Ultrasonic Flow Meter/ Monitor/Counter/Dosing Unit

DUK

IO-Link

Display rotatable in 90° steps

- 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 ½ … G 3, ½" … 3" NPT female
- Material: brass or stainless steel 1.4408
- Analogue, frequency and switching outputs, compact electronic with digital display
- Additionally for option C3T0:
  Temperature measuring, bi-directional measurement, measuring of viscous media up to 68 mm²/s, IO-Link

KofiCom Interface set

S5

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Description

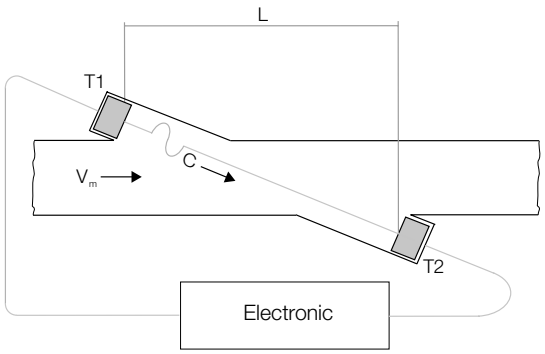
The new KOBOLD type DUK flow meters are used for the measurement, monitoring, metering and dosing of low viscosity fluids.

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 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 universal compact electronics type C3T0 is available and features two outputs arbitrarily configurable by the customer.

The compact electronics offers various diagnostic functions and the following features:

- Flow- and temperature measurement
- Monitoring, dosing and transmitter function
- Dosing function with external control input
- Coloured, multi-parameter configurable TFT-display, rotatable in 90° steps
- Bidirectional measuring
- Intuitive setup menu via 4 optical touch keys
- 2 configurable outputs (pulse-/frequency-/alarm- and analogue output)
- Grand and resettable totaliser
- IO link function

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, various media
Viscosity:	max. 68 mm²/s (option C3T0 only, all others max. 3 mm²/s)
Sensor for temperature measurement:	PT1000 (only for option C3T0)
Accuracy flow*:	0.7 % of reading + 0.7 % of full scale (water/water-glycol ≤ 10 mm²/s) 1.5 % of reading + 0.7 % of full scale (> 10 mm²/s)
Accuracy temperature:	+/- 1°K (depending on ambient temperature)
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

* Under reference conditions in standard flow direction

Reference conditions:
Medium: water;
Medium's and ambient temperature: 15 °C ... 30 °C, 1 bar,
connection pipe inside diameter ≥ 13 mm (for ½ "), ≥ 19 mm (for ¾ "),
≥ 26 mm (for 1 "), ≥ 39 mm (for 1½ "), ≥ 52 mm (for 2 "),
≥ 78 mm (for 3 ")

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Technical Details (continued)

Response time t90:	approx. 0.5...1 s at flow change >10 % FS (depending on electronic version)
Response time t90 temperature:	max. 30 s (flow > 1 m/s)
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, FKM (EPDM 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

Electrical Details

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

Display:	Duo-LED for switch status
Switching output (..S300):	relay SPDT max. 1 A/30 V_{DC}
Switching output (..S30D):	active 24 V_{DC}, 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_{DC} ±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 flow rate
Power supply:	24 V_{DC} ±20 %
Power consumption:	25 mA
Electrical connection:	plug M12, 5-pin
Meas. range overflow:	F_{out} 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_{DC} ±20 %
Power consumption:	max. 45 mA
Electrical connection:	plug M12x1
Meas. range overflow:	I_{out} 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_{DC} ±20 %
Power consumption:	max. 45 mA
Electrical connection:	plug DIN 43650
Meas. range overflow:	I_{out} approx. 20.5 mA from 103 % of full scale

DUK-...C3T0 (Compact electronic)

