General Specifications

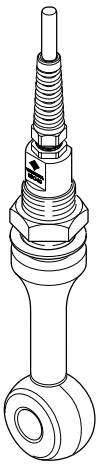
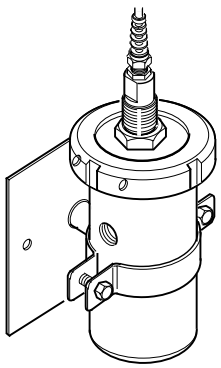
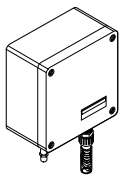
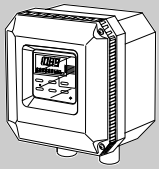
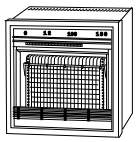
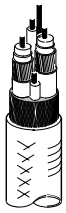
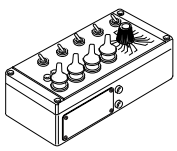
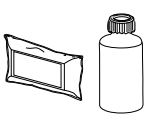
Model IC200
2-wire transmitter
for inductive Conductivity

The EXA IC200 transmitter is a user programmable instrument for conductivity measurements in medium to highly conductive process liquids, using inductive measuring principles. It is used in combination with the YOKOGAWA model IC40 inductive conductivity sensor, for concentration monitoring applications in the chemical industrie and for various other conductivity in the fod and pharmaceutical industrie, the plating and metal finishing industrie and paper & pulp industrie.
The robust cast aluminium, epoxy coated housing makes it the ideal 2-wire transmitter for mounting directly on-site, even under tough environmental conditions.
Its 2-wire concept gives low installation costs, a safe operation and easy maintenance in the field.
The reliability is augmented by the advanced functions of the micro-processor inside the EXA IC200 tansmitter.
The micro-processor enables user-selctable process dedicated temperature compensation for various (strong) acids and alkalis.
The process linearised output function and the "%"-concentration displays contribute to a highly functional inductive conductivity based concentration analyser.

FEATURES

- Process optimised temperature compensation to fit the instrument in any application.
- Extremely wide measuring range (> 6 decades) while maintaining a high resolution and accuracy using only one sensor type :
  Minimum span 100 µS/cm
  Maximum span 1999 mS/cm.
- Free programmable setting of the output range, including a 21-step table output to linearise the output function e.g. to % by weight.
- Programmable % by weight display indication.
- Proven simple 3-leven operation system using YES/NO prompts where each leven can seperately be protected from unwanted access by a 3-digt passcode.\
- Passive 2-wire system, 4 to 20 mA for easy installation at low costs and safe operation at 24 Volt DC.
- Intrinsically safe version available in same design for hazardous areas. CENELEC, FM and CSA approved.

SYSTEM CONFIGURATION

Sensors 	Fittings 	Connecting Equipment 	Transmitters 	Receivers 
		Cable 	Tester 	Accessories 

Process dedicated temperature compensation
The IC200 features optimisation of the temperature compensation for virtually any process. From neutral salt solutions to the most concentrated acids and alkalis. From tightle controlled and/or very stable processes to processes that have extreme variations in both conductivity and temperature. The IC200's temperature compensation can easily be adapted to meet the accuracy requirements for temperature compensation imposed by the process control targets.

Temperature compensation based on the IEC 746-3 table for NaCl solution can be selected for standard conductivity measurements.
For measurements requiring accuracy such as concentration applications, the temperature compensation can be tailored to the process. This is done during commissioning of the transmitter by using the actual process solution by programming a (linear) temperature coefficient : "alpha" (see figure 1).

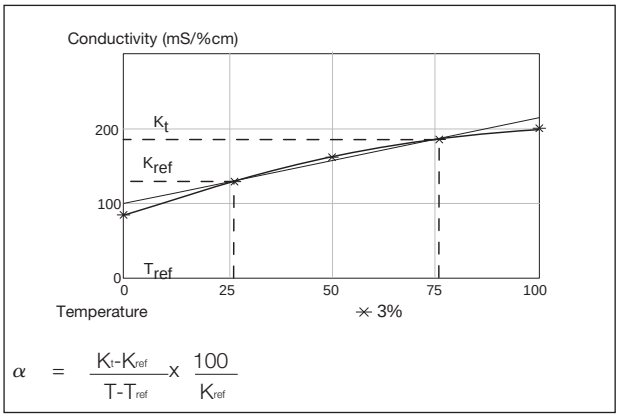


Fig. 1. Definition of temperature compensation factor (α)

Both the reference temperature and the themperature coefficient are freely programmable and can be matched to the process solution for higher accuracy.

