Operating Instructions
Electronic ultrasonic flow-sensor UQS 7

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CRANE Barksdale, Inc./Barksdale GmbH A Subsidiary of Crane Co.

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1 Intended Applications

The ultrasonic flow sensor measures the flow rate of water and watery emulsions. The device monitors the actual process values on a display and generates the signals described in the connection chart.

⚠ DANGER
The sensor may only be used in the specified fields of application.
The temperature has to be within the specified ranges, the pressure values and the electrical rating must not exceed the values specified.
Observe also the applicable national safety instructions for assembly, commissioning and operation of the sensor.
The sensor is not designed to be used as the only safety relevant element in pressurized systems according to DGR 97/23/EC.

2 Safety Instructions

The safety instructions are intended to protect the user from dangerous situations and/or material damage.

In the operating instructions the seriousness of the potential risk is designated by the following signal words:

⚠ DANGER
Refers to imminent danger to men.
Nonobservance may result in fatal injuries.

⚠ WARNING
Refers to a recognizable danger.
Nonobservance may result in fatal injuries, and destroy the equipment or plant parts.

⚠ CAUTION
Refers to a danger.
Nonobservance may result in light injuries and material damage to the sensor and/or to the plant.

☞ IMPORTANT
Refers to important information essential to the user.

🗑 Disposal
The sensor must be disposed of correctly in accordance with the local regulations for electric/electronic equipment.
The sensor must not be disposed of with the household garbage!

3 Standards

The standards applied during development, manufacture and configuration are listed in the CE conformity and manufacturer's declaration.

National and international regulations for the installation of electrotechnical systems. Power supply acc. to EN50178, SELV, PELV.

4 Warranty/Guaranty

Warranty

Our scope of delivery and services is governed by the legal warranties and warranty periods.

Terms of guaranty

We guaranty for function and material of the sensor under normal operating and maintenance conditions in accordance with the statutory provisions.

Loss of guaranty

The agreed guaranty period will expire in case of:

- incorrect use,
- incorrect installation or
- incorrect handling or operation contrary to the provisions of these operating instructions.

No liability is assumed for any damage resulting therefrom, or any consequential damage.

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5 Installation/Commissioning

⚠	**DANGER**

The sensor must be installed and operated only by authorized persons.

Only install or uninstall the sensor when deenergized (electrically and hydraulically/pneumatically). Pressure connection and electrical connection must be carried out by trained or instructed personnel according to state-of-the-art standards. The sensor must only be installed in systems where the maximum pressure P_{max} or the maximum temperature T_{max} is not exceeded (see data sheet).

⚠	**CAUTION**

Cover and bottom of the device are a function unit. Changing the parts may cause measuring errors or malfunction. See serial number inside the cover.

☞	**IMPORTANT**

For wall mounting the back of the device has to be mounted with appropriate screws. By loosening the both backside screws the unit is rotable in steps of 90° and can also be mounted separately (recommended in case of strong vibrations).

➢ The electrical connection (power supply, analog output and switching contacts) acc. to connection chart.

➢ Connect the fittings with the pipe. For sealing use the attached Klingersil seals only.

➢ Mounting of the device according to the flow direction (arrow on the back).

➢ Connect pipe and fittings manually.

➢ Tighten both fittings against one another.

☞	**IMPORTANT**

During operation air bubbles in the system may affect measuring.
Please flush the system after installation or ventilation with >3 l/min; 0.8 gpm. The operating pressure must not exceed 1 bar.

Electrical connection is to be carried out dependent on the type of switch (see type label) according to the chart below. Wrong assignment of the connections may cause malfunctions or incorrect switch outputs.

Connection Chart/Connection Scheme

Plug M 12x1 4/5-pin	Version with 2 switching outputs	Version with 2 switching outputs and 1 analog output	Version with 1 switching output and 1 pulse output.	Version with 1 switching output, 1 pulse output and 1 analog output
Pin 1	+Ub (15...32 V DC)	+Ub (15...32 V DC)	+Ub (15...32 V DC)	+Ub (15...32 V DC)
Pin 2	SP2 (0.5 A max.)	Analog	Pulse output	Analog
Pin 3	0 V	0 V	0 V	0 V
Pin 4	SP1 (0.5 A max.)	SP1 (0.5 A max.)	SP1 (0.5 A max.)	SP1 (0.5 A max.)
Pin 5		SP2 (0.5 A max.)		Pulse output
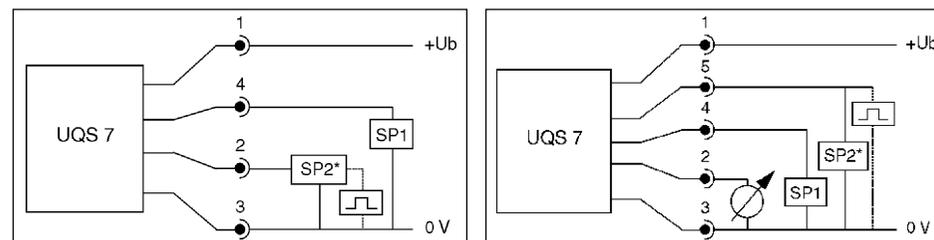
SP2* = pulse output

6 Maintenance/Cleaning

Maintenance

The flow sensor requires no maintenance.