Supply voltage:	19 - 30 V_{DC}, internal power consumption max. 200 mA
Display:	TFT display, 128 x 128 pixels, 1.4" display orientation in 90° steps adjustable
Display repetition rate:	0.5 ... 10 s, adjustable
Pulse output	Push-Pull, freely scalable, configurable for partial and accumulated totaliser
Frequency output	Push-Pull, freely scalable, 2 kHz @ overflow f_{min} @ FS = 50 Hz f_{max} @ FS = 1000 Hz

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Electrical Details (continued)

Alarm output:	NPN, PNP, Push-Pull, configurable max. 30 V_{DC}, max. 200 mA short-circuit proof
Analogue output:	active, 3 wire, 0(4)-20 mA, max. load 500 Ω or 0(2)-10 V_{DC}, (R_i = 500 Ω)
Control input:	active signal U_{high} max. 30 V_{DC} 0 <Low <10 V_{DC} 15 V_{DC} <High <Vs
Dosing function:	Dosing output OUT2: Push-Pull, High active Control input OUT1: START/STOP 0.5 s <t_{high} <4 s RESET t_{high} >5 s
Electrical connection:	plug M12x1, 4-pin

Shock resistance
DIN EN 60068-2-27:2010: 20 g (11 ms)

Vibration resistance
DIN EN 60068-2-6:2008: 5 g (10 … 2000 Hz)

Environmental testing
DIN EN 60068-2-30:2006: severity level b

Configuration of outputs

Output 1 (OUT1, PIN 4)	Output 2 (OUT2, PIN 2)
Analogue output 4-20 mA	Analogue output 4-20 mA
Analogue output 0-20 mA	Analogue output 0-20 mA
Analogue output 2-10 V	Analogue output 2-10 V
Analogue output 0-10 V	Analogue output 0-10 V
Switching output NPN/PNP/PP	Switching output NPN/PNP/PP
Pulse output PP	Pulse output PP
Frequency output PP	Frequency output PP
Communication mode KofiCom	
Communication mode IO-Link	
Control input	
Control input dosing function	Dosing output

IO-Link specification

Manufacturer ID:	1105 (decimal), 0 x 0451 (hex)
Manufacturer name:	Kobold Messring GmbH
IO-Link specification:	V1.1
Bitrate:	COM3
Minimal cycle time:	1,1 ms
SIO-Mode:	yes (OUT1 in configuration IO-Link)
Block parameterisation:	yes
Operational readiness:	10 s
Max. cable length:	20 m

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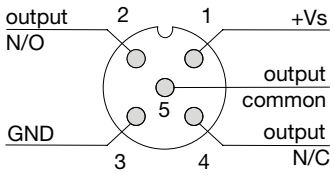
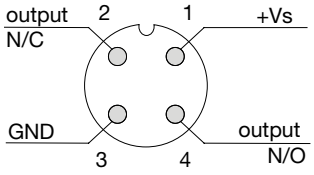
Electrical Connection

