

Coriolis MASS Flowmeters

SITRANS FC300 DN 4

Operating Instructions • 07/2010



SITRANS F

SIEMENS

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This instruction contains all the information required to commission and operate the SITRANS FC MASSFLO coriolis sensor, FC300.

The instruction is aimed at those installing the device, connecting it electronically, and commissioning it, as well as service and maintenance engineers.


SITRANS FC MASSFLO coriolis mass flowmeters measure all types of liquids and gases. The meter is a multiparameter device offering accurate measurement of mass flow, volume flow, density, temperature, and fraction.

Technical Documentation (handbooks, instructions, manuals etc.) on the complete SITRANS F product range can be found on the internet/intranet at the following link:

English: <http://www4.ad.siemens.de/WW/view/en/10806951/133300>



For safety reasons it is important that the following points, especially the points marked with a warning sign, are read and understood before the system is being installed:

- Installation, connection, commissioning and service must be carried out by qualified and authorized personnel.
- It is very important for any person working with the equipment to read and understand the instructions and directions provided in this manual and follow instructions and directions before using the equipment.
- People who are authorized and trained by the owner of the equipment may operate the equipment.
- The installation must ensure that the measuring system is correctly connected and is in accordance with the connection diagram.
- In applications with working pressures/media that can be dangerous to people, surroundings, equipment, or others in case of pipe fracture, we recommend that special precautions such as special placement, shielding, or installation of a security guard or a security valve should be made when the sensor is being installed.
- Siemens Flow Instruments assist by estimating the chemical resistance of the sensor parts that are in connection with the media, but it is at any time the customer's responsibility, which materials are chosen, and Siemens Flow Instruments takes no responsibility if the sensor corrodes!
- Equipment used in hazardous areas must be Ex approved and marked  for Europe and UL for USA.
It is required that the special directions provided in the manual and in the Ex certificate must be followed!
- Installation of the equipment must comply with national regulations.
Example: EN 60079-14 for Denmark.
- Repair and service can be done by approved Siemens Flow Instruments personnel only.
- The p/T ratings indicate the relation between the maximum allowable pressure PN and the maximum allowable temperature.

Before commissioning



Warning

Before using this sensor please read the maximum operating pressure (PN) on the sensor label. The operating pressure indicates the pressure to which measuring pipe and connections have been dimensioned.

The enclosure/housing is **not** rated for pressure containment.

When working with operating pressures/media which in case of pipe fractures may cause injuries to people, equipment, or anything else, we recommend special precautions when installing the sensor, i.e. special placement, shielding, pressure guard or similar protective measures.

Please also refer to section 4, "Installation".

The sensor is a fragile piece of equipment. Therefore, during transportation it must be placed in the transportation box originally delivered by Siemens Flow Instruments. If this is not possible, the alternative sensor packaging must be able to withstand the hazards from transportation.

Description

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Integration

The sensor can be connected to all MASS 6000 transmitters for remote installation only. All sensors are delivered with a SENSORPROM memory unit containing information about calibration data, identity, and factory pre-programming of transmitter settings.

The SENSORPROM unit must be installed in the MASS 6000 transmitter.

The industry today increasingly demands smaller mass flowmeters without loss of performance. The SITRANS FC300 coriolis mass flowmeter is available in several configurations for direct mass flow measurement of all kinds of liquids and gasses. The sensor is a multiparameter device offering accurate measurement of mass flow rate, volume flow rate, density, temperature, and fraction flow rate.

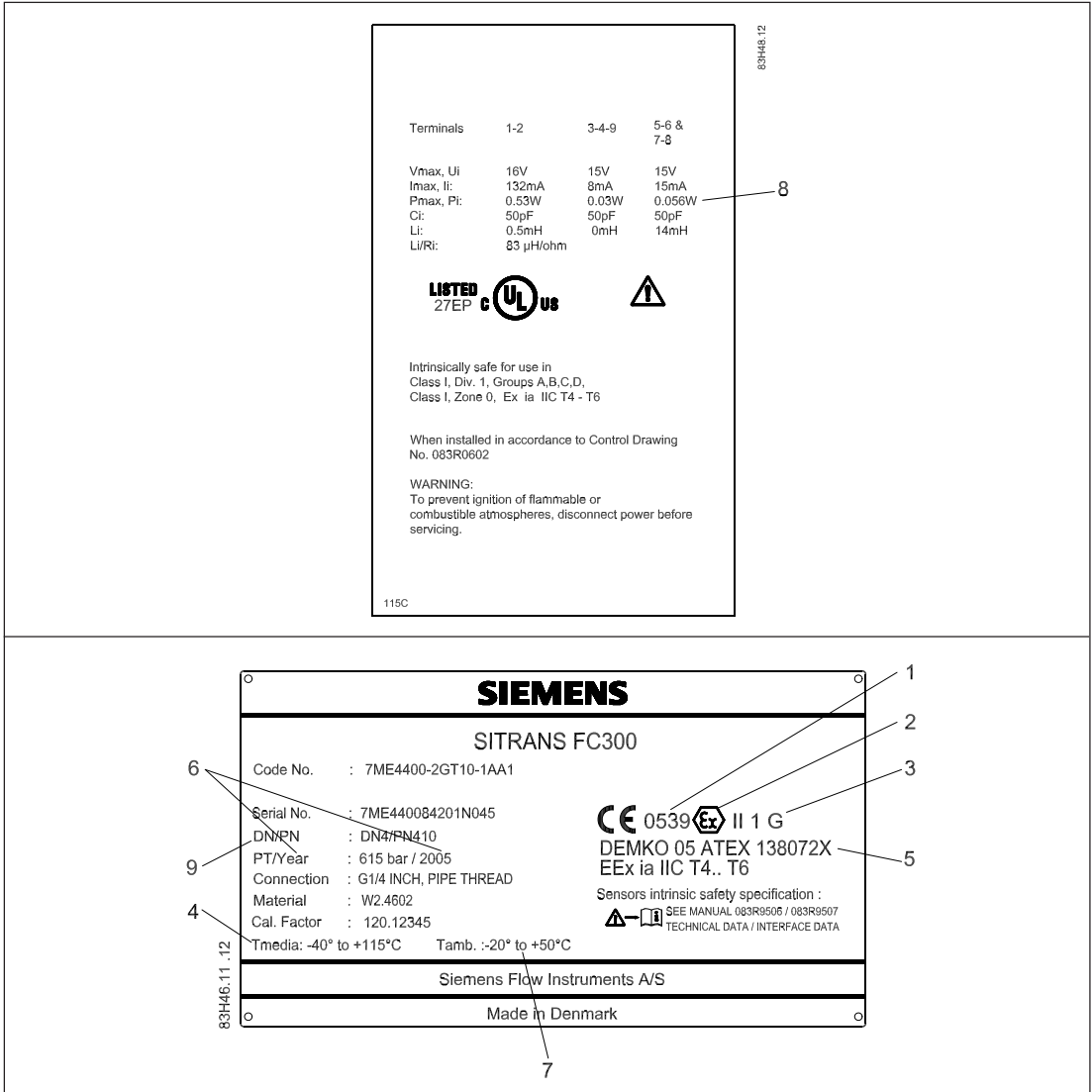
The FC300 sensor consists of a single tube bent in a double pipe geometry, and welded directly to the process connections at each end. The sensor is available in two material configurations (AISI 316L or Hastelloy® C22 with ¼"-NPT or ¼"-ISO process connections).

The enclosure is stainless steel AISI 316L with an encapsulation grade of IP67/NEMA 4. The enclosure is robustly designed, and with a size of 135 x 205 x 58 mm (5.31" x 8.07" x 2.28") the sensor is very compact, requiring little installation space.