To further simplify transmitter set up, temperature compensation curves for several common process solutions are stored in the EPROM. Any of these can be selected from the Service section of the transmitter. They include Sulphuric Acid, Hydrochloric Acid, Nitric Acid and Sodium Hydroxide.

If your process is not covered by one of these selctable curves, the user can create curves specific to the process. This is done by building a simple matrix table of temperature related conductivity values. Thus the accuracy of the measurement is fine-tuned to the specific process conditions.

Programmable output functions
The output of the EXA IC200 can be programmed to give the range and function you need :

- A linear output signal :
  On commissioning the instrument an output range can be selcted over the desired conductivity range ; with a zero suppression up to 90 % and a direct or reverse input-output function.

- A non-linear programmable output-signal :
  The instrument has an output table which can be programmed to give any desired input-output relation.
  A non-linear output signal can be used to make the conductivity output linear to engineering units, e.g. % by weight concentration (see figure 2).
  To support this linear-to-concentration output function the second display line can be programmed to indicate the actual concentration in “%”.
- The output can be set on “hold” when maintenance is being performed.

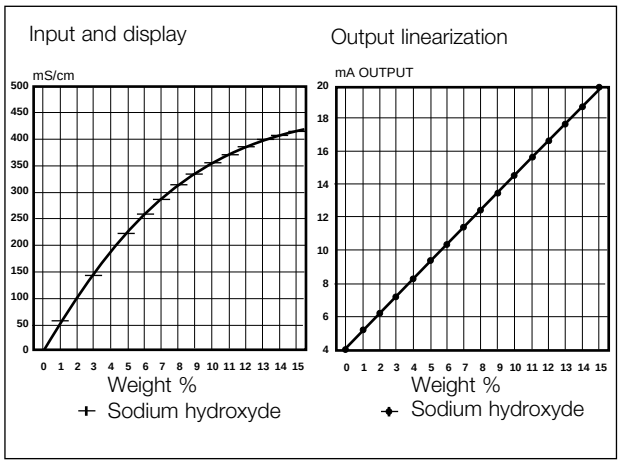


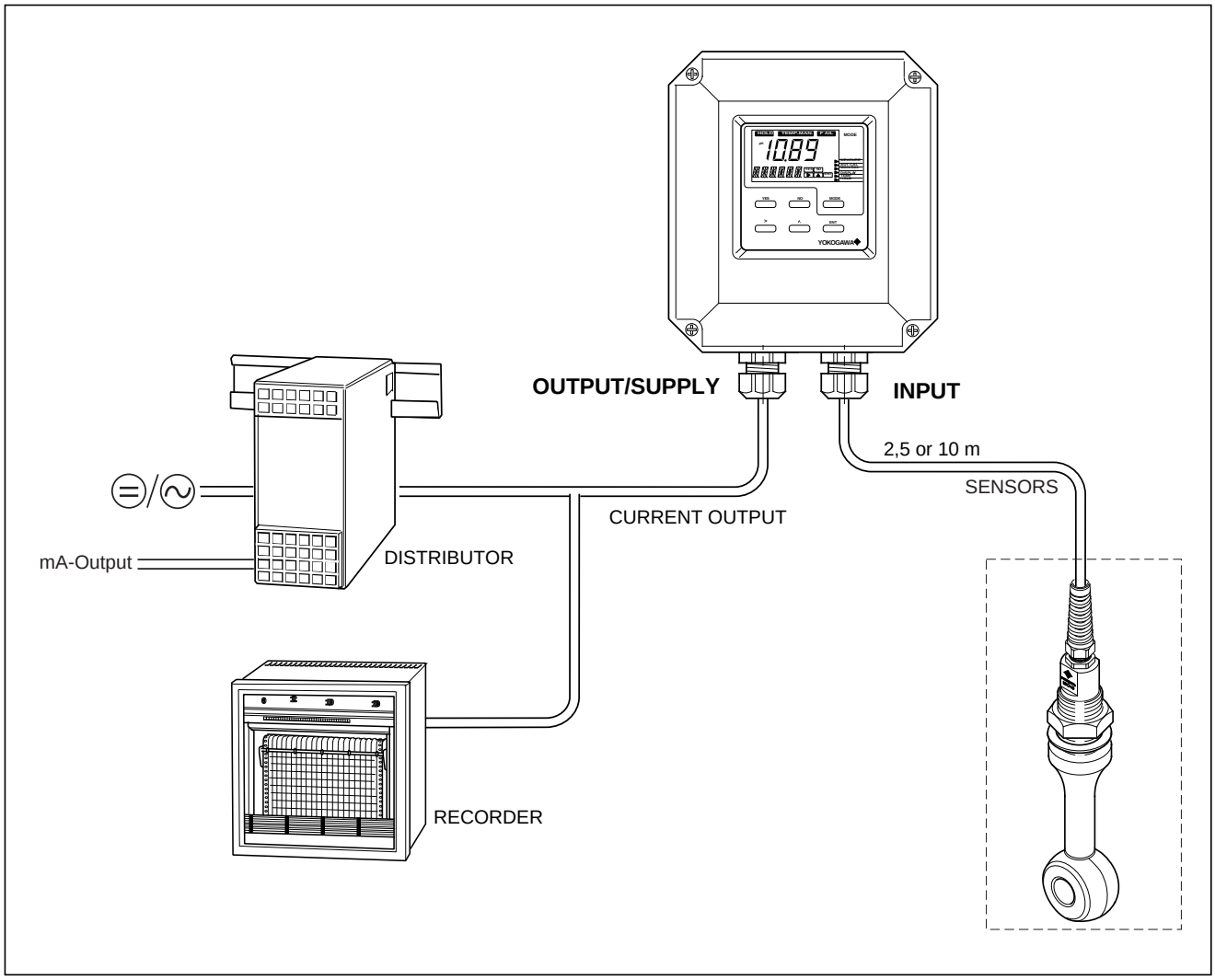
Fig. 2. Output linearised to concentration

Three level operation
