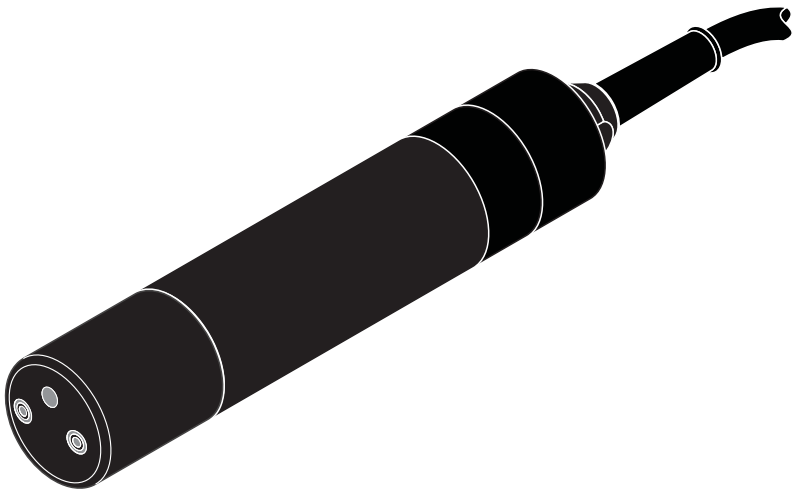
OPERATING MANUAL

ba77055e01 05/2014



TetraCon® 700-...Ex

Ex ib IIC T6 Gb X

CONDUCTIVITY MEASURING CELL,
SUITABLE FOR OPERATION IN POTENTIALLY EXPLOSIVE ATMOSPHERES

WTW
a xylem brand

DE Deutsch	Beachten Sie beim Betrieb in explosionsgefährdeten Bereichen die Sicherheitsanforderungen gemäß Dokument ba77057y.
EN English	For operation in a potentially explosive atmosphere, heed the safety requirements according to document ba77057y.
BG български	При работа във взривоопасна среда спазвайте изискванията за безопасност съгласно Документ 77057y.
CS Česky	Při provozu v oblastech ohrožených výbuchem prosím dodržujte bezpečnostní požadavky dle dokumentu ba77057y.
DA Dansk	Overhold sikkerhedskravene i henhold til dokument ba77057y ved drift i eksplosionsfarlige områder.
EL Ελληνικά	Κατά τη λειτουργία σε εκρήξιμες ατμόσφαιρες λάβετε υπόψη τις απαιτήσεις ασφάλειας σύμφωνα με το έγγραφο ba77057y.
ES Español	Al trabajar en zonas expuestas a explosiones observe las prescripciones de seguridad conforme al documento ba77057y.
ET Eesti keel	Plahvatusohtlikus keskkonnas käitamisel arvestage dokumendis ba77057y sätestatud ohutusnõuetega.
FI Suomi	Jos käytät laitetta räjähdysalttiilla alueilla, noudata asiakirjan 77057y mukaisia turvallisuusvaatimuksia.
FR Français	En cas d'utilisation dans les zones à risques d'explosion, respecter les exigences de sécurité selon le document ba77057y.
HR Hrvatski	Pri radu u područjima u kojima postoji opasnost od eksplozije pridržavajte se sigurnosnih zahtjeva u skladu s dokumentom ba77057y.
HU Magyar	Robbanásveszélyes területen történő üzemeltetés esetén vegye figyelembe a ba77057y jelű dokumentumban előírt biztonsági követelményeket.
IT Italiano	In caso di utilizzo in atmosfere potenzialmente esplosive osservare le disposizioni di sicurezza riportate nel documento ba77057y.
LT Lietuviškai	Dirbdami zonose su sprogia aplinka laikykitės ba77057y dokumento saugumo technikos nurodymų.
LV Latviešu	Ekspluatācijas laikā, sprādzienbīstamajās zonās ievērojiet drošības prasības saskaņā ar dokumentu ba77057y.
NL Nederlands	Neem bij het gebruik in explosie-gevaarlijke omgevingen de veiligheidsvoorschriften volgens document ba77057y in acht.
NO Norsk	Ved bruk i eksplosjonsfarlige omgivelser skal du følge sikkerhetskravene i henhold til dokument ba77057y.
PL Polski	Przy eksploatacji w obszarach zagrożonych wybuchem należy przestrzegać wymogów bezpieczeństwa zgodnie z dokumentem ba77057y.
PT Português	Durante a operação nas áreas com risco de explosão, observar os requisitos de segurança de acordo com o documento ba77057y.
RO Română	În cazul utilizării în zone cu potenţial exploziv, vă rugăm să respectaţi cerinţele de siguranţă conform documentului ba77057y.
RU Русский	При работе во взрывоопасных зонах соблюдайте инструкции по технике безопасности, приведенные в документе ba77057y.
SK Slovensky	Pri prevádzke v priestoroch s nebezpečenstvom výbuchu dodržiavajte bezpečnostné požiadavky uvedené v dokumente ba77057y.
SL Slovenščina	Ob obratovanju v eksplozijsko ogroženih območjih morate upoštevati varnostne zahteve v skladu z dokumentom ba77057y.
SV Svenska	Vid drift i områden med explosionsrisk ska säkerhetskraven enligt dokument ba77057y beaktas.
TR Türkçe	Lütfen patlama tehlikesi bulunan alanlarda kullanırken ba77057y numaralı belge doğrultusundaki güvenlik talimatlarını dikkate alınız.