The standard version sensor has a maximum liquid temperature of 115 °C (239 °F). The high temperature version with raised electrical connector with raised electrical connector has a maximum temperature of 180 °C (356 °F).

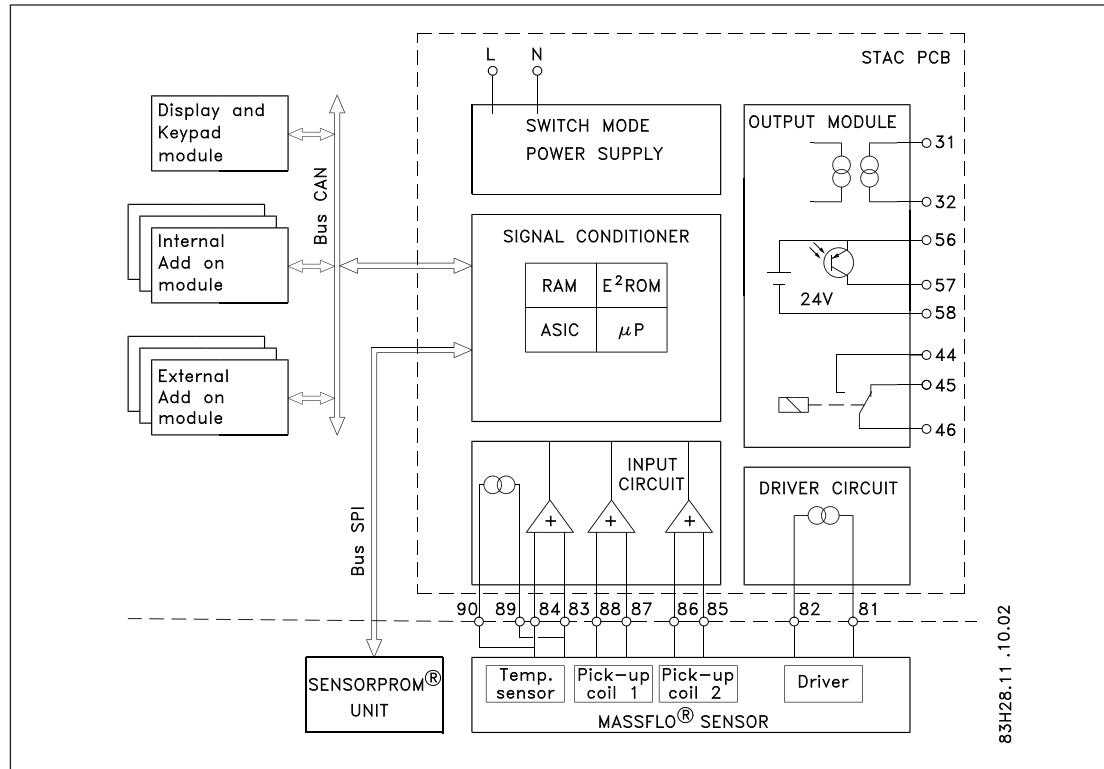
The sensor can be installed in either horizontal or vertical position. It can be mounted directly on any plane surface or, if desired, with the enclosed quick-release clamp fitting. A compact design and the multi-plug electrical connector keeps installation costs and time to a minimum.

The nameplate located on the sensor housing front contains serial No. and other relevant technical information.



No.	Description
1.	Notified body for QA supervision: UL International DEMKO A/S, Denmark
2.	Explosion protected
3.	ATEX Equipment Group and Protection Category
4.	Medium temperature
5.	EC Approval Numbers and Protection Type
6.	Production year
7.	Ambient temperature range
8.	Interface data
9.	DN = sensor size
	PN = max. pressure [bar]
	PT = test pressure, sensor pressure tested with 1.5 x PN

The flow measuring principle is based on coriolis law of movement.
The flowmeter consists of a sensor type FC300 and a transmitter MASS 6000.



The FC300 sensor is energized by an electromechanical driver circuit which oscillates the pipe at its resonant frequency.

Two pick-ups, 1 and 2, are placed symmetrically on both sides of the driver. When liquid or gas flows through the sensor, the coriolis force acts on the measuring pipe and causes a pipe deflection which can be measured as a phase shift on pick-up 1 and 2. The phase shift is proportional to the mass flow rate.

The amplitude of the driver is automatically regulated via a „Phase Locked Loop“ to ensure a stable output from the two pick-ups in the region of 80 to 110 mV.

The temperature of the sensor is measured by a Pt1000, in a Wheatstone configuration (4-wire). The flow proportional signal from the two pick-ups, the temperature measurement, and the driver frequency are fed into the MASS 6000 transmitter used for calculations of mass flow, volume flow, fraction flow, temperature, and density.

The SITRANS FC300 sensor can be installed for different areas of use.

Depending on area of application and system configuration, there may be differences in the installation.

**Warning**

Protection against incorrect use of the measuring device.

Take particular care that the selected materials for the sensor pipes and the enclosure in contact with the media are suitable for the process media used.

Ignoring this safety measure may cause injuries or life-threatening injuries to people and damage the environment.

**Warning**

The device may only be used within the pressure and temperature range specified on the nameplate.

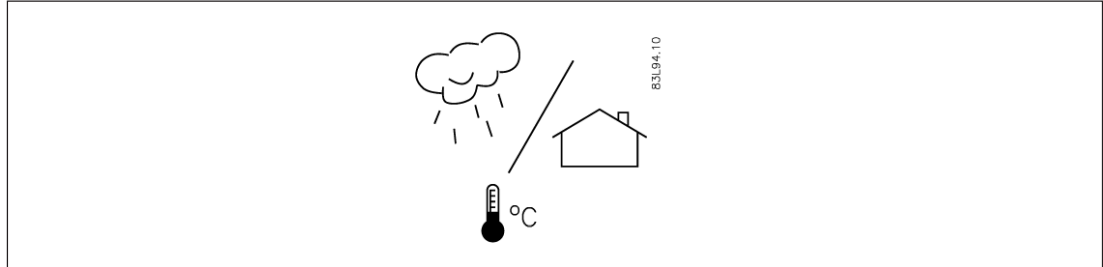
Pressure overload might cause injuries and damage to people and the environment.

**Warning**

Category 1 equipment.

The FC300 may be installed in zone 0, zone 1 and zone 2.

The flowmeter can be located both indoors and outdoors, but the following conditions must be observed:



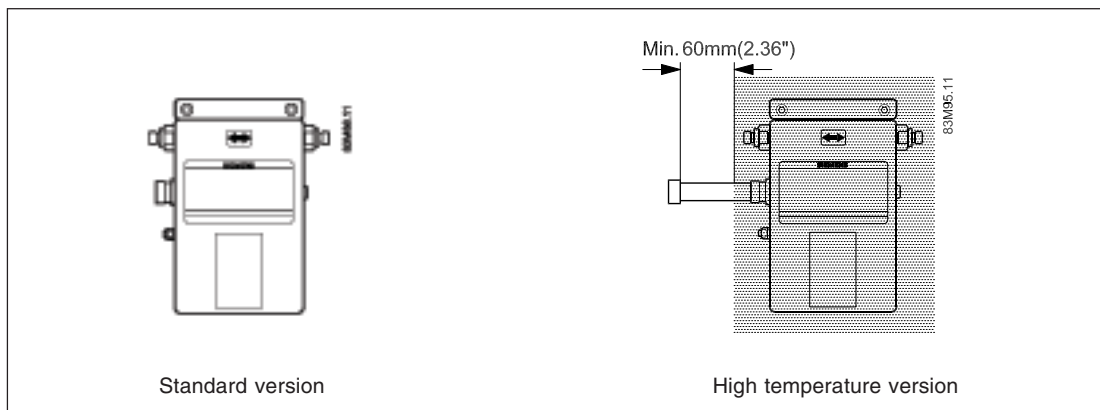
Liquid temperature

The FC300 DN 4 is available in 2 temperature versions:

