

FLWSIC600

Ultrasonic Gas Flow Meter

FLWSIC600 DRU

Ultrasonic gas flow meter
for upstream applications



Document Information

Product

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Manufacturer

SICK Engineering GmbH
Bergener Ring 27 · D-01458 Ottendorf-Okrilla · Germany
Phone: +49 35205 52410
Fax: +49 35205 52450
E-mail: info.pa@sick.de

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Original documents

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Legal information

Subject to change without notice.

Glossary

Abbreviations used in this manual

DRU	Differential Replacement Unit
CBM	C ondition B ased M aintenance
CPA	Canada Pipeline Accessories
LCD	Liquid Crystal Display
OI	O perating I nstructions
SPU	Signal Processing Unit
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



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FLWSIC600

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 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.
- ▶ Special attention must be paid to all safety instructions and warnings for assembly, installation and operation!

FLWSIC600

2 FLWSIC600 DRU

Product description
Technical data
Installation instructions

2.1 **Product description**

2.1.1 **Overview**

FLWSIC600 DRU is an innovative ultrasonic dual-path gas meter for upstream applications based on FLWSIC600. The meter has a full-bore design and includes a 10D inlet piping for piping diameters ≤ 4". For larger diameters an additional specially for DRU manufactured 10D inlet piping is included in the scope of delivery.

With a turn-down ratio of > 50:1¹ FLWSIC600 DRU covers a wide flow range that usually requires several orifice plates. Due to its special design FLWSIC600 DRU provides low measurement uncertainty without need for a high-pressure flow calibration.

High quality components with superior manufacturing precision and wet gas resistant transducers ensure long-term measurement reliability even in challenging conditions. FLWSIC600 DRU provides advanced diagnostic capabilities for real-time monitoring of the meter and the process. The ultrasonic measurement principle with direct path layout makes FLWSIC600 DRU virtually maintenance-free – even with high liquid loads.

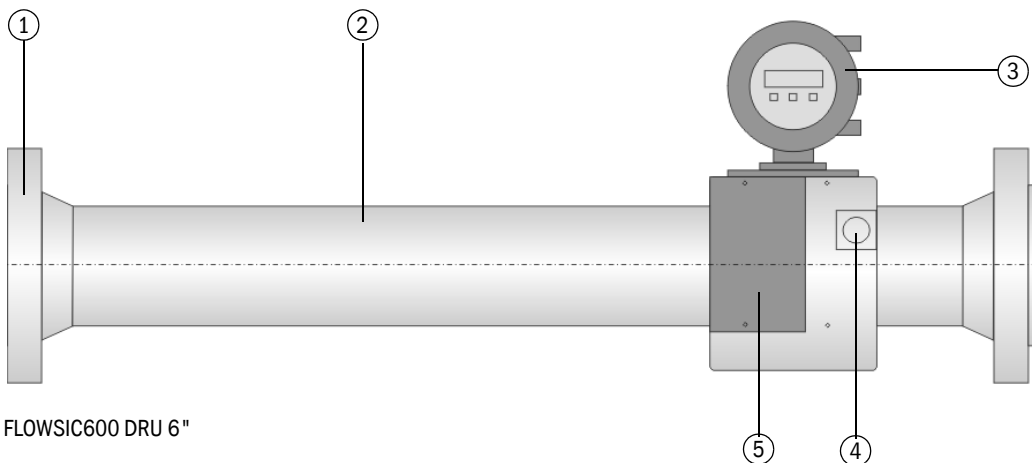
For further information please refer to OI FLWSIC600 chapter 2.

