User's Manual

ROTA*MASS* Total Insight

Coriolis Mass Flow and Density Meter

Explosion Proof Type Manual
IECEx

IM 01U10X02-00EN-R

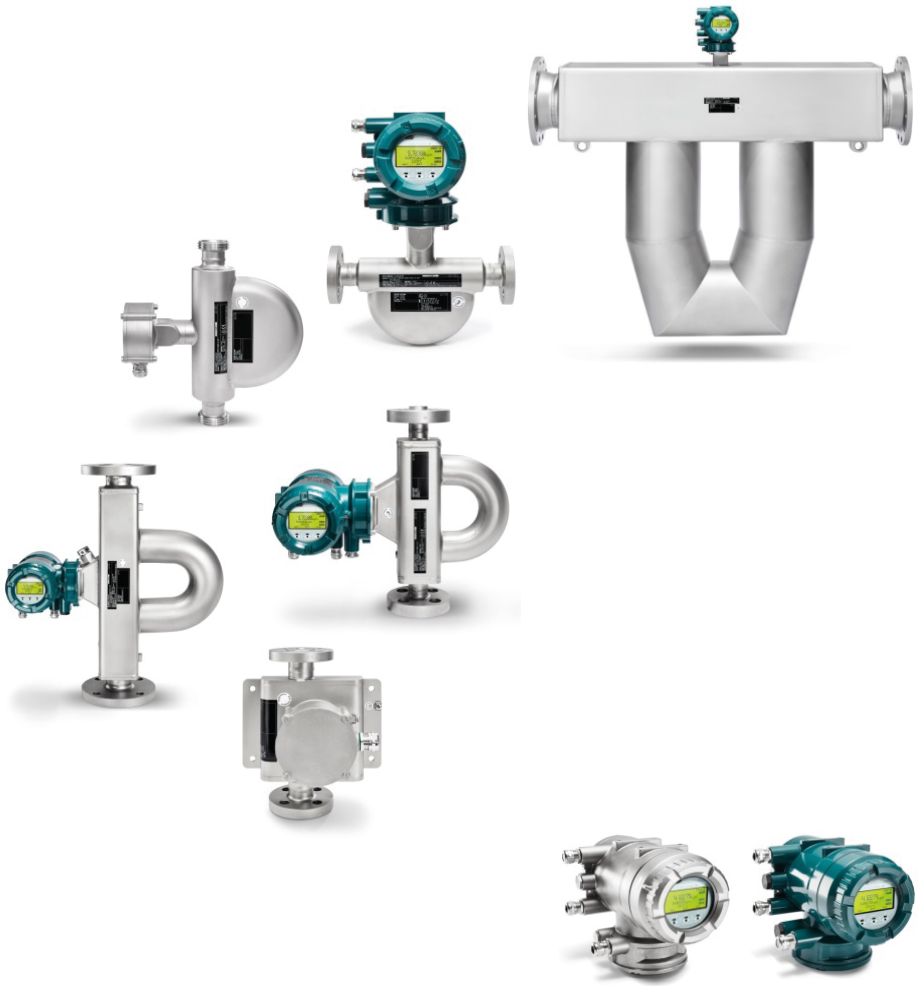


Table of contents

1 Introduction

1.1 Scope of application

These instructions apply to the following Rotamass Total Insight product families:

- Rotamass Nano
- Rotamass Supreme
- Rotamass Giga
- Rotamass Prime
- Rotamass Intense
- Rotamass Hygienic
- Rotamass CNG
- Rotamass LPG
- Rotamass Total Insight transmitter in combination with any Rotamass Total Insight sensor or Rotamass 3 sensor

The availability of product families is defined by the applicable General Specifications.

1.2 Applicable documents

The following documents are part of these instructions:

- Quick Reference
- User´s Manual
- Software Instruction Manuals
- General Specifications

1.3 Explanation

␣ is used as a placeholder for a single character.

2 Nameplates

The sensor as well as the transmitter each contain a main nameplate and an additional nameplate that feature different information.

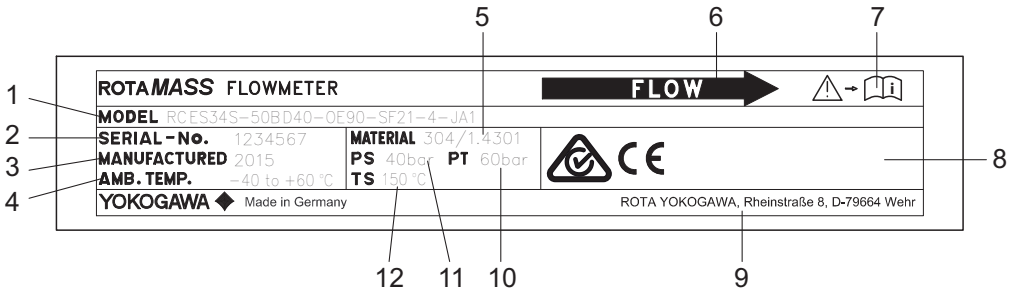
NOTICE

For individual applications (e.g. marine applications with option MC_) additional limitations to those on the nameplate may apply according to the respective applicable regulations. The language of the nameplates may vary depending on the selected option (e.g. Russian language with option VE).

The variants of the nameplates are described below.

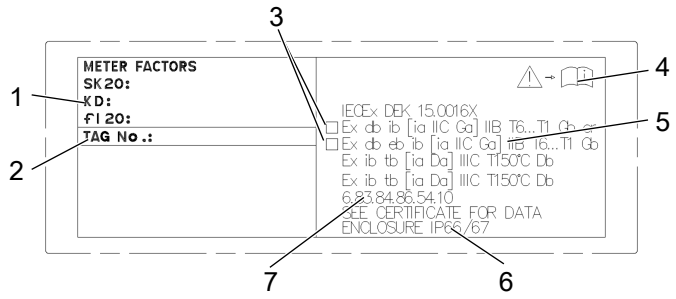
2.1 Sensor, integral type

Main nameplate



1	Model code
2	Serial number
3	Year of manufacture
4	Ambient temperature range
5	Material wetted parts
6	Flow direction
7	Warning with the request to read the documentation
8	Area for conformity marking
9	Manufacturer's address
10	Test pressure
11	Maximum allowed working pressure at room temperature
12	Maximum allowed process fluid temperature

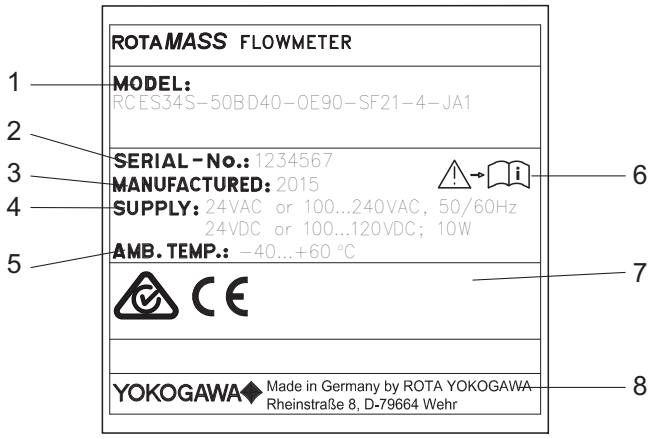
Additional nameplate



1	Calibration constants of sensor
2	Customer-specific identification
3	Identification field for use according to Ex db or Ex db eb
4	Warning with the request to read the documentation
5	Identification of type of protection, explosion group, temperature classes and equipment protection level
6	IP code
7	Ex code

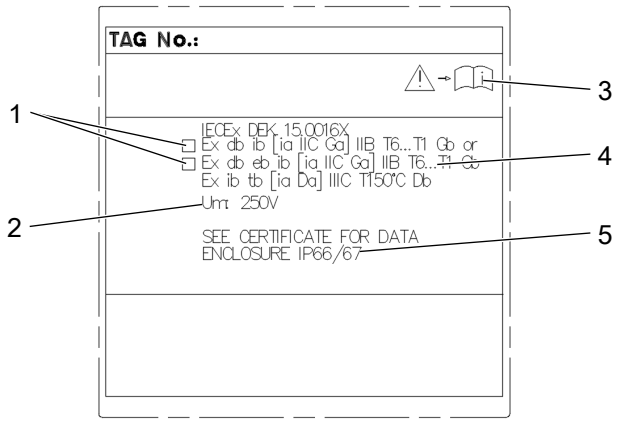
2.2 Transmitter, integral type

Main nameplate



1 Model code
2 Serial number
3 Year of manufacture
4 Power supply range
5 Ambient temperature range
6 Warning with the request to read the documentation
7 Area for conformity marking
8 Manufacturer's address

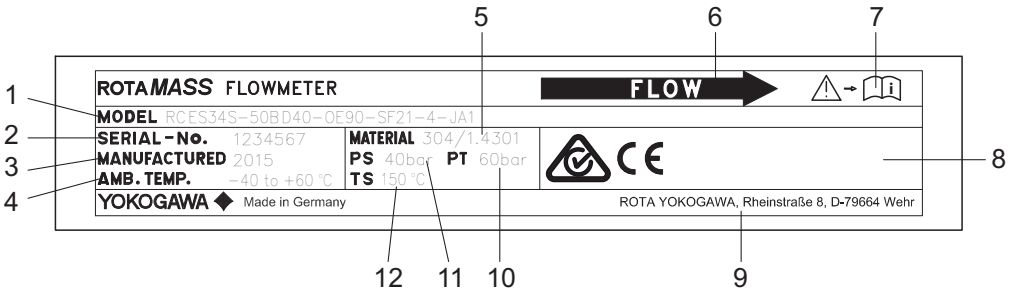
Additional nameplate



1 Identification field for use according to Ex db or Ex db eb
2 Maximum r.m.s. a.c. or d.c. voltage
3 Warning with the request to read the documentation
4 Identification of type of protection, explosion group, temperature classes and equipment protection level
5 IP code

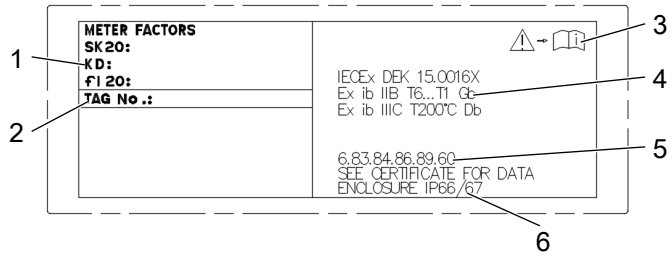
2.3 Sensor, remote type

Main nameplate



1	Model code
2	Serial number
3	Year of manufacture
4	Ambient temperature range
5	Material wetted parts
6	Flow direction
7	Warning with the request to read the documentation
8	Area for conformity marking
9	Manufacturer's address
10	Test pressure
11	Maximum allowed working pressure at room temperature
12	Maximum allowed process fluid temperature

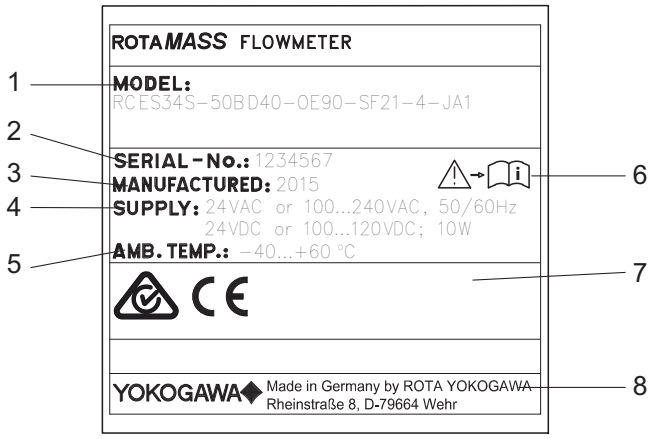
Additional nameplate



1	Calibration constants of sensor
2	Customer-specific identification
3	Warning with the request to read the documentation
4	Identification of type of protection, explosion group, temperature classes and equipment protection level
5	Ex code
6	IP code

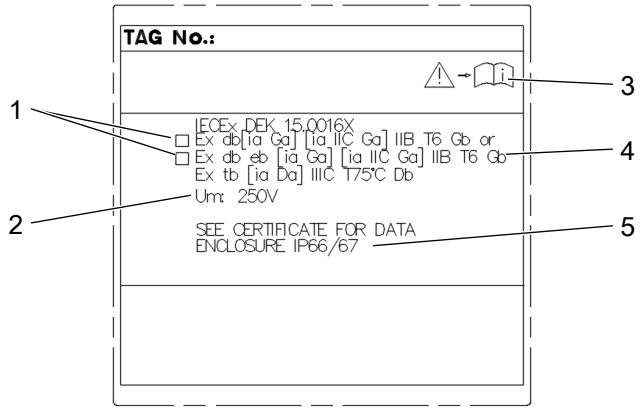
2.4 Transmitter, remote type

Main nameplate



1 Model code
2 Serial number
3 Year of manufacture
4 Power supply range
5 Ambient temperature range
6 Warning with the request to read the documentation
7 Area for conformity marking
8 Manufacturer's address

Additional nameplate



1 Identification field for use according to Ex db or Ex db eb
2 Maximum r.m.s. a.c. or d.c. voltage
3 Warning with the request to read the documentation
4 Identification of type of protection, explosion group, temperature classes and equipment protection level
5 IP code

3 Ordering information

3.1 Model code description

General specifications

All available properties of the Rotamass Total Insight Coriolis mass flow and density meter are specified by means of a model code.

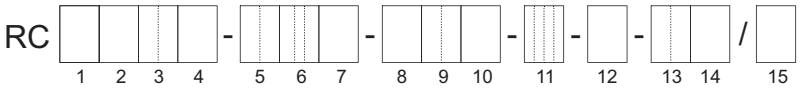
The position of the model code relevant to the respective property is depicted and highlighted in blue.

A complete description of the model code is included in the General Specifications (GS) of the corresponding product family.

The model code of the Rotamass Total Insight is explained below.

Items 1 through 14 are mandatory entries and must be specified at the time of ordering.

Device options (item 15) can be selected and specified individually by separating them with slashes.



1	Transmitter
2	Sensor
3	Meter size
4	Material wetted parts
5	Process connection size
6	Process connection type
7	Sensor housing material
8	Process fluid temperature range
9	Mass flow and density accuracy
10	Design and housing
11	Ex approval
12	Cable entries
13	Communication type and I/O
14	Display
15	Options

4 Installation

4.1 General installation rules

⚠ DANGER

Explosion hazard from electrostatic discharge or brush discharge

Life-threatening injuries or ignition of explosive atmospheres

- Avoid actions that could lead to electrostatic discharges. For example, do not wipe the coated surface of the transmitter using a piece of cloth.
- Install the device in zone 1 or 21 so as to avoid the risk of electrostatic discharges and brush discharges caused by rapid dust flow.

Modifying the Coriolis mass flow meter as well as using unauthorized parts is prohibited and will void the certification.

Service and repair must be done by Yokogawa trained personal!

- Only trained personnel may install and operate the device in an industrial environment.
- The instructions have to be read and understood by all persons authorized with the transport, storage, installation, electrical installation, commissioning, operation, maintenance and disposal of the Coriolis mass flow meter in hazardous areas.
- The respective applicable national safety regulations concerning the installation of the Coriolis mass flow meter in hazardous areas must be followed.
- Only media to which the wetted parts are sufficiently resistant may be used.
- The use of suitable cable glands must be ensured, see *Threads for cable glands [▶ 12]*.
- Ambient and process fluid temperature must not exceed the respective maximum values for the applicable *Temperature specification by temperature classes [▶ 60]*.
- The integral type and the remote-type transmitter must not be insulated.

4.2 Threads for cable glands

The terminal box in the transmitter for connecting the sensor is certified as Ex i. IP66/67-certified cable glands and blind plugs must be used for this connection. At a minimum, the allowable temperature range for cable glands and blind plugs must extend from -40 – +80 °C.

The housing of the transmitter is designed as type of protection Ex db. Optionally, the terminal box for the power supply and the inputs/outputs is also certified as Ex eb. Properly certified cable glands and blind plugs must be used for this purpose. At a minimum, the allowable temperature range for cable glands and blind plugs must extend from -40 – +80 °C. The type of protection is to be indicated on the nameplate's identification fields, see *Nameplates [▶ 5]*.

If the device is to be operated without communication lines, properly classified and certified blind plugs must be installed.

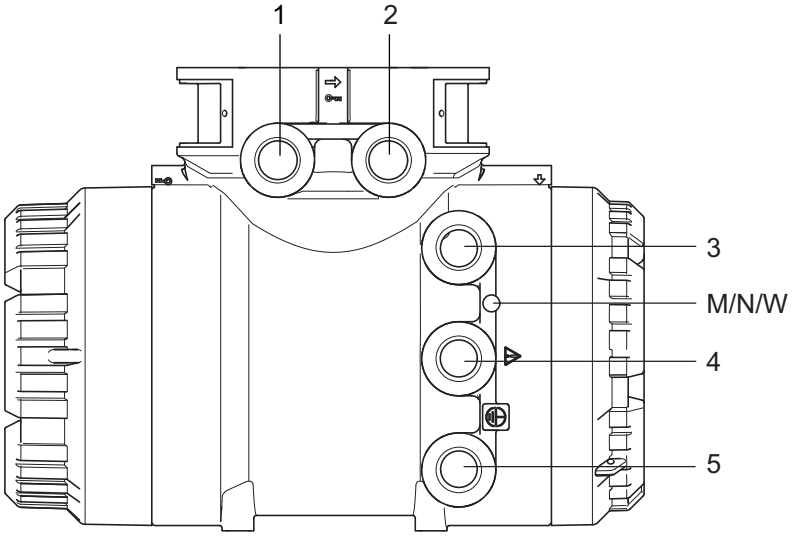
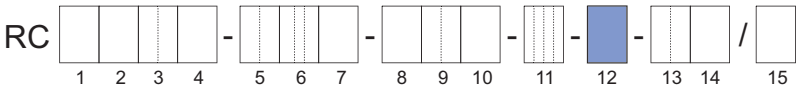


Fig. 1: Threads for the cable glands of the transmitter

1 – 5	Thread position, see the following table
M	Marking of thread size: ISO M20 × 1.5
N or W	Marking of thread size: ANSI 1/2" NPT

The following figure shows the relevant position of the model code:



Thread	model code Position 12	Thread position	Delivery state		Notes
			Integral type	Remote type	
ISO M20 × 1.5	4	1	Blind plug IP66/67, factory-installed	Metal cable gland IP66/67, factory-installed	–
		2	Blind plug IP66/67, factory-installed	Blind plug IP66/67, factory-installed	–
		3	IECEx certified cable gland, minimum IP66/67, factory-added		The user must install professionally a cable gland with minimum IP66/67 that is IECEx certified according to the type of protection used.
		4	IECEx certified blind plug, minimum IP66/67, factory-added.		The user must install professionally a blind plug or cable gland with minimum IP66/67 that is IECEx certified according to the type of protection used.
		5	IECEx certified cable gland, minimum IP66/67, factory-added		The user must install professionally a cable gland with minimum IP66/67 that is IECEx certified according to the type of protection used.
ANSI 1/2" NPT	2	1	Blind plug IP66/67, factory-installed	Metal cable gland IP66/67, factory-installed	–
		2	Blind plug IP66/67, factory-installed	Blind plug IP66/67, factory-installed	–
		3	–		The user must install professionally a cable gland with minimum IP66/67 that is IECEx certified according to the type of protection used.
		4	IECEx certified blind plug, minimum IP66/67, factory-added.		The user must install professionally a blind plug or cable gland with minimum IP66/67 that is IECEx certified according to the type of protection used.
		5	–		The user must install professionally a cable gland with minimum IP66/67 that is IECEx certified according to the type of protection used.

The cable gland of the sensor is factory-installed. The actual temperature of the cable gland must not be less than -50 ° C and not more than + 100 ° C for device option L␣␣␣, and not more than 80 ° C for device option Y␣␣␣.

Blind plugs, which are installed in ANSI 1/2" NPT threads, may not be removed, because the thread will be damaged and does not fulfil the explosion proof requirements!

4.3 Flameproof transmitter threads

Ex-certified models are equipped with a flameproof transmitter housing.