Standard version: $-40\text{ }^{\circ}\text{C}$ to $+115\text{ }^{\circ}\text{C}$ ($-40\text{ }^{\circ}\text{F}$ to $+239\text{ }^{\circ}\text{F}$)

High temperature version: $-40\text{ }^{\circ}\text{C}$ to $+180\text{ }^{\circ}\text{C}$ ($-40\text{ }^{\circ}\text{F}$ to $+356\text{ }^{\circ}\text{F}$)

For the high temperature version the multiple plug is raised from the sensor housing by a pipe, as the maximum temperature of the plug is $125\text{ }^{\circ}\text{C}$ ($257\text{ }^{\circ}\text{F}$). It is possible to insulate the sensor while still having access to the plug.

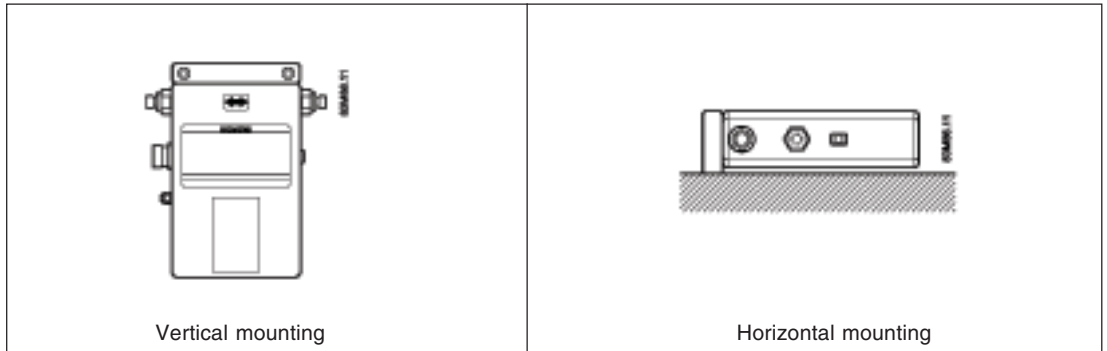


Important.

When the liquid temperature and the ambient temperature differ too much, the sensor must be insulated to prevent 2-phase flow causing possible loss of measuring accuracy. This applies especially in applications with low flow.

The sensor must **always** be completely filled with a homogeneous liquid or gas in single phase, otherwise measuring errors will occur.

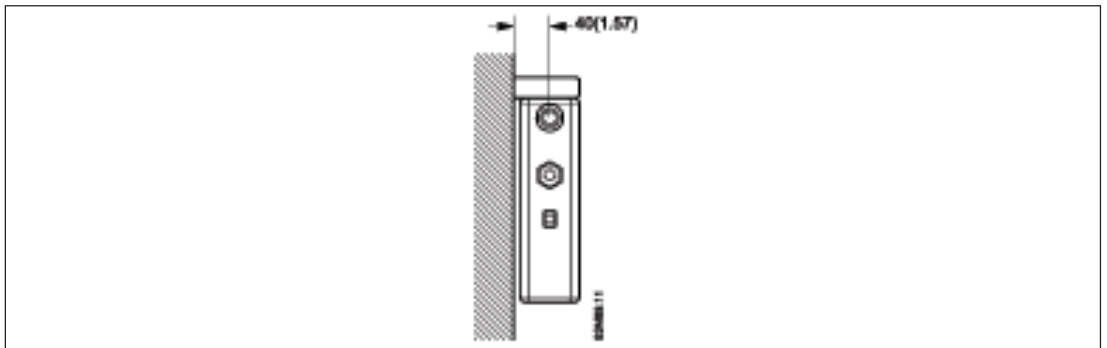
For liquid applications, use horizontal mounting.



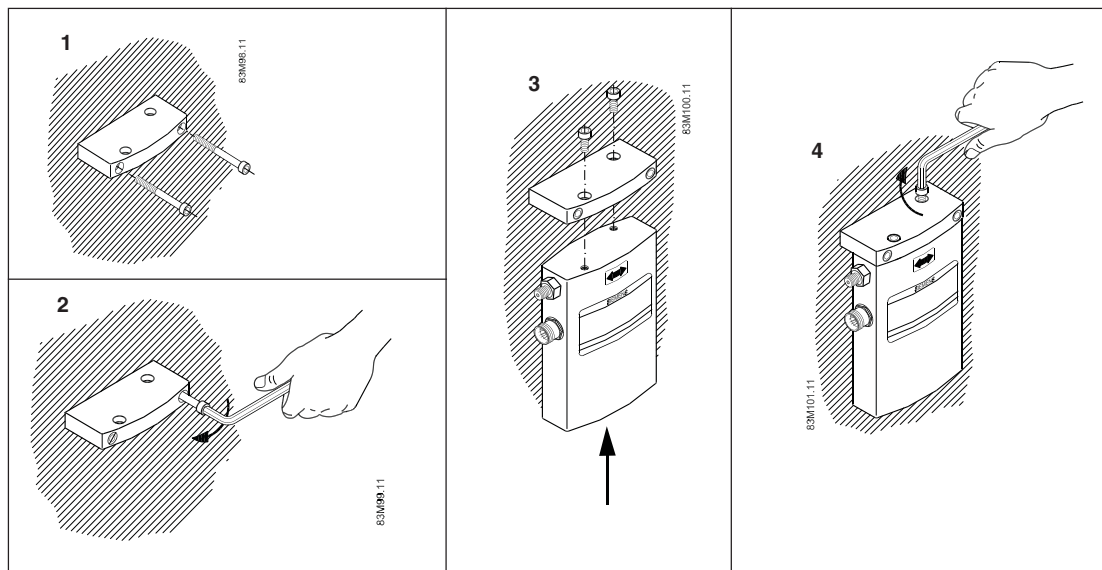
In low flow applications, mount, vertically so air bubbles are easier to remove.

To avoid separation of air from the liquid, we recommend a back pressure of minimum 0.1 – 0.2 bar.

Mount the sensor on a wall or a steel frame vibration-free and mechanically stable. Mount the sensor directly or by using the supplied mounting bracket. Ensure that the mounting surface is plane and gives good support.

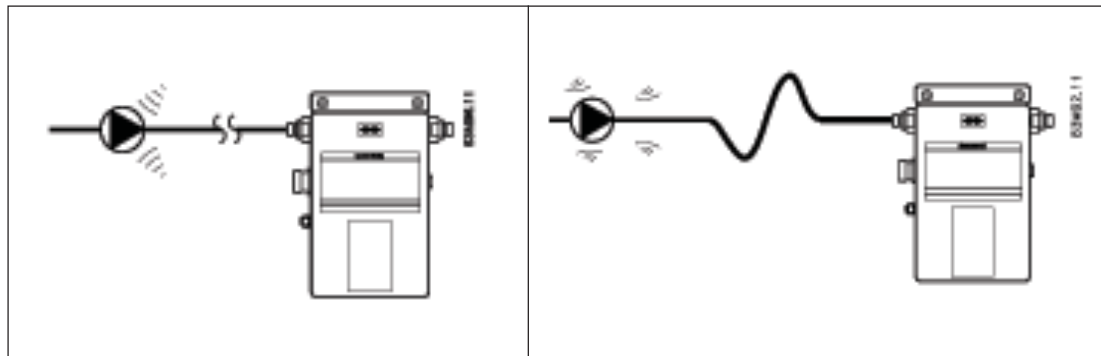


The supplied M8 screws must be used for the mounting bracket. Please note the short screws (M8 x 20 mm) are for the sensor chassis, and the long screws (M8 x 80 mm) are for mounting the bracket on the frame or the wall. Mount the bracket on a plane surface and tighten the screws properly (max. 12 Nm).