TetraCon® 700-...Ex - Contents

1 Overview

1.1 Structure of the TetraCon® 700-...Ex conductivity measuring cell

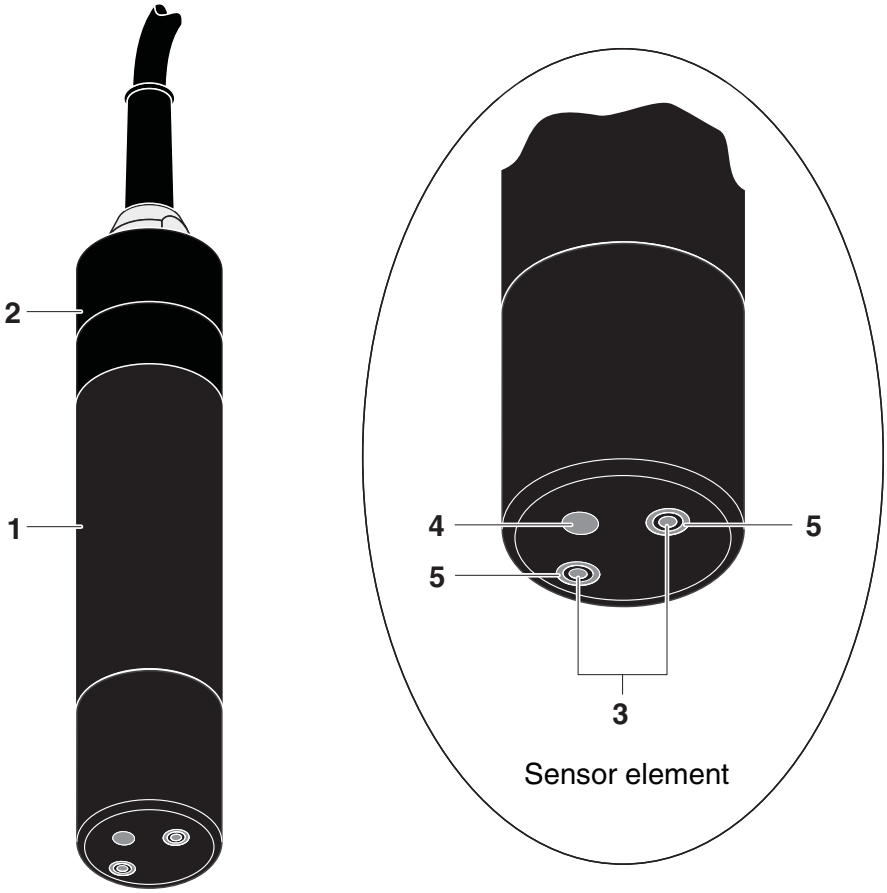


Fig. 1-1 Structure of the TetraCon® 700-...Ex conductivity measuring cell

1	Shaft
2	Closing head with protective ring
3	Voltage electrodes
4	Temperature sensor
5	Current electrodes (ring)

1.2 Recommended fields of application

The TetraCon® 700-...Ex conductivity measuring cell is suitable for stationary measurements in water/wastewater applications.