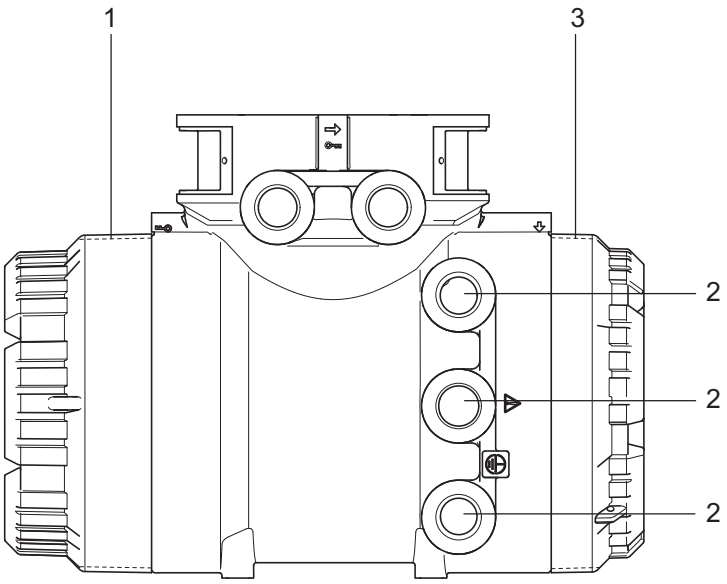


Fig. 2: Flameproof transmitter threads

1 Thread for display cover
2 Threads for cable glands or blind plugs
3 Thread for back cover

Tab. 1: Technical data of flameproof threads

Thread		**Lead** in mm	**Tolerance field**	**Threads in engage-ment**	**Minimum screw-in depth** in mm
Display cover		2	6g/6H	≥ 7	≥ 14
Back cover		2			
Cable glands	ISO M20 × 1.5	1.5	6H	≥ 10	≥ 15
	ANSI 1/2" NPT	1.814	acc. to ANSI B 1.20.1	≥ 6	≥ 13.605

5 Wiring

5.1 General rules

⚠ DANGER

Insufficient connection to the potential equalization system

Life-threatening injuries from electric shock or ignition of explosive atmospheres

- Connect remote-type sensor via the grounding terminal outside of the housing to the potential equalization system, see *Grounding connections and intrinsically safe circuits [▷ 17]*.
- Connect transmitter to the potential equalization system via the grounding terminal outside of the housing, see *Grounding connections and intrinsically safe circuits [▷ 17]*.
- Connect grounding cable of power supply cable to the grounding screw in the terminal box, see *Grounding connections and intrinsically safe circuits [▷ 17]*.

- The relevant national standards must be considered for the electrical installation.
- Rotamass must be integrated into the potential equalization system of the hazardous area.
- The potential equalization must be ensured alongside the intrinsically safe circuit.
- The power supply must be established with a voltage ≤ 250 V at the terminals L/+ and N/-.
- The grounding screw in the terminal box must be mechanically firmly connected with the threaded hole.
- If the type of protection Ex eb is used, cable cross sections of 0.8 to 2.5 mm^2 must be used for the cables of the power supply and the cables of the inputs/outputs. The insulation of the cores must be stripped off 5 to 6 mm.
- The cable connections for the inputs/outputs must be established according to the connection tables. In the process, it must be ensured that the connection type matches the corresponding position of the model code on the nameplate.
- The maximum input parameters of the intrinsically safe outputs must not be exceeded.

5.2 Grounding connections and intrinsically safe circuits

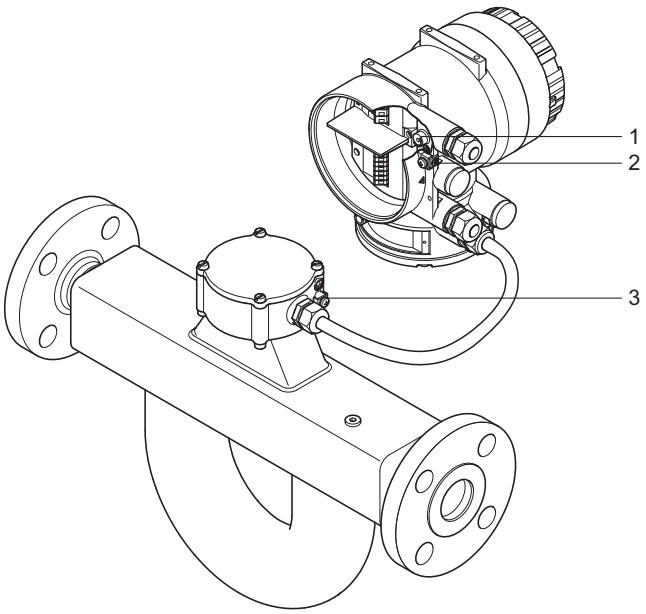


Fig. 3: Grounding connections on transmitter and sensor

1 Grounding screw in terminal box for grounding conductor
2 Grounding terminal on transmitter for potential equalization
3 Grounding terminal on sensor for potential equalization

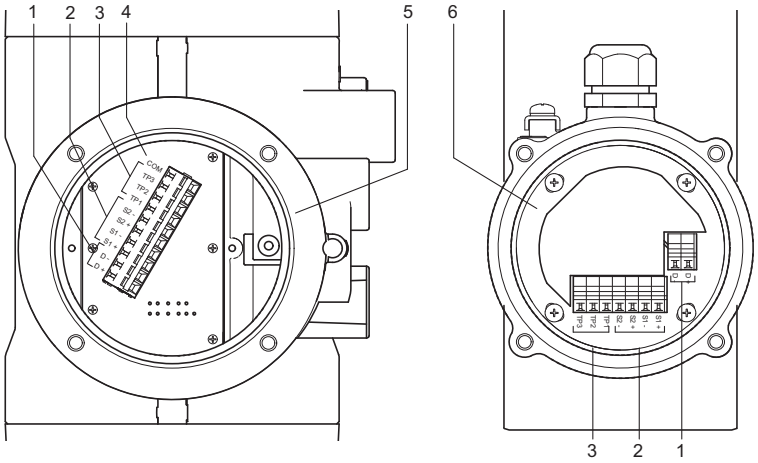


Fig. 4: Connection terminal circuits (transmitter on the left side, sensor on the right side)

1 Driver circuit
2 Sensor circuits
3 Temperature measurement circuits
4 Signal grounding
5 Transmitter
6 Sensor

5.3 Transmitter connection terminals

5.3.1 Configuration for HART communication

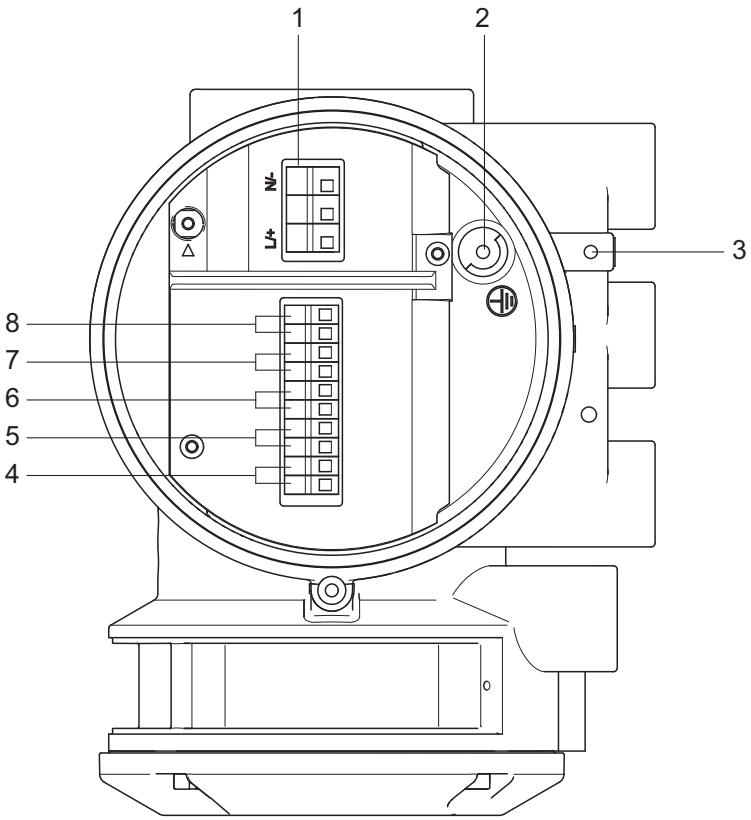
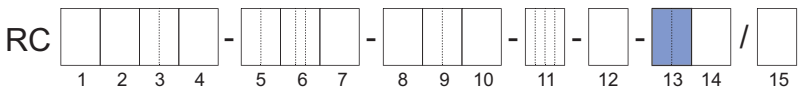


Fig. 5: Terminal box for connection to external devices for HART and for the transmitter power supply

1 Power supply connection terminals
2 Grounding screw in terminal box
3 Grounding terminal
4 Connection terminals for I/O1 +/-
5 Connection terminals for I/O2 +/-
6 Connection terminals for I/O3 +/-
7 Connection terminals for I/O4 +/-
8 WP: Write-protection terminal

The applicable operating instructions must be observed for connecting the cables.

The connection terminal assignments for I/O are defined according to the product variant ordered. The following figure shows the relevant position of the model code:



Tab. 2: Connection terminal assignment for HART

Model code Position 13	Connection terminal assignment				
	I/O1 +/-	I/O2 +/-	I/O3 +/-	I/O4 +/-	WP
JA	Iout1 Active	P/Sout1 Passive	–	–	Write-protect
JB	Iout1 Active	P/Sout1 Passive	P/Sout2 Passive	Iout2 Active	Write-protect
JC	Iout1 Active	P/Sout1 Passive	Sin	Iout2 Active	Write-protect
JD	Iout1 Active	P/Sout1 Passive	Sout Passive	P/Sout2 Passive	Write-protect
JE	Iout1 Active	P/Sout1 Passive	Sin	P/Sout2 Passive	Write-protect
JF	Iout1 Active	P/Sout1 Passive	Sin	P/Sout2 Active Internal pull-up resistor	Write-protect
JG	Iout1 Active	P/Sout1 Passive	Sin	P/Sout2 Active	Write-protect
JH	Iout1 Active	P/Sout1 Passive	Iout2 Passive	Iin Active	Write-protect
JJ	Iout1 Active	P/Sout1 Passive	P/Sout2 Passive	Iin Active	Write-protect
JK	Iout1 Active	P/Sout1 Passive	Sin	Iin Active	Write-protect
JL	Iout1 Active	P/Sout1 Passive	Iout2 Passive	Iin Passive	Write-protect
JM	Iout1 Active	P/Sout1 Passive	P/Sout2 Passive	Iin Passive	Write-protect
JN	Iout1 Active	P/Sout1 Passive	Sin	Iin Passive	Write-protect
JP	Iout1 Passive	P/Sout1 Passive	Iout2 Passive	–	Write-protect
JQ	Iout1 Passive	P/Sout1 Passive	Iout2 Passive	P/Sout2 Passive	Write-protect
JR	Iout1 Passive	P/Sout1 Passive NAMUR	Iout2 Passive	–	Write-protect
JS	Iout1 Passive	P/Sout1 Passive NAMUR	Iout2 Passive	P/Sout2 Passive NAMUR	Write-protect

Iout1	Analog current output with HART communication
Iout2	Analog current output
Iin	Analog current input
P/Sout1	Pulse or status output
P/Sout2	Pulse or status output
Sin	Status input
Sout	Status output

5.3.2 Configuration for Fieldbus communication

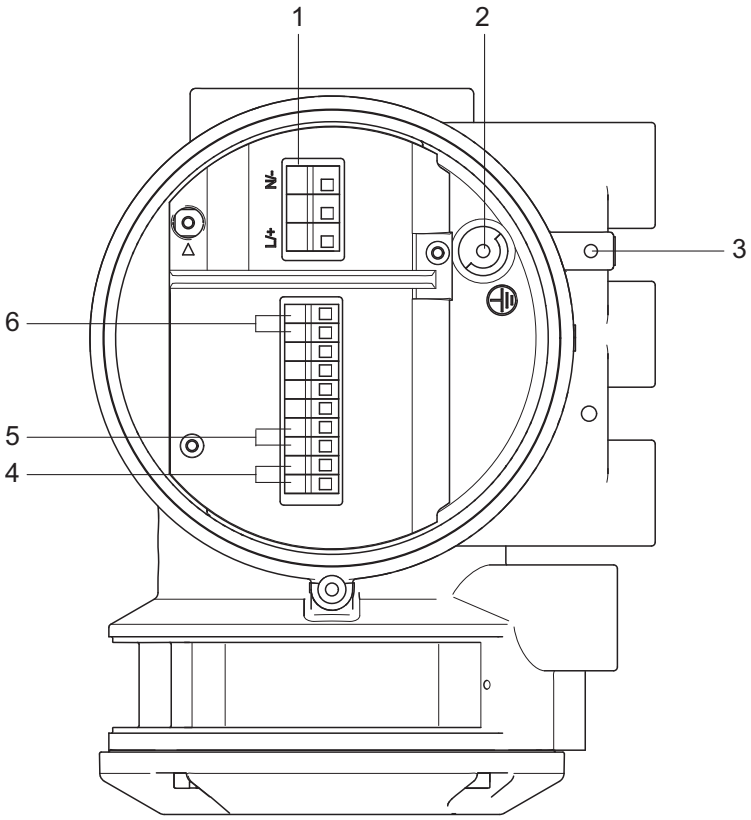
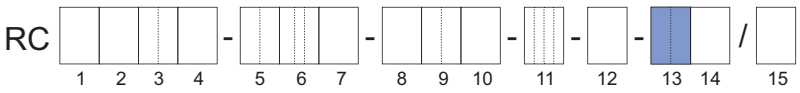


Fig. 6: Terminal box for connection to external devices for Fieldbus and for the transmitter power supply

1 Power supply connection terminals
2 Grounding screw in terminal box
3 Grounding terminal
4 Connection terminals for I/O1+/-
5 Connection terminals for I/O2+/-
6 WP: Write-protection terminal

The applicable operating instructions must be observed for connecting the cables.

The connection terminal assignments for I/O are defined according to the product variant ordered. The following figure shows the relevant position of the model code:



Model code Position 13	Connection terminal assignment				
	I/O1 +/-	I/O2 +/-	I/O3 +/-	I/O4 +/-	WP
F␣	FOUNDATION Fieldbus	P/Sout1 Passive	–	–	Write-protect
G␣	Profibus PA	P/Sout1 Passive	–	–	Write-protect

P/Sout1 Passive pulse or status output
␣ digit

5.3.3 Configuration for Ethernet-APL communication

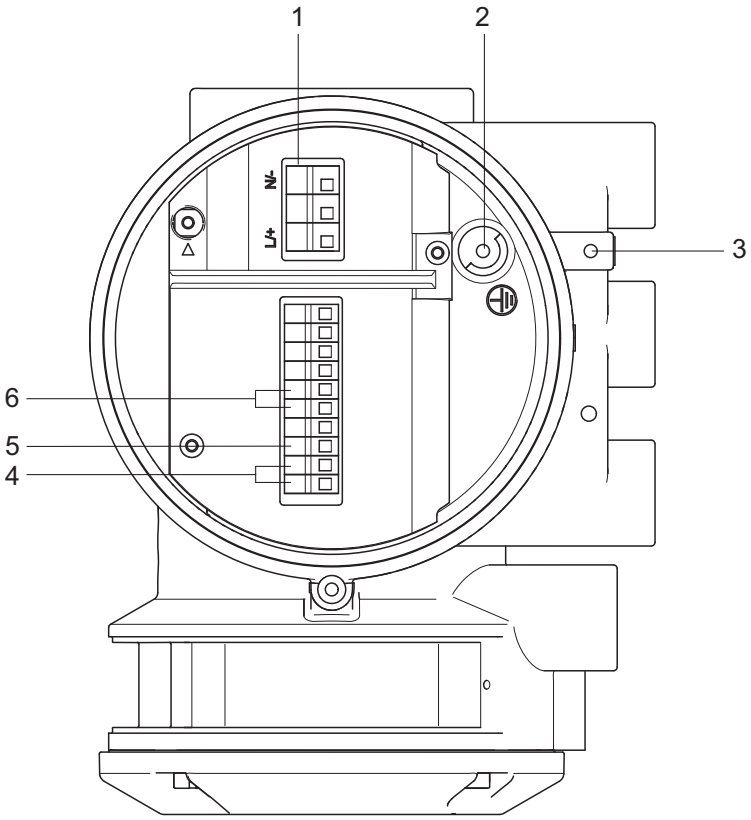


Fig. 7: Terminal box for connection to external devices for Ethernet-APL and for the transmitter power supply

1 Power supply connection terminals
2 Grounding screw in terminal box
3 Grounding terminal
4 Connection terminals for I/O1+/-
5 Connection terminals for I/O2+
6 Connection terminals for I/O3+/-

The applicable operating instructions must be observed for connecting the cables.

The connection terminal assignments for I/O are defined according to the product variant ordered. The following figure shows the relevant position of the model code:

RC □□□□-□□□-□□□-□-□-□□/□

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Model code Position 13	Connection terminal assignment				
	I/O1 +/-	I/O2 +	I/O3 +/-	I/O4 +/-	WP
T␣	Ethernet APL	Shield	P/Sout1 Passive	–	–

P/Sout1 Passive pulse or status output
␣ digit

5.3.4 Configuration for Modbus communication

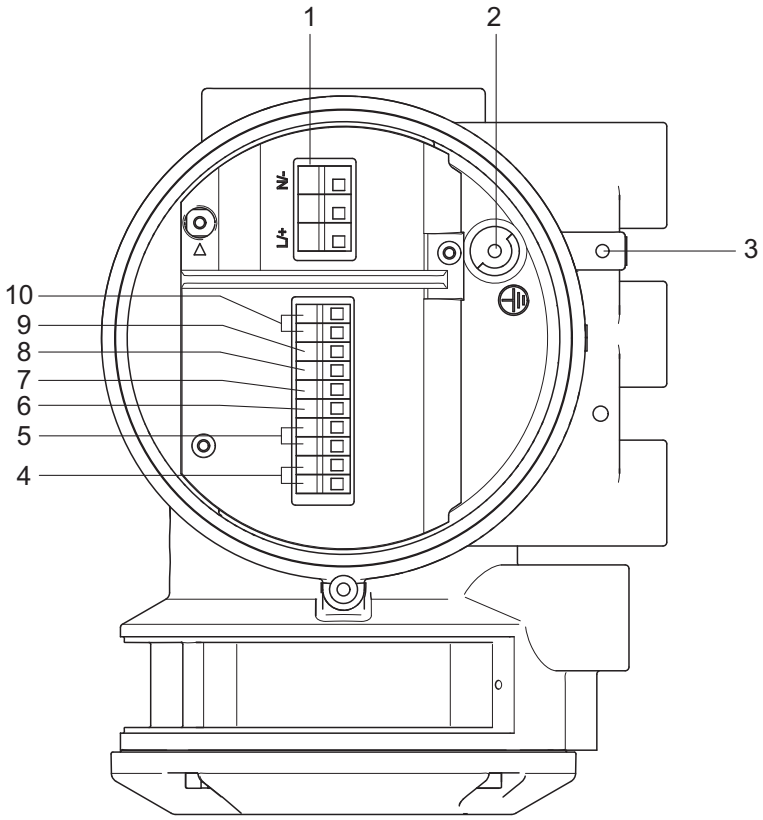
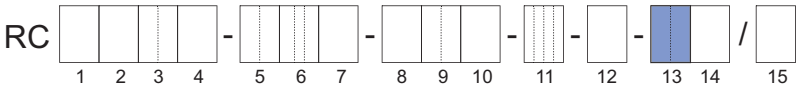


Fig. 8: Terminal box for connection to external devices for Modbus and for the transmitter power supply

1	Power supply connection terminals
2	Grounding screw in terminal box
3	Grounding terminal
4	Connection terminals for I/O1 +/-
5	Connection terminals for I/O2 +/-
6	Connection terminals for I/O3 +
7	Connection terminals for I/O3 -
8	Connection terminals for I/O4 +
9	Connection terminals for I/O4 -
10	WP: Write-protection terminal

The applicable operating instructions must be observed for connecting the cables.