Mount the sensor to the bracket using the enclosed Allen key (M8 x 20 mm), and tighten the screws properly (max. 12 Nm).

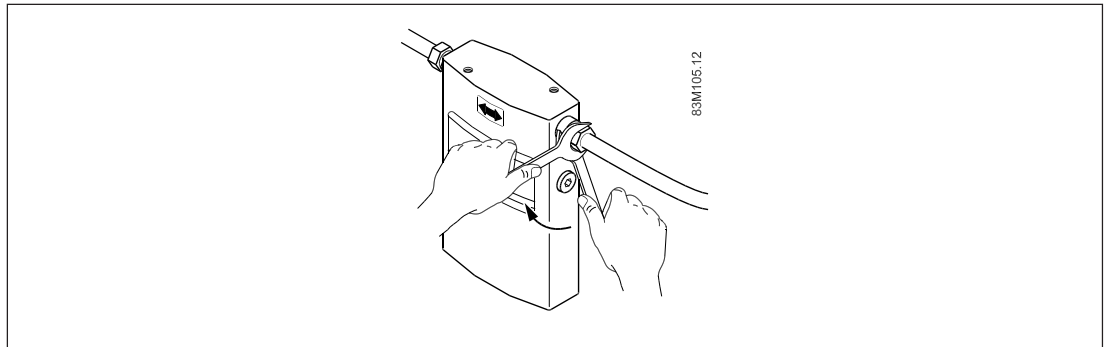
Locate the sensor as far away as possible from components that generate mechanical vibration in the pipe. Or separate from vibration generating components using flexible connections so that there is no direct connection to them.



If more sensors are located close to each other, i.e. in the same pipe section, the meters may disturb each other, especially at low flow. To prevent cross talk, connect the sensors with a flexible connection instead of a permanent connection.

Avoid mounting the sensors on the same steel frame-insulate the meters individually on separate mounting frames supported with rubber pads.

The process pipes can be mounted directly onto the process connections on the sensor. To obtain a proper scaling, use a wrench on the base of the process connections as counter lock to secure with the optimum torque.



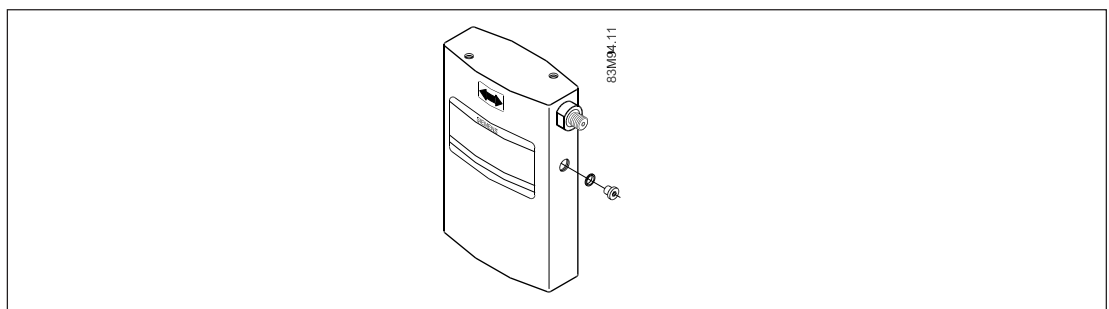
When working with operating pressures/media which may cause pipe fractures and possible injuries to people, equipment, or anything else, we recommend that special precautions are taken when building in the sensor. Use special placement, shielding, pressure guard, or similar precautions.

The sensor enclosure is supplied with a 1/8" nipple. In liquid applications a pressure guard can be connected to automatically shut off the flow to the sensor in case of a leakage. For mounting instructions, refer to section „*Mounting of pressure guard*“. In gas applications a thorough safety evaluation must be made.

Mounting of pressure guard

Before removing the nipple from the sensor enclosure, please note the following: Penetration of humidity, liquids, or particles into the sensor must be avoided as it may influence the measurement and, in worst case, affect the measuring function. Influence, however, can be avoided using the following:

1. Place the sensor in a dry, clean place and leave it to acclimatize until it reaches ambient temperature, preferred 20 °C (68 °F).
2. Carefully disconnect the nipple and mount the pressure guard. Use the enclosed spare sealing ring for proper sealing.
3. Check that the pressure guard has been correctly mounted and thoroughly tightened so that the sealing ring fits tightly. After each dismantling, the sealing ring must always be replaced by a new one.



**Warning***Tightness*

Only when the cable is connected to the sensor, the IP67 protection is achieved.

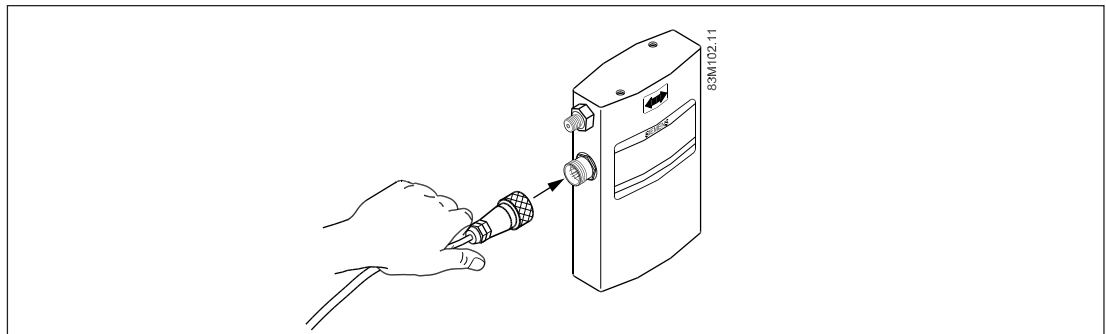
**Warning***Installation in hazardous areas*

When making electrical connections, observe the national statutes and provisions for hazardous areas valid for the particular country.

