ADDENDUM TO OPERATING INSTRUCTIONS

FLOWSIC600
Gas Flow Meter

FLOWSIC600 DRU-S

Gas flow meter
for upstream applications

SICK
Sensor Intelligence.

Document Information

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Glossary

Abbreviations used in this manual

DRU	**D**ifferential **R**eplacement **U**nit
CBM	**C**ondition **B**ased **M**aintenance
CPA	**C**anada **P**ipeline **A**ccessories
LCD	**L**iquid **C**rystal **D**isplay
OI	**O**perating **I**nstructions
LVF	**L**iquid **V**olume **F**raction
SPU	**S**ignal **P**rocessing **U**nit
TI	**T**echnical **I**nformation

Warning Symbols

Warning

Warning levels / Signal words

HAZARD
Risk or hazardous situation which *will* result in severe personal injury or death.

WARNING
Risk or hazardous situation which *could* result in severe personal injury or death.

CAUTION
Hazard or unsafe practice which *could* result in personal injury or property damage.

NOTICE
Hazard which *could* result in property damage.

Information Symbols

Important technical information for this product

Important information on electric or electronic functions

Supplementary information

FLOWSIC600

1 Important Information

About this document

For your safety

1.1 About this document

This document is a supplement of the currently valid Operating Instructions FLOWSIC600 and may only be used in conjunction with them.

Special instructions for FLOWSIC600 DRU-S in this document overwrite related general information in the FLOWSIC600 operating instructions.

1.2 For your safety

NOTICE:

- ► Read the corresponding Operating Instructions carefully before using the FLOWSIC600 DRU-S.
- ► Special attention must be paid to all safety instructions and warnings for assembly, installation and operation!

FLOWSIC600

2 FLOWSIC600 DRU-S

Product description
Wet gas detection (option)
Installation
Technical data
Dimensional drawings

2.1 Product description

2.1.1 Overview

FLOWSIC600 DRU-S is an innovative ultrasonic dual-path gas flow meter for upstream applications based on FLOWSIC600.

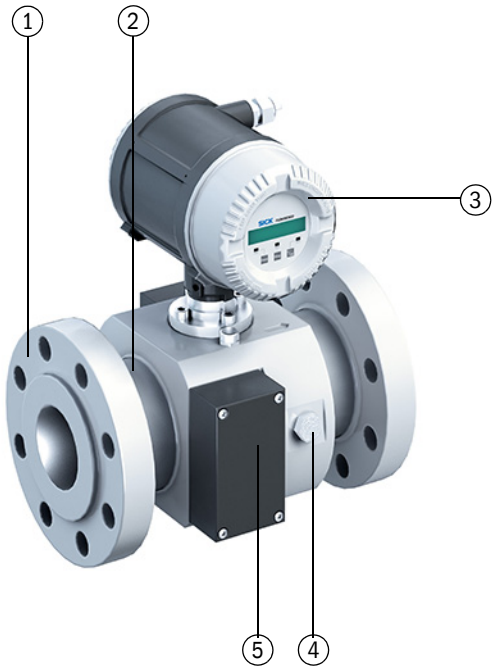
With its large measuring span FLOWSIC600 DRU-S covers a wide flow range that usually requires several orifice plates. Due to its special design FLOWSIC600 DRU-S provides reliable measurement performance, with high accuracy without need for a high-pressure flow calibration.

High quality components with superior manufacturing precision and wet-gas robust transducers ensure long-term measurement reliability even in challenging conditions.

FLOWSIC600 DRU-S provides advanced diagnostic capabilities for real-time monitoring of the meter and the process. The ultrasonic measurement principle with direct path layout makes FLOWSIC600 DRU-S virtually maintenance-free – even with high liquid loads.

For further information, please refer to OI FLOWSIC600 chapter 2.

Figure 1 FLOWSIC600 DRU-S



1 Flange
2 Meter body
3 SPU
4 Pressure tap
5 Transducer cover

Technical modifications to FLOWSIC600:

- Wet-gas robust meter design
- Sensors wet-gas robust
- Full bore meter section
- Diagnostic feature wet gas detection (option)

2.2 Wet gas detection (option)

FLOWSIC600 DRU-S maintains the diagnostic concept of FLOWSIC600 with self-monitoring and User Warnings (refer to OI FLOWSIC600 chapter 2.3).

Additionally, the FLOWSIC600 DRU-S firmware is equipped with a diagnostic feature for detection of wet gas inside the meter (wet gas detection, patent pending).