Characteristics

The principle of the measurement method makes it possible to avoid influences from primary or secondary polarization effects. This ensures a high degree of measuring accuracy.

The modern epoxy casting technique reduces the danger of breaking the conductivity measuring cell in rough industry use.

1.3 Variants and identification

Instrument identification

The instrument designation is printed on the plug-sided end of the cable. The series number is engraved in the closing head. Have these designations ready in case of queries to the WTW service department.

2 Safety

2.1 Safety information

2.1.1 Hazard warnings in this operating manual

The hazard warnings are defined for the following levels of danger:

⚠DANGER

DANGER indicates a possibly dangerous situation that causes death or serious injuries if the safety instruction is not followed.

⚠WARNING

WARNING indicates a possibly dangerous situation that can cause death or serious injuries if the safety instruction is not followed.

⚠CAUTION

CAUTION indicates a possibly dangerous situation that can cause slight or medium injuries if the safety instruction is not followed.

ATTENTION

ATTENTION indicates a situation where goods might be damaged if the actions mentioned are not taken.

2.1.2 Safety information on the product

Note all labels, information signs and safety symbols on the product.

2.2 Safe operation

2.2.1 Authorized use

Authorized use of the TetraCon® 700-...Ex consists of stationary conductivity measurements in the following areas:

- Water and wastewater
- Environment
- Industry.

According to the directive 94/9/EC (ATEX), the TetraCon® 700-...Ex is approved for use in potentially explosive atmospheres. The characteristics concerning explosion protection as well as the safety instructions and other details are given in the enclosed documentation on explosion protection, ba77057y. The documentation on explosion protection is available in numerous languages.

⚠DANGER

Danger of explosion. Noncompliance with the safety requirements according to the explosion protection documentation ba77057y can cause a potentially explosive atmosphere to detonate. Explosion protection is completely ensured only when all safety requirements are met.

2.2.2 Requirements for safe operation

Note the following points for safe operation:

- The product may only be operated according to the authorized use specified above.
- The product may only be supplied with power by the energy sources mentioned in this operating manual.
- The product may only be operated under the environmental conditions mentioned in this operating manual.
- The product or its components may only be opened if this is required for installation and maintenance work and described in the operating manual.

2.2.3 Unauthorized use

The product must not be put into operation if:

- it is visibly damaged (e.g. after being transported)
- it was stored under adverse conditions for a lengthy period of time (storing conditions, see chapter 7 Technical data).

3 Commissioning

3.1 Scope of delivery

- TetraCon® 700-...Ex with protective cap
- Operating manual
- Documentation on explosion protection ba77057y

3.2 Installation

3.2.1 Use in potentially explosive atmospheres

⚠DANGER

Danger of explosion. Noncompliance with the safety requirements according to the explosion protection documentation ba77057y can cause a potentially explosive atmosphere to detonate. Explosion protection is completely ensured only when all safety requirements are met.

3.2.2 Connection to the measuring transmitter

The connection cable of the TetraCon® 700-...Ex has free wire ends to be connected to a terminal strip.

Stratos Pro connection diagram

Wire color, sensor	Terminal, Stratos Pro	Terminal designation
Pink	A	I hi
Gray	B	U hi
Yellow	C	U lo
Green	D	I lo
White	E	RTD (GND)
Brown	F + G (with bridge)	RTD / RTD (Sense)
Black	H	shield

On the Stratos Pro measuring transmitter, the terminal strip for the sensor connection is behind the black cover with the "ESD shield" label. For more details please refer to the operating manual of the measuring transmitter.