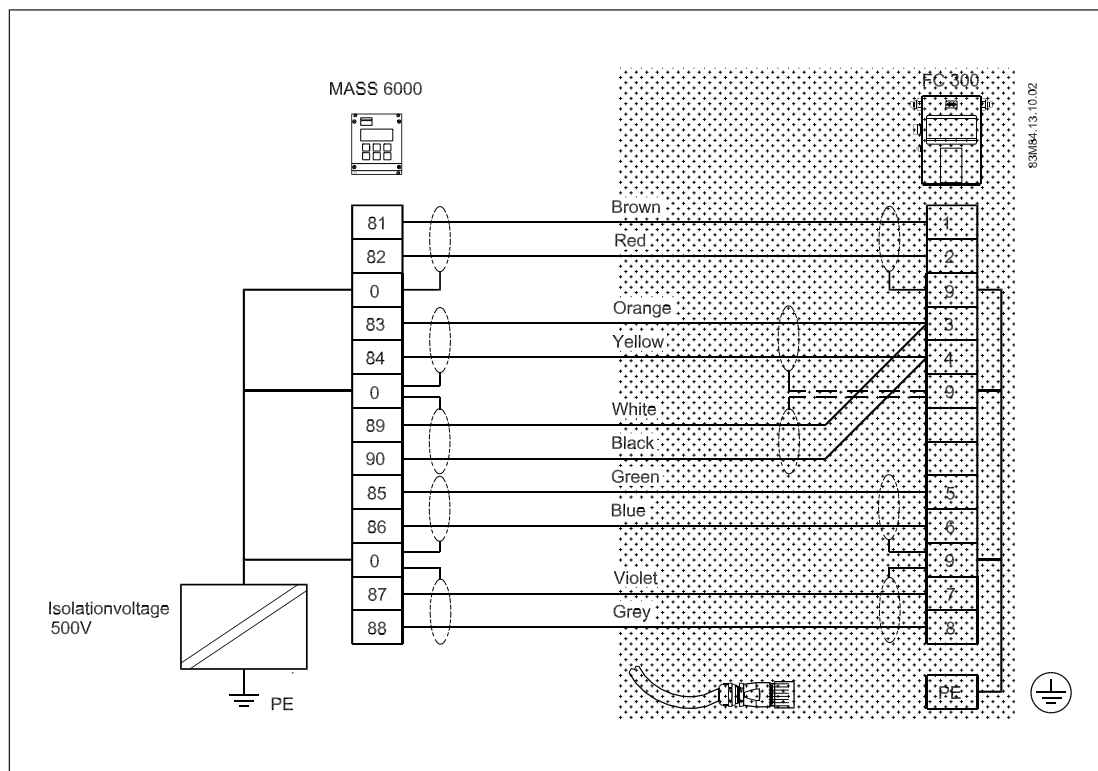
E.g. in Germany these are:

- Operational safety regulations
- Directive for the installation of electrical systems in hazardous areas DIN EN 60079-14 (previously VDE 0165, T1) and EN 60079-25 (additional requirement for Zone 0)

When connecting/disconnecting the pipes, the cable must be mechanically connected in order to prevent the liquid from penetrating into the electrical multiple plug on the sensor. Mount the multiple plug and tighten the glands for optimum sealing.



The electrical connection to the transmitter shall be done in accordance with the selected transmitter version and the wiring diagram shown below.



Installation

The sensor can be installed in zone 0, zone 1, and zone 2. The sensor is intrinsically safe and the electrical data can be found in this table.

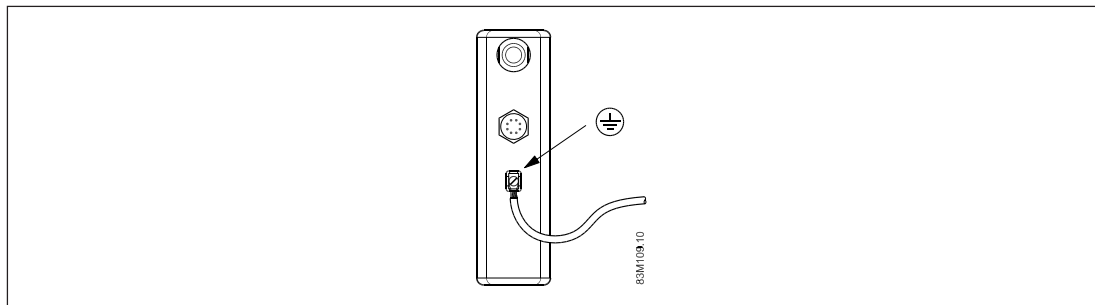
Terminals	1-2	3-4	5-6 & 7-8
U_i [V]	16	15	15
I_i [A]	0,132	0,008	0,015
P_i [W]	0,53	0,03	0,056
L_i or [mH]	0,5		14
C_i [pF]	50	50	50
L_i/R_i [μ H/ohm]	83		

Maximum distance between sensor and transmitter is 300 meters with Siemens Flow Instruments cable, code No. FDK:083H3005 or equivalent.

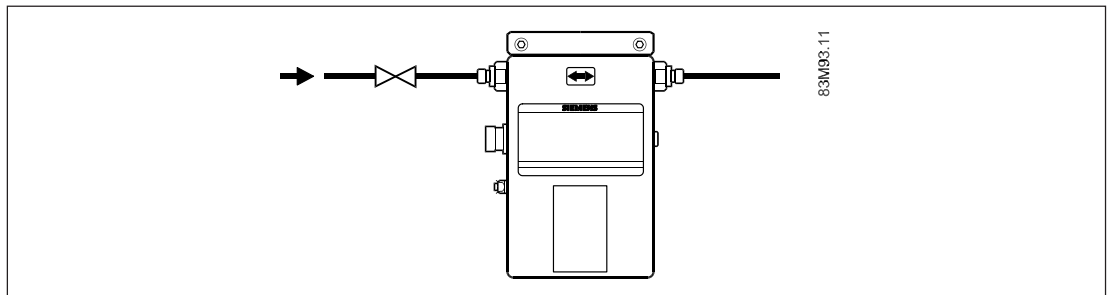
Capacitance	300 [pF/m]
Self-inductance	1 [μ H/m]
Resistance	0.05 [ohm/m]
Maximum length	300 [m] / 984 [ft]
$C_{max.}$	100 [nF]
L_c/R_c	20 [μ H/ohm]
Isolation between single conductor	0.25 [mm]
Temperature range conductors	-20 °C to +105 °C/-4 °F to +221 °F

Equivalent cable must have L_c/R_c ratio lower or equal to 100 [μ H/ohm]. If own cable is used, the multi-plug can be ordered as spare parts, code No. FDK:083H5056.

The protective earth is connected to the earth  terminal according to the diagram below.
Required cable 4 mm² Cu wire.



When the sensor is installed and the electrical connection established, the only commissioning necessary is a proper zero-point adjustment.
To facilitate zero-point adjustment, a valve with tight shut-off should always be mounted in connection with the sensor. A proper zero-point setting is essential to ensure good accuracy.



If after correct commissioning you encounter problems with the flowmeter, check both flow meter and application. The most frequent problems and causes are covered below.

No mass flow reading

1. Check the electrical wiring according to the wiring diagram
2. Check that the multi-plug is properly connected to the sensor and sufficiently tightened
3. Check that empty pipe is not active

Unstable or faulty mass flow reading

Make sure that a proper zero point adjustment has been made. A faulty zero point adjustment may lead to faulty readings. The following reasons can disturb the zero point adjustment

- The flow value was not zero during zero-point adjustment. Ensure that the valve shuts 100% tight. Even very small flow rates will lead to an erroneous zero-point.
- The liquid was not in a homogenous state during zero-point adjustment. A high content of vapor or air due to non ideal temperature or pressure conditions may lead to 2-phase conditions. Ensure that you only have liquid or gaseous phase conditions.
- Ensure that the media in the sensor are in conditions close to the working conditions during zero adjust.
- Ensure sufficient back pressure.
- The sensor is exposed to heavy mechanical noise/vibrations. Heavy mechanical vibrations can be transported mechanically or hydraulically via the liquid and might affect the system performance. Typical vibration sources are pumps or mechanical engines. To check whether pump vibrations affect the system, carry through a zero-point adjustment with an activated pump and then one with a de-activated pump. If a large deviation can be detected, take precautions to avoid the vibrations.

Inaccurate mass flow reading

1. Make sure that the SENSORPROM unit has been properly installed in the sensor. If not, the display will show error code P40 – no SENSORPROM unit installed. If no SENSORPROM unit has been installed, the transmitter will pick a default value which will not match the sensor in question. This will result in false reading of all parameters.