The wet gas detection uses real-time monitoring of multiple diagnostic parameters of the FLOWSIC600 DRU-S in order to identify wet gas conditions (liquids in the gas stream such as liquid hydrocarbons, water and oil). Liquids in the gas stream are usually undesired in the gas production process and may require appropriate actions such as process optimization or consideration for meter readings.

The wet gas detection typically detects wet gas with more than 0.5% of LVF in continuous gas flow conditions.

Since the wet gas detection uses common standard diagnostic meter parameters, the wet gas warning may be activated in parallel to other user-warnings. In this case, a thorough analysis of the operating and process conditions may be beneficial to find the root cause. Consult SICK for support.

2.2.1 Activation of wet gas detection

The wet gas detection feature can be activated via Modbus command (please refer to Short manual modbus FLOWSIC600).

2.2.2 Signalization of wet gas detection

Table 1 Signalization of wet gas detection

LCD (SPU)	Warning 2008: Wet gas
MODBUS Connection	#5069 (Bit 0x00000200UL) (refer to Short manual modbus FLOWSIC600)
Meter logbook	Entry in Warning logbook [2] with time stamp “Wet gas indication” (refer to OI FLOWSIC600 chapter 2.4.2).

If the wet gas detection generates a warning frequently, the activation thresholds can be adjusted. Please contact SICK for support.

It is recommended to set the Warning logbook [2] to rolling in order to avoid rapid filling of logbook in this case.

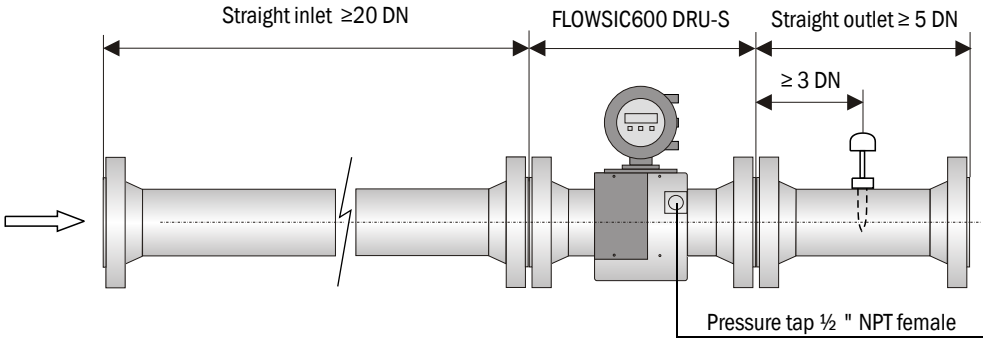
2.3 Installation

2.3.1 Mechanical Installation

- FLOWSIC600 DRU-S is only suitable for unidirectional use.
- Make sure that the meter is mounted in the correct orientation (→ Fig. 2).The flow direction is marked on the meter body.
- For further instructions for mechanical installation please refer to OI FLOWSIC600, chapter 3.3.

> ***NOTICE:***
> Please note that the default installation instructions for FLOWSIC600 (OI FLOWSIC600, §3.2.2) are not valid for FLOWSIC600 DRU-S.

Figure 2 Installation scheme



2.3.2 Electrical Installation

- The output configuration of FLOWSIC600 DRU-S can be taken from the instrument datasheet in the manufacturer data record (MDR) and from the wiring diagram inside the rear housing cover.
- For instructions on the electrical installation please refer to OI FLOWSIC600, chapter 3.4.
- For connection diagrams please refer to OI FLOWSIC600, chapter 7.4.