¹ 100:1 can be achieved with high pressure calibration

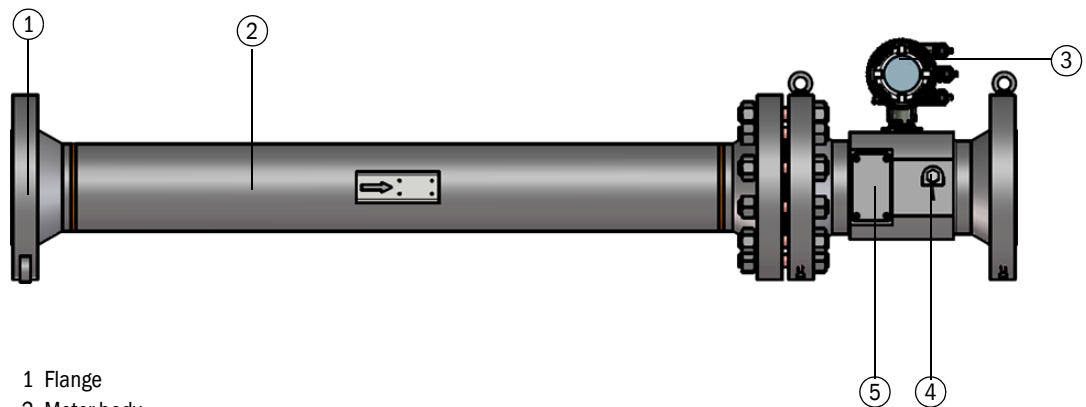
Figure 1

FLWSIC600 DRU

FLWSIC600 DRU 3" and 4"



FLWSIC600 DRU 6"



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

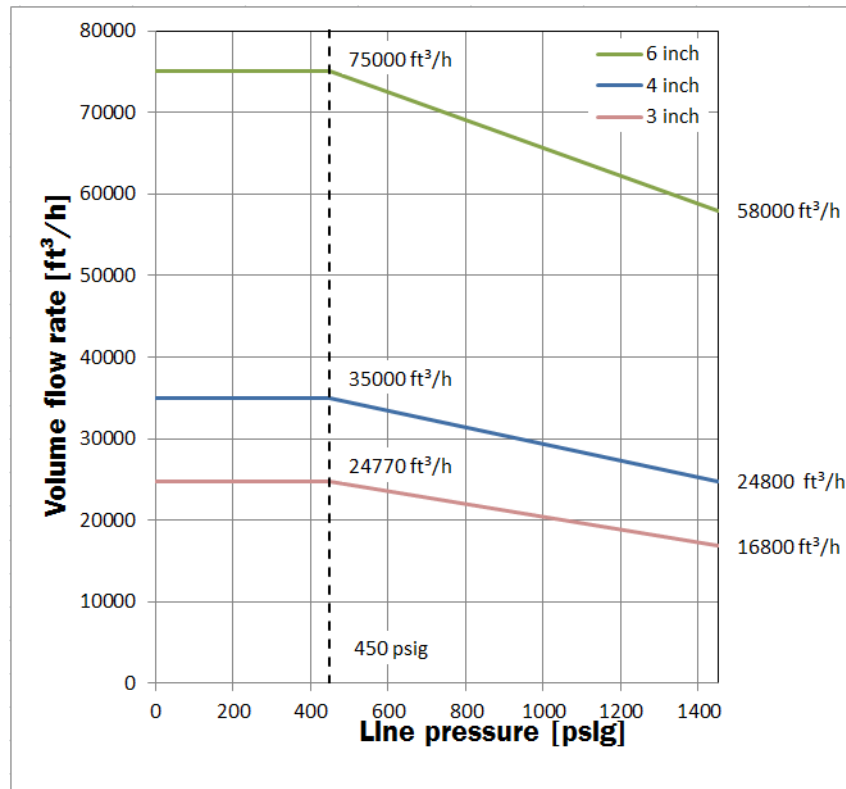
Technical modifications to FLOW SIC600:

- Special 10D inlet piping (integrated or separate)
- Sensors flush-mounted and wet gas resistant
- Full bore meter section
- Diagnostic feature liquid indication

2.1.2 **Application range**

Maximum volume flow rate Q_{max} is limited for gas pressures above 450 psig / 31 barg. The application range for different diameters of FLOW SIC600 DRU is shown in Fig. 2.