The EXA IC200 transmitter uses a 3-level operating system that was developed to take full advantage of the micro-processor while retaining the traditional simplicity of a 2-wire transmitter. The advanced functions are sperated from conventional operation to avoid confusion. They can be activated as required for each individual application.

1. The normal maintenance functions are accessible by pushing the key through the flexible window.
2. Functions required to commission the instrument are hidden from view by the front cover to discourage unauthorized tempering. The front cover is removed to reveal the commissioning menu and the hidden acces key.
3. Operations used to fine-tune the transmitter in the application are found in the Service level. These functions, such as selecting the temperature readout (C or F), are typically done once at the initial start-up. It is accessed via the commissioning menu using selection codes.

All 3 levels can be seperately protected from unauthorized use by a 3-digit passcode.

SYSTEM CONNECTION



MODEL AND SUFFIX CODES

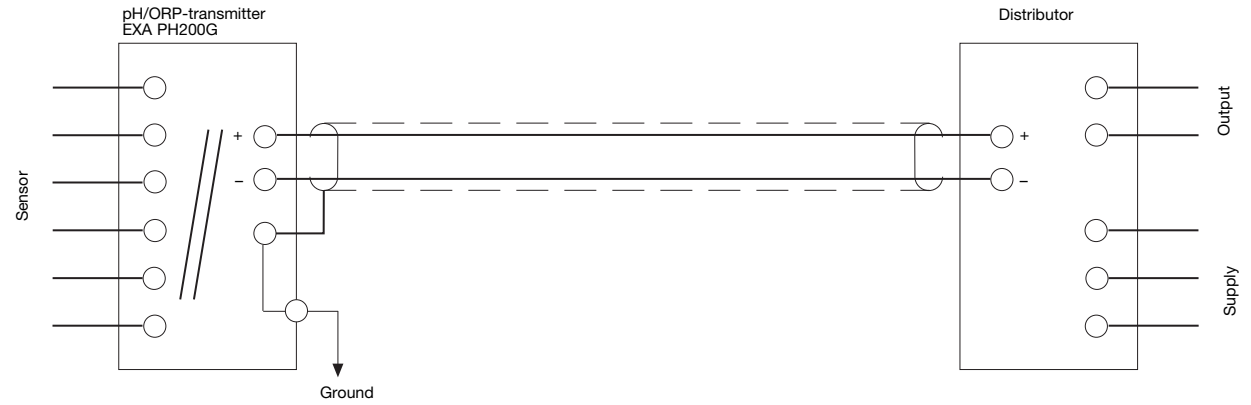
Model	Suffix code	Option code	Description
IC200G	.....	.....	General pupose 2-wire transmitter for inductive conductivity
IC200S	.....	.....	Intrinsic safe 2-wire transmitter for inductive conductivity
	-E	.....	European version (S-E: CENELEC)
	-U	.....	US version (S-U: FM)
	-C	.....	Canadian version (S-C: CSA) (IC200S version only)
Instuction Manual	-E	.....	English version*1
	*A	.....	Style code
Options	.....	/H	Hood for sunlight protection
	.....	/HC	Hose connection ø 19 mm
	.....	/U	Universal pipe and wall mounting kit
	.....	/SCT	Stainless steel tagplate
	.....	/Q	Quality certificate