3.3 Configuration of the measuring transmitter

The following values must be set in the CONF menu of the Stratos Pro measuring transmitter:

Menu item (CONF menu)	Value
Sensor type	4-Electrode
Cell constant	0.9170 c
Type of the temperature sensor	30 NTC

For details on operation, see the operating manual of the measuring transmitter.

4 Measurement / operation

4.1 Measuring

⚠WARNING

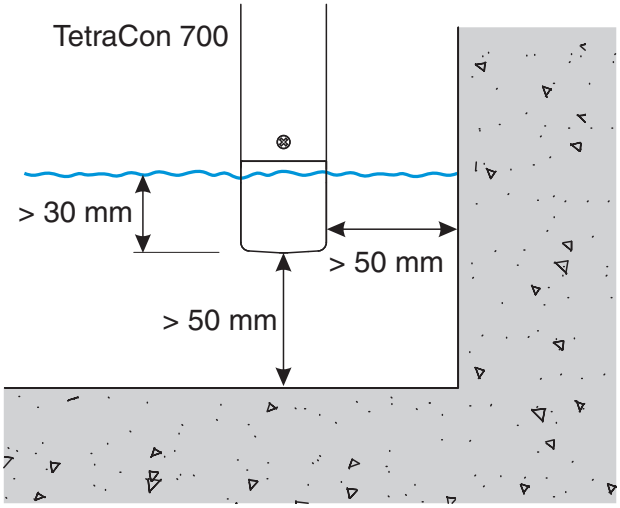
Contact with the sample can lead to danger to the user! Depending on the type of sample, suitable protective measures must be taken (protective clothing, protective goggles, etc.).

Minimum immersion depth

Please observe the minimum immersion depth of the conductivity measuring cell (> 30 mm).

Spacing

Please make sure that the conductivity measuring cell is surrounded by a free space of at least 5 cm at the base and sides (boundary fields) during measurement.



Measuring at a narrow location

If the free space is less than that, the cell constant changes. This leads to inexact measurement results. Normally, measuring transmitters have a correction function that can compensate for this influence. This procedure determines a new cell constant for the system consisting of conductivity measuring cell + measuring environment. For more detailed information, refer to section 4.2 APPLICATION-DEPENDENT SETTINGS.

Normally, the conductivity measuring cell does not age. Special measuring media (e.g. strong acids and bases, organic solvents) or temperatures that are too high may considerably reduce its lifetime or lead to damage. No warranty claims can be made for mechanical damage or any failure caused by these types of measuring media.

4.2 Application-dependent settings

The TetraCon® 700-...Ex conductivity measuring cell is long-term stable. The conductivity measuring cell is immediately ready for operation for the authorized use in water/wastewater applications.

Adapting the cell constant to the installation location

In the case of special installation conditions, it may be necessary to adapt the cell constant (due to the influence of the measuring environment, e.g. of boundary fields).

In chapter 6 WHAT TO DO IF... of this operating manual you will find the correct values to set for some products of the WTW accessory program that require a correction of the cell constant (if it is possible to give fixed values at all). If necessary, special installation recommendations for the TetraCon® 700-...Ex can be found in the accessory operating manual.

Details on how to determine and set the cell constant can be taken from the operating manual of the measuring transmitter.

5 Maintenance, cleaning, disposal

5.1 Maintenance

The TetraCon® 700-...Ex conductivity measuring cell does not require maintenance.

5.2 Cleaning

⚠WARNING

Contact with the sample can lead to danger to the user! Depending on the type of sample, suitable protective measures must be taken (protective clothing, protective goggles, etc.).

If the conductivity measuring cell is heavily contaminated, this can affect the measuring accuracy. Therefore, we recommend cleaning the conductivity measuring cell regularly according to visual checks. Especially before measuring low conductivity values, we recommend to clean the measuring cell thoroughly.

Cleaning

Contamination	Cleaning agents	Reaction time at room temperature
Water-soluble substances	Tap water	Any
Slurry and loosely adhering dirt or biological films	Soft brush, warm tap-water with washing-up liquid	Any
Fats and oils	– Warm water and household washing-up liquid – In the case of heavy contamination: Methylated spirits	– Any – Maximum of 5 minutes
Lime and hydroxide deposits	Acetic acid (10 %)	Any

5.3 Disposal

We recommend to dispose of the conductivity measuring cell as electronic waste.