Figure 2 Application range



2.2 Liquid indication diagnosis

FLWSIC600 DRU maintains the diagnostic concept of FLOWIC600 with self-monitoring and User Warnings (refer to OI FLOWIC600 chapter 2.3).

Additionally, the FLOWIC600 DRU firmware is equipped with a diagnostic feature for detection of wet gas inside the meter (liquid indication diagnosis, patent pending).

The liquid indication diagnosis uses real-time monitoring of multiple diagnostic parameters of the FLOWIC600 DRU 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 liquid indication diagnosis typically detects wet gas with more than 0.5% of liquid volume fraction in continuous gas flow conditions.



Since the liquid indication diagnosis 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 liquid indication



The liquid indication diagnosis feature can be activated via Modbus command (please refer to Short manual modbus FLOWIC600).

2.2.2 Signalization of liquid indication

Table 1 Signalization of liquid indication

LCD (SPU)	Warning 2008: Wet gas
MODBUS Connection	#5069 (Bit 0x00000200UL) (refer to Short manual modbus FLOWIC600)
Meter logbook	Entry in Warning logbook [2] with time stamp “Wet gas indication” (refer to OI FLOWIC600 chapter 2.4.2).



If the liquid indication diagnosis generate 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



WARNING: Danger due to asymmetric meter construction

When transporting FLOWSIC600 DRU pay attention to uneven weight distribution because of the asymmetric meter construction.

- ▶ FLOWSIC600 DRU is only suitable for unidirectional use.
- ▶ Make sure that the meter is mounted in the correct orientation (→ Fig. 3). The flow direction is marked on the meter body.
- ▶ FLOWSIC600 DRU must be installed as shown in → Fig. 3 with upstream flow conditioner type CPA 55E. Installation without upstream flow conditioner or with another type of flow conditioner will cause higher uncertainty of measurement.
- ▶ 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.

Figure 3 Installation scheme (diameters 3" and 4")

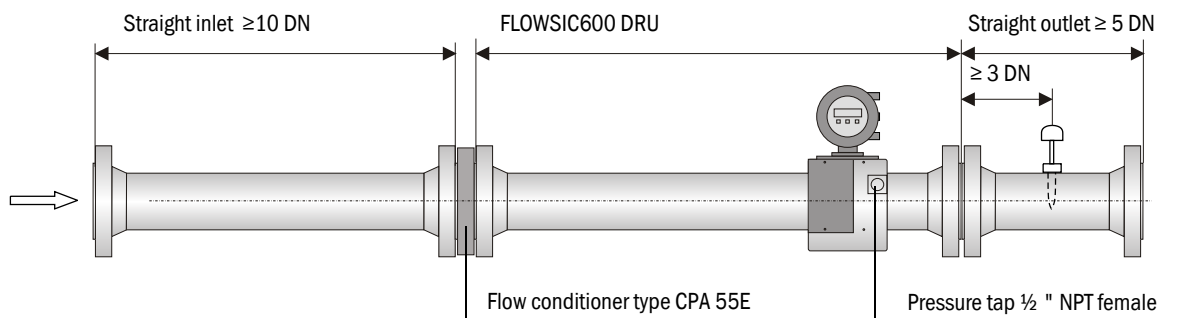
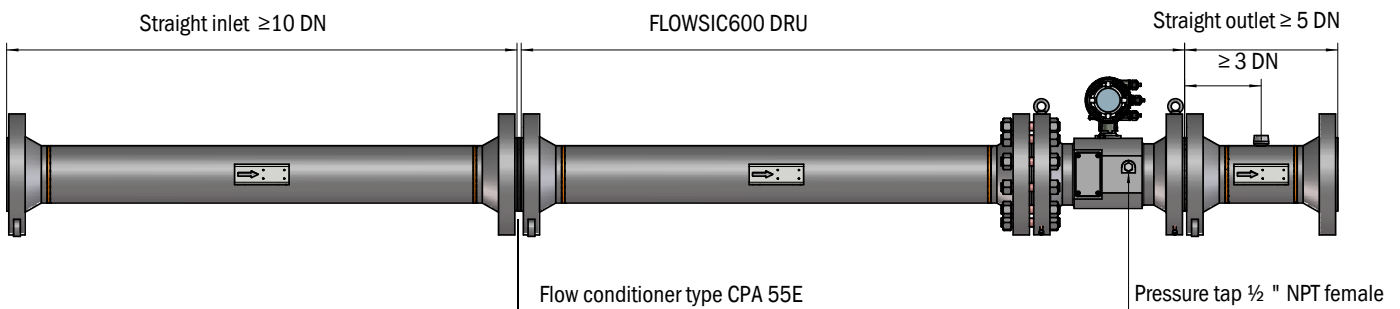