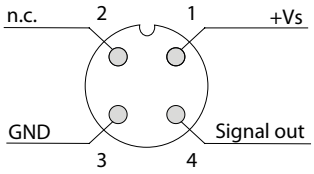
DUK-...S300



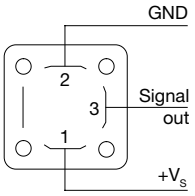
DUK-...S30D



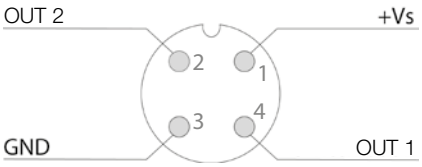
DUK-…F3x0, DUK-...L3x3



DUK-...L443



DUK-...C3T0



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

Housing material/ Sealing	Connection[1]	Electronic	Flow direction	Options
DUK-11[4] = brass/ NBR **DUK-32**[5] = stainless steel 1.4408/ FKM	**G4H** = G ½ female (meas. range 0.08 - 20 l/min) **G5H** = G ¾ IG (meas. range 0.16 - 40 l/min) **G6H** = G 1 female (meas. range 0.25 - 63 l/min) **G8H** = G 1½ female (meas. range 0.6 - 150 l/min) **G9H** = G 2 female (meas. range 1 - 250 l/min) **GBH** = G 3 female (meas. range 2.5 - 630 l/min)	**Switching output** **S300** = relay, M12-plug **S30D** = aktiv 24 V_{DC}, M12-plug **Frequency output** **F300** = M12-plug, 500 Hz **F390** = M12-plug, 50…1000 Hz **Analogue output** **L303** = M12-plug, 0-20 mA **L343** = M12-plug, 4-20 mA **L443** = DIN-plug, 4-20 mA	**L** = from left to right **R** = from right to left **T** = from top to bottom **B** = from bottom to top	without = without **Y** = special option (specify in clear text)
	N4H = ½" NPT female (meas. range 0.08 - 20 l/min) **N5H** = ¾" NPT female (meas. range 0.16 - 40 l/min) **N6H** = 1" NPT female (meas. range 0.25 - 63 l/min) **N8H** = 1½" NPT female (meas. range 0.6 - 150 l/min) **N9H** = 2" NPT I female (meas. range 1 - 250 l/min) **NBH** = 3" NPT female (meas. range 2.5 - 630 l/min)	**Compact electronic** **C3T0** = compact, TFT display, 2 outputs (current/voltage/pulse/ frequency/alarm output/IO link configurable), M12x1 plug		**0** = without **A**[3] = incl. medium config- uration

[1] Standard display in l/min, optional: display GPM (code G instead of H)
[2] While ordering please specify cable length in metres
[3] Medium configuration based on Media Data Base (see following page). **Ordering code ABG-DUK.**
NOTE: The standard factory configuration for DUK is always with “water”.
[4] For FKM sealing, use model code **DUK-31**
[5] For NBR-sealing, use model code **DUK-12**

Order Details for C3T0 Electronic Accessories

Model	Description	Image
KOFICOM-IFMU	PC-Interface Set (necessary for the use of „Software Mediator Tools“) comprising: • KofiCom Interface • USB cable (length: 1 m) for connection PC <-> KofiCom Interface • M12 cable with plug + socket (length: 1 m each) for connecting of device	
Software MEDIATOR Tool	Windows software for exchanging of media tables when using viscous media except water (free download under https://www.kobold.com/qr/DUK)	–

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Media Data Base

(excerpt only. Detailed media table is available in "MEDIATOR Tool" at https://www.kobold.com/qr/DUK)

