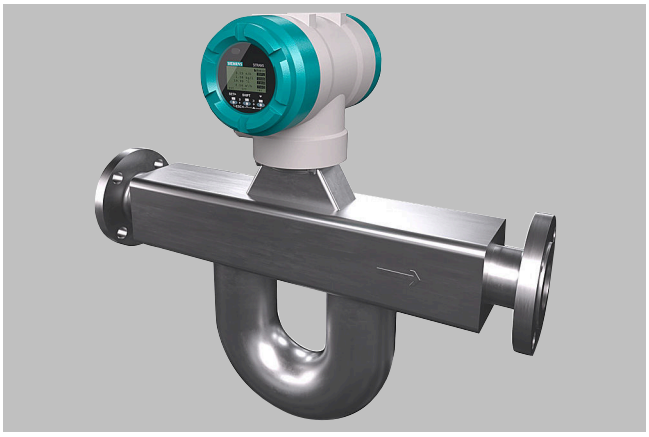
Overview

FCT020 is the standard transmitter, suitable for general purpose applications. It delivers accurate and precise measurements of mass flow rate, density, temperature and volume flow rate.

The FCT020 transmitter is available in compact or remote design and can be combined with all SITRANS FC sensors. The selection is made within the complete SITRANS FC ordering code.

Spare transmitters are selected using the SITRANS FC ordering code, but with no sensor selected.



Example of SITRANS FCT transmitter mounted on SITRANS FCS600

FCT transmitter and SITRANS FCS100

Following features are available in the FCT020 transmitter:

- Tube health check

Tube health check

(software functions option code: S12)

Tube health check monitors key diagnostics, including tube stiffness, driver and pickups. Self-verification alerts to potential performance issues due to unplanned process events, for example gas or vapor breakout, or solid deposits building up in the tubes. The user defines verification frequency and alarm behavior. Verification results indicate whether preventive maintenance action is required.

Overview (continued)

Specification overview of SITRANS FCT020	
Typical measurement performance	• Mass flow accuracy: ± 0.2% (of rate) • Density accuracy: ± 4 kg/m³ (0.25 lb/ft³)
Features and functions	• Easy setup wizard • microSD card • Tube health check • Self-verification
Available measurements	• Mass flow • Density • Temperature • Volume flow
Digital communication options	• HART • MODBUS

Function

Tube health check

- Order code: **S12**

Tube health check monitors key diagnostics, including tube stiffness, driver and pickups. Self-verification alerts to potential performance issues due to unplanned process events, for example gas or vapor breakout, or solid deposits building up in the tubes. The user defines verification frequency and alarm behavior. Verification results indicate whether preventive maintenance action is required.

Overview of functions and features

Overview of the main functions and features of FCT020 transmitter	
Primary measurements	• Mass flow rate liquids (0.2% accuracy) • Mass flow rate gases (0.75% accuracy) • Density (accuracy 4 kg/m³ (0.25 lb/ft³)) • Temperature
Secondary measurements	• Volume flow rate liquids • Actual volume flow rate gases • Normal (standard) volume flow rate gases
Configuration and diagnostics	• microSD card (transmitter with display) • Easy setup wizard • Tube health check (self-verification) • Event management to NAMUR NE107
Inputs and outputs	• Up to 4 combined inputs and outputs
Inputs	• Status input
Outputs	• Analog output • Pulse (frequency) or status output • Status output • Option for internal pull-up resistor
Digital communications	• HART • MODBUS (in preparation)
Enclosure options	• Aluminum alloy with standard powder coating • Aluminum alloy with corrosion resistant coating • Stainless steel CF-8M (remote only)
Power supply	• Universal (AC and DC)

Configuration

Overview of available inputs, outputs and digital communications

The table below provides a matrix of all available combinations for FCT020 transmitters.