The connection terminal assignments for I/O are defined according to the product variant ordered. The following figure shows the relevant position of the model code:



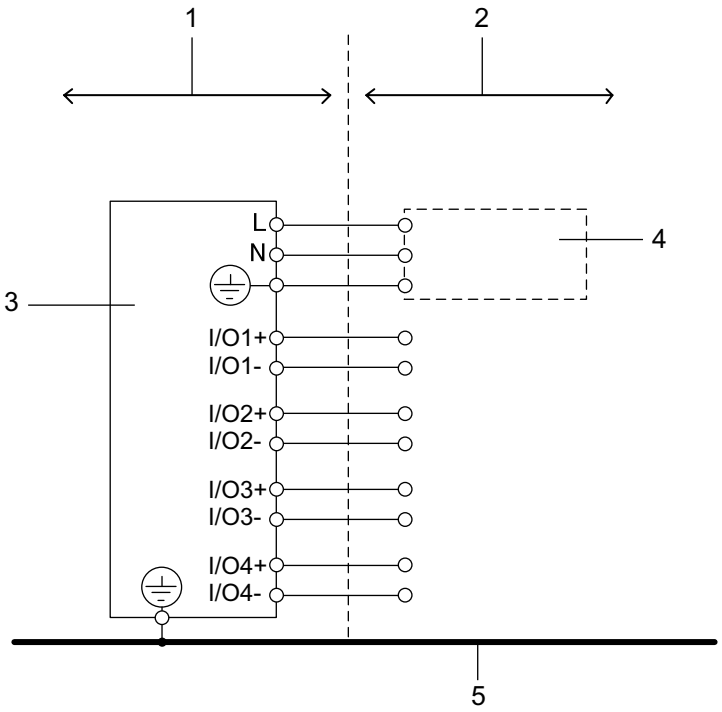
Tab. 3: Connection terminal assignment for Modbus

Model code position 13	**Connection terminal assignment**						
	I/O1 +/-	**I/O2 +/-**	**I/O3 +**	**I/O3 -**	**I/O4 +**	**I/O4 -**	**WP**
M0	–	P/Sout1 Passive	–	Modbus C	Modbus B	Modbus A	Write-protect
M2	Iin Active	P/Sout1 Passive	–	Modbus C	Modbus B	Modbus A	Write-protect
M3	P/Sout2 Passive	P/Sout1 Passive	–	Modbus C	Modbus B	Modbus A	Write-protect
M4	P/Sout2 Active	P/Sout1 Passive	–	Modbus C	Modbus B	Modbus A	Write-protect
M5	P/Sout2 Active Internal pull-up resistor	P/Sout1 Passive	–	Modbus C	Modbus B	Modbus A	Write-protect
M6	Iout1 Active	P/Sout1 Passive	–	Modbus C	Modbus B	Modbus A	Write-protect
M7	Iin Passive	P/Sout1 Passive	–	Modbus C	Modbus B	Modbus A	Write-protect

Iout	Analog current output, no HART
Iin	Analog current input
P/Sout1	Pulse or status output
P/Sout2	Pulse or status output

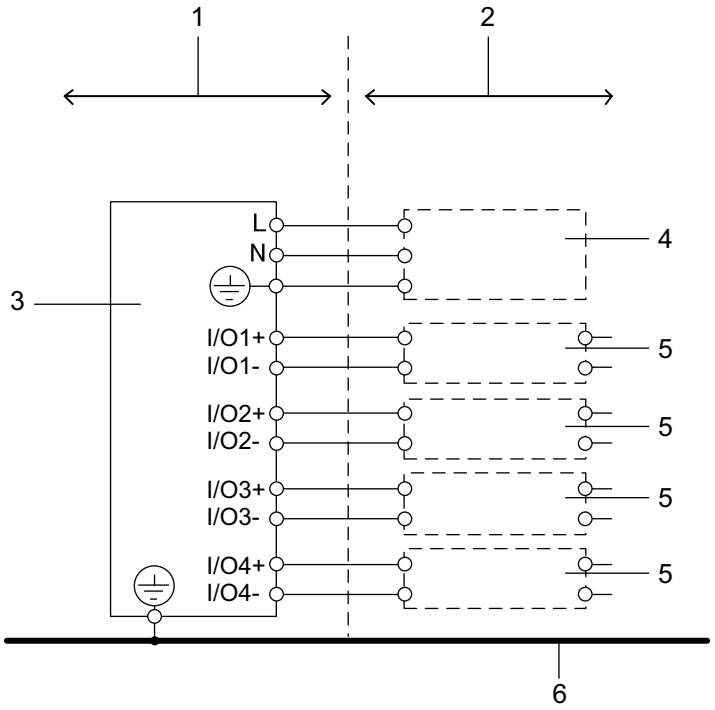
5.4 Installation diagrams

5.4.1 Integral type without intrinsically safe I/O outputs



1 Hazardous area
2 Safe area
3 Rotamass
4 Power supply
5 Potential equalization system

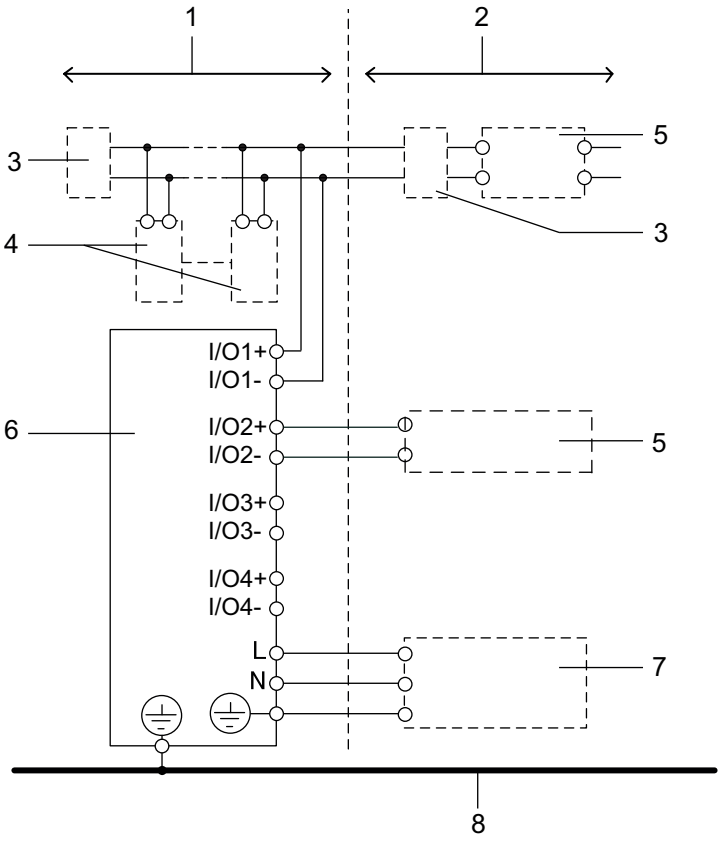
5.4.2 Integral type with intrinsically safe I/O outputs



1 Hazardous area
2 Safe area
3 Rotamass
4 Power supply
5 Associated apparatus
6 Potential equalization system

Multi-core cable connecting separated intrinsically safe circuits I/O1, I/O2, I/O3, I/O4 shall be type A or B in accordance with IEC 60079-14.

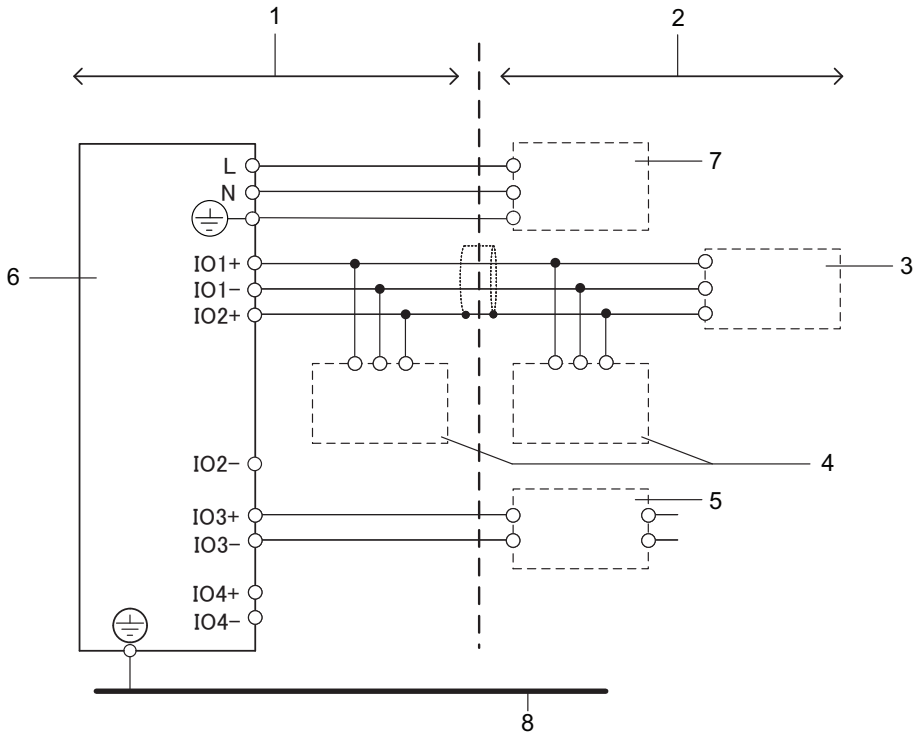
5.4.3 Integral type for Fieldbus communication (intrinsically safe)



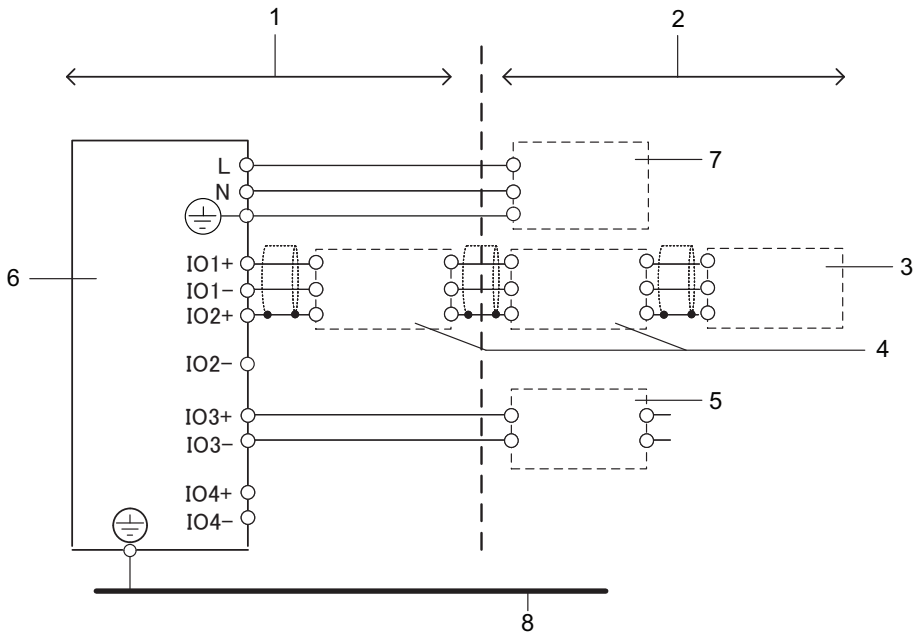
1 Hazardous area
2 Safe area
3 Terminator
4 Field instrument
5 Associated apparatus
6 Rotamass
7 Power supply
8 Potential equalization system

Cable connecting intrinsically safe circuit I/O1, I/O2 shall be type A or B in accordance with IEC 60079-14.

5.4.4 Integral type for Ethernet-APL communication (intrinsically safe)



a) 2-WISE auxiliary device ports connected with short wires (stubs) in the cable



b) 2-WISE auxiliary device ports connected via a series connection in the cable

1	Hazardous area	5	Associated apparatus
2	Safe area	6	Rotamass
3	Power Source	7	Power supply
4	Auxiliary device[1]	8	Potential equalization system

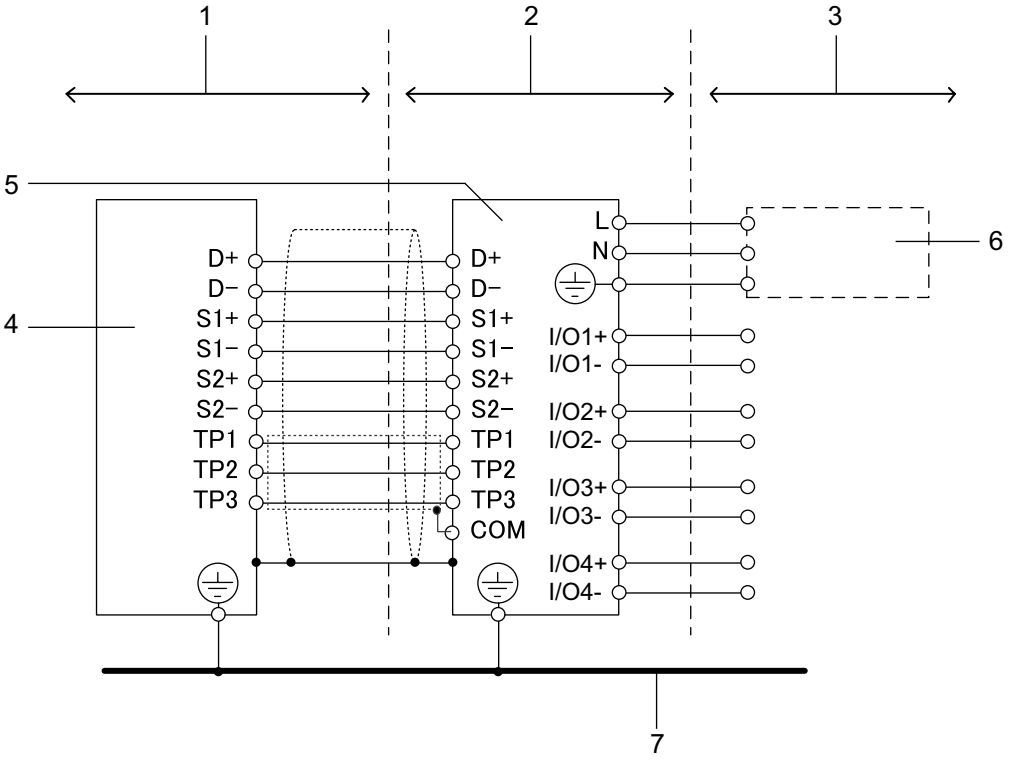
[1] Auxiliary device is not always implemented..

Cable connecting intrinsically safe circuit I/O1 and I/O3 shall be type A or B in accordance with IEC 60079-14.

For models with intrinsically safe APL output: The dielectric strength of at least 500 V a.c. r.m.s. between the intrinsically safe circuits of IO3 and the enclosure is limited only by the overvoltage protection.

5.4.5 Remote type without intrinsically safe I/O outputs

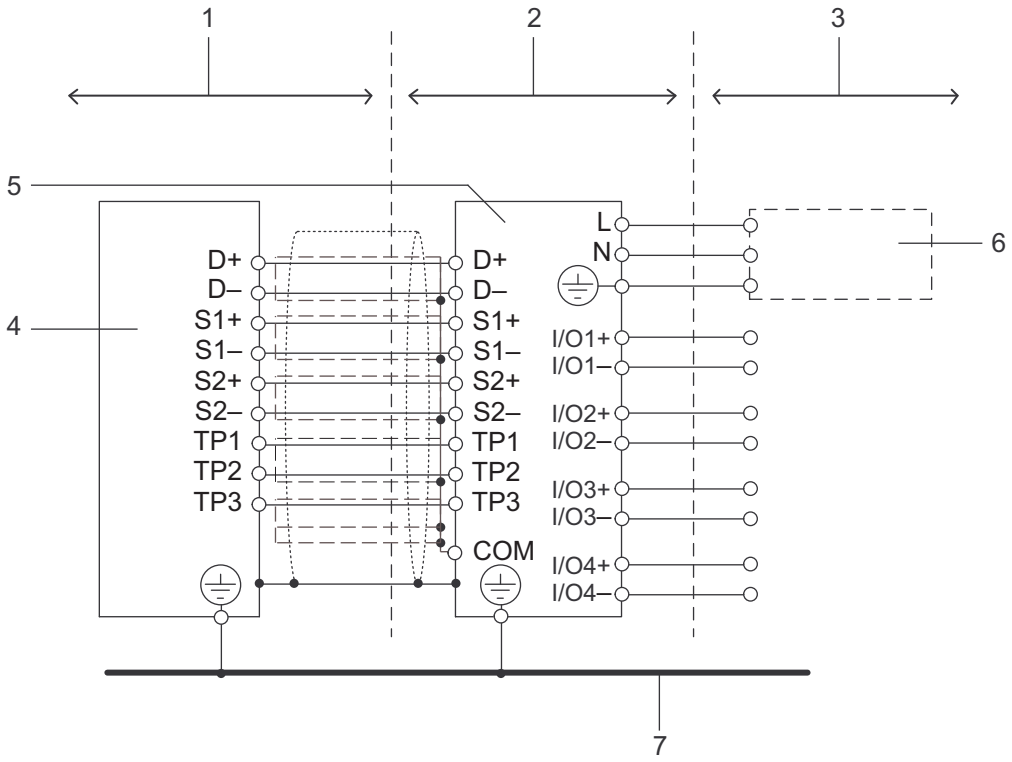
Option L□□□



1	Hazardous area
2	Hazardous area or safe area
3	Safe area
4	Sensor
5	Transmitter
6	Power supply
7	Potential equalization system
D+/D-	Driver circuit
S1+/ S1-, S2+/S2-	Sensor circuits
TP1, TP2, TP3	Temperature measurement circuits

Multi-core cable connecting separated intrinsically safe circuits D+/D-, S1+/S1-, S2+/S2- and TP1/TP2/TP3 shall be type A or B in accordance with IEC 60079-14.

Option Y⎵⎵⎵

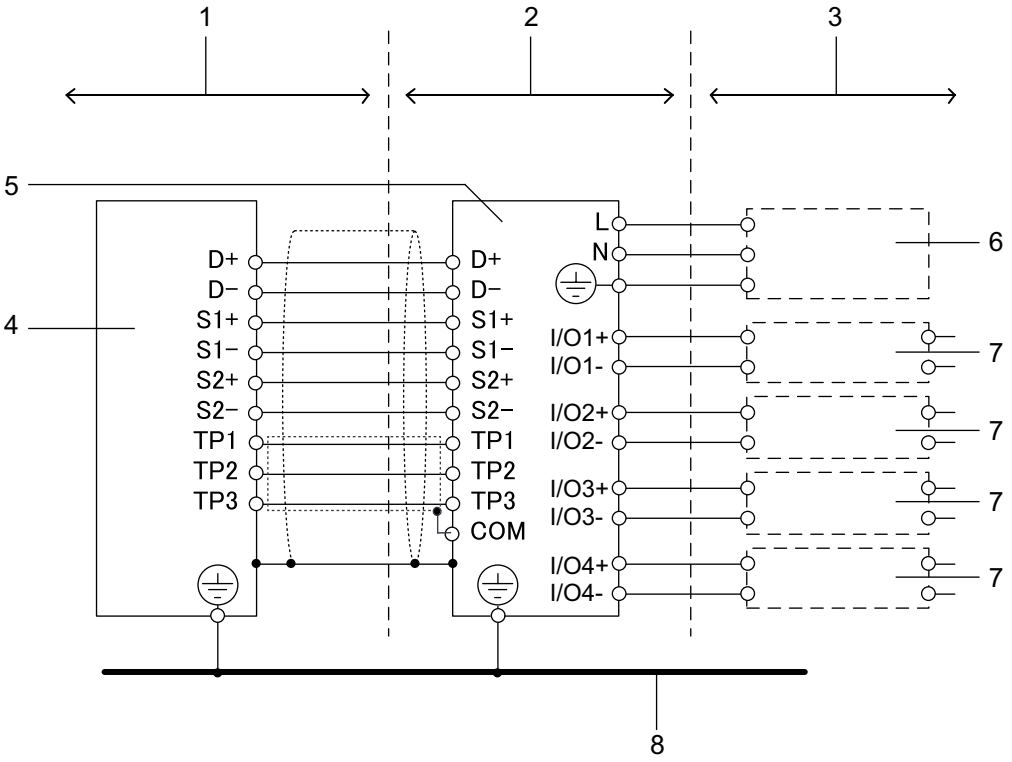


1	Hazardous area
2	Hazardous area or safe area
3	Safe area
4	Sensor
5	Transmitter
6	Power supply
7	Potential equalization system
D+/D-	Driver circuit
S1+/ S1-, S2+/S2-	Sensor circuits
TP1, TP2, TP3	Temperature measurement circuits

Multi-core cable connecting separated intrinsically safe circuits D+/D-, S1+/S1-, S2+/S2- and TP1/TP2/TP3 shall be type A or B in accordance with IEC 60079-14.

