CERTIFICATE OF CONFORMITY

1. **HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT PER US REQUIREMENTS**
2. **Certificate No:** **FM20US0123X**
3. **Equipment:** **pH Sensor Models FU20, FU24, SC25V**
   (Type Reference and Name) **Specific Conductivity Sensor Models SC4A, SC42, SX42**
4. **Name of Listing Company:** **YPA Europe BV**
5. **Address of Listing Company:** **Euroweg 2**
   Amersfoort 3825 HD
   Netherlands
6. The examination and test results are recorded in confidential report number:

   PR456557 dated 25th January 2021

7. FM Approvals LLC, certifies that the equipment described has been found to comply with the following Approval standards and other documents:

   FM Class 3600:2018, FM Class 3610:2018, FM Class 3810:2018, ANSI/ISA 61010-1:2012, ANSI/ISA 60079-0:2019, ANSI/ISA 60079-11:2015

8. If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to specific conditions of use specified in the schedule to this certificate.

Certificate issued by:

J. E. Marquedant

J. E. Marquedant

VP, Manager - Electrical Systems

25 January 2021

Date

To verify the availability of the Approved product, please refer to www.approvalguide.com

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SCHEDULE

US Certificate of Conformity No: FM20US0123X

9. This certificate relates to the design, examination and testing of the products specified herein. The FM Approvals surveillance audit program has further determined that the manufacturing processes and quality control procedures in place are satisfactory to manufacture the product as examined, tested and Approved.

10. Equipment Ratings:

    Intrinsically safe, entity, for Class I, Division 1, Groups A, B, C and D; Class I, Zone 0, AEx ia IIC, Ga (entity) for hazardous (classified) locations when installed per control drawings D&E 2020-023-A50 (pH/ORP sensors) and D&E 2020-024-A50 (conductivity sensors). Refer to Section 11 for ambient temperature ranges and corresponding temperature classification.

11. The marking of the equipment shall include:

    pH sensor models FU20, FU24, SC25V:

    IS CL I, DIV 1, GP ABCD, T3…T6
    CL I, ZN 0, AEx ia IIC, T3…T6 Ga
    D&E 2020-023-A50

    Where:
    T6, -40°C ≤ Ta ≤ 40°C
    T5, -40°C ≤ Ta ≤ 55°C
    T4, -40°C ≤ Ta ≤ 55°C
    T3, -40°C ≤ Ta ≤ 105°C

    Specific conductivity sensor, model SC4A:

    IS CL I, DIV 1, GP ABCD, T4…T6
    CL I, ZN 0, AEx ia IIC, T4…T6 Ga
    D&E 2020-024-A50

    Where:
    T6, -30°C ≤ Ta ≤ 40°C
    T5, -30°C ≤ Ta ≤ 95°C
    T4, -30°C ≤ Ta ≤ 130°C (models without ID-chip)
    T4, -30°C ≤ Ta ≤ 125°C (models with ID-chip)

    Specific conductivity sensor model SC42:

    IS CL I, DIV 1, GP ABCD, T3…T6
    CL I, ZN 0, AEx ia IIC, T3…T6 Ga
    D&E 2020-024-A50

    Where:
    T6, -30°C ≤ Ta ≤ 40°C
    T5, -30°C ≤ Ta ≤ 95°C
    T4, -30°C ≤ Ta ≤ 130°C (models without ID-chip)
    T4, -30°C ≤ Ta ≤ 125°C (models with ID-chip)
    T3, -30°C ≤ Ta ≤ 165°C (models without ID-chip)

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T3, -30°C ≤ Ta ≤ 125°C (models with ID-chip)

Specific conductivity sensor model SX42:

IS CL I, DIV 1, GP ABCD, T2…T6
CL I, ZN 0, AEx ia IIC, T2…T6 Ga
D&E 2020-024-A50

Where:
T6, -30°C ≤ Ta ≤ 40°C
T5, -30°C ≤ Ta ≤ 95°C
T4, -30°C ≤ Ta ≤ 130°C (models without ID-chip)
T4, -30°C ≤ Ta ≤ 125°C (models with ID-chip)
T3, -30°C ≤ Ta ≤ 165°C (models without ID-chip)
T3, -30°C ≤ Ta ≤ 125°C (models with ID-chip)
T2, -30°C ≤ Ta ≤ 275°C (models without ID-chip)
T2, -30°C ≤ Ta ≤ 125°C (models with ID-chip)

12. **Description of Equipment:**

pH sensor models FU20, FU24, SC25V:

General – The pH/ORP sensors measure the concentration of hydrogen ions and/or oxidation reduction potential in a process using a hydrogen ions sensitive glass element. Temperature measurement capability via a Pt1000 element is optionally available for all models. A variant configured with an ID chip is additionally available for storage of sensor-specific data . Though intended for connection to specific Yokogawa transmitters, the sensors are Approved under the entity concept.