Figure 4 Installation scheme (diameter 6")



2.3.2

Electrical Installation

- ▶ The output configuration of FLOWSIC600 DRU can be taken from the instrument data-sheet 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

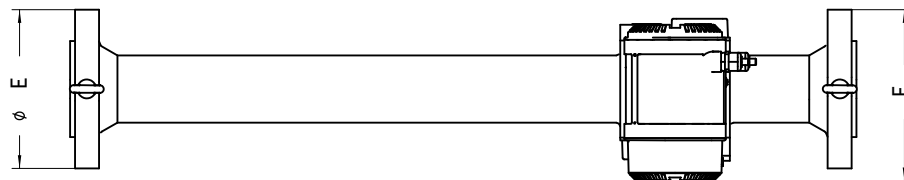
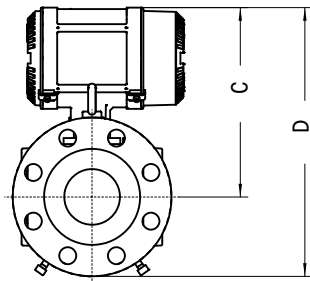
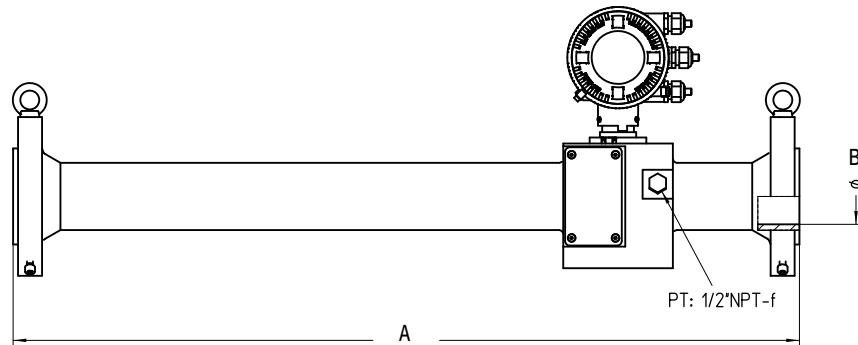
Meter characteristics and measuring parameters					
Measured values	Operational volume flow, operational volume, gas velocity, sound velocity				
Measurement principle	Ultrasonic transit time difference measurement				
Number of measuring paths	2				
Measuring medium	Natural gas				
Measuring ranges	Operational:				
	3 inch:	Q_{min}^1	Q_t	Q_{max}^2	
	Flow velocity [ft/s]	3	10	150	
	Flow velocity [m/s]	0.9	3.0	45.0	
	Volume flow rate [ft ³ /h]	495	1650	24770	
	Volume flow rate [m ³ /h]	14	47	700	
	4 inch:	Q_{min}^1	Q_t	Q_{max}^2	
	Flow velocity [ft/s]	3	10	122	
	Flow velocity [m/s]	0.9	3	37	
	Volume flow rate [ft ³ /h]	860	2875	35000	
	Volume flow rate [m ³ /h]	25	81	1000	
	6 inch	Q_{min}^1	Q_t	Q_{max}^2	
	Flow velocity [ft/s]	3	10	115	
	Flow velocity [m/s]	0.9	3	35	
	Volume flow rate [ft ³ /h]	1950	6500	75000	
	Volume flow rate [m ³ /h]	55	185	2125	
	¹ Below 3 ft/s increased uncertainty. ² Qmax can be limited by the working pressure and attenuation of the gas medium.				
	Repeatability	± 0.2 % of reading (within Q_t to Q_{max} under consideration of installation requirements)			
	Uncertainty	± 1 % from Q_t to Q_{max} (± 2 % from Q_{min} to Q_t)			
	Gas temperature	-40 ... 185 °F			
Operating pressure	0 ... 1480 psig at 100 °F 0 ... 1380 psig at 185 °F				
Nominal pipe size	3 inch Schedule 80 / 4 inch Schedule 80 / 6 inch Schedule 80				
Flange connection	3 inch ANSI B16.5, Cl.600 RF / 4 inch ANSI B16.5, Cl.600 RF / 6 inch ANSI B16.5, Cl. 600 RF				
Ambient conditions					
Ambient temperature	-40 ... 140 °F				
Storage temperature	-40 ... 158 °F				
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)				