5.4.6 Remote type with intrinsically safe I/O outputs

Option L□□□

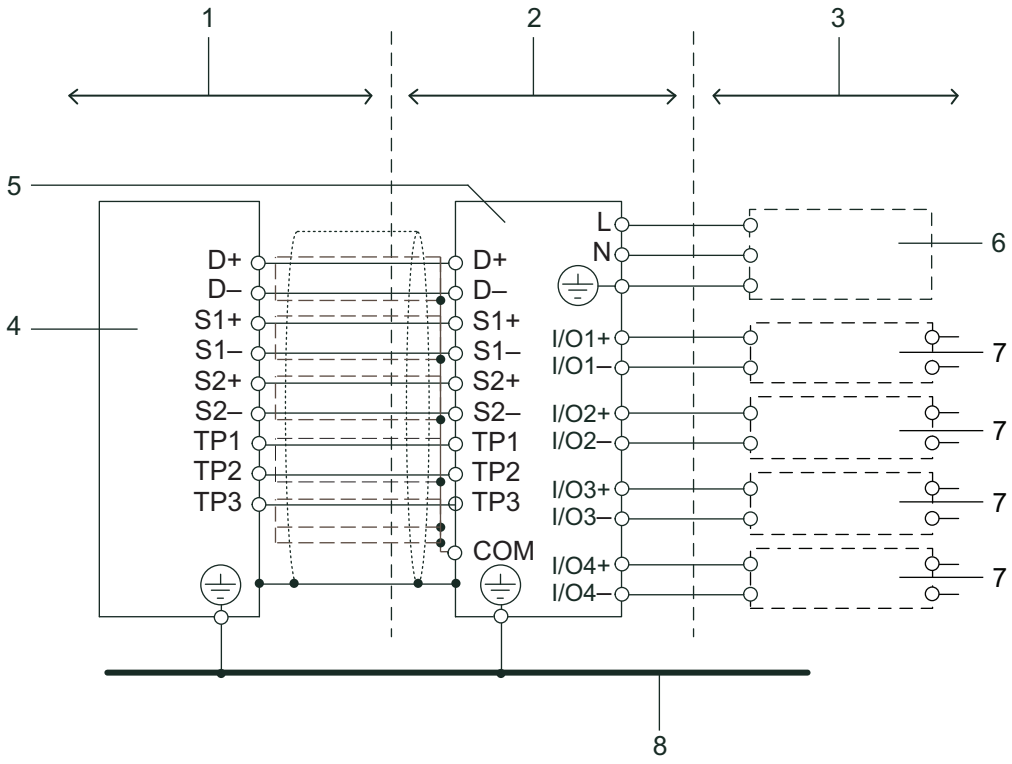


1	Hazardous area
2	Hazardous area or safe area
3	Safe area
4	Sensor
5	Transmitter
6	Power supply
7	Associated apparatus
8	Potential equalization system
D+/D-	Driver circuit
S1+/ S1-, S2+/S2-	Sensor circuits
TP1, TP2, TP3	Temperature measurement circuits

Multi-core cable connecting separated intrinsically safe circuits I/O1, I/O2, I/O3, I/O4 shall be type A or B in accordance with IEC 60079-14.

Multi-core cable connecting separated intrinsically safe circuits D+/D-, S1+/S1-, S2+/S2- and TP1/TP2/TP3 shall be type A or B in accordance with IEC 60079-14.

Option Y⎵⎵⎵



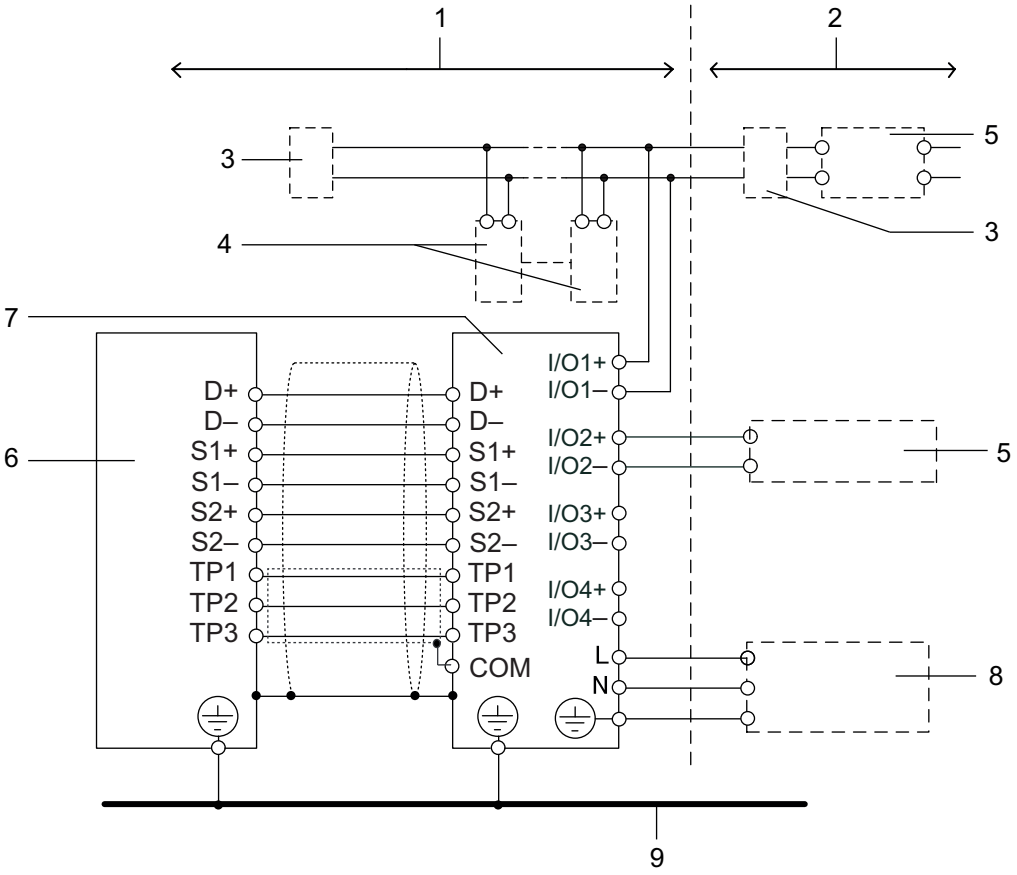
1	Hazardous area
2	Hazardous area or safe area
3	Safe area
4	Sensor
5	Transmitter
6	Power supply
7	Associated apparatus
8	Potential equalization system
D+/D-	Driver circuit
S1+/ S1-, S2+/S2-	Sensor circuits
TP1, TP2, TP3	Temperature measurement circuits

Multi-core cable connecting separated intrinsically safe circuits I/O1, I/O2, I/O3, I/O4 shall be type A or B in accordance with IEC 60079-14.

Multi-core cable connecting separated intrinsically safe circuits D+/D-, S1+/S1-, S2+/S2- and TP1/TP2/TP3 shall be type A or B in accordance with IEC 60079-14.

5.4.7 Remote type for Fieldbus communication (intrinsically safe)

Option L□□□

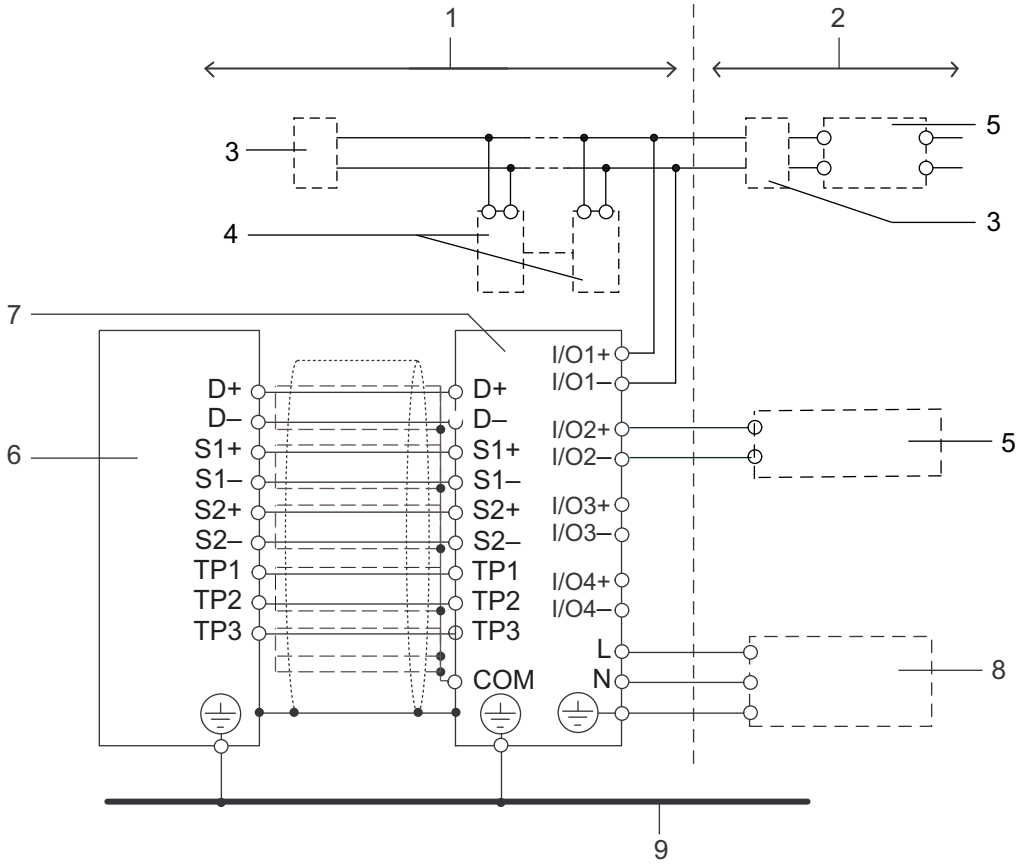


1	Hazardous area
2	Safe area
3	Terminator
4	Field instrument
5	Associated apparatus
6	Sensor
7	Transmitter
8	Power supply
9	Potential equalization system
D+/D-	Driver circuit
S1+/ S1-, S2+/S2-	Sensor circuits
TP1, TP2, TP3	Temperature measurement circuits

Cable connecting intrinsically safe circuit I/O1, I/O2 shall be type A or B in accordance with IEC 60079-14.

Multi-core cable connecting separated intrinsically safe circuits D+/D-, S1+/S1-, S2+/S2- and TP1/TP2/TP3 shall be type A or B in accordance with IEC 60079-14.

Option Y⎵⎵⎵



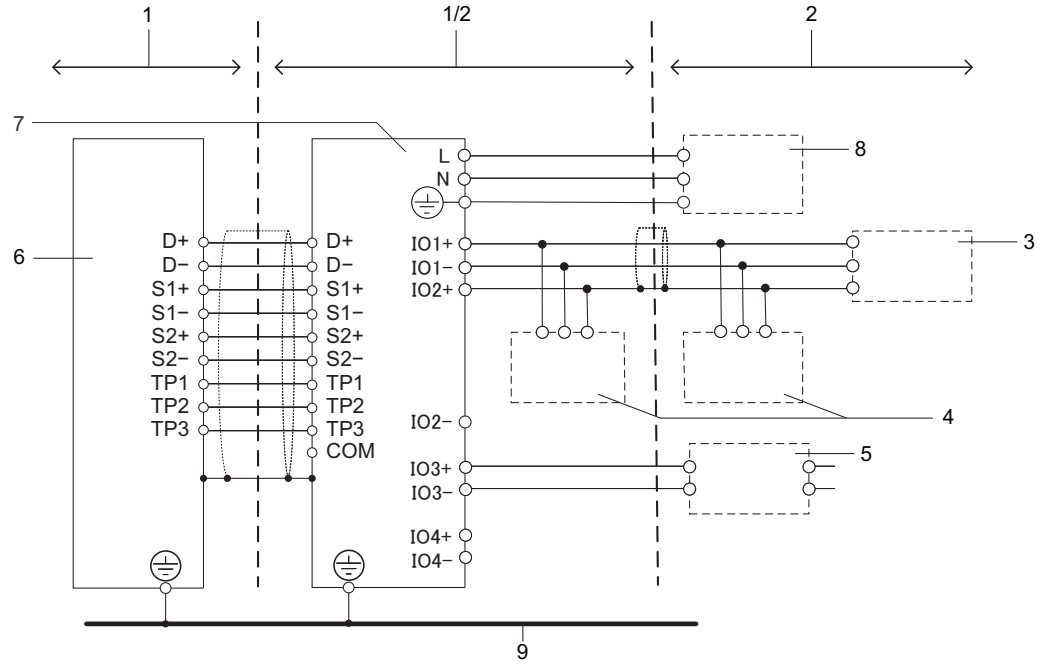
1	Hazardous area
2	Safe area
3	Terminator
4	Field instrument
5	Associated apparatus
6	Sensor
7	Transmitter
8	Power supply
9	Potential equalization system
D+/D-	Driver circuit
S1+/ S1-, S2+/S2-	Sensor circuits
TP1, TP2, TP3	Temperature measurement circuits

Cable connecting intrinsically safe circuit I/O1, I/O2 shall be type A or B in accordance with IEC 60079-14.

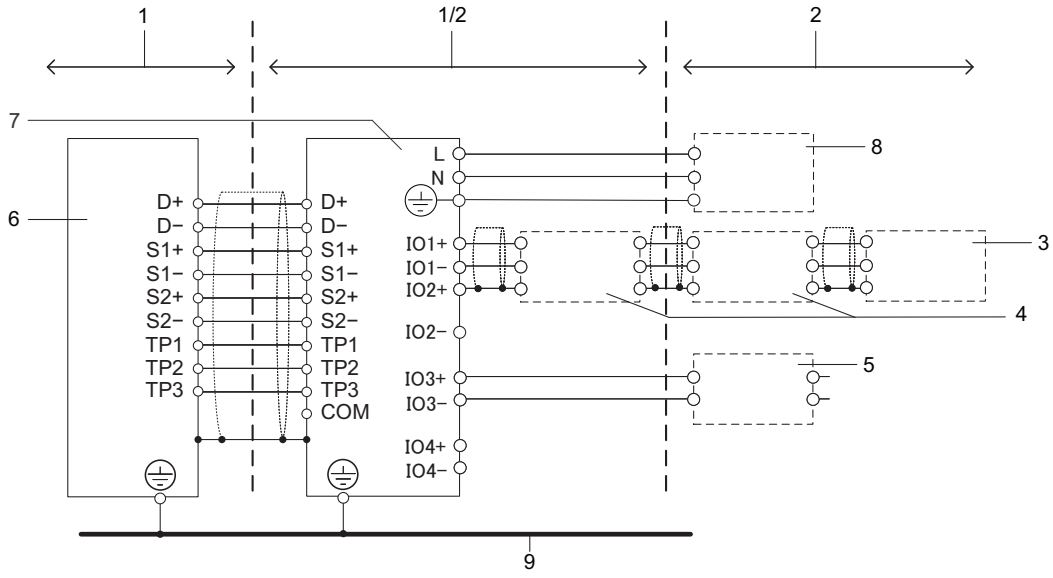
Multi-core cable connecting separated intrinsically safe circuits D+/D-, S1+/S1-, S2+/S2- and TP1/TP2/TP3 shall be type A or B in accordance with IEC 60079-14.

5.4.8 Remote type for Ethernet-APL communication (intrinsically safe)

Option L□□□



a) 2-WISE auxiliary device ports connected with short wires (stubs) in the cable

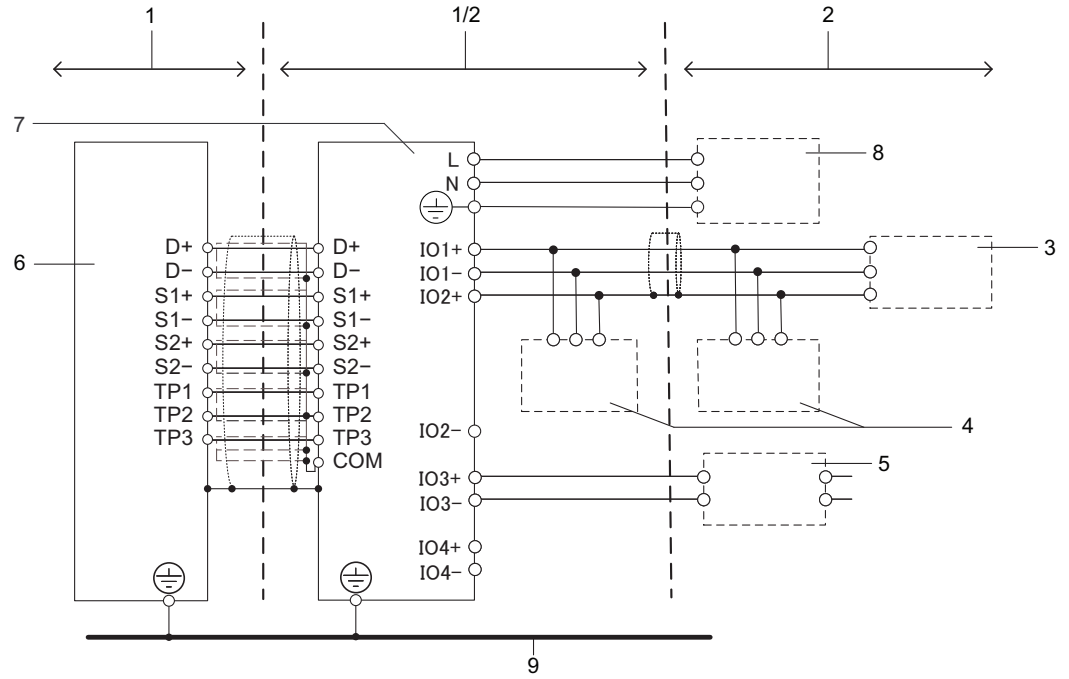


b) 2-WISE auxiliary device ports connected via a series connection in the cable

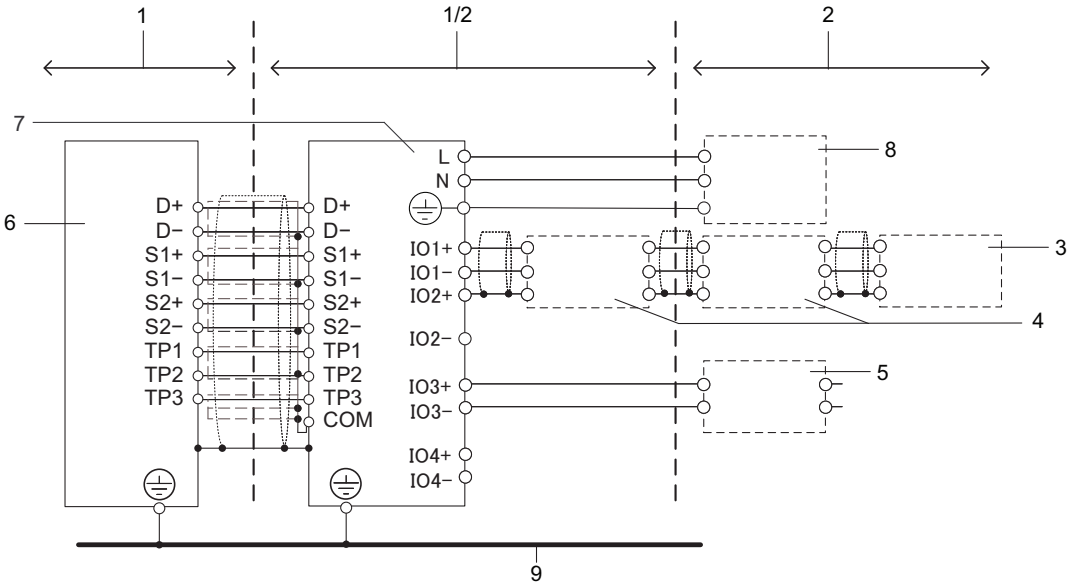
1	Hazardous area
2	Safe area
3	Power Source
4	Auxiliary device (not always implemented)
5	Associated apparatus
6	Sensor
7	Transmitter
8	Power supply
9	Potential equalization system
D+/D-	Driver circuit
S1+/ S1-, S2+/S2-	Sensor circuits
TP1, TP2, TP3	Temperature measurement circuits

ⓘ	Cable connecting intrinsically safe circuit I/O1 and I/O3 shall be type A or B in accordance with IEC 60079-14.
ⓘ	Multi-core cable connecting separated intrinsically safe circuits D+/D-, S1+/S1-, S2+/S2- and TP1/TP2/TP3 shall be type A or B in accordance with IEC 60079-14.
ⓘ	For models with intrinsically safe APL output: The dielectric strength of at least 500 V a.c. r.m.s. between the intrinsically safe circuits of IO3 and the enclosure is limited only by the overvoltage protection.

Option Y⎵⎵⎵



a) 2-WISE auxiliary device ports connected with short wires (stubs) in the cable



b) 2-WISE auxiliary device ports connected via a series connection in the cable

1	Hazardous area
2	Safe area
3	Power Source
4	Auxiliary device (not always implemented)
5	Associated apparatus
6	Sensor
7	Transmitter
8	Power supply
9	Potential equalization system
D+/D-	Driver circuit
S1+/ S1-, S2+/S2-	Sensor circuits
TP1, TP2, TP3	Temperature measurement circuits

ⓘ	Cable connecting intrinsically safe circuit I/O1 and I/O3 shall be type A or B in accordance with IEC 60079-14.
ⓘ	Multi-core cable connecting separated intrinsically safe circuits D+/D-, S1+/S1-, S2+/S2- and TP1/TP2/TP3 shall be type A or B in accordance with IEC 60079-14.
ⓘ	For models with intrinsically safe APL output: The dielectric strength of at least 500 V a.c. r.m.s. between the intrinsically safe circuits of IO3 and the enclosure is limited only by the overvoltage protection.