Cleaning

⚠	**CAUTION**

The plastic film keys may be damaged by the use of unsuitable cleaning agents. Do not use any cleaning agents containing solvents or abrasive additives.

7 Technical Data

Measuring ranges (Qn)*	UQS 7 - 10	UQS 7 - 25	UQS 7 - 40	UQS 7 - 100	UQS 7 - 170
Flow rate [l/min]	0.04... 10	0.1... 25	0.16... 40	0.4... 100	0.68... 170
Flow rate [m³/h]	0.0024... 0.6	0.006... 1.5	0.0096... 2.4	0.024... 6.0	0.041... 10.2
Flow rate [gpm]	0.01... 2.64	0.026... 6.6	0.042... 10.6	0.11... 26.42	0.18... 44.91
Flow rate [gph]	0.63... 158.5	1.58... 396.3	2.53... 634	0.34... 1585.03	10.77... 2695.55

* Qmax = Qn x 2; in the range of Qmax the accuracy class is 3%.

Pressure Drop

depending on the flow rate(Q)

Flow rate [m³/h]

Dimensions in mm (inch)

M12x1 connector

approx. 115 (4.528)

approx. 75 (2.953)

approx. 80 (3.15)

Flow⇨

a

approx. 54 (2.126)

b
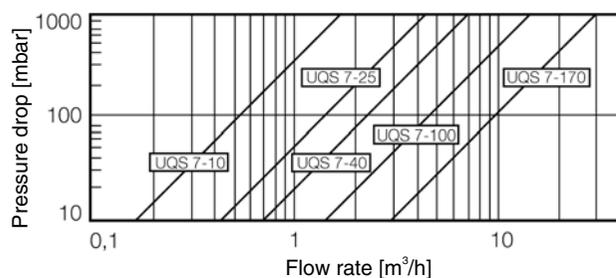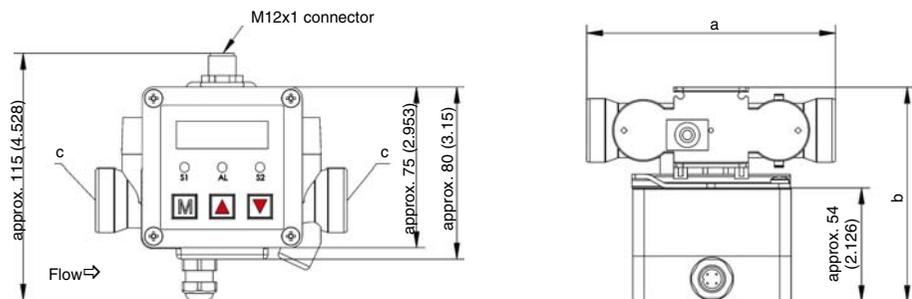
Type	Measuring range [l/min]	a [mm/inch]	b [mm/inch]	C
UQS 7 - 10	0 ... 10	110/4.331	100/3.937	G3/4
UQS 7 - 25	0 ... 25	110/4.331	100/3.937	G3/4
UQS 7 - 40	0 ... 40	190/7.48	100/3.937	G1
UQS 7 - 100	0 ... 100	260/10.236	130/5.118	G1 1/4
UQS 7 - 170	0 ... 170	300/11.811	135/5.315	G2

8 Operation

The sensor must be installed and operated only by authorized persons. After the unit is switched on, the unit starts an automatic self-test. Operation via three plastic film keys is menu-driven. These keys must **not** be touched with hard objects!

The display monitors the actual flow or volume rate. The green LEDs S1 and S2 display the switching mode of the two outputs. In case of overflow of the volume amount the decimal point at the bottom right will be flashing.