Construction – The sensors are housed within a cylindrical enclosure available, depending upon model, in plastic and/or glass. The sensors are available with an integral cable or fitted with an external connector.

Ratings - The sensors are rated for an ambient temperature range of -40°C to 105°C. Refer to entity parameters for maximum electrical ratings

Ordering information is as follows:

pH Sensor, FU20-ab-cd-efg/h
pH Sensor, FU24-ab-cd-efg/h

ab = Connection type: VP, VS, or two digits, up to 99, identifying cable length (in meters) of permanent cable
cd = Temperature sensor and region code: T1
efg =Type: NPT, FSM. Model FU20 also includes: FTD, FTS, MTS, RTS
h = Option not affecting intrinsic safety: up to ten characters

Input parameters:
Ui = 18 V

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Ii = 170 mA
Pi = 400 mW
Permanently connected cable variant: Li = 0.1 mH, Ci = 150 nF
Connector variant: Li = 0 mH
Ci: Type FU2*-VP-**-***/* (without ID chip) = 0 nF
Type FU2*-VS-**-***/* (with ID chip) = 0.4 nF

pH Sensor, SC25V-abcde-fgh/i

abcde = Type: AGP25, ALP25, BGP25, BLP25
fgh = Sensor length, not affecting intrinsic safety: any 3 characters
i = Option not affecting intrinsic safety: up to ten characters

Input parameters:
Ui = 18 V
Ii = 170 mA
Pi = 400 mW
Li = 0 mH
Ci: Type SC25V-A*P25-***/* (without ID chip) = 0 nF
Type SC25V-B*P25-***/* (with ID chip) = 0.4 nF

Specific conductivity sensor models SC4A, SC42, SX42:

General – The specific conductivity sensors measure the ionic content in a solution using electrodes which are in contact with the process. Temperature sensing via a Pt1000 element is provided for all models. A variant configured with an ID chip is additionally available for storage of sensor-specific data. Though intended for connection to specific Yokogawa transmitters, the sensors are Approved under the entity concept.

Construction – The sensors are housed within a cylindrical enclosure available, depending upon model and option type, in metal, plastic and/or glass. The sensors are available with an integral cable or fitted with an external connector.

Ratings – The operating ambient temperature range varies by model type with the maximum possible range being -30°C to 125°C for types fitted with an ID-chip and -30°C to 275°C for types not fitted with an ID-chip. Refer to entity parameters for maximum electrical ratings.

Ordering information is as follows:

Specific Conductivity Sensor, SC4A-a-bc-de-fgh-ij-kl/m

a = Material: T, S, E
bc = Fitting type, not affecting intrinsic safety: Any two characters
de = Sensor length, not affecting intrinsic safety: Any two characters
fgh = Cell constant, not affecting intrinsic safety: Any three characters
ij = Connection type: VS, or two digits, up to 99, identifying cable length (in meters) of permanent cable
kl = Temperature sensor: T1
m = Option not affecting intrinsic safety: Up to ten characters

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Input parameters:
Ui = 14.4 V
Ii = 116.5 mA
Pi = 342.4 mW
Permanently connected cable variant: Li = 0.1 mH, Ci = 150 nF
Connector variant with ID chip (SC4A-*-**-**-***-VS-**/*): Li = 0 mH, Ci = 0.4 nF

Specific Conductivity Sensor, SC42-abcd/e

a = Material: E, S, T, F
b = Construction and region code: P, V
c = Cell constant, not affecting intrinsic safety: Any single character
d = Measuring type, not affecting intrinsic safety: Any single character
e = Option not affecting intrinsic safety: Up to ten characters

Input parameters:
Ui = 14.4 V
Ii = 116.5 mA
Pi = 342.4 mW
Li = 0 mH
Ci: Type SC42-*P**/* (without ID chip) = 0 nF
Type SC42-*V**/* (with ID chip) = 0.4 nF