6 Operation, maintenance and repair

6.1 General rules

⚠ DANGER

Life-threatening injuries from electric shock

- Switch off power supply.
- Secure power supply against inadvertent switch-on.
- Check that power supply is free of voltage.

⚠ DANGER

Life-threatening injuries from ignition of explosive atmospheres

- Wait 20 minutes before opening the housing until the capacitors have discharged and components have cooled off.
- Avoid electrostatically charging the device, e.g. by rubbing it with dry clothes or by impact.

ⓘ

Modifying the Coriolis mass flow meter as well as using unauthorized parts is prohibited and will void the certification.

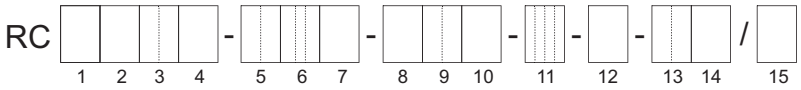
Service and repair must be done by Yokogawa trained personal!

- The locking screws of the covers may be loosened and tightened only with an Allen wrench.
- After closing and before commissioning, it must be checked whether the locking screws are tightened and the covers are closed.

6.2 Replacing the sensor

If a defective Rotamass Total Insight sensor must be replaced, contact the Yokogawa service.

Generally the model code of a spare sensor can be different from the installed design. In this case the model code of the sensor must be selected and checked.



Integral type

Model code position	Meaning	Check criteria between model code of installed design and spare sensor
1	Transmitter	without hazardous area restriction
2	Sensor	could differ with restriction see[2], value “3” is excluded
3	Meter size	if changed see[1]
4	Material wetted parts	without hazardous area restriction
5	Process connection size	without hazardous area restriction
6	Process connection type	without hazardous area restriction
7	Sensor housing material	without hazardous area restriction
8	Process fluid temperature range	if changed see[1]
9	Mass flow and density accuracy	without hazardous area restriction
10	Design and housing	restriction to numeric values (0,1,2,…)
11	Ex approval	must be identical
12	Cable entries	without hazardous area restriction
13	Communication type and I/O	without hazardous area restriction, except: intrinsic safe outputs JP … JU, F␣ (␣ odd), G1 must be identical
14	Display	without hazardous area restriction
15	Options	without hazardous area restriction, except option EPT must be identical

[1] The Ex codes must be compared. If they are different then[2] is applicable. In case of no Ex code take the temperature specification from applicable Explosion Proof certificate or the applicable User´s Manual for Explosion Proof Type.

[2] The temperature specification of the spare sensor has to be evaluated according to model code and *Ex code [▷ 55]*. In case of no Ex code take the temperature specification from applicable Explosion Proof certificate or the applicable User´s Manual for Explosion Proof Type. Compare the temperature specification with the requirements of hazardous area and perform assessment.

Remote type

Model code position	Meaning	Check criteria between model code of installed design and spare sensor
1	Transmitter	without hazardous area restriction
2	Sensor	could differ with restriction see[2], value “3” is excluded
3	Meter size	if changed see[1]
4	Material wetted parts	without hazardous area restriction
5	Process connection size	without hazardous area restriction
6	Process connection type	without hazardous area restriction
7	Sensor housing material	without hazardous area restriction
8	Process fluid temperature range	if changed see[1]
9	Mass flow and density accuracy	without hazardous area restriction
10	Design and housing	restriction to alphabetic values (A,B,…); type B, D, F, K must not be changed to type A, C, E, J.
11	Ex approval	must be identical
12	Cable entries	without hazardous area restriction
13	Communication type and I/O	without hazardous area restriction
14	Display	without hazardous area restriction
15	Options	without hazardous area restriction, except: option EPT, Y␣␣␣ must be identical and see[1]. If option T␣␣ changes see[1].

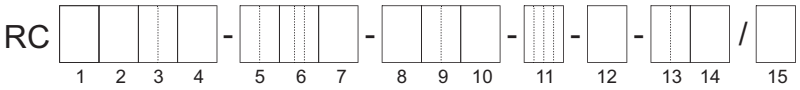
[1] The Ex codes must be compared. If they are different then[2] is applicable. In case of no Ex code take the temperature specification from applicable Explosion Proof certificate or the applicable User´s Manual for Explosion Proof Type.

[2] The temperature specification of the spare sensor has to be evaluated according to model code and *Ex code [▷ 55]*. In case of no Ex code take the temperature specification from applicable Explosion Proof certificate or the applicable User´s Manual for Explosion Proof Type. Compare the temperature specification with the requirements of hazardous area and perform assessment.

6.3 Replacing the transmitter

If a defective Rotamass Total Insight transmitter must be replaced, contact the Yokogawa service.

Generally the model code of a spare transmitter can be different from the installed design. In this case the model code of the transmitter must be selected and checked.



Integral type

Model code position	Meaning	Check criteria between model code of installed design and spare transmitter
1	Transmitter	without hazardous area restriction
2	Sensor	value “3” is excluded
3	Meter size	without hazardous area restriction
4	Material wetted parts	without hazardous area restriction
5	Process connection size	without hazardous area restriction
6	Process connection type	without hazardous area restriction
7	Sensor housing material	without hazardous area restriction
8	Process fluid temperature range	without hazardous area restriction
9	Mass flow and density accuracy	without hazardous area restriction
10	Design and housing	restriction to numeric values (0,1,2,…)
11	Ex approval	must be identical
12	Cable entries	without hazardous area restriction
13	Communication type and I/O	without hazardous area restriction, except: intrinsic safe outputs: JP … JU; F␣ (␣ odd), G1 must be identical
14	Display	without hazardous area restriction
15	Options	without hazardous area restriction , except: option EPT must be identical

The transmitter replacement for an integral-type Rotamass 3 series instrument is not possible.

Remote type

Model code position	Meaning	Check criteria between model code of installed design and spare transmitter
1	Transmitter	without hazardous area restriction
2	Sensor	without hazardous area restriction
3	Meter size	without hazardous area restriction
4	Material wetted parts	without hazardous area restriction
5	Process connection size	without hazardous area restriction
6	Process connection type	without hazardous area restriction
7	Sensor housing material	without hazardous area restriction
8	Process fluid temperature range	without hazardous area restriction
9	Mass flow and density accuracy	without hazardous area restriction
10	Design and housing	restriction to alphabetic (A,B,…)
11	Ex approval	without hazardous area restriction
12	Cable entries	without hazardous area restriction
13	Communication type and I/O	without hazardous area restriction
14	Display	without hazardous area restriction
15	Options	without hazardous area restriction, except: option EPT, Y␣␣␣ must be identical.

Remote transmitters as replacement for Rotamass 3 transmitters must be identified by the value 3 in the model code position 2.

7 Approvals and standards

IECEx approval	IECEx DEK 15.0016X
Applied standards	See approval IECEx DEK 15.0016X

8 Technical data

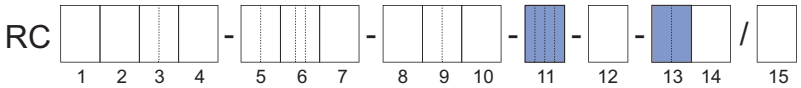
This chapter features the ex-relevant technical data.

Aside from the maximum surface temperature, the technical data of the integral type as well as the remote type transmitters are identical, regardless of product family. For the remote-type sensor the technical data are different, depending on the product family.

8.1 Integral type

The Ex marking is determined via the Ex approval product properties as well as inputs and outputs.

The following figure shows the relevant positions of the model code:



Ex marking

Ex approval	Model code Position 11	Inputs and outputs	Model code Position 13	Ex marking
IECEx approval for explosion group IIC and IIIC	SF21	Non-intrinsically safe	JA, JB, JC, JD, JE, JF, JG, JH, JJ, JK, JL, JM, JN M0, M2, M3, M4, M5, M6, M7 F␣[1] G0 T␣[1]	Ex db ib IIC T6...T1 Gb or Ex db eb ib IIC T6...T1 Gb Ex ib tb IIIC T150 °C Db
		Intrinsically safe	JP, JQ, JR, JS F␣[2] G1 T␣[2]	Ex db ib [ia Ga] IIC T6...T1 Gb or Ex db eb ib [ia Ga] IIC T6...T1 Gb Ex ib tb [ia Da] IIIC T150 °C Db
IECEx approval for explosion group IIB and IIIC	SF22	Non-intrinsically safe	JA, JB, JC, JD, JE, JF, JG, JH, JJ, JK, JL, JM, JN M0, M2, M3, M4, M5, M6, M7 F␣[1] G0 T␣[1]	Ex db ib IIB T6...T1 Gb or Ex db eb ib IIB T6...T1 Gb Ex ib tb IIIC T150 °C Db
		Intrinsically safe	JP, JQ, JR, JS F␣[2] G1 T␣[2]	Ex db ib [ia IIC Ga] IIB T6...T1 Gb or Ex db eb ib [ia IIC Ga] IIB T6...T1 Gb Ex ib tb [ia Da] IIIC T150 °C Db

[1] ␣: even digit
[2] ␣: odd digit

Allowed temperature ranges

Standard temperature range	
Process fluid temperature range	-50 – 150 °C
Maximum surface temperature	150 °C
Ambient temperature range	-40 – 60 °C

Technical data

Electrical data	
Operating voltage V_{AC}	20.4 – 28.8 V_{AC} or 80 – 250 V_{AC}
Operating voltage V_{DC}	20.4 – 28.8 V_{DC} or 90 – 130 V_{DC}
Maximum output	10 W
Overvoltage category	II
Maximum r.m.s. a.c. or d.c. voltage non-intrinsically safe circuits U_m	250 V

Maximum input values for intrinsically safe current and pulse outputs (HART communication)		
	Current output	**Pulse output**
Voltage U_i	30 V	30 V
Current I_i	300 mA	300 mA
Power P_i	1.25 W	1.25 W
Inductance L_i	12 µH	12 µH
Electrical capacitance C_i	4.84 nF	14.6 nF

The dielectric strength of at least 500 V a.c. r.m.s. between the intrinsically safe circuits and the enclosure is limited only by the overvoltage protection.

Maximum input values for intrinsically safe Fieldbus and pulse output (Fieldbus communication)		
	Fieldbus	**Pulse output**
Voltage U_i	30 V	30 V
Current I_i	380 mA	300 mA
Power P_i	5.32 W	1.25 W
Inductance L_i	10 µH	12 µH
Electrical capacitance C_i	5 nF	14.6 nF
FISCO field device		

The dielectric strength of at least 500 V a.c. r.m.s. between the intrinsically safe circuits and the enclosure is limited only by the overvoltage protection.

Maximum input values for intrinsically safe Ethernet-APL and pulse output (Ethernet-APL communication)		
	Ethernet-APL	**Pulse output**
Voltage U_i	2-WISE power load	30 V
Current I_i		300 mA
Power P_i		1.25 W
Inductance L_i		12 µH
Electrical capacitance C_i		14.6 nF

The dielectric strength of at least 500 V a.c. r.m.s. between the intrinsically safe circuits and the enclosure is limited only by the overvoltage protection.

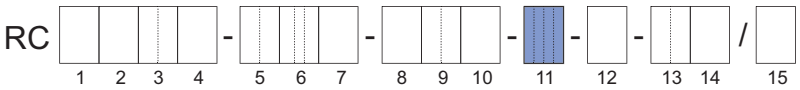
Ambient conditions	
IP code of housing	IP66/IP67
Relative humidity range	0 – 95 %
Allowed pollution degree according to IEC 61010-1	4 (in operation)

8.2 Remote type

8.2.1 Nano, CNG, LPG sensor

The Ex marking is determined via the Ex approval product property.

The following figure shows the relevant position of the model code:



Ex marking

Ex approval	Model code Position 11	Ex marking
IECEx approval for explosion group IIC and IIIC	SF21	Ex ib IIC T6...T1 Gb Ex ib IIIC T⎵⎵⎵°C[1]Db
IECEx approval for explosion group IIB and IIIC	SF22	Ex ib IIB T6...T1 Gb Ex ib IIIC T⎵⎵⎵°C[1]Db

[1] Maximum surface temperature according to the tables "Allowed temperatures"

Allowed temperature ranges

The allowed temperature ranges specified below are based on the technical performance parameters of Rotamass. In addition, temperature classes are relevant and must be taken into account for Ex applications.

In case of CNG and LPG sensors with "Meter size" smaller than 34 these ranges are applicable.

Standard temperature range	
Process fluid temperature range	-50 – 150 °C
Maximum surface temperature	150 °C
Ambient temperature range, with option L⎵⎵⎵	-50 – 80 °C
Ambient temperature range, with option Y⎵⎵⎵	-35 – 70 °C
Heat tracing temperature range	0 – 150 °C

Mid-temperature range	
Process fluid temperature range	-50 – 260 °C
Process fluid temperature range, with option Insulation T⎵⎵	-50 – 260 °C
Ambient temperature range, with option L⎵⎵⎵	-50 – 80 °C
Ambient temperature range, with option Y⎵⎵⎵	-35 – 70 °C
Maximum surface temperature	260 °C
Maximum surface temperature, with option Insulation T⎵⎵	260 °C
Heat tracing temperature range	0 – 220 °C

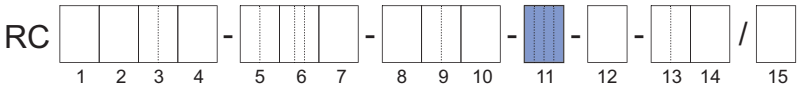
Ambient conditions

Ambient conditions	
IP code of housing	IP66/IP67
Relative humidity range	0 – 95 %
Allowed pollution degree according to IEC 61010-1	4 (in operation)

8.2.2 Supreme, CNG, LPG, Intense and Giga sensor

The Ex marking is determined via the Ex approval product property.

The following figure shows the relevant position of the model code:



Ex marking

Ex approval	Model code Position 11	Ex marking
IECEx approval for explosion group IIC and IIIC	SF21	Ex ib IIC T6...T1 Gb Ex ib IIIC T␣␣␣°C[1]Db
IECEx approval for explosion group IIB and IIIC	SF22	Ex ib IIB T6...T1 Gb Ex ib IIIC T␣␣␣°C[1]Db

[1] Maximum surface temperature according to the tables "Allowed temperatures"

Allowed temperature ranges

The allowed temperature ranges specified below are based on the technical performance parameters of Rotamass. For Ex applications, the Ex code and the Temperature classes are also relevant and must be taken into account.

In case of CNG and LPG sensors with "Meter size" 34 these ranges are applicable.

Standard temperature range	
Process fluid temperature range	-50 – 150 °C
Maximum surface temperature	150 °C
Heat tracing temperature range	0 – 150 °C
Ambient temperature range, with option L␣␣␣	-50 – 80 °C
Ambient temperature range, with option Y␣␣␣	-35 – 80 °C

Low-temperature range	
Process fluid temperature	-200 – 150 °C
Maximum surface temperature	150 °C
Heat tracing temperature	0 – 150 °C
Ambient temperature range, with option L␣␣␣	-50 – 80 °C
Ambient temperature range, with option Y␣␣␣	-35 – 80 °C

Mid-temperature range	
Process fluid temperature	-50 – 220 °C
Maximum surface temperature	220 °C
Heat tracing temperature	0 – 220 °C
Ambient temperature range, with option L␣␣␣	-50 – 80 °C
Ambient temperature range, with option Y␣␣␣	-35 – 80 °C

High-temperature range		
		Process fluid temperature
Process fluid temperature	0 – 350 °C	
Maximum surface temperature	350 °C	
Heat tracing temperature	0 – 350 °C	
Ambient temperature range,	-50 – 80 °C	up to 230 °C
with option L␣␣␣	-50 – 60 °C	230 °C up to 350 °C
Ambient temperature range,	-35 – 80 °C	up to 230 °C
with option Y␣␣␣	-35 – 60 °C	230 °C up to 350 °C

Ultra high-temperature range		
		Process fluid temperature
Process fluid temperature	0 – 400 °C	
Maximum surface temperature	400 °C	
Heat tracing temperature	0 – 400 °C	
Ambient temperature range,	-50 – 80 °C	up to 230 °C
with option L␣␣␣	-50 – 52 °C	230 °C up to 400 °C
Ambient temperature range,	-35 – 80 °C	up to 230 °C
with option Y␣␣␣	-35 – 32 °C	230 °C up to 400 °C

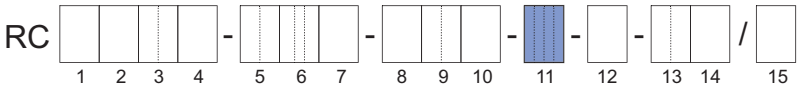
Ambient conditions

Ambient conditions	
IP code of housing	IP66/IP67
Relative humidity range	0 – 95 %
Allowed pollution degree according to IEC 61010-1	4 (in operation)

8.2.3 Prime and Hygienic sensor

The Ex marking is determined via the Ex approval product property.

The following figure shows the relevant position of the model code:



Ex marking

Ex approval	Model code Position 11	Ex marking
IECEx approval for explosion group IIC and IIIC	SF21	Ex ib IIC T6...T1 Gb Ex ib IIIC T␣␣␣°C[1]Db
IECEx approval for explosion group IIB and IIIC	SF22	Ex ib IIB T6...T1 Gb Ex ib IIIC T␣␣␣°C[1]Db

[1] Maximum surface temperature according to the tables "Allowed temperatures"

Allowed temperature ranges

The allowed temperature ranges specified below are based on the technical performance parameters of Rotamass. For Ex applications, the Ex code and the Temperature classes are also relevant and must be taken into account.

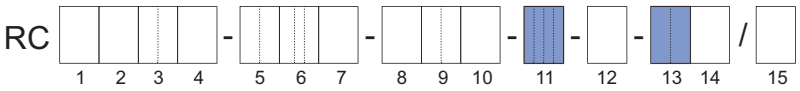
Standard temperature range		
		Process fluid temperature
Process fluid temperature range	-50 – 200 °C	
Maximum surface temperature	200 °C	
Ambient temperature range,	-50 – 80 °C	up to 150 °C
with option L␣␣␣	-50 – 60 °C	150 °C up to 200 °C
Ambient temperature range,	-35 – 80 °C	up to 150 °C
with option Y␣␣␣	-35 – 60 °C	150 °C up to 200 °C

Ambient conditions

Ambient conditions	
IP code of housing	IP66/IP67
Relative humidity range	0 – 95 %
Allowed pollution degree according to IEC 61010-1	4 (in operation)

8.2.4 Transmitter

The Ex marking is determined via the Ex approval product properties as well as inputs and outputs. The following figure shows the relevant positions of the model code:



Ex marking

Tab. 4: Ex marking depending on the model code for transmitters of remote types of all product families

Ex approval	Model code Position 11	Inputs and outputs	Model code Position 13	Ex marking
IECEx approval for explosion group IIC and IIIC	SF21	Non-intrinsically safe	JA, JB, JC, JD, JE, JF, JG, JH, JJ, JK, JL, JM, JN M0, M2, M3, M4, M5, M6, M7 F␣[1] G0 T␣[1]	Ex db [ia Ga] IIC T6 Gb or Ex db eb [ia Ga] IIC T6 Gb Ex tb [ia Da] IIIC T75 °C Db
		Intrinsically safe	JP, JQ, JR, JS F␣[2] G1 T␣[2]	Ex db [ia Ga] IIC T6 Gb or Ex db eb [ia Ga] IIC T6 Gb Ex tb [ia Da] IIIC T75 °C Db
IECEx approval for explosion group IIB and IIIC	SF22	Non-intrinsically safe	JA, JB, JC, JD, JE, JF, JG, JH, JJ, JK, JL, JM, JN M0, M2, M3, M4, M5, M6, M7 F␣[1] G0 T␣[1]	Ex db [ia Ga] IIB T6 Gb or Ex db eb [ia Ga] IIB T6 Gb Ex tb [ia Da] IIIC T75 °C Db
		Intrinsically safe	JP, JQ, JR, JS F␣[2] G1 T␣[2]	Ex db [ia Ga] [ia IIC Ga] IIB T6 Gb or Ex db eb [ia Ga] [ia IIC Ga] IIB T6 Gb Ex tb [ia Da] IIIC T75 °C Db

[1] ␣ : even digit
[2] ␣: odd digit

Technical data

Allowed temperatures	
Ambient temperature range	-40 – 60 °C

Electrical data	
Operating voltage V_{AC}	20.4 – 28.8 V_{AC} or 80 – 250 V_{AC}
Operating voltage V_{DC}	20.4 – 28.8 V_{DC} or 90 – 130 V_{DC}
Maximum output	10 W
Overvoltage category	II
Maximum r.m.s. a.c. or d.c. voltage non-intrinsically safe circuits U_m	250 V

Maximum input values for intrinsically safe current and pulse outputs (HART communication)		
	Current output	**Pulse output**
Voltage U_i	30 V	30 V
Current I_i	300 mA	300 mA
Power P_i	1.25 W	1.25 W
Inductance L_i	12 µH	12 µH
Electrical capacitance C_i	4.84 nF	14.6 nF

The dielectric strength of at least 500 V a.c. r.m.s. between the intrinsically safe circuits and the enclosure is limited only by the overvoltage protection.