Remedy: Install the SENSORPROM unit. If no SENSORPROM unit is available, go to the sensor characteristics menu and enter calibration value and temperature constant value. Both values can be found in the calibration report.

Check the reading: If temperature or density are not correct, either the SENSORPROM unit is not correct, there are wiring faults, or the sensor has been damaged.

2. Large air collections non-homogeneously distributed in the sensor will lead to inaccurate readings. Diagnosing air can be done via the MASS 6000 service menu or by increasing the pressure.
 - Go to the service menu and read the values under menu driver amplitude. Under normal conditions, i.e. water at 20 °C / 1 bar, typical driver amplitude is approximately 9 mA. If the values are much higher and/or fluctuate more than 2-3 mA this indicates a high damping in the system due to either air, vapors, or degassing.
 - Alternatively, close the valve after the sensor, start the pump and then increase the pump pressure. If the zero-point becomes more stable, non-homogeneously distributed air bubbles are in the system.

Problems with air generation may occur due to phase conditions:

1. Suction pressure of pump is too low (pump cavitation).
2. Obstructions (valves and/or blocked filters) before the sensor generate cavitation and air generation.
3. Dissolved air in the liquid is released at low pressure (can be just the pressure drop across the sensor).
4. Volatile liquids producing air or vapors (degassing) at low pressures or high temperatures.

Specifications

8

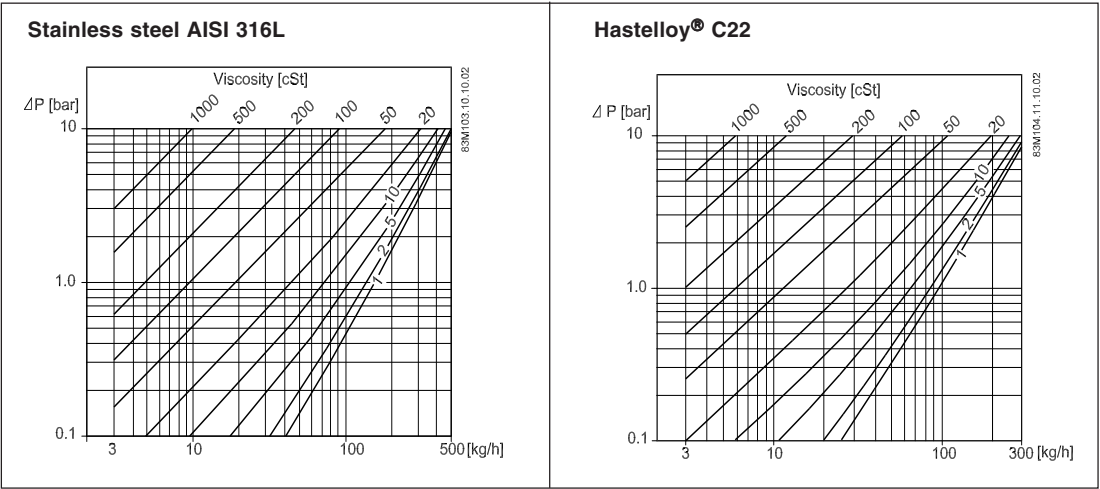
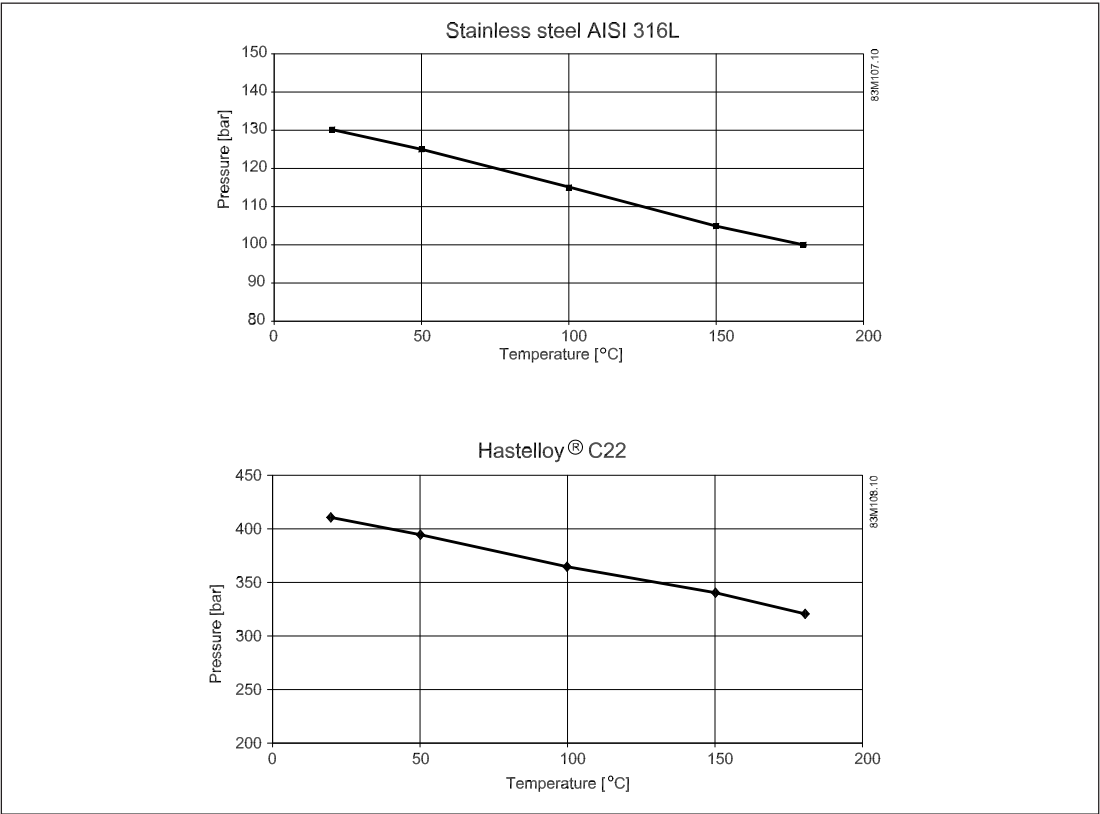
Sensor size	DN 4	
Mass flow		
Measuring range	0 ... 350 kg/h (0 ... 772 lb/h)	
Accuracy, mass flow ¹⁾	0.1% of rate	
Repeatability	0.05% of rate	
Max. zero point error	0.010 kg/h (0.022 lb/h)	
Density		
Density range	0 ... 2.9 g/cm ³ (0 ... 0.105 lb/inch ³)	
Density error	0.0015 g/cm ³ (0.000036 lb/inch ³)	
Repeatability error	0.0002 g/cm ³ (0.0000072 lb/inch ³)	
Temperature media		
Standard	-40 ... +115 °C (-40 ... +239 °F)	
High temperature version	-40 ... +180 °C (-40 ... +356 °F)	
Temperature error	0.5 °C	
Temperature ambient	-20 ... +50 °C (-4 ... +122 °F)	
Brix		
Measuring range	0 ... 100 °Brix	
Brix error	0.3 °Brix	
Inside pipe diameter	Stainless steel AISI 316L	Hastelloy® C22
	3.5 mm (0.14")	3.0 mm (0.12")
Pipe wall thickness	0.25 mm (0.0098")	0.5 mm (0.0196")
Liquid pressure measuring pipe ²⁾	130 bar (1885 psi) at 20 °C (68 °F)	410 bar (5945 psi) at 20 °C (68 °F)
	1.4435	2.4602
³⁾		
Material	1.4435 (AISI 316) Stainless steel	
Enclosure grade	IP67/NEMA4	
Thread	ISO 228/1 G ¼"	
	ANSI/ASME B1.20.1 ¼" NPT	
	EEX [ia] IIC T3-T6	
	ATEX 138072X	
	UL/CSA (under preparation)	
	3.1 kg (6.8 lb)	
⁴⁾	135 x 205 x 58 mm (5.31" x 8.07" x 2.28")	