*1 For other languages, please contact your local sales office

ORDERING EXAMPLE: IC200S-E*A/M/SCT/Q for a CENELEC certified intrinsic safe 2-wire transmitter for inductive conductivity, European version, style A, with a mounting kit, stainless steel tagplate and quality certificate.

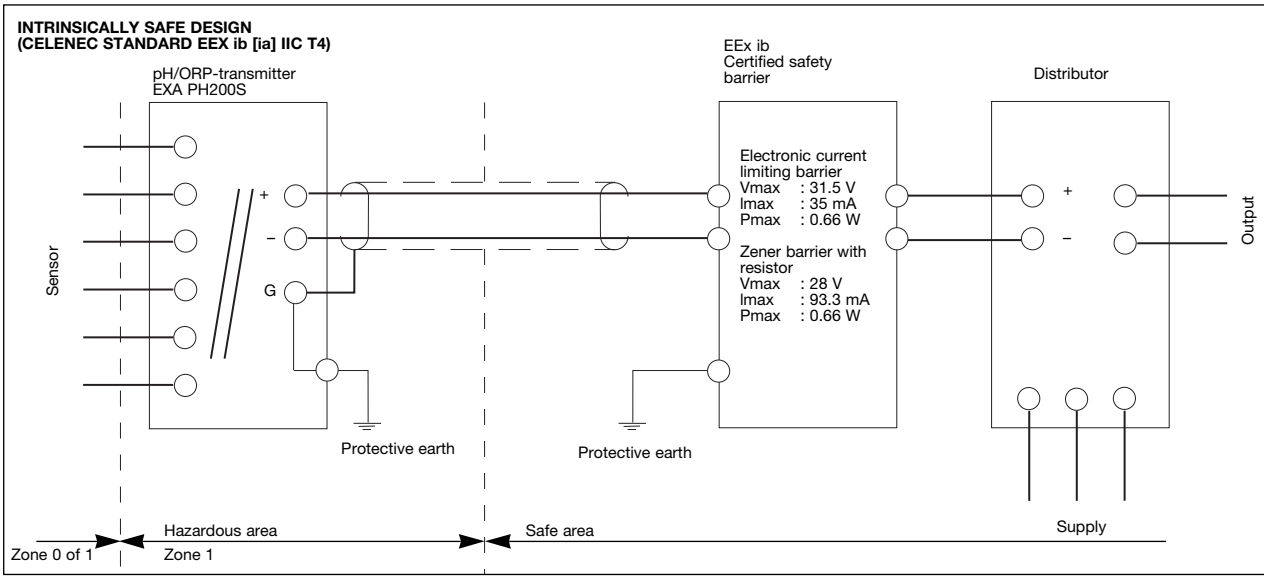
CONNECTION DIAGRAM FOR SUPPLY POWER

GENERAL PURPOSE DESIGN



NOTE: The outside earth terminal should be connected to site ground by a large area conductor (e.g. a flat earth strip) for best protection against interference.