Each combination is defined by a blend of two order code options:

- Ch 1 codes in the form "**E..**" define the required type of digital communication.
- Ch 2-4 codes in the form "**F..**" define the required combination of conventional inputs and outputs.

Abbreviations used in the table:

- Pulse or status output is abbreviated to "P/S output".
- Status only output is abbreviated to "S output".
- Status input is abbreviated to "S input".

Ch 1 code	Ch 2-4 code	I/O 1 (Channel 1)	I/O 2 (Channel 2)	I/O 3 (Channel 3)	I/O 4 (Channel 4)
E00	**F00**	none	none	none	none
E07 [1]	**F01**	passive mA HART output	passive P/S output	passive mA output	none
E07 [1]	**F02**	passive mA HART output	passive P/S output	passive mA output	passive P/S output
E07 [1]	**F03**	passive mA HART output	passive P/S output NAMUR	passive mA output	none
E07 [1]	**F04**	passive mA HART output	passive P/S output NAMUR	passive mA output	passive P/S output NAMUR
E06	**F11**	active mA HART output	passive P/S output	none	none
E06	**F12**	active mA HART output	passive P/S output	passive S output	passive P/S output
E06	**F13**	active mA HART output	passive P/S output	volt free S input	passive P/S output
E06	**F20**	active mA HART output	passive P/S output	volt free S input	active P/S output
E06	**F21**	active mA HART output	passive P/S output	volt free S input	active P/S output and pull-up
E06	**F22**	active mA HART output	passive P/S output	passive P/S output	active mA output
E06	**F23**	active mA HART output	passive P/S output	volt free S input	active mA output
E14	**F31**	none	passive P/S output	MODBUS C	MODBUS A & B
E14	**F32**	passive P/S output	passive P/S output	MODBUS C	MODBUS A & B
E14	**F35**	active P/S output	passive P/S output	MODBUS C	MODBUS A & B
E14	**F36**	active P/S output and pull-up	passive P/S output	MODBUS C	MODBUS A & B
E14	**F37**	active mA output	passive P/S output	MODBUS C	MODBUS A & B

[1] Any combinations with passive mA HART output on Channel are only possible with Ex approval. All outputs in these combinations are intrinsically safe.

Technical specifications

Mechanical specifications

Material specifications			
Housing material options	**Coating**	**Design**	**Order code position 14**
Cast aluminum alloy Al-Si10Mg(Fe)	Standard coating[1)]	Remote transmitter	C or D
Cast aluminum alloy Al-Si10Mg(Fe)	Corrosion resistant coating[2)]	Remote transmitter	E or F
ASTM CF8M stainless steel	None	Remote transmitter	G or H
Display			
Material of the lid window	Glass		
Mounting bracket[3)]			
Material	AISI 316L stainless steel	W Nr. 1.4404	
Nameplates[4)]	**Process temperature range**	**Nameplate material**	
Transmitter with cast aluminum housing	Not applicable	Foil	
Transmitter with ASTM CF8M stainless steel housing	Not applicable	AISI 316L ss	

1) Standard coating is urethane cured polyester powder coating.
2) Corrosion protection coating is a three-layer coating with high chemical resistance (polyurethane coating on two layers of epoxy).
3) Only the remote transmitters are supplied with a mounting bracket.
4) Nameplate material depends on the materials selected for SITRANS FC sensors.

Electrical specifications

Power supply	
Alternating current voltage (rms)	nominal 24 V AC (-15% ... +10%), or 100 ... 240 V AC (-20% ... +10%)
Frequency	47 ... 63 Hz
Direct current voltage	nominal 24 V DC (-15% ... +20%) or 100 ... 120 V DC (-10% ... +8.3%)
Power consumption	P ≤ 10 W (including sensor)

Notes:

- For DNV approval option supply voltage is limited to 24 V.
- NAMUR NE21 testing specifies the range 24 V DC ±20% under NE21 test conditions.

