TYPE APPROVAL CERTIFICATE

Certificate no.:
TAA00002HC
Revision No:
8

This is to certify:

that the Sensors for Liquid Analysis

with type designation(s)
xPS11E, xPS12E, xLS21E, xLS50D, xPF81E, xUS50D, xUS52D, xFS51, xYK10

issued to

Endress+Hauser Conducta GmbH+Co. KG
Gerlingen, **Germany**

is found to comply with
DNV rules for classification – Ships, offshore units, and high speed and light craft

Application:

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.

Location classes:

Temperature	**A**
Humidity	**B**
Vibration	**A**
EMC	**B**
Enclosure	**D**

Issued at **Hamburg** on **2024-12-19**

This Certificate is valid until **2029-12-18**.
DNV local unit: **Augsburg**

Approval Engineer: **Dariusz Lesniewski**

for **DNV**

This document has been digitally signed and will therefore not have handwritten signature

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to USD 300 000.

Product description

ph electrode with digital Memosens technology

	010	020	030	040	50		590
xPS11E-	**	*	*	**	*	+	**

x can be named as C, O or OC		
010	Approval	
	AA	Non-hazardous area
	**	two letters for non-ex or ex-approval (no construction relevance)
020	Electrode Type	
	7	Basic version, zero point pH 7,0, temperature sensor NTC 30k
030	Application Range:	
	A	1-12pH, -15...80°C, 0,8...17 bar (abs)
	B	0-14 pH, 0...135°C, 0,8...17 bar (abs)
	F	0-10 pH, 0...70°C, 0,8...7 bar (abs)
040	Reference system	
	AA	Teflon ring junction, 3 M KCl, Ag/AgCl
	AS	Teflon ring junction, salt store, saturated KCl, Ag/AgCl
	TA	Teflon ring junction, ion trap, 3 M KCl, Ag/AgCl
050	Shaft Length:	
	2	120mm
590	Additional Approval:	
	LI	DNV
and other additional marks (no construction relevance, can be more than two letters)		

ORP electrode with digital Memosens technology

	010	020	030	040	050		590
xPS12E-	**	*	*	**	*	+	**

x can be named as C, O or OC		
010	Approval	
	AA	Non-hazardous area
	**	two letters for non-ex or ex-approval (no construction relevance)
020	Electrode Type	
	7	Basic
030	Application Range	
	G	Gold, -1500 mV… 1500 mV, -15…135°C, 0,8...17 bar (abs)
	P	Platinum, -1500 mV… 1500 mV, -15…135°C, 0,8...17 bar (abs)
040	Reference System	
	AA	Teflon ring junction, 3 M KCl, Ag/AgCl
050	Shaft length	
	2	120 mm
590	Additional Approval:	
	LI	DNV
and other additional marks (no construction relevance, can be more than two letters)		

ph/ORP electrode with digital Memosens technology

	010	020	030	040	045		590
xPF81E-	**	*	*	**	*	+	**

x can be named as C, O or OC		
010	Approval:	
	AA	Non-hazardous area
	**	two letters for non-ex or ex-approval
020	Electrode type:	
	5	Basic version, process connection NPT 3/4", zero point pH 7,0, temperature sensor NTC 30k
030	Application range:	

	L	0-14 pH, 0…110°C, 0,8… 11 bar (abs)
	N	0-14 pH, 0…80°C, 0,8… 11 bar (abs)
040	Reference system:	
	AD	Teflon ring junction, double chamber, 3 M KNO3, 3 M KCL, Ag/ AgCl
045	Insertion Length:	
	1	23 mm, bulb membrane, electrode guard
	2	13, flat membran
	3	58 mm, bulb membrane, electrode guard
590	Additional Approval:	
	LI	DNV
and other additional marks (no construction relevance, can be more than two letters)		

Conductivity sensor with digital Memosens technology

	010	020	030		590
xLS21E-	**	**	**	+	**
x can be named as C, O or OC					

010	Approval	
	AA	Non-hazardous area
	**	two letters for non-ex or ex-approval (no construction relevance)
020	Process Connection:	
	GA	Thread G1"
	HA	Thread NPT 1"
030	Material	
	11	Sensor PES, electrodes Graphite
590	Additional Approval:	
	LI	DNV
and other additional marks (no construction relevance, can be more than two letters)		