Operating and display elements
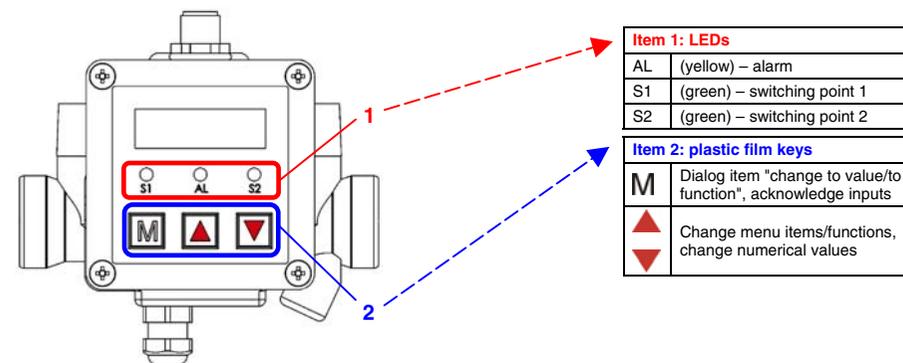
Item 1: LEDs	
AL	(yellow) – alarm
S1	(green) – switching point 1
S2	(green) – switching point 2

Item 2: plastic film keys	
M	Dialog item "change to value/to function", acknowledge inputs
▲ ▼	Change menu items/functions, change numerical values

9 Error display

If an error is recognized during the self-test or during operation, this is signalled by the (yellow) flashing alarm LED (AL).
The error can be read out in the menu. Err

Display	Error	Display	Error
OH	no error	dot	data error EEProm
nRH	exceeding positive measuring range	CAL	calibration error
n In	exceeding negative measuring range	ono	error analog output
SP 1	error switching output 1	OCLn	sensor too dirty or without media
SP2	error switching output 2	OCOn	sensor error

10 Programming

1	Activation of the display	Display the decimal places 5 - 8 by pushing ▼ or ▲ after switching on.
2	Change menu level	With M in the top menu level, i.e. change from measuring mode into the main menu or from the main menu to the sub menu.
3	Select menu items	Select with ▼ or ▲ the desired menu item (see chapter 11).
4	Activate menu item Value input/Function selection	Activate the desired menu item with M, to change the corresponding value or the desired function.
5	Change value	Select the individual digits with M. Change the numerical value with ▼ or ▲ and acknowledge with M. If the entered value is within the permissible range, the system changes to the menu item after input and acknowledgement of the last digit, otherwise the 1st digit will flash again.
6	Change function	Change the function with ▼ or ▲ and acknowledge with M
	Return to the main menu	Leave the last item of the sub menu with ▲ . You will automatically return to the main menu.
	Activate key lock	Press ▲ + ▼ for at least 5 s simultaneously. The display must not change.
	Key lock active	Values or functions will be displayed but cannot be changed. LOH will be displayed when attempting a change.
	Deactivate key lock	Press ▲ + ▼ for at least 5 s simultaneously. The display must not change.
	Return to measuring mode	If no entry is made for 2 minutes, the switch automatically returns to the measuring mode **without** accepting the entries.
	Terminate programming	Press M for at least 5 s to change to the measuring mode.

11 User Level Dialog

Main menu	Sub menu	Value	Function/Description
Measuring mode	....	....	Display the actual measuring value and the unit of the measuring value
nEnU			Display programming lock no lock: all settings can be changed unit is locked: no settings can be changed
dISP			Display Menu
	SI	I-n	Selecting the display units
		I-h	
		9Ph	
		n3-h	
	Und	on	Activation of the unit display
		oFF	
	uOLd	FIou	Flow (Flou) or Volume (voL) display
		voL	Press ▼ + M for at least 5 sec to change into the volume display.

Dialog User Level (continued)

Main menu	Sub menu	Value	Function/Description
SP1 ... SP2			Switchpoint menu SP1 ... SP2
	nOdE	Std	Standard evaluation (rising/falling)
		uIn	window technology
		Err	error output
		voL	Dosing mode (when measuring volume)
	On	....	Switch-on value for SP1...SP2
	OFF		if the ON-value is smaller than the OFF-value, the switch evaluation is falling
	SUd	....	Switch-off value for SP1...SP2
	LEu	0.0 s ... 99.9 s	Startup delay (0 = deactivated)
			Inversion of switching output
		HFS	high-level-fail-safe (normally open function)
		LFS	low-level-fail-safe (normally closed function)
	dS1	0.0 s ... 9.9 s	Switch-on delay for SP1 [s]
	dr1	0.0 s ... 9.9 s	Switch-off delay for SP1 [s]
	dS2	0.0 s ... 9.9 s	Switch-on delay for SP2 [s]
	dr2	0.0 s ... 9.9 s	Switch-off delay for SP2 [s]
AnAO			Analog output menu
	AnOP	On	Analog output in operation
		OFF	Analog output switched off
	AO2S	....	Scale the analog output - start value (e. g. 0 l/min = 4 mA)
	AOFS	....	Scale the analog output - end value (e. g. 40 l/min = 20 mA)
PULS if available			Pulse output menu
	PnOd	FLO	Flow mode
		uOL	Volume mode
	IOFS	....	Scale frequency output value
	IOFr	....	Scale frequency at end value
	IOuL	....	Volume per pulse

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CONTROL PRODUCTS

12 Menu Structure