Table 2 Technical data FLOWSIC600 DRU

Meter characteristics and measuring parameters	
Bus protocol	MODBUS ASCII, MODBUS RTU
Dimensions and Weight	
Dimensions (W x H x D)	See dimensional drawings
Weight	3 inch: 48 kg; 4 inch: 85 kg; 6 inch: 250 kg
Electrical connection	
Voltage	12 ... 28.8 V DC
Power consumption	≤ 1 W

2.5 **Dimensional drawings**

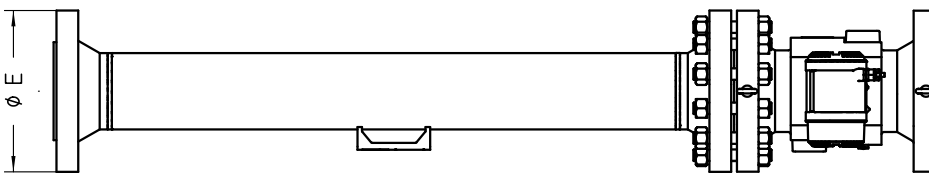
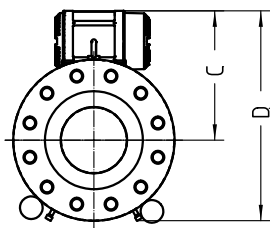
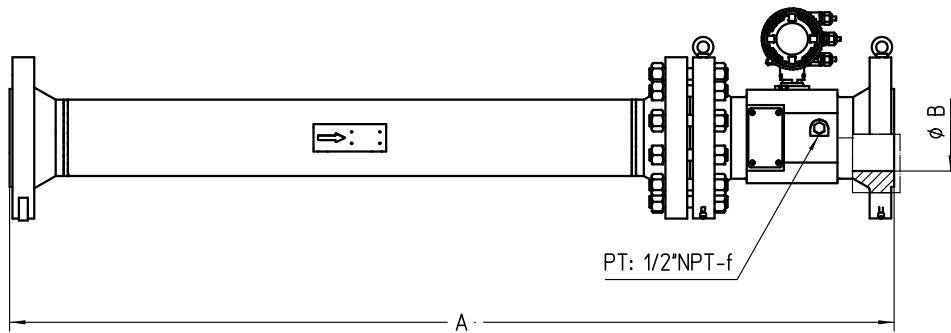
2.5.1 **FLWSIC600 DRU 3" and 4"**



