




[1]

EU-TYPE EXAMINATION CERTIFICATE

- [2] **Equipment intended for use in potentially explosive atmospheres Directive 2014/34/EU – Annex III**
- [3] Certificate Number: **EPT 18 ATEX 2961 X issue 2**
- [4] Equipment: **Flanged electrical heaters
NT 80÷450 and HP 250÷700**
- [5] Manufacturer: **MASTERWATT S.r.l.**
- [6] Address: **Via Collegno n° 31, 10044 Pianezza (TO) - Italy**
- [7] This equipment and its accepted variations are specified in the annex to this Certificate.
- [8] Eurofins Product Testing Italy S.r.l., Notified Body n. 0477 in accordance with Article 21 of the Directive 2014/34/EU of the European Parliament and of the Council of 26th February 2014, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II of the Directive. The examination and test results are recorded in the confidential Report N°EPT.23.REL.02/2213097
- [9] Compliance with the essential health and safety requirements is assured through the verification of them and by compliance with the following harmonized standards:

**EN IEC 60079-0:2018, EN 60079-1:2014, EN 60079-31:2014,
EN 60079-7: 2015+ EN IEC 60079-7/A1:2018**

- [10] If the sign "X" is placed after the Certificate number, it indicates that the equipment is subject to the special conditions for safe use specified in the annex to this Certificate.
- [11] This EU-TYPE EXAMINATION CERTIFICATE relates only to the design, the exam and the tests of the specified equipment.
Further requirements of the Directive 2014/34/EU apply to the manufacture and supply of this equipment. These requirements are not object of this Certificate.
- [12] The equipment shall include the sign  and the following strings:

II -/2G Ex db IIC T6...T1 -/Gb	-xx°C ≤ Ta ≤ +xx°C
II -/2D Ex tb IIIC T85°C...T450°C -/Db	-xx°C ≤ Ta ≤ +xx°C
II 2G/2G Ex db eb IIC T6...T1 Gb/Gb	-xx°C ≤ Ta ≤ +xx°C

See the equipment description for details related to the maximum surface temperatures and ambient temperature ranges

Place and date of issue:
(DD-MM-YYYY)

Torino, 14-07-2023


 Omar Galasso
 Deputi Head of Directive


 Paolo Trisoglio
 Managing Director





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This Certificate has 8 pages and it is reproducible only in its entirety. Conditions of validity are reported below.



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[15] Equipment description

The electrical heaters, Types NT 80÷450 and HP 250÷700, are composed of a heating unit (increased safety construction) and a terminal box (flameproof and/or dust tight construction). The heating unit can be made of one or more heating elements and it is attached to the heated vessel through a coupling flange or a plate.

The heating elements are made of a resistive wire insulated by means of MgO from the external metallic sheet that is in direct contact with the fluid to heat. The explosion proof enclosure can be directly connected to the connection flange/plate or separated through a neutral extension. The heating elements can be permanently secured to the coupling flange/plate or can be dismountable (bite coupling elements).

The maximum number of elements that may be fitted in is 300, while the external diameter of the elements can be from 8 mm to 16 mm. The elements can be connected internally by means of brass / copper bars or through cable lugs.

The heaters are supplied with one or more thermowells for the insertion of one or more temperature control sensing probes whose terminals are located in the terminal box.

The heaters can be used for the heating of solids, liquids or gases and are intended to be installed in the boundary wall between the process (EPL Gb or no EPL required) and the external atmosphere (EPL Gb and/or EPL Db). They are suitable for gas group IIC and dust group IIIC.

Electrical characteristics

Maximum voltage: 750 V

Maximum current: 18 kA

Rated Frequency: 50 or 60 Hz (operation with Continuous Current with the same values in respect to Vac rms value is allowed too)

Degree of protection:

- HP 250÷700 IP68 (1h submersed at a depth of 1m)
- NT 80÷450 IP 66/68 (1h submersed at a depth of 1m)

Minimum ambient temperature: -60°C

Maximum ambient temperature: +40 °C or +60 °C or +70 °C

Surface temperature

The temperature class of the equipment **T6...T1 / T85°C...T450°C** is specified and affixed on the nameplate by the manufacturer on the basis of the tables below reported. The maximum surface temperature for equipment suitable to be used with flammable dust is selected as the highest temperature value for the corresponding Tclass. The cable design temperature is specified in the manufacturer's documents and affixed on the nameplate based on the maximum temperature of the elements terminal studs and on the type of cable connection arranged inside the heater.