INTRINSICALLY SAFE DESIGN
(CELENEC STANDARD EEX ib [ia] IIC T4)



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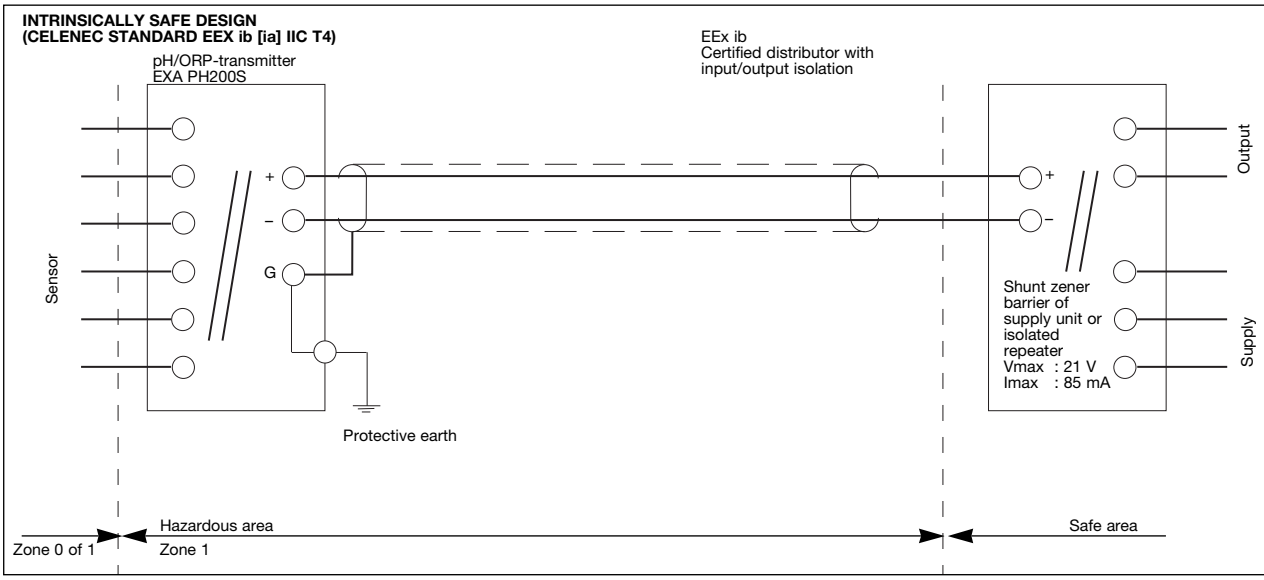


GENERAL SPECIFICATIONS

A. Input specifications : Compatible to Yokogawa Model ISC40 indcutive conductivity sensor with integrated temperature sensor.

B. Measuring range
- Conductivity : 0 to 1999 mS/cm [at 25 °C (77°F) reference temperature]. Minimum conductivity at process temperature: 1.0 µS/cm. Maximum conductivity at process temperature: 3000 mS/cm.
- Temperature : -20 to 140°C (0 to 280°F). Ranges using Yokogawa sensor model ISC40.

C. Indicating range
- Main display : 0.0 µS/cm to 1999 mS/cm.
- Message display : -20 to 140 °C (0 to 280°F). 0 to 199.9%.

D. Transmission signal : 4 to 20 mA DC;
- Maximum load : 550 Ohm at 24 Volt.
- Maximum output current : 20.5 mA.
- Use selectable maximum output current on fault condition : 22 mA (continueous or single 30 second pulse).

E Transmission range : User programmable to any conductivity range within th indicating range.
- Minimum span : 100 µS/cm.
- Maximum span : 1999 mS/cm.
- Maximum. zero suppresion: 90% [low value (4 mA) corresponds to conductivity value <1 S/cm] A user programmable output table can be set up in 21 steps.

F. Power supply
- Model IC200G : 17 to Volt DC, dependent on load.
- Model IC200S : 17 to 31.5 Volt DC, powered from a certified zener barrier or isolated power supply.

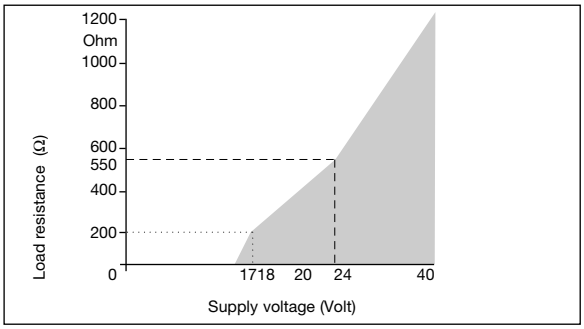


Fig. 3. Max. load resistance as function of supply voltage

G. Power consumption : maximum 0.9 VA.

FUNCTIONAL SPECIFICATIONS

A. Performance *
- Linearity : 0.2% FS ±0.2 µS/cm.
- Repeatability : 0.2% FS ±0.2 µS/cm.
- Accuracy : 0.5% FS ±0.3 µS/cm.
- Influence of ambient temperature changes : 0.1% per °C ±0.05 µS/cm.
- Step response : 90% (<2 decades) in ≤6 sec.