	A	B	C	D	E	F
	All dimensions in mm (in).					
3"	1040 (40.94)	76,66 (2.90)	250,5 (9.86)	355,5 (14.00)	210 (8.27)	226,3 (8.91)
4"	1300 51.18	97.18 (3.83)	259 (10.20)	396 (15.60)	275 (10.83)	258.8 (10.19)

2.5.2

FLWSIC600 DRU 6"



	A	B	C	D	E
	All dimensions in mm (in)				
6"	1950 (76.77)	146.4 (5.76)	285 (11.22)	462 (18.20)	355.6 (14.00)

Australia

Phone +61 3 9457 0600
1800 334 802 – tollfree
E-Mail sales@sick.com.au

Austria

Phone +43 22 36 62 28 8-0
E-Mail office@sick.at

Belgium/Luxembourg

Phone +32 2 466 55 66
E-Mail info@sick.be

Brazil

Phone +55 11 3215-4900
E-Mail marketing@sick.com.br

Canada

Phone +1 905 771 14 44
E-Mail information@sick.com

Czech Republic

Phone +420 2 57 91 18 50
E-Mail sick@sick.cz

Chile

Phone +56 2 2274 7430
E-Mail info@schadler.com

China

Phone +86 20 2882 3600
E-Mail info.china@sick.net.cn

Denmark

Phone +45 45 82 64 00
E-Mail sick@sick.dk

Finland

Phone +358-9-2515 800
E-Mail sick@sick.fi

France

Phone +33 1 64 62 35 00
E-Mail info@sick.fr

Germany

Phone +49 211 5301-301
E-Mail info@sick.de

Hong Kong

Phone +852 2153 6300
E-Mail ghk@sick.com.hk

Hungary

Phone +36 1 371 2680
E-Mail office@sick.hu

India

Phone +91 22 6119 8900
E-Mail info@sick-india.com

Israel

Phone +972 4 6881000
E-Mail info@sick-sensors.com

Italy

Phone +39 02 274341
E-Mail info@sick.it

Japan

Phone +81 3 5309 2112
E-Mail support@sick.jp

Malaysia

Phone +6 03 8080 7425
E-Mail enquiry.my@sick.com

Mexico

Phone +52 (472) 748 9451
E-Mail mario.garcia@sick.com

Netherlands

Phone +31 30 2044 000
E-Mail info@sick.nl

New Zealand

Phone +64 9 415 0459
0800 222 278 – tollfree
E-Mail sales@sick.co.nz

Norway

Phone +47 67 81 50 00
E-Mail sick@sick.no

Poland

Phone +48 22 539 41 00
E-Mail info@sick.pl

Romania

Phone +40 356 171 120
E-Mail office@sick.ro

Russia

Phone +7 495 775 05 30
E-Mail info@sick.ru

Singapore

Phone +65 6744 3732
E-Mail sales.gsg@sick.com

Slovakia

Phone +421 482 901201
E-Mail mail@sick-sk.sk

Slovenia

Phone +386 591 788 49
E-Mail office@sick.si

South Africa

Phone +27 11 472 3733
E-Mail info@sickautomation.co.za

South Korea

Phone +82 2 786 6321
E-Mail info@sickkorea.net

Spain

Phone +34 93 480 31 00
E-Mail info@sick.es

Sweden

Phone +46 10 110 10 00
E-Mail info@sick.se

Switzerland

Phone +41 41 619 29 39
E-Mail contact@sick.ch

Taiwan

Phone +886 2 2375-6288
E-Mail sales@sick.com.tw

Thailand

Phone +66 2645 0009
E-Mail Ronnie.Lim@sick.com

Turkey

Phone +90 216 528 50 00
E-Mail info@sick.com.tr

United Arab Emirates

Phone +971 4 88 65 878
E-Mail info@sick.ae

United Kingdom

Phone +44 1727 831121
E-Mail info@sick.co.uk

USA

Phone +1 800 325 7425
E-Mail info@sick.com

Vietnam

Phone +84 945452999
E-Mail Ngo.Duy.Linh@sick.com

Further locations at www.sick.com