Inductive conductivity sensor with digital Memosens technology

	010	020	030	040	050		590
xLS50D-	**	*	*	*	*	+	**
x can be named as C, O or OC							

010	Approval:	
	AA	Standard:
	**	two letters for non-ex or ex-approval (no construction relevance)
020	Process Connection:	
	1	Thread G 3/4"
	2	Thread NPT 1"; PEEK
030	Sensor-, Seal-; Adapter Material:	
	B	PEEK; Viton; PEEK
	C	PEEK; Chemraz; PEEK
	D	PFA; Chemraz; 1.4571
040	Cable Length:	
	1	3m
	2	7m
	3	15m
050	Cable connection:	
	1	Fixed cable ; crimp sleeves
	2	Fixed cable; M12 plug
590	Additional Approval:	
	LI	DNV
and other additional marks (no construction relevance, can be more than two letters)		

Sensor for fluorescence measurement

	010	020	030	040	050	060	070		590
xFS51-	**	*	*	*	*	*	*	+	**

x can be named as C, O or OC

010	Approval:	
	AA	Non-hazardous area
	**	two letters for non-ex or ex-approval (no construction relevance)
020	Application/Measuring Range:	
	1	PAH measurement for marine applications
030	Process Connection:	
	A	Immersion sensor, thread G1, NPT 3/4
040	Adaption Cable:	
	A	Fixed cable ; crimp sleeves
	B	Fixed cable; M12 plug
050	Cable Length:	
	2	3m
	3	7m
	4	15m
	7	…m
	8	…ft
060	Sensor Material:	
	A	Titanium
070	Seal Material:	
	1	FKM
590	Additional approval:	
	LI	DNV
and other additional marks (no construction relevance, can be more than two letters)		

Turbidity and suspended solids sensor

	010	020	030	040	050	060	070		590
xUS50D-	**	*	*	*	*	*	*	+	**

x can be named as C, O or OC

010	Approval:	
	AA	Non-hazardous area
	GR	Non-hazardous area + EAC marking
	**	two letters for non-ex or ex-approval (no construction relevance)
020	Measuring Range:	
	2	Absorption (ISO 7027)
030	Process Connection:	
	A	Immersion sensor, thread G1, NPT 3/4
040	Adaption Cable:	
	A	Fixed cable ; crimp sleeves
	B	Fixed cable; M12 plug
050	Cable Length:	
	2	3m
	3	7m
	4	15m
	7	…m
	8	…ft
060	Sensor Material:	
	A	Head: PCTFE, shaft: 1.4571
	B	Head: PCTFE, shaft: PPS
070	Seal Material:	
	1	EPDM
590	Additional approval:	

	LI	DNV
and other additional marks (no construction relevance, can be more than two letters)		

Turbidity sensor

	010	020	030	040	050		590
xUS52D-	**	*	*	*	*	+	**
x can be named as C, O or OC							

010	Approval:	
	AA	Non-hazardous area
	GR	Non-hazardous area + EAC marking
	**	two letters for non-ex or ex-approval
020	Measuring Method:	
	1	ISO 7027, IR
030	Process Connection:	
	A	Immersion Sensor, thread G1, NPT 3/4
	B	Clamp 2"
	C	Varivent N DN 65-125 (standard immersion depth 22,5 mm)
	D	Varivent N DN 65-125 (immersion depth 42,5 mm)
	H	Immersion sensor, thread G1, NPT3/4, head: PEEK, shaft: PPS
040	Adaption Cable:	
	A	Fixed cable; crimp sleeves
	B	Fixed cable; M12 plug
050	Cable Length:	
	2	3m
	3	7m
	4	15m
	7	…m
	8	…Ft
590	Additional approval:	
	LI	DNV
and other additional marks (no construction relevance, can be more than two letters)		

Memosens data cable

	010	020	030
xYK10-	*	**	*
x can be named as C, O or OC			

010	Approval:	
	A	Non-hazardous area
	L	one letter for non-ex or ex-approval (no construction relevance)
	*	one letter for non-ex or ex-approval
020	Cable Length:	
	01	1,5m
	03	3m
	05	5m
	10	10m
030	Cable Connection:	
	1	wire terminals
	2	M12 plug

Approval conditions

The Type Approval covers hardware listed under Product description. When the hardware is used in applications to be classed by DNV, documentation for the actual application is to be submitted for approval by the manufacturer of the application system in each case. Reference is made to DNV rules for classification of ships Pt.4 Ch.9 Control and monitoring systems.

