



# IECEX Certificate of Conformity

## INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification System for Explosive Atmospheres

for rules and details of the IECEx Scheme visit [www.iecex.com](http://www.iecex.com)

Certificate No.: **IECEX EUT 17.0016X** Page 1 of 5 Certificate history:  
Status: **Current** Issue No: 2 Issue 1 (2019-07-26)  
Date of Issue: 2019-12-20 Issue 0 (2017-09-21)  
Applicant: **Masterwatt S.r.l.**  
Via Collegno, 31 – 10044 Pianezza (TO)  
Italy  
Equipment: **Armoured electrical heaters, Series 80 ÷ 700**  
Optional accessory:  
Type of Protection: **Equipment dust ignition protection by enclosure "t", Increased safety "e"**  
Marking: Ex eb IIC T6...T1 -/Gb or Ex eb IIC T6...T1 Gb/Gb  
and / or  
Ex tb IIIC T85°C...T450°C -/Db

Approved for issue on behalf of the IECEx  
Certification Body:

**Dionisio Bucchieri**

Position:

**Head of IECEx CB**

Signature:  
(for printed version)

Date:

2019-12-20

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Via Cuorgnè  
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Italy



Product Testing



# IECEX Certificate of Conformity

Certificate No.: **IECEX EUT 17.0016X**

Page 2 of 5

Date of issue: 2019-12-20

Issue No: 2

Manufacturer: **Masterwatt S.r.l.**  
Via Collegno, 31 – 10044 Pianezza (TO)  
**Italy**

Additional  
manufacturing  
locations:

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended

## STANDARDS :

The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

**IEC 60079-0:2017** Explosive atmospheres - Part 0: Equipment - General requirements  
Edition:7.0

**IEC 60079-31:2013** Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"  
Edition:2

**IEC 60079-7:2015** Explosive atmospheres – Part 7: Equipment protection by increased safety "e"  
Edition:5.0

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

## TEST & ASSESSMENT REPORTS:

A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Report:

[IT/EUT/ExTR17.0016/02](#)

Quality Assessment Report:

[IT/EUT/QAR14.0002/05](#)



# IECEx Certificate of Conformity

Certificate No.: **IECEx EUT 17.0016X**

Page 3 of 5

Date of issue: 2019-12-20

Issue No: 2

## EQUIPMENT:

Equipment and systems covered by this Certificate are as follows:

The electrical armoured heaters Series 80÷700 are composed of a heating unit (characterized by an increased safety construction) and a terminal box (characterized by an increased safety and/or dust tight construction) for the electrical connections.

The heating unit can be made of one or more heating elements and it is attached to the heated vessel through a coupling flange.

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 terminal box enclosure can be directly connected to the coupling flange or can be spaced from it by a neutral extension in order to comply with the maximum service temperature of the terminal box in relation to the process temperature. The heating elements can be permanently fixed to the coupling flange or can be dismountable (bite coupling elements).

The element's external diameter can be from 8 mm to 16 mm.

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 (probes types intrinsic safety or increased safety or flameproof).

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.

A more detailed description is given in the annex

## SPECIFIC CONDITIONS OF USE: YES as shown below:

- The user has to periodically clean the enclosure in order to avoid a dust deposit higher than 5 mm
- 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 IEC 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 IEC 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 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 terminal 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
- operate in a reliable way.



# IECEx Certificate of Conformity

Certificate No.: **IECEX EUT 17.0016X**

Page 4 of 5

Date of issue: 2019-12-20

Issue No: 2

## Equipment (continued):

Electrical characteristics:

Maximum voltage: 750 Vac/Vdc

Rated frequency: 0/50/60 Hz

Maximum current density on the heaters terminals  $1.5 \text{ A/mm}^2$

Protection degree: IP 66 or IP 65

Minimum ambient temperature:  $-60 \text{ }^\circ\text{C}$

Maximum ambient temperature:  $+40 \text{ }^\circ\text{C}$  or  $+60 \text{ }^\circ\text{C}$  or  $+70 \text{ }^\circ\text{C}$



# IECEx Certificate of Conformity

Certificate No.: **IECEx EUT 17.0016X**

Page 5 of 5

Date of issue: 2019-12-20

Issue No: 2

**DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)**

- Standard update (IEC 60079-0)
- Better identification of surface temperature for dusts
- Further details in the specific condition of use

**Annex:**

[Annex to CoC EUT 17.0019\\_2.pdf](#)

**Annex to certificate:** IECEx EUT 17.0016X Issue N. 2 of 2019-12-20

**General product information:**

In order to avoid operating conditions which are dangerous or outside the limits fixed in the nameplate, each heater is equipped with the safety devices below indicated. These safety devices shall always be in addition to the devices used for the process control and shall be non- resettable.