Nr.	Filename	Infotext Display	Description
001	DUK_Water.para	001 DUK WATER	Water 100 %
002	DUK_Water-Glycol-20.para	002 DUK H2OGLY20	Water Glycol mixture 20 %
003	DUK_Water-Glycol-34.para	003 DUK H2OGLY34	Water Glycol mixture 34 %
004	DUK_Water-Glycol-39.para	004 DUK H2OGLY39	Water Glycol mixture 39 %
005	DUK_Water-Glycol-52.para	005 DUK H20GLY52	Water Glycol mixture 52 %
006	DUK_Alkan_Solvent.para	006 DUK ALKAN	Solvent/Alkan comparable to Exxsol D120, 4 mm^2/s at 25 °C
007	DUK_Oil ISO VG 10-4.para	007 DUK OIL VG10	Mineral transmission oil Shell ISO VG 10, 10 mm^2/s at 40 °C, for DUK connection code ...4... only
008	DUK_Oil ISO VG10-5+.para	008 DUK OILVG10+	Mineral transmission oil Shell ISO VG 10, 10 mm^2/s at 40 °C, for DUK connection code ...5... and greater only
009	DUK_Oil ISO VG 22-4.para	009 DUK OIL VG22	Mineral machine oil Shell ISO VG 22, 22 mm^2/s at 40 °C, for DUK connection code ...4... only
010	DUK_Oil ISO VG 22-5+.para	010 DUK OILVG22+	Mineral machine oil Shell ISO VG 22, 22 mm^2/s at 40 °C, for DUK connection code ...5... and greater only
011	DUK_Oil ISO VG 32-4.para	011 DUK OIL VG32	Mineral machine oil Shell ISO VG 32, 32 mm^2/s at 40 °C, for DUK connection code ...4... only
012	DUK_Oil ISO VG 32-5+.para	012 DUK OILVG32+	Mineral machine oil Shell ISO VG 32, 32 mm^2/s at 40 °C, for DUK connection code ...5... and greater only
013	DUK_Oil ISO VG 46-4.para	013 DUK OIL VG46	Mineral machine oil Shell ISO VG 46, 46 mm^2/s at 40 °C, for DUK connection code ...4... only
014	DUK_Oil ISO VG 46-5+.para	014 DUK MOR46 5+	Mineral machine oil Shell ISO VG 46, 46 mm^2/s at 40 °C, for DUK connection code ...5... and greater only
015	DUK_Oil ISO VG 68-4.para	015 DUK MOR68 4	Mineral machine oil Shell ISO VG 68, 68 mm^2/s at 40 °C, for DUK connection code ...4... only
016	DUK_Oil ISO VG 68-5+.para	016 DUK MOR68 5+	Mineral machine oil Shell ISO VG 68, 68 mm^2/s at 40 °C, for DUK connection code ...5... and greater only
017	DUK_Ethanol.para	017 DUK Ethanol	Ethanol
018	DUK_Fuel 100LL.para	018 DUK FUEL100L	Fuel (airplanes) 100LL
019	DUK_Chloroform.para	019 DUK CHLOFORM	Chloroform
020	DUK_Aceton.para	020 DUK ACETON	Aceton
021	DUK_Anilin.para	021 DUK ANILIN	Anilin
022	DUK_Chlorobenzene.para	022 DUK CHLOBENZ	Chlorobenzene
023	DUK_Cyclohexane.para	023 DUK CYCLOHEX	Cyclohexane
024	DUK_Diesel EN590.para	024 DUK DIESEL	Diesel EN590
025	DUK_Acetic_Acid 5%.para	025 DUK ACACID 5	Acetic Acid 5%
026	DUK_Acetic Acid 10%.para	026 DUK ACACID10	Acetic Acid 10%
027	DUK_Acetic Acid 20%.para	027 DUK ACACID20	Acetic Acid 20%
028	DUK_Ethylene Glycol.para	028 DUK ETHGLYC	Ethylene Glycol 100%
029	DUK_Glyzerine-4.para	029 DUK GLYCERIN	Glycerine, for DUK connection code ...4... only
030	DUK_Glyzerine-5+.para	030 DUK GLYCERIN	Glycerine, for DUK connection code ...5... and greater only
031	DUK_Methylacetate.para	031 DUK METHACET	Methylacetate
032	DUK_Hexane.para	032 DUK HEXANE	Hexane
033	DUK_n-Pentane.para	033 DUK PENTANE	n-Pentane
034	DUK_n-Octane.para	034 DUK OCTANE	n-Octane
035	DUK_O-Xylene.para	035 DUK OXYLENE	O-Xyelne; O-Xylol; 1,2 Dimethylbenzol
036	DUK_Petroleum.para	036 DUK PETROLEU	Petroleum
037	DUK_Seawater.para	037 DUK SEAWAT	Seawater
038	DUK_Triglycerid.para	038 DUK TRIGLYC	Triglycerid
039	DUK_Corn Oil 4.para	039 DUK CORNOIL	Cornoil, for DUK connection code ...4... only
040	DUK_Corn Oil 5+.para	040 DUK CORNOIL	Cornoil for DUK connection code ...5... and greater only
041	DUK_Palm Oil 4.para	041 DUK PALMOIL	Palmoil, for DUK connection code ...4... only
042	DUK_Palm Oil 5+.para	042 DUK PALMOIL	Palmoil, for DUK connection code ...5... and greater only
043	DUK_Rapeseed Oil.para	043 DUK RAPEOIL	Rapeseedoil
044	DUK_Olive Oil 4.para	044 DUK OLIVEOIL	Oliveoil, for DUK connection code ...4... only
045	DUK_Olive Oil 5+.para	045 DUK OLIVEOIL	Oliveoil, for DUK connection code ...5... and greater only
...	...	...	***... more media in "MEDIATOR Tool"***

