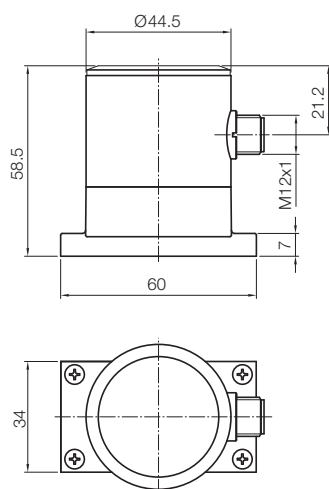
DUK-...S30x, DUK-...F3x0, DUK-...L3x3



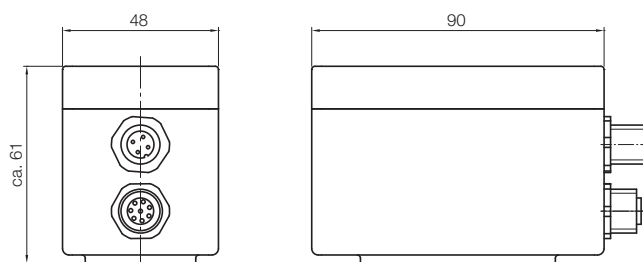
DUK-...L443



DUK-...C3xx



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



DUK with ADI electronic