The following tables provide the temperature class and indirectly the max surface temperature for applications with combustible dusts (see above) with reference to the ambient temperature range, process temperature, length of the neutral section and current density in the heating element

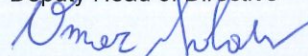
Table 1: Tamb from -60 °C to + 40 °C; Is = 1.5 A/mm²

Neutral section length (mm)	Temperature class								
	T4	T4	T4	T3	T3	T2	T2	T1	T1
300	T4	T4	T4	T3	T3	T2	T2	T1	T1
250	T4	T4	T4	T3	T3	T2	T2	T1	T1
200	T4	T4	T4	T3	T3	T2	T2	T1	T1
150	T4	T4	T4	T3	T3	T2	T2	T1	T1
100	T4	T4	T4	T3	T3	T2			
0	T4	T4	T4	T3					
	60 °C	80 °C	100 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
	PROCESS TEMPERATURE								


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Table 2: Tamb from -60 °C to + 60 °C; Is = 1.5 A/mm²

Neutral section length (mm)	Temperature class								
	T4	T4	T3	T3	T3	T2	T2	T1	T1
300	T4	T4	T3	T3	T3	T2	T2	T1	T1
250	T4	T4	T3	T3	T3	T2	T2	T1	T1
200	T4	T4	T3	T3	T3	T2	T2	T1	T1
150	T4	T4	T3	T3	T3	T2	T2	T1	T1
100	T4	T4	T3	T3	T3	T2			
0	T4	T4	T3	T3					
	60 °C	80 °C	100 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
PROCESS TEMPERATURE									

Table 3: Tamb from -60 °C to + 70 °C; Is = 1.5 A/mm²

Neutral section length (mm)	Temperature class								
	T4	T3	T3	T3	T2	T2	T2	T1	T1
300	T4	T3	T3	T3	T2	T2	T2	T1	T1
250	T4	T3	T3	T3	T2	T2	T2	T1	T1
200	T4	T3	T3	T3	T2	T2	T2	T1	T1
150	T4	T3	T3	T3	T2	T2	T2	T1	T1
100	T4	T3	T3	T3	T2	T2			
0	T4	T3	T3	T3					
	70 °C	80 °C	100 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
PROCESS TEMPERATURE									

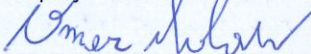
Table 4: Tamb from -60 °C to + 40 °C; Is = 1.1 A/mm²

Neutral section length (mm)	Temperature class								
	T6	T5	T4	T3	T3	T2	T2	T1	T1
300	T6	T5	T4	T3	T3	T2	T2	T1	T1
250	T6	T5	T4	T3	T3	T2	T2	T1	T1
200	T6	T5	T4	T3	T3	T2	T2	T1	T1
150	T6	T5	T4	T3	T3	T2	T2	T1	T1
100	T6	T5	T4	T3	T3	T2			
0	T6	T5	T4	T3					
	60 °C	80 °C	100 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
PROCESS TEMPERATURE									


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Table 5: Tamb from -60 °C to + 60 °C; Is = 1.1 A/mm²

Neutral section length (mm)	Temperature class								
	T5	T4	T4	T3	T3	T2	T2	T1	T1
300	T5	T4	T4	T3	T3	T2	T2	T1	T1
250	T5	T4	T4	T3	T3	T2	T2	T1	T1
200	T5	T4	T4	T3	T3	T2	T2	T1	T1
150	T5	T4	T4	T3	T3	T2	T2	T1	T1
100	T5	T4	T4	T3	T3	T2			
0	T5	T4	T4	T3					
	60 °C	80 °C	100 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
PROCESS TEMPERATURE									

Table 6: Tamb from -60 °C to + 70 °C; Is = 1.1 A/mm²

Neutral section length (mm)	Temperature class								
	T4	T4	T4	T3	T3	T2	T2	T1	T1
300	T4	T4	T4	T3	T3	T2	T2	T1	T1
250	T4	T4	T4	T3	T3	T2	T2	T1	T1
200	T4	T4	T4	T3	T3	T2	T2	T1	T1
150	T4	T4	T4	T3	T3	T2	T2	T1	T1
100	T4	T4	T4	T3	T3	T2			
0	T4	T4	T4	T3					
	70 °C	80 °C	100 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
PROCESS TEMPERATURE									