Power supply failure

In the event of a power failure, the flowmeter data are backed up on a non-volatile internal memory. In case of devices with display, the characteristic sensor values, such as nominal diameter, serial number, calibration constants, zero point and the error history are also stored on a microSD card.

Galvanic isolation

All circuits for inputs, outputs and power supply are galvanically isolated from each other.

Analog inputs and outputs

Analog input

FCT020 transmitters cannot be specified with analog current input.

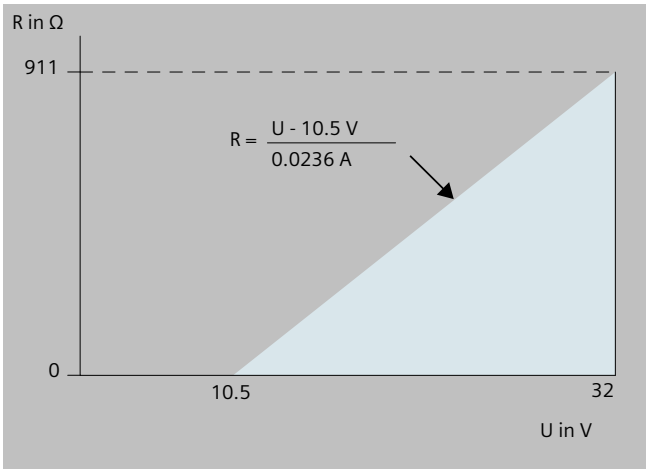
Analog output

Up to 2 analog outputs can be selected at time of ordering. The analog outputs can be configured to represent the following measured values:

- Flow rate (mass, volume, net partial component flow of a mixture)
- Density
- Temperature
- Pressure
- Concentration

HART communication, when selected, is supplied on channel 1 (I/O 1). The current output may be operated in compliance with the NAMUR NE43 standard.

Analog outputs	
Active output	
Nominal output current range	4 ... 20 mA
Maximum output current range	2.4 ... 21.6 mA
Load resistance	≤ 750 Ω
Load resistance for secure HART communication	230 ... 600 Ω
Passive output	
Nominal output current range	4 ... 20 mA
Maximum output current range	2.4 ... 21.6 mA
External power supply	10.5 ... 32 VDC
Load resistance for secure HART communication	230 ... 600 Ω
Load resistance at current output	≤ 911 Ω



Maximum load resistance as a function of an external power supply voltage

Technical specifications (continued)

Digital inputs and outputs

Digital inputs (status)

Do not connect a signal source with electric voltage.

The status input is provided for use of voltage-free contacts with the following specification:

Resistance when closed	< 200 Ω
Resistance when open	> 100 kΩ

Digital outputs

Digital outputs	
Active pulse output available on Pulse/Status output, connection of an electronic counter[1]	
Load resistance	> 1 kΩ
Internal power supply	24 V DC ±20%
Maximum pulse rate	10 000 pulses/s
Frequency range	0 ... 12.5 kHz
Active pulse output available on Pulse/Status output, connection of an electromechanical counter	
Maximum current	150 mA
Average current	≤ 30 mA
Internal power supply	24 V DC ±20%
Maximum pulse rate	2 pulses/s
Pulse width	20, 33, 50, or 100 ms
Active pulse output available on Pulse/Status output, with internal pull-up resistor	
Internal power supply	24 V DC ±20%
Internal pull-up resistor	2.2 kΩ
Maximum pulse rate	10 000 pulses/s
Frequency range	0 ... 12.5 kHz
Passive pulse output available on Pulse/Status output[1]	
Maximum load current	≤ 200 mA
External power supply	≤ 30 V DC
Maximum pulse rate	10 000 pulses/s
Frequency range	0 to 12.5 kHz
Active status output available on Pulse/Status output[2]	
Load resistance	> 1 kΩ
Internal power supply	24 V DC ±20%
Active status output available on Pulse/Status output, with internal pull-up resistor[3]	
Internal pull-up resistor	2.2 kΩ
Internal power supply	24 V DC ±20%
Passive status output available on Pulse/Status output, or Status output	
Output current	≤ 200 mA
External power supply	≤ 30 V DC
Passive pulse or status output available on Pulse/Status output (NAMUR)	Output signals according to EN 60947-5-6 (previously NAMUR, worksheet NA001)