B. Temperature compensation : Automatic between -10 and 130 °C (10 to 270°F).

C. Reference temperature : User programmable 0 to 100 °C (30 to 210°F).

D. Temperature compensation algorithm
- User selectable
  - According to IEC 746-3 tables for NaCl.
  - Process calibrated or user programmable linear compensation factor -9.99 to 9.99% per °C.
  - User selectable values for specific process liquids including Sulphuric Acid, Hydrochloric Acid, Nitric Acid and Sodium Hydroxide.
  - User programmable values for specific process liquids (user defined).

* Performance of the transmitter and sensor exclusive of process effects.

ENVIRONMENT AND OPERATIONAL CONDITIONS

A. Ambient temperature : 10 to 55°C (10 to 131°F) Ecursions to -30°C (-20°F) do not influence the current output function and excursions to 70°(+160°F) are acceptable too.

B. LCD display function : -10 to 70°C (10 to 160°F).

C. Storage temperature : -30 to 70°C (-20 to 160°F).

D. Relative humidity : 10 to 90%.

E. Weather protection : Rain and dust tight to IP 65 (NEMA 4X).

F. Data protection : Non volatile memory (EEPROM); three-fold back-up.

G. Voltage supply interruption : <50 mS.

H. Power down : No effect, reset to measurement

I. Operation protection : 3 digit passcode.

CONSTRUCTION

A. Display method : Custom liquid christal display.
- Main display : $3^1/_2$ digit, 12.5 mm high.
- Message display : 6 alfanumeric characters, 7 mm high.
- Special fields : Flags for status indication (Hold output signal condition; Fault condition).
- Measuring units : µS/cm; mS/cm.
- Key prompts : YES, NO, ^, >, ENT. Menu pointer.

B. Keys : 6 keys operated through flexible window with tactile feedback and one hidden key behind the front cover.

C. Housing
- Housing material : Cast aluminium with chemical resistant coating. Cover fixed with stainless steel screws in stainless steel inserts.
- Window : Flexible Poly-carbonate.
- Colours used : Moss green cover on off-white body.
- Cable entries : Two glands PG 16 (1/2" NPT adaptor for US model). Hose connection optional.
- Cable terminals : For maximum 2.5 mm^2 cable (cable finishings prefered).
- Earth connection : For external ground.
- Labels : Stainless steel type plate. Optional stainless steel tagplate.

D. Mounting configurations
- Bracket mounting : Two M6 bolts, 9 mm long. Wall, panel or pipe mounting by the optional mounting kit.

E Shipping details
- Dimensions : wxhxd = 162x178x115 mm (6.5x7x4.5")
- Package : wxhxd = 225x225x220 mm (9x9x8.6")
- Weight : approximately 2.5 kg (5 lbs)