Specific Conductivity Sensor, SX42-abcd-efgh/i

abcd = Cell constant, not affecting intrinsic safety: Any four characters
ef = Connection type: BS, BV, NS, NV, DF, EF, AF
g = Spare code, not affecting intrinsic safety: Any one character
h = Region code: A
i = Option no affecting intrinsic safety: Up to ten characters

Input parameters:
Ui = 14.4 V
Ii = 116.5 mA
Pi = 342.4 mW
Li = 0 mH
Ci: Connection types BS, NS, AF, DF, EF (without ID chip) = 0 nF
Connection types BV, NV (with ID chip) = 0.4 nF

13. **Specific Conditions of Use:**

pH Sensor models FU20, FU24, SC25V:

1. Potential electrostatic charging hazard - pH sensors containing accessible plastic parts and/or external conductive parts must be installed and used in such a way, that dangers of ignition due to hazardous electrostatic charges cannot occur, especially in the case that the process medium is non-conductive.

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2. Ambient temperature conditions depend upon temperature class, see Control drawings for details:

   T6: -40°C ≤ Ta ≤ +40°C
   T5: -40°C ≤ Ta ≤ +55°C
   T4: -40°C ≤ Ta ≤ +55°C
   T3: -40°C ≤ Ta ≤ +105°C

Specific conductivity sensor, model SC4A:

1. Potential electrostatic charging hazard – Contact Conductivity sensors containing accessible plastic parts and/or external conductive parts must be installed and used in such a way, that dangers of ignition due to hazardous electrostatic charges cannot occur, especially in the case that the process medium is non-conductive.

2. Potential ignition hazard – Contact Conductivity sensors containing light metals, must be installed and used in such a way that, even in the event of rare incidents, ignition sources due to impact and friction sparks are excluded.

3. Ambient temperature conditions depend upon temperature class:
   T6, -30°C ≤ Ta ≤ 40°C
   T5, -30°C ≤ Ta ≤ 95°C
   T4, -30°C ≤ Ta ≤ 130°C (models without ID-chip)
   T4, -30°C ≤ Ta ≤ 125°C (models with ID-chip)

Specific Conductivity Sensor, model SC42:

1. Potential electrostatic charging hazard – Contact Conductivity sensors containing accessible plastic parts and/or external conductive parts must be installed and used in such a way, that dangers of ignition due to hazardous electrostatic charges cannot occur, especially in the case that the process medium is non-conductive.

2. Potential ignition hazard – Contact Conductivity sensors containing light metals, must be installed and used in such a way that, even in the event of rare incidents, ignition sources due to impact and friction sparks are excluded.

3. Ambient temperature conditions depend upon temperature class:
   T6, -30°C ≤ Ta ≤ 40°C
   T5, -30°C ≤ Ta ≤ 95°C
   T4, -30°C ≤ Ta ≤ 130°C (models without ID-chip)
   T4, -30°C ≤ Ta ≤ 125°C (models with ID-chip)
   T3, -30°C ≤ Ta ≤ 165°C (models without ID-chip)
   T3, -30°C ≤ Ta ≤ 125°C (models with ID-chip)

Specific Conductivity Sensor, model SX42:

1. Potential electrostatic charging hazard – Contact Conductivity sensors containing accessible plastic parts and/or external conductive parts must be installed and used in

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such a way, that dangers of ignition due to hazardous electrostatic charges cannot occur, especially in the case that the process medium is non-conductive.

2. Potential ignition hazard – Contact Conductivity sensors containing light metals, must be installed and used in such a way that, even in the event of rare incidents, ignition sources due to impact and friction sparks are excluded.

3. Ambient temperature conditions depend upon temperature class:
   T6, -30°C ≤ Ta ≤ 40°C
   T5, -30°C ≤ Ta ≤ 95°C
   T4, -30°C ≤ Ta ≤ 130°C (models without ID-chip)
   T4, -30°C ≤ Ta ≤ 125°C (models with ID-chip)
   T3, -30°C ≤ Ta ≤ 165°C (models without ID-chip)
   T3, -30°C ≤ Ta ≤ 125°C (models with ID-chip)
   T2, -30°C ≤ Ta ≤ 275°C (models without ID-chip)
   T2, -30°C ≤ Ta ≤ 125°C (models with ID-chip)

14. **Test and Assessment Procedure and Conditions:**

This Certificate has been issued in accordance with FM Approvals US Certification Requirements.

15. **Schedule Drawings**

A copy of the technical documentation has been kept by FM Approvals.

16. **Certificate History**

Details of the supplements to this certificate are described below:

Date	Description
25th January 2021	Original Issue.

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