Maximum input values for intrinsically safe Fieldbus and pulse output (Fieldbus communication)		
	Fieldbus	**Pulse output**
Voltage U_i	30 V	30 V
Current I_i	380 mA	300 mA
Power P_i	5.32 W	1.25 W
Inductance L_i	10 µH	12 µH
Electrical capacitance C_i	5 nF	14.6 nF
FISCO field device		

The dielectric strength of at least 500 V a.c. r.m.s. between the intrinsically safe circuits and the enclosure is limited only by the overvoltage protection.

Maximum input values for intrinsically safe Ethernet-APL and pulse output (Ethernet-APL communication)		
	Ethernet-APL	**Pulse output**
Voltage U_i	2-WISE power load	30 V
Current I_i		300 mA
Power P_i		1.25 W
Inductance L_i		12 µH
Electrical capacitance C_i		14.6 nF

The dielectric strength of at least 500 V a.c. r.m.s. between the intrinsically safe circuits and the enclosure is limited only by the overvoltage protection.

Ambient conditions	
IP code of housing	IP66/IP67
Relative humidity range	0 – 95 %
Allowed pollution degree according to IEC 61010-1	4 (in operation)

8.2.5 Connecting cable

To connect the sensor with the transmitter, the following specifications must be adhered to for Ex applications:

Complete cable	
Temperature range, with option L□□□	-50 – 105 °C
Temperature range, with option Y□□□	-35 – 90 °C

Connection terminals/cable section	Maximum inductance	Maximum capacitance
D+/D-, S1+/ S1-, S2+/S2-	< 0.03 mH	< 90 nF
TP1, TP2, TP3	< 158 mH	< 11 µF

Calculation of maximum allowed cable length for option L□□□

The supplied connecting cable has the following line constants:

Line type	Connection terminals	Capacitance in nF/km		Inductance in mH/km
		Core/core	Core/shield	
Coaxial	D+/D-, S1+/S1-, S2+/S2-	120	132	0.175
AWG20	TP1, TP2, TP3	145	290	0.7

The resulting maximum allowed cable length is:

Connection terminals	Limitation	Calculation		Length limitation
D+/D-, S1+/S1-, S2+/S2-	Inductance	0.03 mH / (0.175 mH/km)	=	171 m
D+/D-, S1+/S1-, S2+/S2-	Capacitance	90 nF / (132 nF/km)	=	682 m
TP1, TP2, TP3	Inductance	158 mH / (0.7 mH/km)	=	226 km
TP1, TP2, TP3	Capacitance	11 µF / (290 nF/km)	=	38 km
	Maximum allowed cable length		=	**171 m**

Calculation of maximum allowed cable length for option Y□□□

The supplied marine cable has the following line constants:

Connection terminals	Capacitance in nF/km	Inductance in mH/km
D+/D-, S1+/ S1-, S2+/S2-,TP1, TP2, TP3	81	0.315

Inductance and capacitance at terminals D+/D-, S1+/S1-, S2+/S2- are limiting.

Limitation	Calculation		Length limitation
Inductance	0.03 mH / (0.315 mH/km)	=	95 m
Capacitance	90 nF / (81 nF/km)	=	1.1 km
Maximum allowed cable length		=	**95 m**

8.2.6 Connection to Rotamass 3 sensor

If a Rotamass Essential or Ultimate transmitter was configured for use at a remote type Rotamass 3 sensor via the model code, the maximum input and output values of the Rotamass 3 sensor must be observed; see the corresponding operating instructions.

Tab. 5: Maximum output values, connection terminals Rotamass Total Insight transmitter to Rotamass 3 sensor

Connection terminals	**Voltage U_o** in V		**Current I_o** in mA		**Power P_o** in mW		**Inductance L_o** in mH		**Electrical capacitance C_o** in µF	
	IIC	**IIB**	**IIC**	**IIB**	**IIC**	**IIB**	**IIC**	**IIB**	**IIC**	**IIB**
D+/D-	14.28		47	134.4	168	480	16	7.8	0.68	4.28
S1+/S1- or S2+/ S2-	7.14		36.1		64.4		27		13.5	
TP1, TP2, TP3	7.14		10.7		19.1		310		13.5	

The process fluid temperature ranges of the Rotamass 3 sensor must be observed.

The corresponding documentation of the Rotamass 3 is applicable to the respective sensor.

The process fluid temperature range specified in this document applies to the transmitter, see *Transmitter [▷ 51]*.

8.3 Ex code

The Ex code, in combination with the model code positions 2 and 10, allows determining the maximum process fluid and ambient temperatures for every temperature class according to the Ex certificate. In each case, it is located on the additional nameplate of the sensor, except for Rotamass Nano and all high-temperature versions. No Ex code is available for these devices so that the process fluid temperature ranges must be taken directly from the chapter *Temperature specification by temperature classes [▶ 60]*.

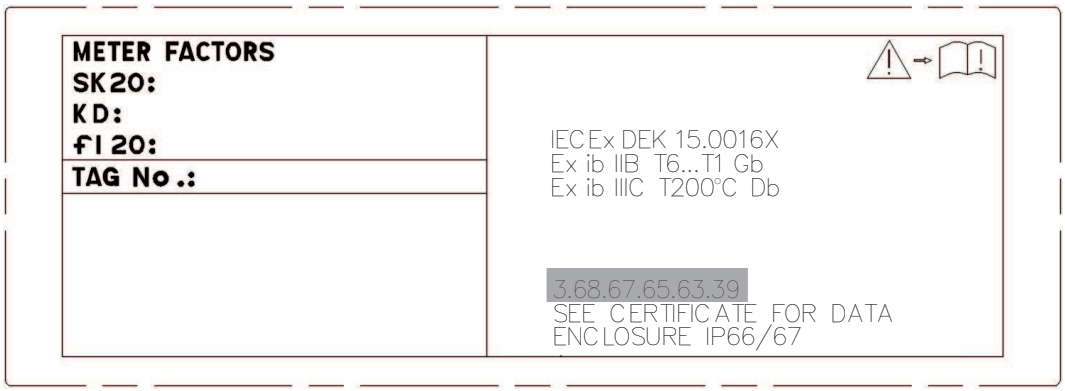


Fig. 9: Additional nameplate with Ex code

Ex code design

The Ex code is a 6-digit key with the following design:

3	.	68	.	67	.	65	.	63	.	39
a	.	p6	.	p5	.	p4	.	p3	.	p2

a	Ambient temperature column number
p6	Line number for maximum process fluid temperature for temperature class T6
p5	Line number for maximum process fluid temperature for temperature class T5
p4	Line number for maximum process fluid temperature for temperature class T4
p3	Line number for maximum process fluid temperature for temperature class T3
p2	Line number for maximum process fluid temperature for temperature classes T2 and T1

8.3.1 Determining the maximum temperatures based on the Ex code

The specific example below is intended to explain how to determine the maximum process fluid- and ambient temperatures based on the Ex code and the model code.

The complete tables of the process fluid temperature range are listed in the "Annex 1" of the IECEx certificate. Option L␣␣␣ or Y␣␣␣ determines table a or b for remote variants. This example presents only excerpts thereof.

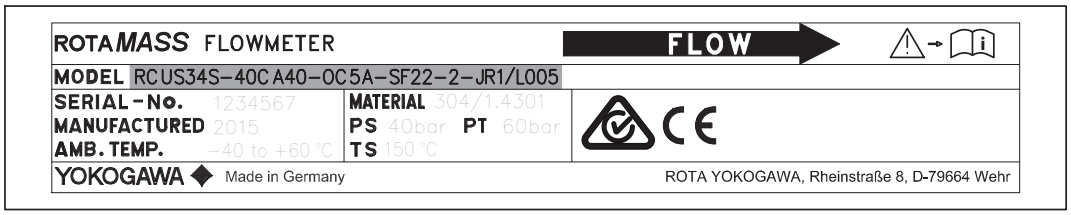
The following steps are performed to determine the maximum temperatures:

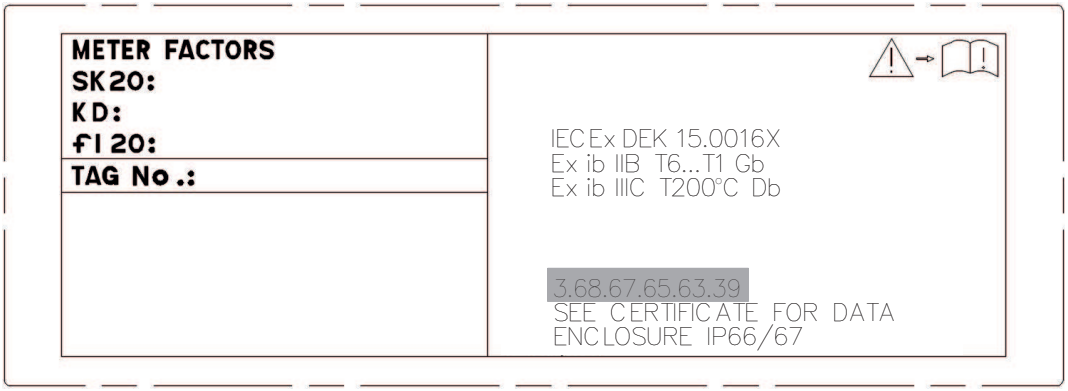
- Determining the maximum process fluid temperature $T_{pro,max}$ based on the Ex code, positions p6...p2
- Determining the maximum ambient temperature $T_{amb\ pre}$ based on the following criteria:
  - model code position 2 and 10
  - Ex code, position a
  - Determined maximum process fluid temperatures $T_{pro,max}$

Problem definition

The allowed process fluid and ambient temperatures for a Rotamass Supreme 34 are to be determined based on the Ex code and the model code on the nameplates.

The following model code and Ex code are given:





RC	U	S	34	S	-	40	CA4	0	-	0	C5	A	-	SF22	-	2	-	JR1	/	L005
	1	2	3	4		5	6	7		8	9	10		11		12		13	14	15

3	.	68	.	67	.	65	.	63	.	39
a	.	p6	.	p5	.	p4	.	p3	.	p2

Fig. 10: Ex code based on nameplate

Determining the maximum process fluid temperature $T_{pro,max}$

The values of the Ex code on the nameplate p6 – p2 are the line indexes that determine the maximum process fluid temperatures $T_{pro,max}$ according to Table 6 in the Ex certificate. The temperature class determines the applicable column.

Tab. 6: Excerpt from the process fluid temperature table of the Ex certificate: "Table 6: Process fluid temperatures according Ex Code"

p2 to p6 Ex code values	**$T_{pro,\ max}$ in °C:** for temperature classes					
	T6	**T5**	**T4**	**T3**	**T2**	**T1**
...	...	...	...	...	...	...
39	20	35	70	135	**179**	**179**
...	...	...	...	...	...	...
63	44	59	94	**159**	203	203
...	...	...	...	...	...	...
65	46	61	**96**	161	205	205
...	...	...	...	...	...	...
67	48	**63**	98	163	107	107
68	**49**	64	99	164	208	208
...	...	...	...	...	...	...

For the temperature classes, this results in the following values for the maximum process fluid temperature:

- Temperature class **T6** (column T6) and value of Ex code p6 (value = 68) define the intersection: $T_{pro,\ max}$ = **49 °C**
- Temperature class **T5** (column T5) and value of Ex code p5 (value = 67) define the intersection: $T_{pro,\ max}$ = **63 °C**
- Temperature class **T4** (column T4) and value of Ex code p4 (value = 65) define the intersection: $T_{pro,\ max}$ = **96 °C**
- Temperature class **T3** (column T3) and value of Ex code p3 (value = 63) define the intersection: $T_{pro,\ max}$ = **159 °C**
- Temperature class **T2** (column T2) and value of Ex code p2 (value = 39) define the intersection: $T_{pro,\ max}$ = **179 °C**
- Temperature class **T1** (column T1) and value of Ex code p2 (value = 39) define the intersection: $T_{pro,\ max}$ = **179 °C**

These maximum process fluid temperatures established must be used for further determination of the ambient temperatures.

Determining the maximum ambient temperature $T_{amb\ pre}$

The following is required for determining the maximum ambient temperatures:

- model code position 2, 10 and 15
- Ex code, position a
- Determined maximum process fluid temperatures $T_{pro,max}$

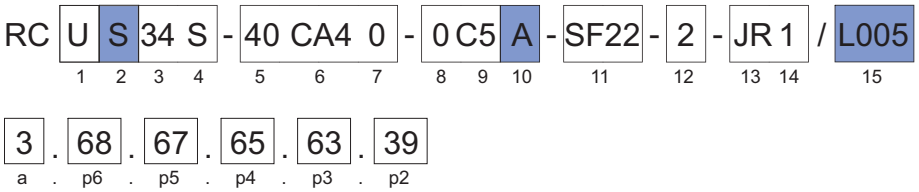


Fig. 11: Ex code

Temperature class	Maximum process fluid temperature $T_{pro,max}$
T6	49 °C
T5	63 °C
T4	96 °C
T3	159 °C
T2	179 °C
T1	179 °C

First, the correct product-dependent table for the ambient temperature must be identified. To do so, the values of the positions 2 and 10 of the model code on the nameplate are compared with the information of the table titles in Table 7 – 11 of the annex to the Ex certificate. A match determines the table to be applied.

In this case table 9a is valid, because no option Y␣␣␣ is present in the model code. The first digit of the Ex code, a = 3, defines the applicable columns T6 – T1 within the located ambient temperature table.

The maximum process fluid temperatures $T_{pro,max}$ established define the applicable lines within the located ambient temperature table. If a value of the maximum process fluid temperature is not listed in the table, the next higher temperature value is used.

Determined maximum process fluid temperature in °C	**Next higher process fluid temperature** in °C
49	50
63	65
96	100
159	160
179	180
179	180

Tab. 7: Excerpt from the ambient temperature table of the Ex certificate: "Table 9a: Ambient temperature table for designs: RC_[2.]_ _-_ _ _-_ _[10.]-_-_ _ _/_
Applicable for model code part values: [2.] = S, G, C, L ,T; [10.] = A, C, E, J"

	$T_{amb\ pre}$ in °C																
a:	**...**	**a = 2**					**a = 3**					**a = 4**					**...**
T_{pro} in °C	**...**	**T6**	**T5**	**T4**	**T3**	**T2** T1	**T6**	**T5**	**T4**	**T3**	**T2** T1	**T6**	**T5**	**T4**	**T3**	**T2** T1	**...**
50	...	69	80	80	80	80	**62**	77	80	80	80	58	73	80	80	80	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
65	...	69	80	80	80	80	61	**77**	80	80	80	55	73	80	80	80	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
100	...			80	80	80			**80**	80	80			80	80	80	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
160	...				74	74				**74**	74				74	74	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
180					65	65				65	**65**				65	65	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

The value determined based on the ambient temperature table is a temporary value of the ambient temperature. Next, it must be compared with the determined maximum process fluid temperature. The lower value determines the actual maximum ambient temperature.

Result

Determined maximum process fluid temperature in °C	**Temperature class**	**Determined temporary value for the ambient temperature** in °C	**Maximum ambient temperature** in °C
49	T6	62	**49**
63	T5	77	**63**
96	T4	80	**80**
159	T3	74	**74**
179	T2	65	**65**
179	T1	65	**65**

8.4 Temperature specification by temperature classes

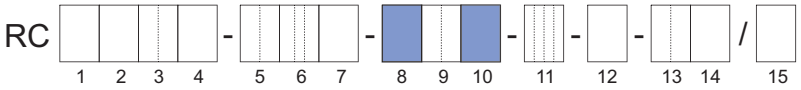
Maximum ambient and process fluid temperatures depending on explosion groups and temperature classes can be determined via the model code or via the model code together with the Ex code.

8.4.1 Identification via model code

The following tables provide an overview of where the tables of the temperature specifications are located based on model code and explosion group.

Rotamass Nano, CNG, LPG

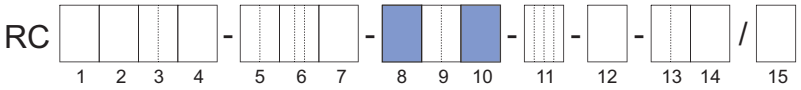
The following figure shows the relevant positions of the model code:



Process fluid temperature range	Model code Position 8	Housing design	Model code Position 10	Temperature specification for the explosion groups	
Standard	0	Remote type, standard terminal box	A, C, E, J	IIC, IIB	*[▷ 64]*
Standard	0	Remote type, long neck	B, D, F, K	IIC, IIB	*[▷ 64]*
Mid-range	2	Remote type, long neck	B, D, F, K	IIC, IIB	*[▷ 64]*

Rotamass Supreme, CNG, LPG and Intense

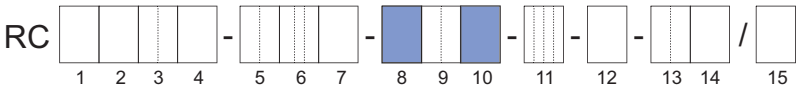
The following figure shows the relevant positions of the model code:



Process fluid temperature range	Model code Position 8	Housing design	Model code Position 10	Temperature specification for the explosion groups	
Standard	0	Integral type	0, 1, 2	IIC IIB	*[▷ 65]* *[▷ 65]*
Standard	0	Remote type, standard terminal box	A, C, E, J	IIC IIB	*[▷ 65]* *[▷ 66]*
Standard	0	Remote type, long neck	B, D, F, K	IIC IIB	*[▷ 66]* *[▷ 66]*
Low-range	1	Remote type, long neck	B, D, F, K	IIC IIB	*[▷ 67]* *[▷ 67]*
Mid-range	2	Remote type, long neck	B, D, F, K	IIC IIB	*[▷ 67]* *[▷ 68]*
High	3	Remote type, long neck	B, D, F, K	IIC IIB	*[▷ 68]* *[▷ 68]*
Ultra-high	4	Remote type, long neck	B, D, F, K	IIC IIB	*[▷ 68]* *[▷ 68]*

Rotamass Giga

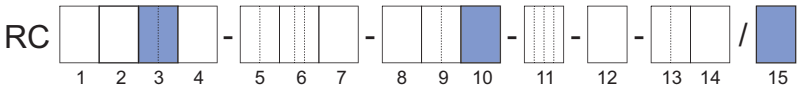
The following figure shows the relevant positions of the model code:



Process fluid temperature range	Model code Position 8	Housing design	Model code Position 10	Temperature specification for the explosion groups	
Standard	0	Integral type	0, 1, 2	IIC IIB	*[69]* *[69]*
Standard	0	Remote type, standard terminal box	A, C, E, J	IIC IIB	*[69]* *[70]*
Standard	0	Remote type, long neck	B, D, F, K	IIC IIB	*[70]* *[70]*
Mid-range	2	Remote type, long neck	B, D, F, K	IIC IIB	*[71]* *[71]*
High	3	Remote type, long neck	B, D, F, K	IIC IIB	*[71]* *[71]*
Ultra-high	4	Remote type, long neck	B, D, F, K	IIC IIB	*[72]* *[72]*

Rotamass Prime and Hygienic

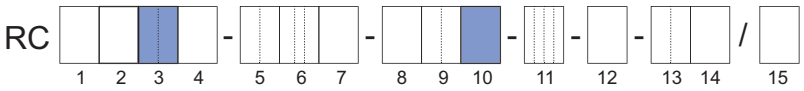
The following figure shows the relevant positions of the model code:



Model code Position 3	Housing design	Model code Position 10	Device option	Model code Position 15	Temperature specification for the explosion groups	
25	Integral type	0, 1, 2	–		IIC, IIB	*[▷ 75]*
40						
25	Integral type	0, 1, 2	Expanded temperature range	/EPT	IIC, IIB	*[▷ 75]*
40						
50	Integral type	0, 1, 2	–		IIC, IIB	*[▷ 75]*
50	Integral type	0, 1, 2	Expanded temperature range	/EPT	IIC, IIB	*[▷ 76]*
80	Integral type	0, 1, 2	–		IIC IIB	*[▷ 76]* *[▷ 76]*
1H	Integral type	0, 1, 2	–		IIC, IIB	*[▷ 77]*
25	Remote type, standard terminal box	A, C, E, J	–		IIC, IIB	*[▷ 77]*
40						
25	Remote type, standard terminal box	A, C, E, J	Expanded temperature range	/EPT	IIC, IIB	*[▷ 77]*
40						
50	Remote type, standard terminal box	A, C, E, J	–		IIC, IIB	*[▷ 78]*
50	Remote type, standard terminal box	A, C, E, J	Expanded temperature range	/EPT	IIC, IIB	*[▷ 78]*
80	Remote type, standard terminal box	A, C, E, J	–		IIC IIB	*[▷ 78]* *[▷ 79]*
1H	Remote type, standard terminal box	A, C, E, J	–		IIC, IIB	*[▷ 79]*