REGULATORY COMPLIANCE

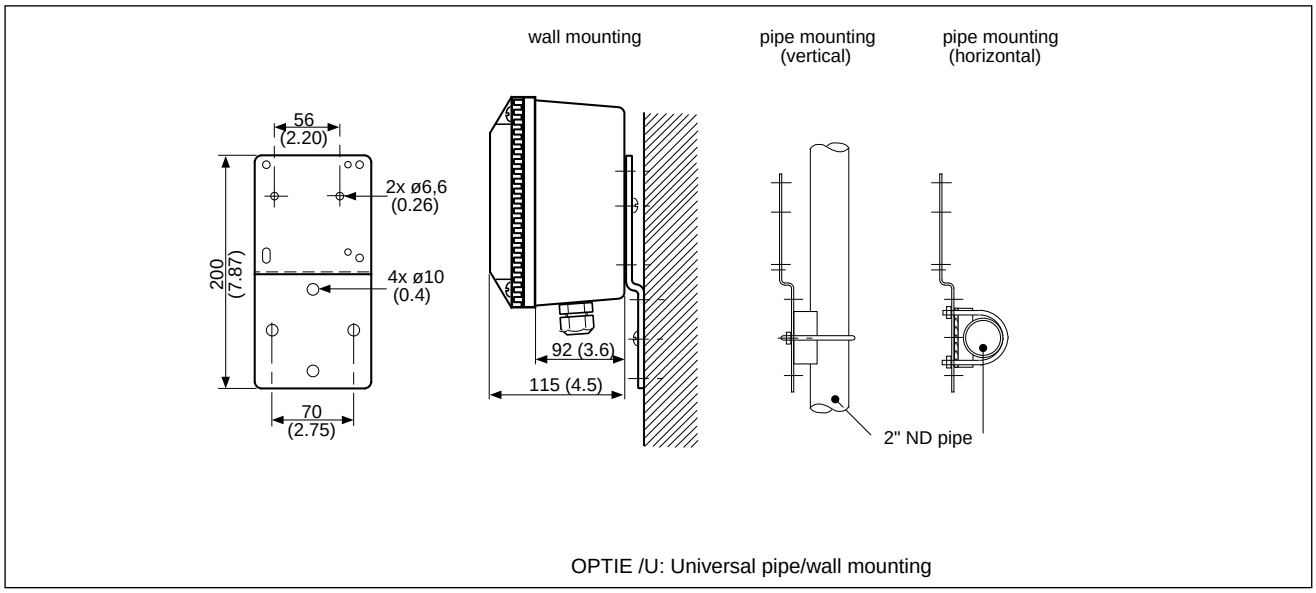
A. Hazardous areas * : CENELEC intrinsic safety according to EN50014 and EN50020.
CENELEC standard EEx ib [ia] IIC T6 for ambient temperature <40 °C and EEx ib [ia] IIC T4 for ambient temperature <70 °C.
Certificate no: Ex 93.C 8739.
FM intrinsic safety for IS CL1, DIV1, GP ABCD
T3B for Ta-30 to 70°C.
T4 for Ta-30 to 40°C.
Approval report: J.I. 1Y1A7.AX
CSA intrinsic safety for Ex [ia] Class I, Division 1, groups C and D, T4A
Approval file: LR 102851-1

B. Electromagnetic compatibility
: meets council directive 80/336/EEC
- Emission : meets EN55011 requirements:class A
- Immunity : meets prEN50082-1 requirements:
Burst (Fast transient pulses) conform to IEC 801-4:0.2 % FS.
Electrostatic Discharge conform to IEC 801-2: 0.2 % FS.
Electromagnetic radiation conform IEC 801-3: 2 % FS ±10mS/cm.

* Note: Intrinsic safety only guaranteed when used in combination with an ISC40S sensor.