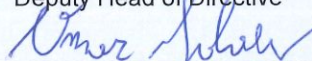
Table 7: Tamb from -60 °C to + 40 °C; Is = 0.8 A/mm²

Neutral section length (mm)	Temperature class								
	T6	T5	T4	T3	T3	T2	T2	T1	T1
300	T6	T5	T4	T3	T3	T2	T2	T1	T1
250	T6	T5	T4	T3	T3	T2	T2	T1	T1
200	T6	T5	T4	T3	T3	T2	T2	T1	T1
150	T6	T5	T4	T3	T3	T2	T2	T1	T1
100	T6	T5	T4	T3	T3	T2			
0	T6	T5	T4	T3					
	60 °C	80 °C	100 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
PROCESS TEMPERATURE									


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Table 8: Tamb from -60 °C to + 60 °C; Is = 0.8 A/mm²

Neutral section length (mm)	Temperature class								
	T6	T5	T4	T3	T3	T2	T2	T1	T1
300	T6	T5	T4	T3	T3	T2	T2	T1	T1
250	T6	T5	T4	T3	T3	T2	T2	T1	T1
200	T6	T5	T4	T3	T3	T2	T2	T1	T1
150	T6	T5	T4	T3	T3	T2	T2	T1	T1
100	T6	T5	T4	T3	T3	T2			
0	T6	T5	T4	T3					
	60 °C	80 °C	100 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
PROCESS TEMPERATURE									

Table 9: Tamb from -60 °C + + 70 °C; Is = 0.8 A/mm²

Neutral section length (mm)	Temperature class								
	T5	T4	T4	T3	T3	T2	T2	T1	T1
300	T5	T4	T4	T3	T3	T2	T2	T1	T1
250	T5	T4	T4	T3	T3	T2	T2	T1	T1
200	T5	T4	T4	T3	T3	T2	T2	T1	T1
150	T5	T4	T4	T3	T3	T2	T2	T1	T1
100	T5	T4	T4	T3	T3	T2			
0	T5	T4	T4	T3					
	70 °C	80 °C	100 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
PROCESS TEMPERATURE									

Cable entries

The cable entry devices used on the enclosure have to be suitably ATEX certified. They have to be chosen according to the type of protection, the operating temperature indicated in the manufacturer's instructions, the type of thread and the degree of protection of the equipment.

Warning label

"Do not open when energized"

"Before opening wait until the terminal box has cooled down"

Routine tests

In compliance with clause 16 of EN 60079-1, the manufacturer has to perform the individual pressure test on each terminal enclosure with a minimum pressure of:

- 20.4 bar for 10s for NT 80÷450 series;
- 17.1 bar for 10s for HP 250÷700 series.

In addition, if the heater marking is "Ex db eb IIC T6...T1 Gb/Gb", the manufacturer has to perform the dielectric strength test (in compliance with clause 7.1 of EN 60079-7) between galvanically isolated parts with a minimum voltage of $(2*U+1000)$ V r.m.s. for 60 s, where "U" is the working voltage. As an alternative, the test can also be conducted at $(2*U+1000)*1.2$ V r.m.s. for $t>0.1$ s;

Assessment Report n° EPT.23.REL.02/2213097

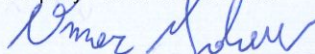
This EU-Type Examination Certificate is released after the positive result of the conformity assessment of the Council Directive 2014/34/EU and to harmonized technical standards listed in this certificate performed by the Notified Body Eurofins Product Testing Italy S.r.l., and reported in the Assessment Report above cited.



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[17] **Special condition for a safe use**