1) Dynamic measuring range 1:200

2) According to EN 13480-3:2002

3) Housing is not rated for pressure containment

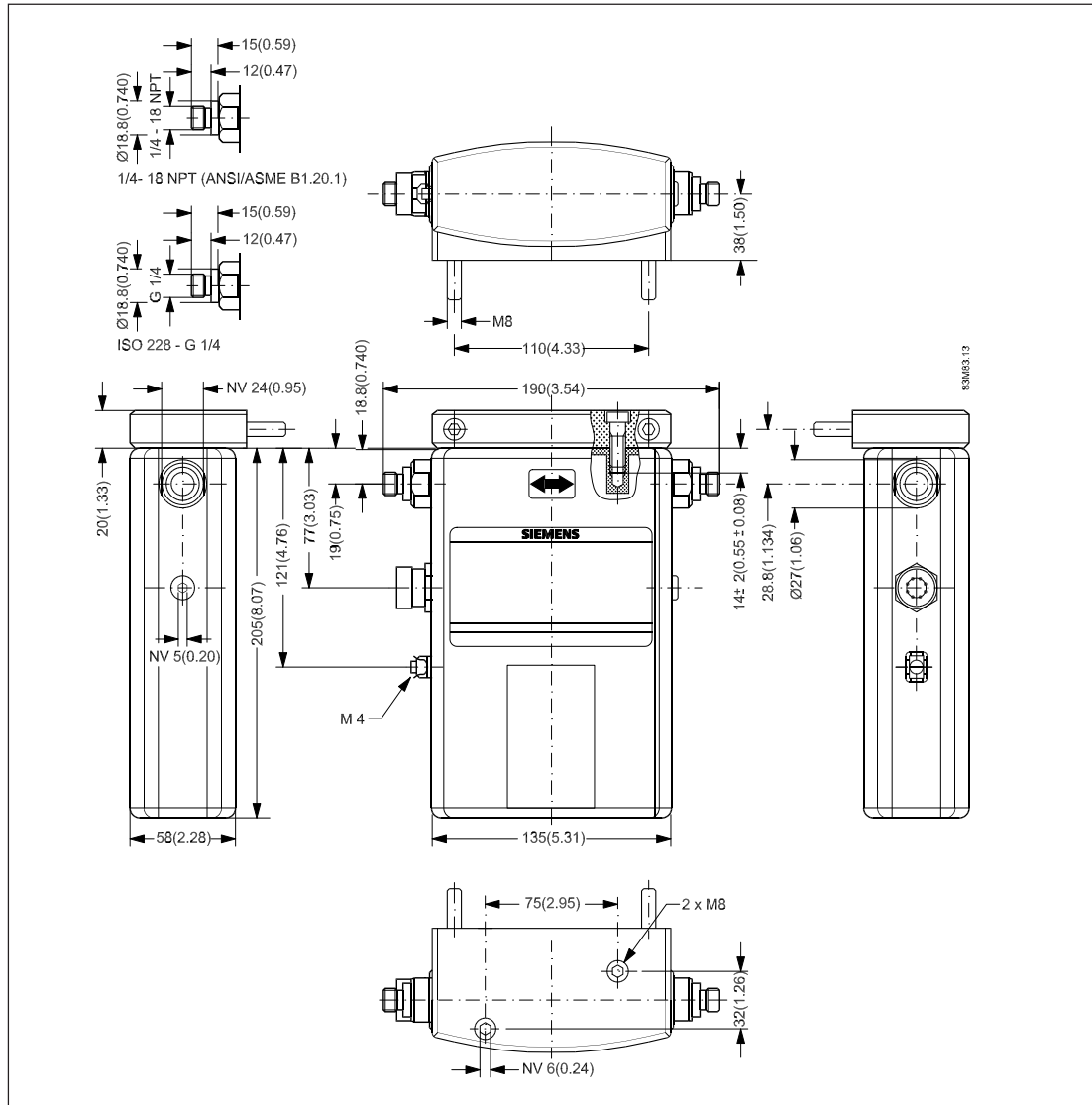
4) See dimensional drawings



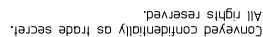
Dimensional drawings

9

−40 ... +115 °C (−40 ... +239 °F)



[illegible]



[1] **EC-TYPE EXAMINATION CERTIFICATE**

[2] **Equipment or Protective System intended for use
in Potentially Explosive Atmospheres
Directive 94/9/EC**



[3] EC-Type Examination Certificate Number: **DEMKO 05 ATEX 138072X**

[4] Equipment or Protective System: **SITRANS FC300 DN4 (for varieties, see Schedule).**

[5] Manufacturer: **Siemens Flow Instruments A/S**

[6] Address: **Nordborgvej 81, 6430 Nordborg, Denmark.**

[7] This equipment or protective system and any acceptable variation there to is specified in the schedule to this certificate and the documents therein referred to.

[8] UL International Demko A/S, notified body number 0539 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report no. 138072

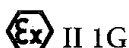
[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014: 1997 E incl. A1+A2 EN 50020: 2002 E EN50284: 1999 E

[10] If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

[11] This EC-Type examination certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by the certificate.

[12] The marking of the equipment or protective system shall include the following:



II 1G

EEx ia IIC T4-T6

On behalf of UL International Demko A/S

Herlev, 2005-10-26

Karina Christiansen
Certification Manager

UL International Demko A/S

Lyskaer 8, P.O. Box 514
DK-2730, Herlev, Denmark
Telephone: +45 44856565
Fax: +45 44856500

Certificate: 05 ATEX 138072X

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P1

[13]

Schedule

[14]

EC-TYPE EXAMINATION CERTIFICATE No. DEMKO 05 ATEX 138072X

[15]

Description of Equipment or protective system

The sensor FC300 is for measuring the mass flow in a closed pipe system. The sensor consist of two parallel tubes which vibrate in phase opposition. Each tube is affected by a gyroscopic force proportional to the mass and the velocity of the mass. The driver coil, 2 sensor coils and the measuring tubes are located in the stainless steel enclosure together with a Pt1000 sensor measuring the tube temperature.

Designations covered by this certificate is the following:

Type FC300versions:

DN 4 with part nos. 7ME4, followed by, 40, followed by 0, followed by 1G, 1H, 2G or 2H, followed by A, B, C, D, E, F, G, H, J, K, L, M, N, P, Q, R or S, followed by 10 or 11, followed by 1, 2, 3 or 9, followed by A, or Z (P0A, P0B, P1A, P1B, P1C, P1D, P2A, P2B, P2C, P2D, P3A, P3B, P3C, P3D, P4A, P4B, P4C or P4D), followed by A, B, C, D, E, F or G, followed by 1, 2, 3 or 8, followed by Z (C11, C12, C13, C14, C15, Y17, Y18, Y20, Y60, Y61, Y62, Y63 or Y99).