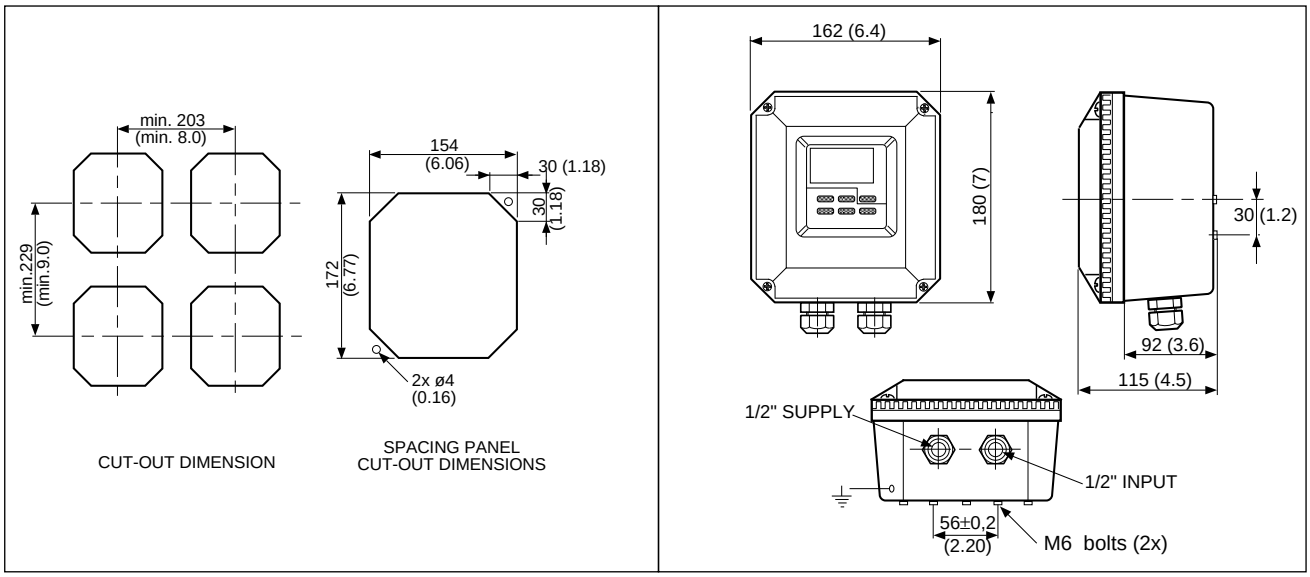
DIMENSIONS AND MOUNTING

Unit: mm (inch)



OPTIE /U: Universal pipe/wall mounting

Universal pipe/wall mounting kit



Panel cut-out and spacing

YOKOGAWA

EUROPEAN HEADQUARTERS
Yokogawa Europe B.V.
Vanadiumweg 11,
3812 PX AMERSFOORT
The Netherlands
Tel. +31-33-4641 611
Fax +31-33-4641 610
E-mail: info@yokogawa.nl

THE NETHERLANDS
Yokogawa Nederland B.V.
Computerweg 1,
3606 AV MAARSSEN
Tel. +31-346-59 12 11
Fax +31-346-56 61 96

AUSTRIA
Yokogawa Austria Ges.m.b.H.
Franzensbrückenstrasse 26
A-1021 WIEN
Tel. +43-1-216 50 43
Fax +43-1-216 50 43 33

BELGIUM
Yokogawa Belgium N.V./S.A.
Minervastraat 16
1930 ZAVENTEM
Tel. +32-2-719 55 11
Fax +32-2-725 34 99

FRANCE
Yokogawa Contrôle Bailey S.A.
Vélizy Valley
18-20 Rue Grange Dame Rose
78140 VELIZY VILLACOUBLAY
Tel. +33-1-39 26 10 00
Fax +33-1-39 26 10 30

GERMANY
Yokogawa Deutschland GmbH
Berliner Strasse 101-103
D-40880 RATINGEN
Tel. +49-2102-4983 0
Fax +49-2102-4983 22

ITALY
Yokogawa Italia S.r.l.
Vicolo D. Pantaleoni, 4
20161 MILANO
Tel. +39-2-66 24 11
Fax +39-2-645 57 02

SPAIN
Yokogawa España S.A.
C/Francisco Remiro, N°2, Edif. H
28028 MADRID
Tel. +34-1-724 20 80
Fax +34-1-355 31 40

UNITED KINGDOM
Yokogawa United Kingdom Ltd.
Stuart Road, Manor Park,
RUNCORN
Cheshire WA7 1TR
Tel. +44-1-928 597100
Fax +44-1-928 597101

AUSTRALIA
Yokogawa Australia Pty Ltd.
Private mail bag 24
Centre Court D3
25-27 Paul Street North
NORTH RYDE, N.S.W. 2113
Tel. +61-2-805 0699
Fax +61-2-888 1844

SINGAPORE
Yokogawa Engineering Asia Pte. Ltd.
11, Tampines Street 92
SINGAPORE, 528872
Tel. +65-783 9537
Fax +65-786 2606

JAPAN
Yokogawa Electric Corporation
2-9-32, Nakacho, Musashino-shi
TOKYO, 180
Tel. +81-422 52 5617
Fax +81-422 52 0622

SOUTH AFRICA
Yokogawa South Africa (Pty) ltd.
67 Port Road, Robertsham
Southdale 2135, JOHANNESBURG
Tel. +27-11-680-5420
Fax +27-11-680-2922

UNITED STATES OF AMERICA
Yokogawa Industrial Automation
4 Dart Road
NEWNAN, GA 30265-1040
Tel. +1-770-254 0400
Fax +1-770-251 6427

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Czechia, Slovakia, Hungary, Poland, Croatia, Slovenia, Jugoslavia, Bulgaria, Romania, Macedonia, Bosnia & Herzegovina

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