- Flameproof joints shall not be repaired
- The user has to periodically clean the enclosure in order to avoid a dust deposit
- The supply cable shall be suitable for an operating temperature equal or greater than the temperature indicated on the label.
- The user shall adopt the following additional safety measures:
 - Heating of liquids: the user shall take adequate measures (e.g. by means of a level switch) to guarantee that the heater is operating only when the fluid level is at least 50 mm above the highest heated part of the heater
 - Heating of static gases in processes with EPL required: the user shall guarantee that the temperature of the volume where the heater is used is maintained below the limits specified on the heater nameplate by the manufacturer. The user shall further protect the equipment with a residual current device according to clause 5.8.6 of EN 60079-7
 - Heating of forced flow gases in processes with Gb EPL required: the user shall take appropriate measures to:
 - protect the equipment with a residual current device according to clause 5.8.6 of EN 60079-7
 - stop the power supply to the heater in case the fluid flow rate drops below the minimum value specified by the manufacturer.
 - connect the safety sensor, installed by the manufacturer in one heating element for surveillance of the maximum skin temperature, to a suitable control system. Make sure that no single failure in the equipment or in the supply (here including also the open circuit of a single heating element) can cause a local reduction of temperature in the controlled element while the other elements normally work (see instructions for the details)
 - make sure that, in case the heater consists of several independent power supply stages, the stage in which the safety sensor is located is always ON or it is the first to be switched on and the last to be switched off. If this is not possible, the user shall request to the manufacturer to supply a heater with one safety device for each power supply stage
 - Heating of dynamic fluids: special case hothead execution (low inlet temperature of the fluid to be heated): in addition to the safety devices described in the above, these heaters shall be equipped with a safety device that monitors the fluid temperature, in the area close to the heater coupling device to the plant, and intervenes when this temperature exceeds the safety value specified in the manufacturer's documents and representing the basis for the definition of the maximum temperature inside the heater contact box.

All the safety functions above mentioned must be in addition to the normal process control functions and shall:

- produce the shutdown of the heater and realize the transition to a safe state of the plant in case of activation of any of the safety devices; the activation cannot have an automatic reset
- set up a safety chain SIL 1 in accordance with the prescriptions of EN 50495 standard in case EPL Gb required in the process side



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[18] Essential Health and Safety Requirements

Assured by compliance with harmonized standards.

[19] Descriptive documents

The equipment object of this Certificate are described by the following documents that are scheduled documents and therefore they cannot be modified without the explicit authorization of the Notified Body.

Type of document	Document identification	Rev.	Date (YYYY/MM/DD)
*Design document	CAP-EX-0001	02	2023/04/20
*Safety instruction	MAN-EX-0002	03	2023/04/20
Drawing: Flanged heaters for submersion series 250 + 700 Exde IIC – HP	7014076	05	2019/07/20
Drawing: Flanged heaters for submersion series 80 + 450 – Ex de IIC –NT	7014077	04	2019/07/20
Drawing: Flanged heaters for submersion Byte-coupling	7014081	02	2017/02/20
Drawing: Pipe Ch. 22 M22x1,5 H15	7040066	04	2018/12/21
Drawing: Ogive $\Phi 20 \times 10,6$	7040067	03	2018/12/21
Drawing: Pipe Ch. 14 M14x1,5 H15	7040068	00	2011/01/10
Drawing: Ogive $\Phi 8 \times 6,5$	7040069	01	2011/03/01
Drawing: Pipe Ch. 22 M22x1,5 – M20X1,5 AISI 303	7040079	01	2018/12/21
Drawing: Pipe Ch. 24 M20X1,5 AISI 3031	7040080	00	2012/10/17
Drawing: Pipe Ch. 14 M14x1,5 – M10X1,5 AISI 303	7040081	01	2018/12/21
Drawing: Pipe Ch. 14 M10x1,5 AISI 303	7040082	00	2012/10/17
Drawing: Brass Washer $\Phi E 19.8 \Phi i 16.1$ Sp.1	7560041	00	2012/10/17
Drawing: Brass Washer $\Phi i 6.1 \Phi e 11$ Sp.1	7560042	00	2012/10/17
Marking plate	7657236	03	2017/12/20
Marking plate	7657237	03	2017/12/20
Drawing: sensitive unit for smooth probe $\Phi 10$	7040137	00	2019/03/15
Drawing: sensitive unit for smooth probe $\Phi 16$	7040138	00	2019/03/15

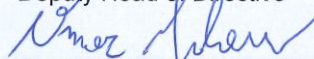
* New or revised document



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[20] Terms and conditions

The product liability rests with the Manufacturer, his representative or, in the absence of a representative, with the importer, in accordance with the General Product Safety Directive 2001/95/EC.

The following conditions may render this certificate invalid:

- changes in the design or construction of the product;
- changes or amendments to the Directive;
- changes or amendments in the standards which form the basis for documenting compliance with the essential requirements of the 2014/34/EU Directive.

[21] History

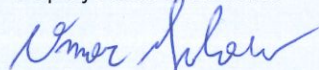
Issue	Description	Date
0	First Emission.	28-05-2018
1	Standard update, possibility to use increased safety heating elements when process requires EPL Gb, better identification of surface temperature for dusts	20-12-2019
2	The NT 80÷450 series has been verified to be in compliance with requirements of IP66 besides IP68 already assessed	14-07-2023



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