Intense

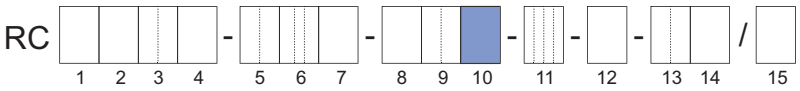
The following figure shows the relevant positions of the model code:



Model code Position 3	Housing design	Model code Position 10	Temperature specification for the explosion groups	
08	Integral type	0, 1, 2	IIC, IIB	*[▷ 73]*
10				
08	Remote type, standard terminal box	A, C, E, J	IIC, IIB	*[▷ 73]*
10				

8.4.2 Identification via model code and Ex code

Using the model code and Ex code, the following table can be used to identify the corresponding temperature classification table:



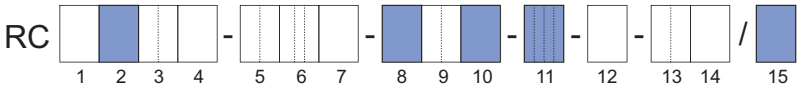
Product family	Model code Position 10	Ex code	See table
Rotamass Supreme CNG, LPG and Intense	0, 1, 2	6.85.86.87.54.10	*[65]*
	0, 1, 2	2.78.79.81.54.10	*[65]*
	A, C, E, J	6.85.86.87.54.10	*[65]*
	A, C, E, J	2.78.79.81.54.10	*[66]*
	B, D, F, K	6.85.86.87.54.10	*[66]*
	B, D, F, K	2.78.79.81.54.10	*[66]*
	B, D, F, K	3.79.80.82.54.10	*[67]*
	B, D, F, K	2.77.78.80.54.10	*[67]*
	B, D, F, K	6.85.86.87.89.80	*[67]*
	B, D, F, K	2.78.79.81.85.80	*[68]*
Rotamass Giga	0, 1, 2	7.89.89.90.54.10	*[69]*
	0, 1, 2	7.84.84.86.54.10	*[69]*
	A, C, E, J	7.89.89.90.54.10	*[69]*
	A, C, E, J	7.84.84.86.54.10	*[70]*
	B, D, F, K	7.89.89.90.54.10	*[70]*
	B, D, F, K	7.84.84.86.54.10	*[70]*
	B, D, F, K	7.89.89.90.90.80	*[71]*
	B, D, F, K	7.84.84.86.87.80	*[71]*
Rotamass Prime and Hygienic	0, 1, 2	7.66.66.68.54.10	*[75]*
	0, 1, 2	1.83.83.84.54.10	*[75]*
	0, 1, 2	2.73.72.76.54.10	*[75]*
	0, 1, 2	1.91.91.91.54.10	*[76]*
	0, 1, 2	7.83.84.86.54.10	*[76]*
	0, 1, 2	6.83.84.86.54.10	*[76]*
	0, 1, 2	7.87.87.88.54.10	*[77]*
	A, C, E, J	7.66.66.68.66.60	*[77]*
	A, C, E, J	1.83.83.84.82.60	*[77]*
	A, C, E, J	2.73.72.76.80.60	*[78]*
	A, C, E, J	1.91.91.91.91.60	*[78]*
	A, C, E, J	7.83.84.86.89.60	*[78]*
	A, C, E, J	6.83.84.86.89.60	*[79]*
	A, C, E, J	7.87.87.88.89.60	*[79]*
Intense 08/10	0, 1, 2	–	*[73]*
	A, C, E, J	–	*[73]*

8.4.3 Rotamass Nano, CNG, LPG

In case of CNG and LPG sensors with "Meter size" smaller than 34 these temperatures are applicable.

Model code:
Pos. 2: N, C, L
Pos. 8: 0
Pos. 10: A, C, E, J, B, D, F, K
Pos. 11: SF21, SF22
Ex code:
–

The following figure shows the relevant positions of the model code:

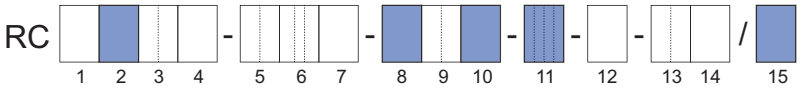


Tab. 8: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L⌴⌴⌴	Option Y⌴⌴⌴	
T6	65 (149)	65 (149)	65 (149)
T5	75 (167)	75 (167)	90 (194)
T4	80 (176)	74 (165)	130 (266)
T3	80 (176)	72 (161)	150 (302)
T2	80 (176)	72 (161)	150 (302)
T1	80 (176)	72 (161)	150 (302)

Model code:
Pos. 2: N, C, L
Pos. 8: 2
Pos. 10: B, D, F, K
Pos. 11: SF21, SF22
Ex code:
–

The following figure shows the relevant positions of the model code:



Tab. 9: Temperature classification

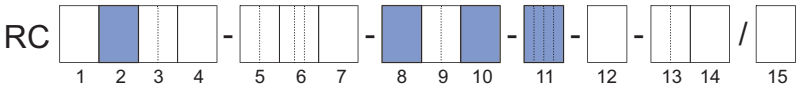
Temperature class	Maximum ambient temperature in °C (°F)			Maximum process fluid temperature in °C (°F)
	Option L⌴⌴⌴	Option Y⌴⌴⌴ without option T⌴⌴	Option Y⌴⌴⌴ with option T⌴⌴	
T6	65 (149)	65 (149)	65 (149)	65 (149)
T5	75 (167)	75 (167)	75 (167)	90 (194)
T4	80 (176)	76 (168)	75 (167)	130 (266)
T3	80 (176)	75 (167)	71 (159)	180 (356)
T2	80 (176)	73 (163)	64 (147)	260 (500)
T1	80 (176)	73 (163)	64 (147)	260 (500)

8.4.4 Rotamass Supreme, CNG, LPG and Intense

In case of CNG and LPG sensors with "Meter size" 34 these temperatures are applicable.

Model code:
Pos. 2: S, C, L, T
Pos. 8: 0
Pos. 10: 0, 1, 2
Pos. 11: SF21
Ex code:
6.85.86.87.54.10

The following figure shows the relevant positions of the model code:

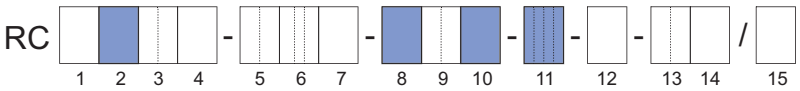


Tab. 10: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)	Maximum process fluid temperature in °C (°F)
T6	43 (109)	66 (150)
T5	58 (136)	82 (179)
T4	60 (140)	118 (244)
T3	60 (140)	150 (302)
T2	60 (140)	150 (302)
T1	60 (140)	150 (302)

Model code:
Pos. 2: S, C, L, T
Pos. 8: 0
Pos. 10: 0, 1, 2
Pos. 11: SF22
Ex code:
2.78.79.81.54.10

The following figure shows the relevant positions of the model code:

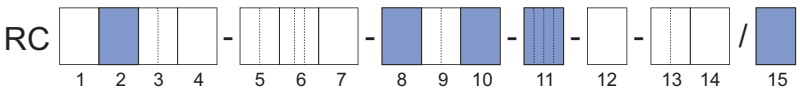


Tab. 11: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)	Maximum process fluid temperature in °C (°F)
T6	59 (138)	59 (138)
T5	60 (140)	75 (167)
T4	60 (140)	112 (233)
T3	60 (140)	150 (302)
T2	60 (140)	150 (302)
T1	60 (140)	150 (302)

Model code:
Pos. 2: S, C, L, T
Pos. 8: 0
Pos. 10: A, C, E, J
Pos. 11: SF21
Ex code:
6.85.86.87.54.10

The following figure shows the relevant positions of the model code:

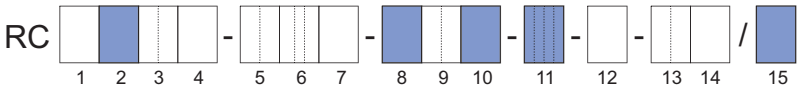


Tab. 12: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	41 (105)	41 (105)	66 (150)
T5	56 (132)	56 (132)	82 (179)
T4	80 (176)	62 (143)	118 (244)
T3	78 (172)	49 (120)	150 (302)
T2	78 (172)	49 (120)	150 (302)
T1	78 (172)	49 (120)	150 (302)

Model code:
Pos. 2: S, C, L, T
Pos. 8: 0
Pos. 10: A, C, E, J
Pos. 11: SF22
Ex code:
2.78.79.81.54.10

The following figure shows the relevant positions of the model code:

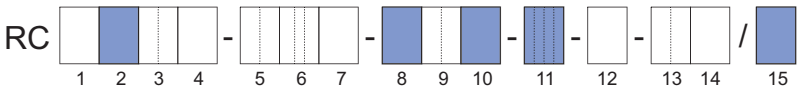


Tab. 13: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	59 (138)	59 (138)	59 (138)
T5	75 (167)	75 (167)	75 (167)
T4	80 (176)	65 (149)	112 (233)
T3	78 (172)	49 (120)	150 (302)
T2	78 (172)	49 (120)	150 (302)
T1	78 (172)	49 (120)	150 (302)

Model code:
Pos. 2: S, C, L, T
Pos. 8: 0
Pos. 10: B, D, F, K
Pos. 11: SF21
Ex code:
6.85.86.87.54.10

The following figure shows the relevant positions of the model code:

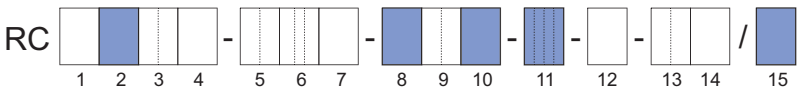


Tab. 14: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	47 (116)	47 (116)	66 (150)
T5	62 (143)	62 (143)	82 (179)
T4	80 (176)	74 (165)	118 (244)
T3	80 (176)	70 (158)	150 (302)
T2	80 (176)	70 (158)	150 (302)
T1	80 (176)	70 (158)	150 (302)

Model code:
Pos. 2: S, C, L, T
Pos. 8: 0
Pos. 10: B, D, F, K
Pos. 11: SF22
Ex code:
2.78.79.81.54.10

The following figure shows the relevant positions of the model code:

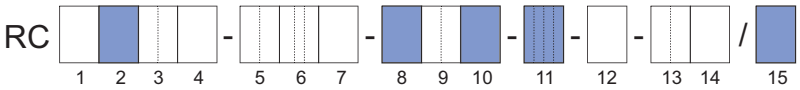


Tab. 15: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	59 (138)	59 (138)	59 (138)
T5	75 (167)	75 (167)	75 (167)
T4	80 (176)	74 (165)	112 (233)
T3	80 (176)	70 (158)	150 (302)
T2	80 (176)	70 (158)	150 (302)
T1	80 (176)	70 (158)	150 (302)

Model code:
Pos. 2: S
Pos. 8: 1
Pos. 10: B, D, F, K
Pos. 11: SF21
Ex code:
3.79.80.82.54.10

The following figure shows the relevant positions of the model code:

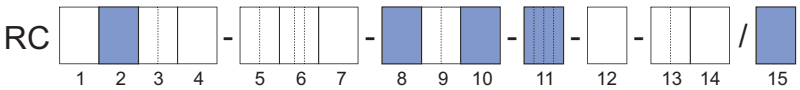


Tab. 16: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	60 (140)	60 (140)	60 (140)
T5	76 (168)	76 (168)	76 (168)
T4	80 (176)	74 (165)	113 (235)
T3	80 (176)	70 (158)	150 (302)
T2	80 (176)	70 (158)	150 (302)
T1	80 (176)	70 (158)	150 (302)

Model code:
Pos. 2: S
Pos. 8: 1
Pos. 10: B, D, F, K
Pos. 11: SF22
Ex code:
2.77.78.80.54.10

The following figure shows the relevant positions of the model code:

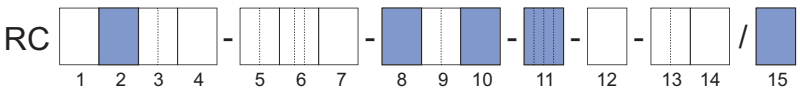


Tab. 17: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	58 (136)	58 (136)	58 (136)
T5	74 (165)	74 (165)	74 (165)
T4	80 (176)	74 (165)	111 (232)
T3	80 (176)	70 (158)	150 (302)
T2	80 (176)	70 (158)	150 (302)
T1	80 (176)	70 (158)	150 (302)

Model code:
Pos. 2: S, C, L, T
Pos. 8: 2
Pos. 10: B, D, F ,K
Pos. 11: SF21
Ex code:
6.85.86.87.89.80

The following figure shows the relevant positions of the model code:

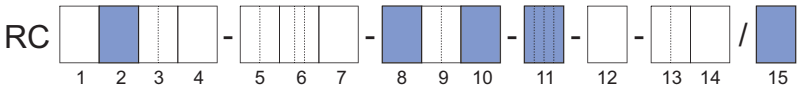


Tab. 18: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	47 (116)	47 (116)	66 (150)
T5	62 (143)	62 (143)	82 (179)
T4	80 (176)	74 (165)	118 (244)
T3	80 (176)	64 (147)	185 (365)
T2	80 (176)	59 (138)	220 (428)
T1	80 (176)	59 (138)	220 (428)

Model code:
Pos. 2: S, C, L, T
Pos. 8: 2
Pos. 10: B, D, F, K
Pos. 11: SF22
Ex code:
2.78.79.81.85.80

The following figure shows the relevant positions of the model code:

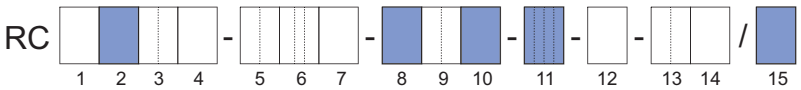


Tab. 19: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	59 (138)	59 (138)	59 (138)
T5	75 (167)	75 (167)	75 (167)
T4	80 (176)	74 (165)	112 (233)
T3	80 (176)	64 (147)	181 (357)
T2	80 (176)	59 (138)	220 (428)
T1	80 (176)	59 (138)	220 (428)

Model code:
Pos. 2: S, C, L, T
Pos. 8: 3
Pos. 10: B, D, F, K
Pos. 11: SF21, SF22
Ex code:
–

The following figure shows the relevant positions of the model code:

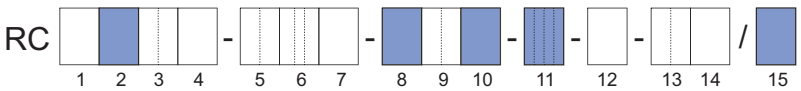


Tab. 20: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	62 (143)	62 (143)	65 (149)
T5	77 (170)	77 (170)	80 (176)
T4	80 (176)	74 (165)	115 (239)
T3	80 (176)	65 (149)	180 (356)
T2	73 (163)	50 (122)	275 (527)
T1	60 (140)	40 (104)	350 (662)

Model code:
Pos. 2: S, C, L, T
Pos. 8: 4
Pos. 10: B, D, F
Pos. 11: SF21, SF22
Ex code:
-

The following figure shows the relevant positions of the model code:



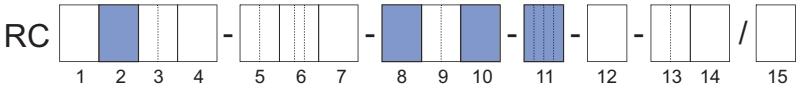
Tab. 21: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	62 (143)	62 (143)	65 (149)
T5	77 (170)	77 (170)	80(176)
T4	80 (176)	74 (165)	115 (239)
T3	80 (176)	65 (149)	180 (356)
T2	73 (163)	50 (122)	275 (527)
T1	52 (125)	32 (89)	400 (752)

8.4.5 Rotamass Giga

Model code:
Pos. 2: G
Pos. 8: 0
Pos. 10: 0, 1, 2
Pos. 11: SF21
Ex code:
7.89.89.90.54.10

The following figure shows the relevant positions of the model code:

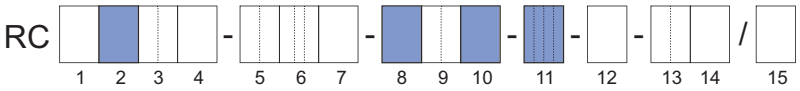


Tab. 22: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)	Maximum process fluid temperature in °C (°F)
T6	39 (102)	70 (158)
T5	54 (129)	85 (185)
T4	60 (140)	121 (249)
T3	60 (140)	150 (302)
T2	60 (140)	150 (302)
T1	60 (140)	150 (302)

Model code:
Pos. 2: G
Pos. 8: 0
Pos. 10: 0, 1, 2
Pos. 11: SF22
Ex code:
7.84.84.86.54.10

The following figure shows the relevant positions of the model code:

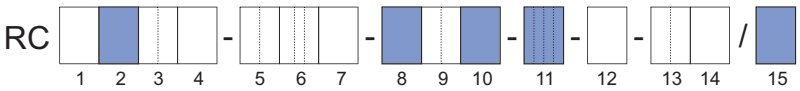


Tab. 23: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)	Maximum process fluid temperature in °C (°F)
T6	41 (105)	65 (149)
T5	56 (132)	80 (176)
T4	60 (140)	117 (242)
T3	60 (140)	150 (302)
T2	60 (140)	150 (302)
T1	60 (140)	150 (302)

Model code:
Pos. 2: G
Pos. 8: 0
Pos. 10: A, C, E, J
Pos. 11: SF21
Ex code:
7.89.89.90.54.10

The following figure shows the relevant positions of the model code:

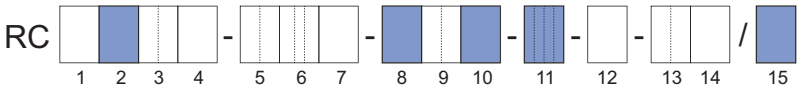


Tab. 24: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	37 (98)	37 (98)	70 (158)
T5	52 (125)	52 (125)	85 (185)
T4	80 (176)	60 (140)	121 (249)
T3	78 (172)	49 (120)	150 (302)
T2	78 (172)	49 (120)	150 (302)
T1	78 (172)	49 (120)	150 (302)

Model code:
Pos. 2: G
Pos. 8: 0
Pos. 10: A, C, E, J
Pos. 11: SF22
Ex code:
7.84.84.86.54.10

The following figure shows the relevant positions of the model code:

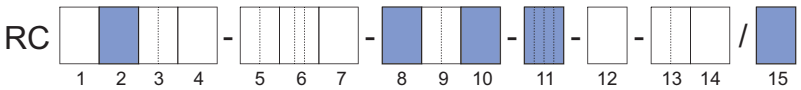


Tab. 25: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	39 (102)	39 (102)	65 (149)
T5	54 (129)	54 (129)	80 (176)
T4	80 (176)	62 (143)	117 (242)
T3	78 (172)	49 (120)	150 (302)
T2	78 (172)	49 (120)	150 (302)
T1	78 (172)	49 (120)	150 (302)

Model code:
Pos. 2: G
Pos. 8: 0
Pos. 10: B, D, F, K
Pos. 11: SF21
Ex code:
7.89.89.90.54.10

The following figure shows the relevant positions of the model code:

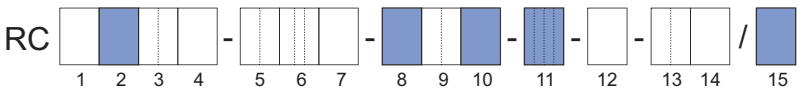


Tab. 26: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	44 (111)	44 (111)	70 (158)
T5	59 (138)	59 (138)	85 (185)
T4	80 (176)	73 (163)	121 (249)
T3	80 (176)	70 (158)	150 (302)
T2	80 (176)	70 (158)	150 (302)
T1	80 (176)	70 (158)	150 (302)

Model code:
Pos. 2: G
Pos. 8: 0
Pos. 10: B, D, F, K
Pos. 11: SF22
Ex code:
7.84.84.86.54.10

The following figure shows the relevant positions of the model code:

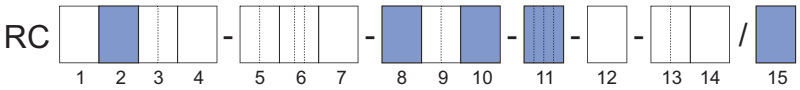


Tab. 27: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	44 (111)	44 (111)	65 (149)
T5	59 (138)	59 (138)	80 (176)
T4	80 (176)	74 (165)	117 (242)
T3	80 (176)	70 (158)	150 (302)
T2	80 (176)	70 (158)	150 (302)
T1	80 (176)	70 (158)	150 (302)

Model code:
Pos. 2: G
Pos. 8: 2
Pos. 10: B, D, F, K
Pos. 11: SF21
Ex code:
7.89.89.90.90.80

The following figure shows the relevant positions of the model code:

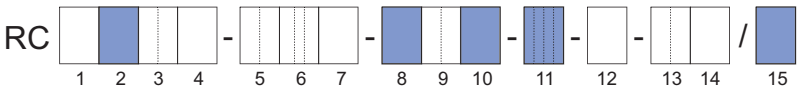


Tab. 28: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	44 (111)	44 (111)	70 (158)
T5	59 (138)	59 (138)	85 (185)
T4	80 (176)	73 (163)	121 (249)
T3	80 (176)	64 (147)	186 (366)
T2	80 (176)	59 (138)	220 (428)
T1	80 (176)	59 (138)	220 (428)

Model code:
Pos. 2: G
Pos. 8: 2
Pos. 10: B, D, F, K
Pos. 11: SF22
Ex code:
7.84.84.86.87.80

The following figure shows the relevant positions of the model code:

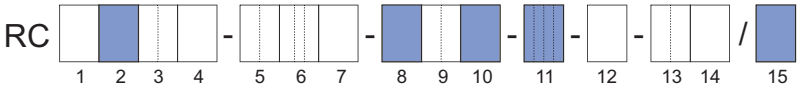


Tab. 29: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	44 (111)	44 (111)	65 (149)
T5	59 (138)	59 (138)	80 (176)
T4	80 (176)	74 (165)	117 (242)
T3	80 (176)	64 (147)	183 (361)
T2	80 (176)	59 (138)	220 (428)
T1	80 (176)	59 (138)	220 (428)

Model code:
Pos. 2: G
Pos. 8: 3
Pos. 10: B, D, F, K
Pos. 11: SF21, SF22
Ex code:
–

The following figure shows the relevant positions of the model code:

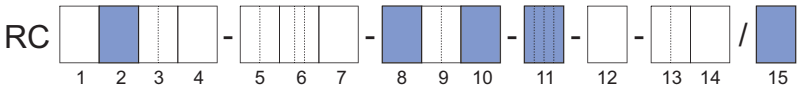


Tab. 30: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	62 (143)	62 (143)	65 (149)
T5	77 (170)	77 (170)	80 (176)
T4	80 (176)	74 (165)	115 (239)
T3	80 (176)	65 (149)	180 (356)
T2	73 (163)	50 (122)	275 (527)
T1	60 (140)	40 (104)	350 (662)

Model code:
Pos. 2: G
Pos. 8: 4
Pos. 10: B, D, F
Pos. 11: SF21, SF22
Ex code:
-

The following figure shows the relevant positions of the model code:



Tab. 31: Temperature classification

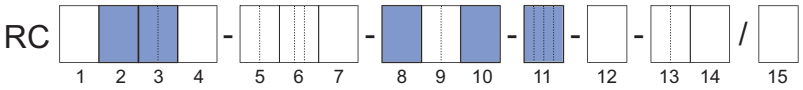
Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	62 (143)	62 (143)	65 (149)
T5	77 (170)	77 (170)	80(176)
T4	80 (176)	74 (165)	115 (239)
T3	80 (176)	65 (149)	180 (356)
T2	73 (163)	50 (122)	275 (527)
T1	52 (125)	32 (89)	400 (752)

8.4.6 Rotamass Intense

Variant 1:

Model code:
Pos. 2: T
Pos. 3: 08, 10
Pos. 8: 0
Pos. 10: 0, 1, 2
Pos. 11: SF21, SF22
Ex code:
–

The following figure shows the relevant positions of the model code:

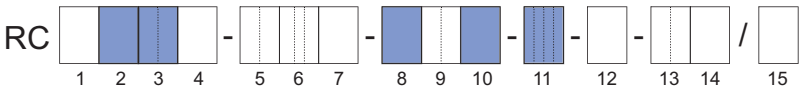


Tab. 32: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)	Maximum process fluid temperature in °C (°F)
T6	42 (107)	75 (167)
T5	57 (134)	90 (194)
T4	60 (140)	125 (257)
T3	60 (140)	150 (302)
T2	60 (140)	150 (302)
T1	60 (140)	150 (302)

Model code:
Pos. 2: T
Pos. 3: 08, 10
Pos. 8: 0
Pos. 10: A, C, E, J
Pos. 11: SF21, SF22
Ex code:
–

The following figure shows the relevant positions of the model code:



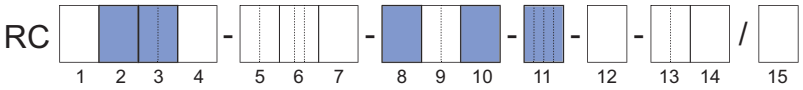
Tab. 33: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	43 (109)	43 (109)	75 (167)
T5	58 (136)	58 (136)	90 (194)
T4	80 (176)	74 (165)	125 (257)
T3	80 (176)	60 (140)	150 (302)
T2	80 (176)	60 (140)	150 (302)
T1	80 (176)	60 (140)	150 (302)

Variant 2:

Model code:
Pos. 2: T
Pos. 3: 08
Pos. 8: 0
Pos. 10: 0, 1, 2
Pos. 11: SF21, SF22
Ex code:
–

The following figure shows the relevant positions of the model code:

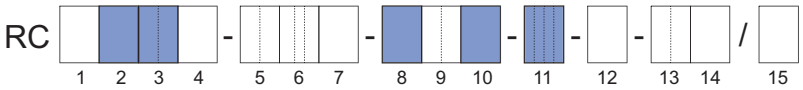


Tab. 34: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)	Maximum process fluid temperature in °C (°F)
T6	60 (140)	75 (167)
T5	60 (140)	90 (194)
T4	60 (140)	125 (257)
T3	60 (140)	150 (302)
T2	60 (140)	150 (302)
T1	60 (140)	150 (302)

Model code:
Pos. 2: T
Pos. 3: 08
Pos. 8: 0
Pos. 10: A, C, E, J
Pos. 11: SF21, SF22
Ex code:
–

The following figure shows the relevant positions of the model code:

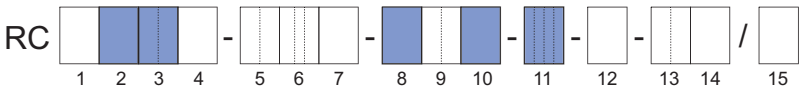


Tab. 35: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	67 (152)	67 (152)	75 (167)
T5	80 (176)	77 (170)	90 (194)
T4	80 (176)	74 (165)	125 (257)
T3	80 (176)	60 (140)	150 (302)
T2	80 (176)	60 (140)	150 (302)
T1	80 (176)	60 (140)	150 (302)

Model code:
Pos. 2: T
Pos. 3: 10
Pos. 8: 0
Pos. 10: 0,1, 2
Pos. 11: SF21, SF22
Ex code:
–

The following figure shows the relevant positions of the model code:

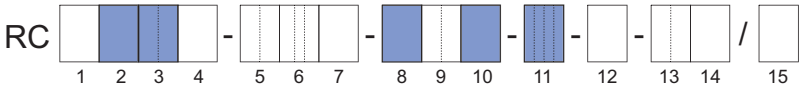


Tab. 36: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)	Maximum process fluid temperature in °C (°F)
T6	56 (133)	75 (167)
T5	60 (140)	90 (194)
T4	60 (140)	125 (257)
T3	60 (140)	150 (302)
T2	60 (140)	150 (302)
T1	60 (140)	150 (302)

Model code:
Pos. 2: T
Pos. 3: 10
Pos. 8: 0
Pos. 10: A, C, E, J
Pos. 11: SF21, SF22
Ex code:
–

The following figure shows the relevant positions of the model code:



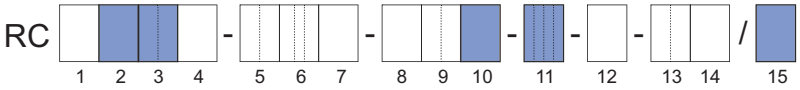
Tab. 37: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	58 (136)	58 (136)	75 (167)
T5	73 (163)	73 (163)	90 (194)
T4	80 (176)	74 (165)	125 (257)
T3	80 (176)	60 (140)	150 (302)
T2	80 (176)	60 (140)	150 (302)
T1	80 (176)	60 (140)	150 (302)

8.4.7 Rotamass Prime and Hygienic

Model code:
Pos. 2: P, H
Pos. 3: 25, 40
Pos. 10: 0, 1, 2
Pos. 11: SF21, SF22
Pos. 15: –
Ex code:
7.66.66.68.54.10

The following figure shows the relevant positions of the model code:

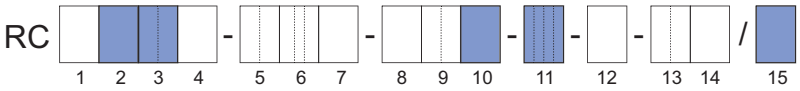


Tab. 38: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)	Maximum process fluid temperature in °C (°F)
T6	43 (109)	47 (116)
T5	58 (136)	62 (143)
T4	60 (140)	99 (210)
T3	60 (140)	150 (302)
T2	60 (140)	150 (302)
T1	60 (140)	150 (302)

Model code:
Pos. 2: P, H
Pos. 3: 25, 40
Pos. 10: 0, 1, 2
Pos. 11: SF21, SF22
Pos. 15: /EPT
Ex code:
1.83.83.84.54.10

The following figure shows the relevant positions of the model code:

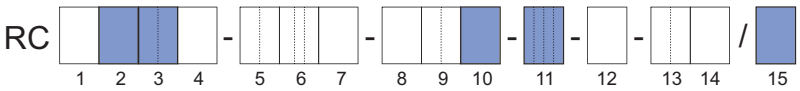


Tab. 39: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)	Maximum process fluid temperature in °C (°F)
T6	60 (140)	64 (147)
T5	60 (140)	79 (174)
T4	60 (140)	115 (239)
T3	60 (140)	150 (302)
T2	60 (140)	150 (302)
T1	60 (140)	150 (302)

Model code:
Pos. 2: P, H
Pos. 3: 50
Pos. 10: 0, 1, 2
Pos. 11: SF21, SF22
Pos. 15: –
Ex code:
2.73.72.76.54.10

The following figure shows the relevant positions of the model code:

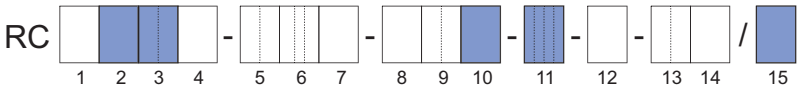


Tab. 40: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)	Maximum process fluid temperature in °C (°F)
T6	54 (129)	54 (129)
T5	60 (140)	68 (154)
T4	60 (140)	107 (224)
T3	60 (140)	150 (302)
T2	60 (140)	150 (302)
T1	60 (140)	150 (302)

Model code:
Pos. 2: P, H
Pos. 3: 50
Pos. 10: 0, 1, 2
Pos. 11: SF21, SF22
Pos. 15: /EPT
Ex code:
1.91.91.91.54.10

The following figure shows the relevant positions of the model code:

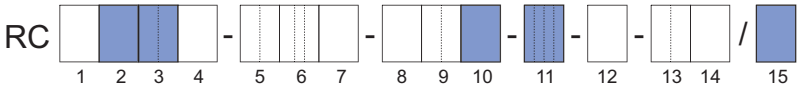


Tab. 41: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)	Maximum process fluid temperature in °C (°F)
T6	60 (140)	72 (161)
T5	60 (140)	87 (188)
T4	60 (140)	122 (251)
T3	60 (140)	150 (302)
T2	60 (140)	150 (302)
T1	60 (140)	150 (302)

Model code:
Pos. 2: P, H
Pos. 3: 80
Pos. 10: 0, 1, 2
Pos. 11: SF21
Pos. 15: –
Ex code:
7.83.84.86.54.10

The following figure shows the relevant positions of the model code:

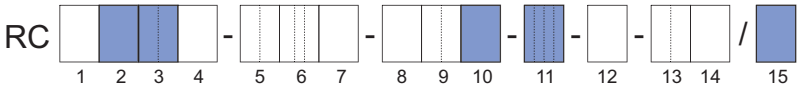


Tab. 42: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)	Maximum process fluid temperature in °C (°F)
T6	40 (104)	64 (147)
T5	55 (131)	80 (176)
T4	60 (140)	117 (242)
T3	60 (140)	150 (302)
T2	60 (140)	150 (302)
T1	60 (140)	150 (302)

Model code:
Pos. 2: P, H
Pos. 3: 80
Pos. 10: 0, 1, 2
Pos. 11: SF22
Pos. 15: –
Ex code:
6.83.84.86.54.10

The following figure shows the relevant positions of the model code:

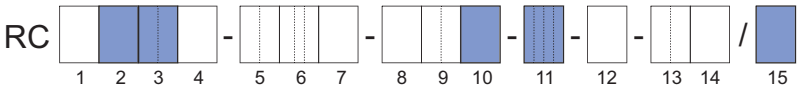


Tab. 43: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)	Maximum process fluid temperature in °C (°F)
T6	44 (111)	64 (147)
T5	59 (138)	80 (176)
T4	60 (140)	117 (242)
T3	60 (140)	150 (302)
T2	60 (140)	150 (302)
T1	60 (140)	150 (302)

Model code:
Pos. 2: P, H
Pos. 3: 1H
Pos. 10: 0, 1, 2
Pos. 11: SF21, SF22
Pos. 15: –
Ex code:
7.87.87.88.54.10

The following figure shows the relevant positions of the model code:

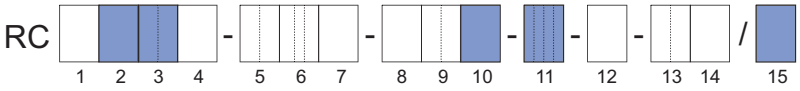


Tab. 44: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)	Maximum process fluid temperature in °C (°F)
T6	39 (102)	68 (154)
T5	54 (129)	83 (181)
T4	60 (140)	119 (246)
T3	60 (140)	150 (302)
T2	60 (140)	150 (302)
T1	60 (140)	150 (302)

Model code:
Pos. 2: P, H
Pos. 3: 25, 40
Pos. 10: A, C, E, J
Pos. 11: SF21, SF22
Pos. 15: –
Ex code:
7.66.66.68.66.60

The following figure shows the relevant positions of the model code:

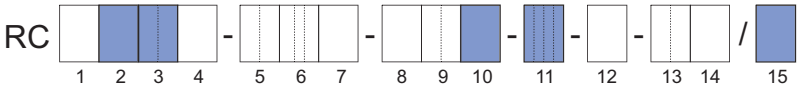


Tab. 45: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	46 (114)	46 (114)	47 (116)
T5	61 (141)	61 (141)	62 (143)
T4	80 (176)	74 (165)	99 (210)
T3	74 (165)	56 (132)	162 (323)
T2	60 (140)	46 (114)	200 (392)
T1	60 (140)	46 (114)	200 (392)

Model code:
Pos. 2: P, H
Pos. 3: 25, 40
Pos. 10: A, C, E, J
Pos. 11: SF21, SF22
Pos. 15: /EPT
Ex code:
1.83.83.84.82.60

The following figure shows the relevant positions of the model code:

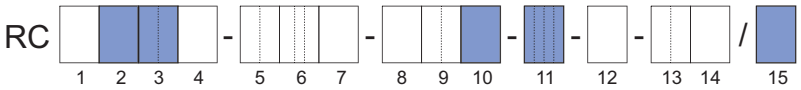


Tab. 46: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	64 (147)	64 (147)	64 (147)
T5	79 (174)	79 (174)	79 (174)
T4	80 (176)	66 (150)	115 (239)
T3	68 (154)	51 (123)	178 (352)
T2	60 (140)	46 (114)	200 (392)
T1	60 (140)	46 (114)	200 (392)

Model code:
Pos. 2: P, H
Pos. 3: 50
Pos. 10: A, C, E, J
Pos. 11: SF21, SF22
Pos. 15: –
Ex code:
2.73.72.76.80.60

The following figure shows the relevant positions of the model code:

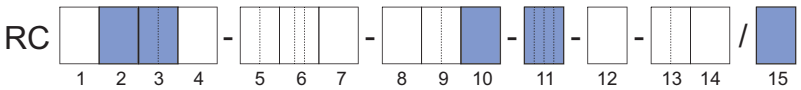


Tab. 47: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	54 (129)	54 (129)	54 (129)
T5	68 (154)	68 (154)	68 (154)
T4	80 (176)	66 (150)	107 (224)
T3	68 (154)	51 (123)	176 (348)
T2	60 (140)	46 (114)	200 (392)
T1	60 (140)	46 (114)	200 (392)

Model code:
Pos. 2: P, H
Pos. 3: 50
Pos. 10: A, C, E, J
Pos. 11: SF21, SF22
Pos. 15: /EPT
Ex code:
1.91.91.91.91.60

The following figure shows the relevant positions of the model code:

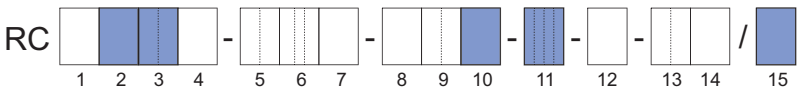


Tab. 48: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	72 (161)	72 (161)	72 (161)
T5	80 (176)	77 (170)	87 (188)
T4	80 (176)	66 (150)	122 (251)
T3	64 (147)	49 (120)	187 (368)
T2	60 (140)	46 (114)	200 (392)
T1	60 (140)	46 (114)	200 (392)

Model code:
Pos. 2: P, H
Pos. 3: 80
Pos. 10: A, C, E, J
Pos. 11: SF21
Pos. 15: –
Ex code:
7.83.84.86.89.60

The following figure shows the relevant positions of the model code:

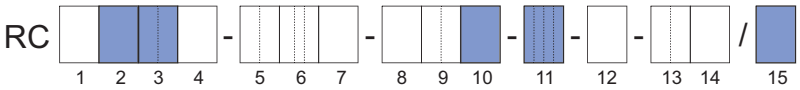


Tab. 49: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	42 (107)	42 (107)	64 (147)
T5	57 (134)	57 (134)	80 (176)
T4	80 (176)	66 (150)	117 (242)
T3	66 (150)	50 (122)	185 (365)
T2	60 (140)	46 (114)	200 (392)
T1	60 (140)	46 (114)	200 (392)

Model code:
Pos. 2: P, H
Pos. 3: 80
Pos. 10: A, C, E, J
Pos. 11: SF22
Pos. 15: –
Ex code:
6.83.84.86.89.60

The following figure shows the relevant positions of the model code:

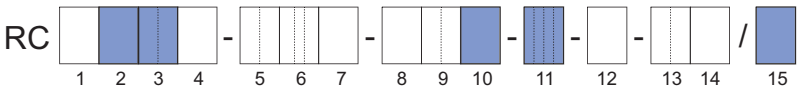


Tab. 50: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	46 (114)	46 (114)	64 (147)
T5	61 (141)	61 (141)	80 (176)
T4	80 (176)	66 (150)	117 (242)
T3	66 (150)	50 (122)	185 (365)
T2	60 (140)	46 (114)	200 (392)
T1	60 (140)	46 (114)	200 (392)

Model code:
Pos. 2: P, H
Pos. 3: 1H
Pos. 10: A, C, E, J
Pos. 11: SF21, SF22
Pos. 15: –
Ex code:
7.87.87.88.89.60

The following figure shows the relevant positions of the model code:



Tab. 51: Temperature classification

Temperature class	Maximum ambient temperature in °C (°F)		Maximum process fluid temperature in °C (°F)
	Option L□□□	Option Y□□□	
T6	40 (104)	40 (104)	68 (154)
T5	55 (131)	55 (131)	83 (181)
T4	80 (176)	66 (150)	119 (246)
T3	66 (150)	50 (122)	185 (365)
T2	60 (140)	46 (114)	200 (392)
T1	60 (140)	46 (114)	200 (392)

Manufacturer:

Rota Yokogawa GmbH & Co. KG
Rheinstr. 8
D-79664 Wehr
Germany

For the actual manufacturing location of your device refer to the model code and/or serial number.

COMPANY WITH QUALITY SYSTEM CERTIFIED BY DNV GL = ISO 9001 =