1) Maximum voltage and correct polarity must be observed for wiring.
2) Since this is a transistor contact, maximum allowed current as well as polarity and level of output voltage must be observed during wiring.
3) A relay must be connected in series to switch alternating voltage.

Digital communications

Each transmitter is configured with one default digital communication interface, selectable in the SITRANS FC order code.

HART

- When selected, HART communication is supplied on the output terminal pair I/O 1.
- Up to 3 further input/output options can be configured for output terminal pairs I/O 2, I/O 3, and I/O 4.
- HART is available with either non-intrinsically safe or intrinsically safe outputs.

PROFIBUS PA

- When selected, PROFIBUS PA communication is supplied on the output terminal pair I/O 1.
- PROFIBUS PA interface is available with and without intrinsic safety.
- PROFIBUS PA digital communication signal is in accordance with IEC 61158/61784.
- Maximum voltage and correct polarity must be observed for wiring.
- Power supply: 9 ... 32 V DC
- Current draw: 15 mA (maximum)
- Compliance with PA profile revision 3.02 supporting: Condensed Status (NE107)
- Device identification number (IDENT_NUMBER) adaption

Summary of available function blocks – PROFIBUS PA

Function block	Code	Description
Transducer block	FTB	Flow
	CTB	Concentration
	LTB	LCD Indicator
	MTB	Maintenance
	SDBT	Advanced diagnostics
Analog input block [1]	AI1	Mass flow
	AI2	Density
	AI3	Temperature
	AI4	Volume flow
	AI5	Reference density
	AI6	Corrected (normal/standard) volume flow
Totalizer block [1]	TOT1	Mass
	TOT2	Volume
	TOT3	Corrected (normal/standard) volume
Analog output block [1]	AO	Pressure

1) Factory default setting. Assignment can be changed by parameter "channel".

Available function blocks are also influenced by the type of device description file (GSD) being used. For further details, please contact your regional Siemens Measurement Intelligence team.

MODBUS

(in preparation for later release)

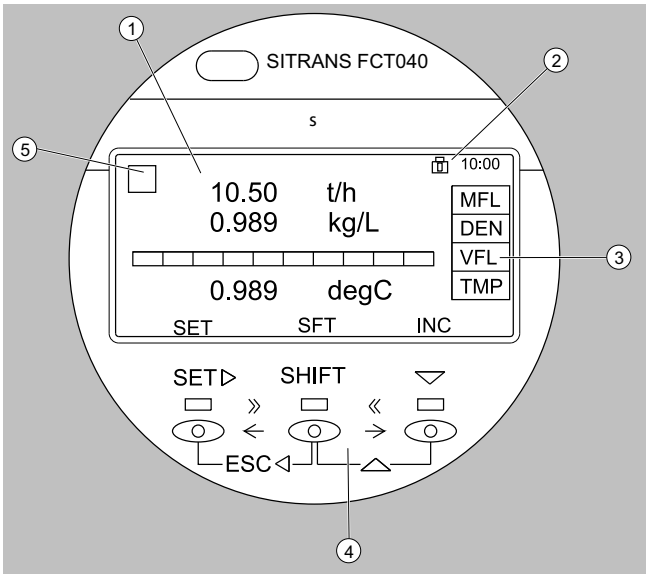
- The MODBUS interface is available with up to two additional input/output options.
- When selected, MODBUS communication is supplied on the terminal pairs I/O 3 and I/O 4.
- The digital MODBUS communication signal is in accordance with EIA-485 standard (RS 485).