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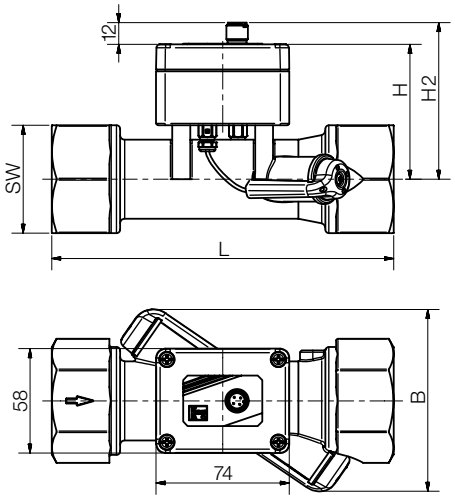
Dimensions

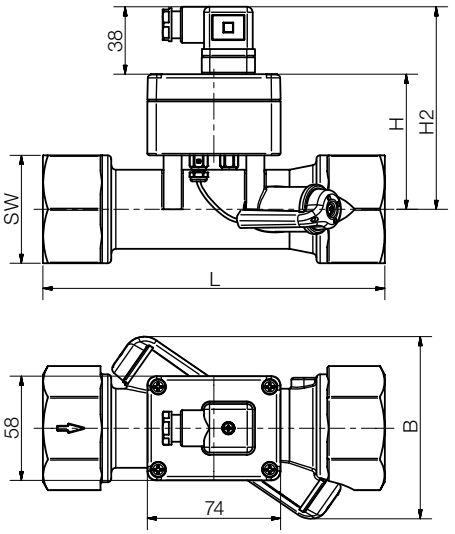
DUK-…S30x, DUK-…F3x0, DUK-…L3x3

Model	G/ NPT	SW [mm]	H [mm]	H2	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



DUK-…L443

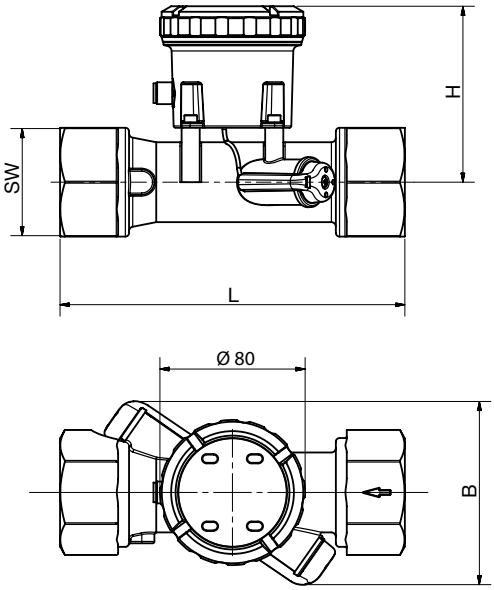
Model	G/ NPT	SW [mm]	H [mm]	H2	L [mm]	B [mm]
DUK-xxx4	½"	30	63	101	114	85
DUK-xxx5	¾"	36	65	103	126.5	89
DUK-xxx6	1"	46	69	107	146	93
DUK-xxx8	1½"	60	75	113	190	103
DUK-xxx9	2"	76	80	118	238	114
DUK-xxxB	3"	105	90	128	306	135



Dimensions (continued)

DUK-…C3T0

Model	G/NPT	SW [mm]	H [mm]	L [mm]	B [mm]
DUK-xxx4	½"	30	85	114	85
DUK-xxx5	¾"	36	87	126.5	89
DUK-xxx6	1"	46	91	146	93
DUK-xxx8	1½"	60	97	190	103
DUK-xxx9	2"	76	102	238	114
DUK-xxxB	3"	105	112	306	135



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