Category 1 Product marked: EEx ia IIC T4-T6

The relation between ambient temperature and the assigned temperature class is as follows:

Ambient temperature range	For the temperature class
-20 °C to +50 °C	T4 to T6

The relation between media temperature and the assigned temperature class is as follows:

Media temperature range	Temperature class
-40 °C to +65 °C	T6
-40 °C to +80 °C	T5
-40 °C to +115 °C	T4

The relation between maximum pressure and the media temperature in the sensor:

FC300 Sensor tube materials	Media temperature	DN4 MPa	DN4bar
1.4435 (316L)	20 °C	13,0	130
1.4435 (316L)	180 °C	10,0	100
2.4602 (Hastelloy C-22)	20 °C	41,0	410
2.4602 (Hastelloy C-22)	180 °C	32,0	320

Allowed working pressures and testing pressures have been calculated according to EN 13480-3:2002.

UL International Demko A/S

Lyskaer 8, P.O. Box 514
DK-2730, Herlev, Denmark
Telephone: +45 44856565
Fax: +45 44856500

Certificate: 05 ATEX 138072X
Report: 138072-02

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P2/4

Schedule

EC-TYPE EXAMINATION CERTIFICATE No. DEMKO 05 ATEX 138072X

Electrical data

Intrinsically safe specifications:

Terminals 1-2 Driver coil, 3-4-9 Temperature sensor, 5-6 and 7-8 Pickup coils:

FC300	1-2	3-4	5-6 & 7-8
Ui	16 V	15 V	15 V
Ii	0,132 A	0,008 A	0,015 A
Pi	0,53 W	0,03 W	0,056 W
Li or Li/Ri	0,5mH or 83 [μ H/ Ω]	-	14 mH
Ci	50pF	50pF	50pF

Installation instructions

The sensor shall be installed in accordance with the information in the instructions manual.

Field wiring shall be in accordance with national rules and applicable standards e.g. EN60079-14 and -25.

[16] Report No.

Project Report No.: 138072-02 (Hazardous Location Testing)

Drawings:

Number	Date	Description
083R0601	2005.10.13	R-INSTRUCTION ATEX

[17] Special conditions for safe use:

- Ambient temperatures rating and the media temperature in relation to the temperature classification shall be observed.
- The intrinsic safety data for the FC300 is without the cable data, which shall be evaluated separately.

UL International Demko A/S

Lyskaer 8, P.O. Box 514
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Telephone: +45 44856565
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Certificate: 05 ATEX 138072X
Report: 138072-02

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Schedule

EC-TYPE EXAMINATION CERTIFICATE No. DEMKO 05 ATEX 138072X

[18] Essential Health and Safety Requirements

Concerning ESR this Schedule verifies compliance with the Ex standards only. The manufacturer's Declaration of Conformity declares compliance with other relevant Directives.

The manufacturer shall inform the notified body concerning all modifications to the technical documentation as described in ANNEX III to Directive 94/9/EC of the European Parliament and the Council of 23 March 1994.

On behalf of UL International Demko A/S

Herlev, 2005-10-26

Karina Christiansen
Certification Manager

UL International Demko A/S

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[1] **EC-TYPE EXAMINATION CERTIFICATE**

[2] **Equipment or Protective System intended for use
in Potentially Explosive Atmospheres
Directive 94/9/EC**



[3] EC-Type Examination Certificate Number: **DEMKO 05 ATEX 138072X**

[4] Equipment or Protective System: **SITRANS FC300 DN4 (for varieties, see Schedule).**

[5] Manufacturer: **Siemens Flow Instruments A/S**

[6] Address: **Nordborgvej 81, 6430 Nordborg, Denmark.**

[7] This equipment or protective system and any acceptable variation there to is specified in the schedule to this certificate and the documents therein referred to.

[8] UL International Demko A/S, notified body number 0539 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report no. 138072

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014: 1997 E incl. A1+A2 EN 50020: 2002 E EN50284: 1999 E

[10] If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

[11] This EC-Type examination certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by the certificate.

[12] The marking of the equipment or protective system shall include the following:



II 1G

EEx ia IIC T4-T6

On behalf of UL International Demko A/S

Herlev, 2005-10-26

Karina Christiansen
Certification Manager

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[13]

Schedule

[14]

EC-TYPE EXAMINATION CERTIFICATE No. DEMKO 05 ATEX 138072X

[15]

Description of Equipment or protective system

The sensor FC300 is for measuring the mass flow in a closed pipe system. The sensor consist of a tube bent into two parallel loops which vibrate in phase opposition. Each loop is affected by a gyroscopic force proportional to the mass and the velocity of the mass. The driver coil, 2 sensor coils and the measuring tubes are located in the stainless steel enclosure together with a Pt1000 sensor measuring the tube temperature.

Designations cover by this certificate is the following:

Category 1 Product marked: EEx ia IIC T3-T6

The relation between ambient temperature and the assigned temperature class is as follows:

Ambient temperature range
-20 °C to +50 °C

For the temperature class
T3 to T6

Type FC300 versions:

DN 4 with part nos. 7ME4, followed by, 40, followed by 0, followed by 1G, 1H, 2G or 2H, followed by A, B, C, D, E, F, G, H, J, K, L, M, N, P, Q, R or S, followed by 1, 2, 3 or 9, followed by A, or Z (P0A, P0B, P1A, P1B, P1C, P1D, P2A, P2B, P2C, P2D, P3A, P3B, P3C, P3D, P4A, P4B, P4C or P4D), followed by A, B, C, D, E, F or G, followed by 1, 2, 3 or 8, followed by Z (C11, C12, C13, C14, C15, Y17, Y18, Y20, Y60, Y61, Y62, Y63 or Y99).

The relation between media temperature and the assigned temperature class is as follows:

Media temperature range
-40 °C to +65 °C
-40 °C to +80 °C
-40 °C to +115 °C
-40 °C to +180 °C

Temperature class
T6
T5
T4
T3

Electrical data

Intrinsically safe specifications:

Terminals 1-2 Driver coil, 3-4-9 Temperature sensor, 5-6 and 7-8 Pickup coils:

FC300	1-2	3-4	5-6 & 7-8
Ui	16 V	15 V	15 V
Ii	0,132 A	0,008 A	0,015 A
Pi	0,53 W	0,03 W	0,056 W

Certificate: 05 ATEX 138072X
Report: 138072-03

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EC-TYPE EXAMINATION CERTIFICATE No. DEMKO 05 ATEX 138072X

Li or Li/Ri	0,5mH or 83 [μ H/ Ω]	-	14 mH
Ci	50pF	50pF	50pF

Installation instructions

The sensor shall be installed in accordance with the information in the instructions manual.

Field wiring shall be in accordance with national rules and applicable standards e.g. EN60079-14 and -25.

- [16] Report No.
Project Report No.: 138072-02, -03 (Hazardous Location Testing)

Drawings:

Number	Date	Description
083R0601	2005.11.17	R-INSTRUCTION ATEX

- [17] Special conditions for safe use:

- Ambient temperatures rating and the media temperature in relation to the temperature classification shall be observed.
- The intrinsic safety data for the FC300 is without the cable data and shall be evaluated separately.
- The relation between maximum pressure and the media temperature in the sensor:

FC300 Sensor tube materials	Media temperature	DN4 MPa	DN4 bar
1.4435 (316L)	20 °C	13,0	130
1.4435 (316L)	180 °C	10,0	100
2.4602 (Hastelloy C-22)	20 °C	41,0	410
2.4602 (Hastelloy C-22)	180 °C	32,0	320

Allowed working pressures and testing pressures have been calculated according to EN 13480-3:2002.

- [18] Essential Health and Safety Requirements

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The manufacturer shall inform the notified body concerning all modifications to the technical documentation as described in ANNEX III to Directive 94/9/EC of the European Parliament and the Council of 23 March 1994.

On behalf of UL International Demko A/S

Herlev, 2006-01-02

Karina Christiansen
Certification Manager

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Report: 138072-03

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For more information

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