Technical specifications (continued)

PROFINET over Ethernet-APL
(in preparation for later release)

Display attributes	
Type	4-line dot-matrix display
Resolution	128 × 64 (W × H) dots
Size	64.6 × 31.2 mm (2.54" × 1.23")
Control	via IR switches

Numerical values entered via the display are limited to six digits for process variables and eight digits for totalizer.



Display layout

1	Measured quantities and units
2	Status icon and time
3	Measured quantity abbreviation
4	IR switches
5	Alarm symbol

The controls on the display are IR switches. They respond as soon as an object, such as a finger, is in proximity. It is not necessary to apply pressure to the display surface.

The display unit includes a slot for the microSD card.

microSD card specifications	
Type	Industrial Grade microSD card, compliant with SD specification version 2.0
Physical dimension	15 × 11 × 1.0 mm (± 0.1 mm) (0.6 × 0.4 × 0.04 inch (± 0.004 inch))
Capacity	1 GB
Sequential throughput (read)	24.01 MB/s
Sequential throughput (write)	17.96 MB/s

It is recommended to use the microSD card included with the SITRANS FCT transmitter. Functionality of the device cannot be guaranteed if other cards are used.

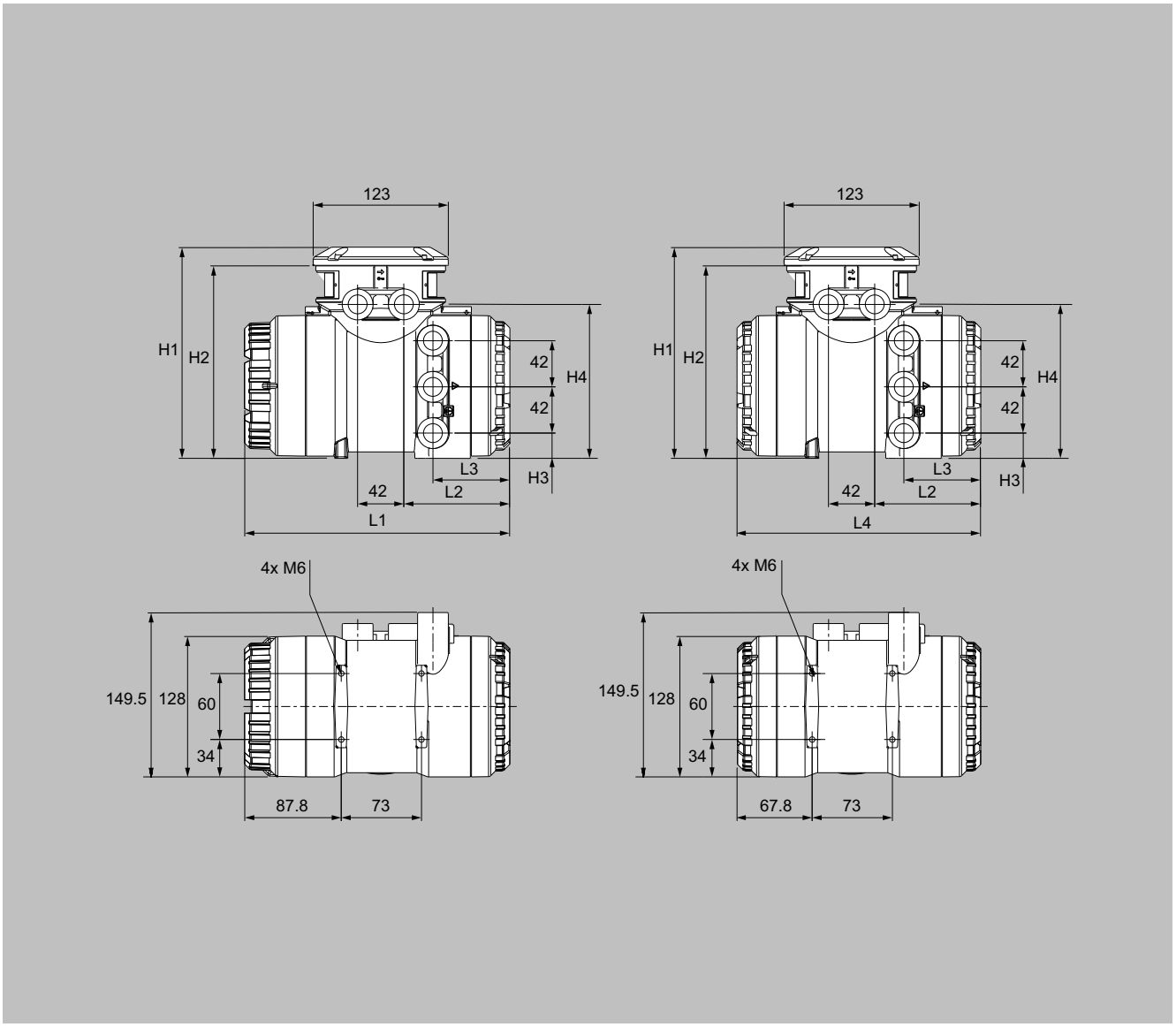
Cable specifications