Ex-certification is not covered by this certificate. Application in hazardous area to be approved in each case according to DNV Rules and Ex-Certification / Special Condition for Safe Use listed in valid Ex-certificate issued by a notified/recognized Certification Body.

Place of manufacture

Endress+Hauser Conducta GmbH+Co. KG … for all products except xPF81E
Landsberger Strasse 28
04736 Waldheim, Germany

Endress+Hauser Conducta Inc. … for xPF81E and xPS11E
4123 East La Palma Avenue, Suite 200
Anaheim, CA 92807 USA

Application/Limitation

"The sensor for fluorescence measurement, the pH electrodes as well as the sensors for the turbidity measurements are generally in compliance with the with the requirements of Resolution MEPC.259(68) – "2015 Guidelines for exhaust gas cleaning systems", Chapter 10.2 "Washwater monitoring" as well as Resolution MEPC.340(77) – "2021 Guidelines for exhaust gas cleaning systems", Chapter 10.2 "Discharge water monitoring".

"The turbidity sensor CUS52D meets the following requirements:
- Permissible deviation of the Turbidity monitoring equipment MEPC.340(77), 10.2.2
- Principle of detection for Turbidity MEPC.259(68), 10.2.5 and MEPC.340(77), 10.2.6)"

Type Approval documentation

Test Report: PHOENIX TESTLAB No. S182222E1, dated 2019-03-01
Test Report: PHOENIX TESTLAB No. S202076E1, dated 2021-03-15
Test Report: PHOENIX TESTLAB No. E182222E1, dated 2019-06-27
Test Report: PHOENIX TESTLAB No. E202076E1, dated 2021-04-20
Test Report: PHOENIX TESTLAB No. U182222E1, dated 2019-07-11
Test Report: PHOENIX TESTLAB No. U202076E1, dated 2021-05-03
Test Report: PHOENIX TESTLAB No. U220601E1, dated 2022-07-28
Test Report: PHOENIX TESTLAB No. E220601E1, dated 2022-07-23
Test Report: PHOENIX TESTLAB No. E231610E1, dated 2023-11-28
Test Report: PHOENIX TESTLAB No. U231610E1, dated 2023-11-10

Test Report: Currenta No. 19/0390, dated 2019-03-13
Test Report: Currenta No. 19/0397, dated 2019-03-13
Test Report: Currenta No. 19/0914, dated 2019-06-17
Statement of Compliance No. 29917063/DNV issued on 2022-06-13
Statement of Compliance No. 31371820/DNV issued on 2023-06-05
E+H List Marine cables V03

Technical Information (Data Sheets):
- TI00182C/07/EN/20.23-00
- TI01395C/07/EN/05.23-00, TI01136C/07/EN/07.23-00
- TI01493C/07/EN/02.24-00, TI01493C/07/EN/02.24-00
- TI01630C/07/EN/02.22-00

Reference documents:
'Sensor documentation overview (2024)'
- User Manuals
- Mechanical Drawings, Part Lists, Circuit Diagrams, Assembly Plans, Layout Patterns
- Ex-Certificates
- IP-Test Reports, Pressure Test Reports

Checkliste Marine E10 of KSG3 ReDesign (CPS11E, CPF81E), dated 2023-03-09
'Doc. package - folder KSG3_VX.01.XX and folder KSG3_VX.03.XX'
E+H Product order codes for Marine type approval Rev. 03, dated 2024-10-28
E+H Change information for DNV Audit, dated 2024-10-23

Type approval assessment report issued at Augsburg on 2024-10-28.

Tests carried out

Applicable tests according to class guideline DNV-CG-0339, August 2021.

Marking of product

The products to be marked with:
- manufacturer name
- model name
- serial number
- power supply ratings

Periodical assessment

The scope of the periodical assessment is to verify that the conditions stipulated for the type are complied with, and that no alterations are made to the product design or choice of systems, software versions, components and/or materials.

The main elements of the assessment are:

- Ensure that type approved documentation is available
- Inspection of factory samples, selected at random from the production line (where practicable)
- Review of production and inspection routines, including test records from product sample tests and control routines
- Ensuring that systems, software versions, components and/or materials used comply with type approved documents and/or referenced system, software, component and material specifications
- Review of possible changes in design of systems, software versions, components, materials and/or performance, and make sure that such changes do not affect the type approval given
- Ensuring traceability between manufacturer's product type marking and the type approval certificate

Periodical assessment is to be performed after 2 years and after 3.5 years. A renewal assessment will be performed at renewal of the certificate.

END OF CERTIFICATE