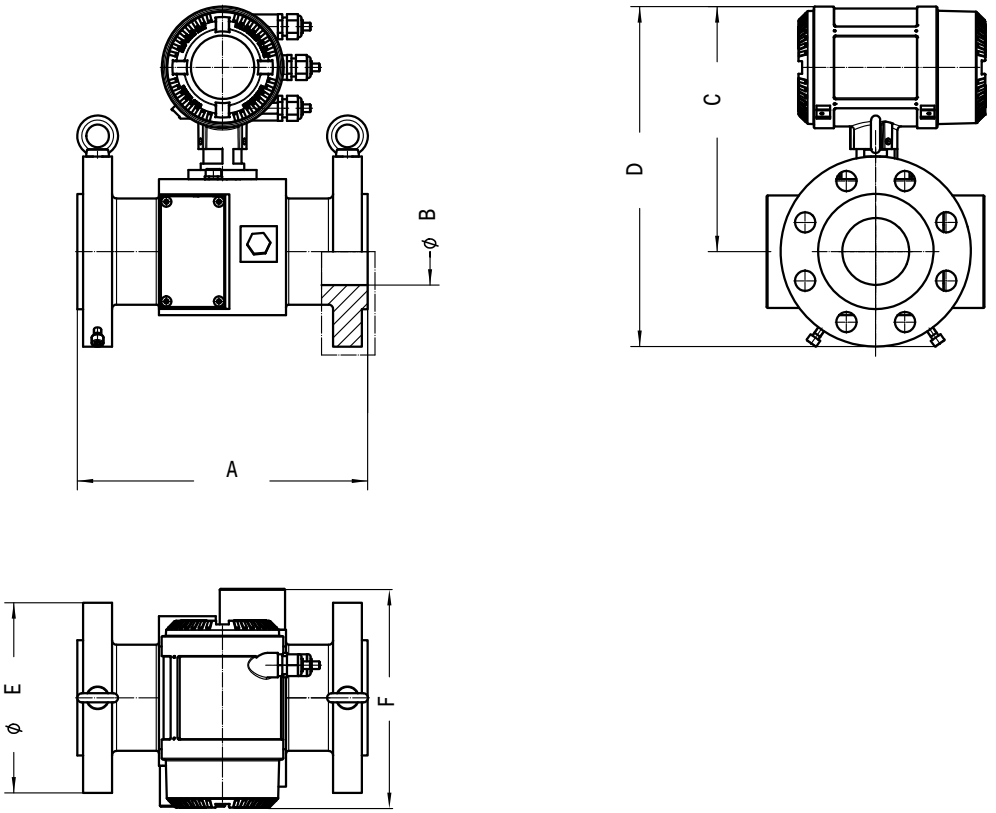
2.4 Technical data

Table 2 Technical data FLOWSIC600 DRU-S

Meter characteristics and measuring parameters				
Measured values	Volume flow a.c., volume a. c., gas velocity, sound velocity			
Measurement principle	Ultrasonic transit time difference measurement			
Number of measuring paths	2			
Nominal pipe size	2 inch Schedule 80			
Measuring medium	Natural gas			
Measuring ranges [1,2,3]	Volume flow a.c.			
		Q_{min}	Q_t	Q_{max}
	Volume flow [ft^3/h]	140	1,400	14,000
	Volume flow [m^3/h]	4	40	400
Repeatability [4]	± 0.2 % of the measured value			
Accuracy [3, 5]	± 2 % from Q_t to Q_{max} (± 4 % from Q_{min} to Q_t)			
Gas temperature	-40 °F ... +212 °F (-40 °C ... +100 °C)			
Operating pressure	70 psi (g) ... 1480 psi (g) at 100 °F (5 bar (g) ... 102.0 bar (g) at 38 °C) 70 psi (g) ... 1350 psi (g) at 212 °F (5 bar (g) ... 93.2 bar (g) at 100 °C)			
Flange connection	ANSI B16.5, Cl.600 RF			
Ambient conditions				
Ambient temperature	-40 °F ... +140 °F (-40 °C ... +60 °C)			
Storage temperature	-40 °F ... +158 °F (-40 °C ... +70 °C)			
Ambient humidity	≤ 95 % Relative humidity			
Approvals				
Ex approvals	NEC/CEC	Class I, Division 1, Group D T4 Class I, Division 2, Group D T4 Ultrasonic transducers intrinsically safe		
Enclosure rating	IP66/IP67			
Outputs and interfaces				
Digital outputs	2 DO and 1 FO: 30 V, 10 mA Passive, galvanically isolated, Open Collector, fmax = 6 kHz (scalable)			
Interfaces	RS-485 (2x, for configuration data output and diagnosis)			
Bus protocol	MODBUS ASCII, MODBUS RTU			
Dimensions and Weight				
Dimensions (W x H x D)	See dimensional drawings			
Weight	77 lbs (35 kg)			
Electrical connection				
Voltage	12 ... 28.8 V DC			
Power consumption	≤ 1 W			
	[1] Below Q_{min} reduced accuracy [2] Q_{max} can be limited by the working pressure and attenuation of the gas medium. [3] Under consideration of installation requirements [4] From Q_t to Q_{max} and under consideration of installation requirements [5] Verified with pipe configurations according to OIML R-137:2012 Annex B (mild)			

2.5 Dimensional drawings

Figure 3 FLOWSIC600 DRU-S



A	B	C	D	E	F
mm (in).					
250 (9.54)	49.3 (1.94)	252 (9.94)	335 (13.20)	165.1 (6.50)	228 (8.99)

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