For remote type devices, an interconnecting cable must be used to connect the sensor to the transmitter. The device specifications, stated in this document, are valid only if one of the original SITRANS FC interconnecting cables is used.

Standard cable length options are specified up to 30 m are specified in the order code to maintain the stated specifications. Cables longer than 30 m (98 ft) are available but must be ordered as separate items. For further details, please contact your regional Siemens Measurement Intelligence team.

Dimensional drawings

SITRANS FCT020 transmitter dimensions

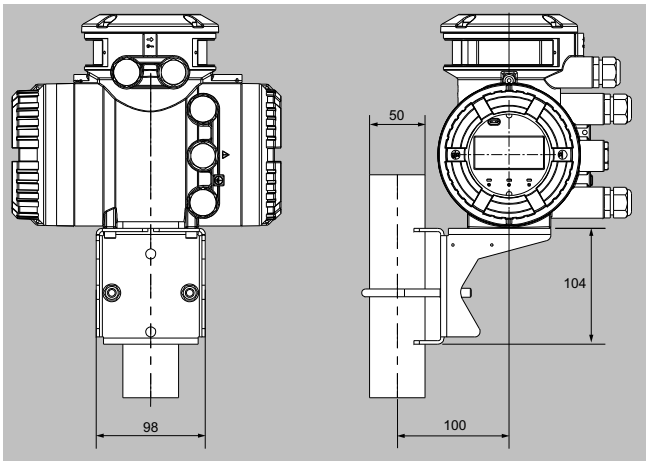


Dimensions of FCT020 transmitter in mm. Transmitter with display shown on the left. Transmitter without display shown on the right.

Dimensions L1 to L4 and H1 to H4 (material options: stainless steel, aluminum)

Material	L1 in mm (inch)	L2 in mm (inch)	L3 in mm (inch)	L4 in mm (inch)	H1 in mm (inch)	H2 in mm (inch)	H3 in mm (inch)	H4 in mm (inch)
Stainless steel	255.5 (10.06)	110.5 (4.35)	69 (2.72)	235 (9.25)	201 (7.91)	184 (7.24)	24 (0.94)	150.5 (5.93)
Aluminum	241.5 (9.51)	96.5 (3.8)	70 (2.76)	221 (8.7)	192 (7.56)	175 (6.89)	23 (0.91)	140 (5.51)

Dimensional drawings (continued)



Dimensions of transmitter in mm, attached to mounting bracket

Transmitter weights

Design type	Transmitter enclosure material	Weight in kg (lb)
Remote	Cast aluminum	4.2 (9.3)
	CF-8M stainless steel	12.5 (27.6)