6 What to do if...

Measurement delivers no or wrong measured values

Cause	Remedy
– Conductivity measuring cell not correctly connected	– Check connection to measuring transmitter
– Cable damaged	– Check the cable. If it is defective, send conductivity measuring cell to WTW
– Measuring range exceeded	– Select a larger measuring range or set the automatic selection of the measuring range

Measurement provides implausible measured values

Cause	Remedy
– Conductivity measuring cell is heavily contaminated	– Clean the conductivity measuring cell
– Boundary field not maintained	– The conductivity measuring cell must be surrounded by a free space of at least 5 cm at the base and sides during measurement. Otherwise, the cell constant will change (see section 4.1 MEASURING)
– Electrodes damaged	– Send the measuring cell to WTW
– System setting incorrect	– Correct the system setting
– Measuring range exceeded	– Make sure the correct sensor is being used for the application
– The measuring cell was installed in a flow-thru device and the boundary field is not sufficient	– Set the cell constant to the value of the installed state (if known) – If the cell constant of the measuring cell in the installed state is not known, adjust the measured value to the nominal value of a measuring solution (see operating manual of the measuring transmitter)

7 Technical data

7.1 General features

Measuring range 10 µS/cm ... 1000 mS/cm at 0 °C ... + 40 °C

Measuring principle Four-electrodes measurement

Temperature sensor Integrated NTC 30 (30 kΩ / 25 °C)

Dimensions

Length	196 mm (without screwed cable gland)
Shaft diameter	40 mm

Weight Approx. 660 g (without sensor connection cable)

Material

Sensor head	PVC, epoxy (filler)
Electrodes, housing of the temperature sensor	Graphite
Shaft	POM, conductive
Closing head	POM, conductive
Protection ring	POM, conductive
Cable screw joint	POM
Cable coating	PUR

Connection cable

Length	Depending on variant: – 1.5 m – 7.0 m – 15.0 m
Diameter	8.8 mm
Smallest allowed bend radius	Permanent bend: 180 mm Short time bend: 90 mm
Connection	Screw plug, 7 poles (IP 65)

Applicable guidelines and norms

General safety	– EN 60079-0 – EN 60079-11 – EN 61010-1

7.2 Explosion protection

Explosion protection characteristics

See document ba77057y (available in numerous languages).

7.3 Electrical data

⚠WARNING

All voltages must be protective low voltages or safety extra low voltages without hazard of contact according to E 61010-1 or UL 3111-1.

Type of connection

Cable with free stranded wire ends

Terminal assignment

Wire color	Assignment
Pink	Current electrode I1 (ring)
Gray	Voltage electrode U1
Yellow	Voltage electrode U2
Green	Current electrode I2 (ring)
White	NTC
Brown	NTC
Transparent	Shield

7.4 Measurement conditions

Temperature range

Measuring medium	0 °C ... + 40 °C
Storage/transport	- 5 °C ... + 65 °C (storage in air recommended)

Depth of immersion

Min. 30 mm

Operating position

Any

Approach flow

not required

Pressure resistance

Conductivity measuring cell including connection cable:

Max. allowed overpressure	10^6 Pa (10 bar)
Type of protection	IP 68 (106 Pa or 10 bar)

7-pole screw plug:

Type of protection	IP 65

The TetraCon® 700-...Ex meets the requirements according to article 3(3) of the directive 97/23/EC ("pressure equipment directive").

7.5 Characteristic data on delivery

Temperature measurement

Sensor accuracy	± 0.2 K
Response time	t_{90} (90 % of the final value display after) < 60 s t_{95} (95 % of the final value display after) < 120 s

Cell constant

In free solution, i.e. base and side clearance > 5 cm	K = 0.917 cm^{-1} ± 1.5 %
In a flow-thru system, e.g. EBST 700-DU/N	K = 0.933 cm^{-1} ± 1.5 %

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