Heating of solids: The heaters are equipped with a safety device for the control of the maximum temperature of the heated solid (temperature of the solid surface exposed to the explosive atmosphere).

Heating of liquids: The heaters are equipped with a safety device for the control of the maximum operating temperature of the process plant (internal part of the coupling device to the plant).

Heating of gases in processes with no EPL required: The heaters are equipped with a safety device for the control of the maximum operating temperature of the process plant (internal part of the coupling device to the plant).

In addition, if the heaters are used on processes requiring an EPL, they comply with the following prescriptions:

Heating of static gases in processes with EPL Gb required: The Temperature Class is defined on the basis of the maximum temperature of the heating elements. In addition they are manufactured as self-limiting units in which the maximum temperature of the heating elements, when powered at the nominal design voltage and with the ambient temperature at the upper value specified on the heater nameplate, will not reach the Temperature Class limits.

Heating of forced flow gases in processes with EPL Gb required: The Temperature Class is defined on the basis of the maximum temperature of the heating elements. Each heating unit is equipped with a safety device for the control of the maximum temperature of the heating elements and, if required by the operational conditions, also with a safety device dedicated to the control of the maximum fluid temperature.

**Electrical characteristics**

Maximum voltage: 750 Vac or Vdc  
 Rated frequency: 0 Hz or 50 Hz or 60 Hz  
 Maximum current density on the heaters terminals 1.5 A/mm<sup>2</sup>  
 Protection degree: IP66 or IP 65  
 Ambient temperature: from -60 to +40 °C (or from -60°C to +60 °C or from -60°C to +70 °C)

**Surface temperature**

The temperature class of the equipment / maximum surface temperature (dusts) T6...T1 / T85°C...T450°C is specified 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 defined by the manufacturer 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: Maximum Ambient Temperature : +40 °C – Maximum Terminals Current Density : 0.8 A/mm<sup>2</sup>

Neutral section length (mm)	Temperature class										
	300	T6	T6	T5	T4	T4	T3	T3	T2	T2	T1
250	T6	T6	T5	T4	T4	T3	T3	T2	T2	T1	T1
200	T6	T6	T5	T4	T4	T3	T3	T2	T2	T1	T1
150	T6	T6	T5	T4	T4	T3	T3	T2	T2	T1	T1
100	T6	T6	T5	T4	T4	T3	T3	T2			
0	T6	T6	T5	T4	T4	T3					
	60 °C	75 °C	95 °C	100 °C	130 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
	PROCESS TEMPERATURE										

Table 2: Maximum Ambient Temperature : +40 °C – Maximum Terminals Current Density : 1.1 A/mm<sup>2</sup>

Neutral section length (mm)	Temperature class										
	300	T6	T6	T5	T4	T4	T3	T3	T2	T2	T1
250	T6	T6	T5	T4	T4	T3	T3	T2	T2	T1	T1
200	T6	T6	T5	T4	T4	T3	T3	T2	T2	T1	T1
150	T6	T6	T5	T4	T4	T3	T3	T2	T2	T1	T1
100	T6	T5	T5	T4	T4	T3	T3	T2			
0	T5	T5	T4	T4	T4	T3					
	60 °C	75 °C	95 °C	100 °C	130 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
	PROCESS TEMPERATURE										

Table 3: Maximum Ambient Temperature : +40 °C – Maximum Terminals Current Density : 1.5 A/mm<sup>2</sup>

Neutral section length (mm)	Temperature class										
	300	T6	T6	T5	T4	T4	T3	T3	T2	T2	T1
250	T6	T6	T5	T4	T4	T3	T3	T2	T2	T1	T1
200	T6	T6	T5	T4	T4	T3	T3	T2	T2	T1	T1
150	T5	T5	T5	T4	T4	T3	T3	T2	T2	T1	T1
100	T5	T5	T5	T4	T4	T3	T3	T2			
0	T5	T5	T4	T4	T4	T3					
	60 °C	75 °C	95 °C	100 °C	130 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
	PROCESS TEMPERATURE										

Table 4: Maximum Ambient Temperature : +60 °C – Maximum Terminals Current Density : 0.8 A/mm<sup>2</sup>

Neutral section length (mm)	Temperature class										
	300	T6	T5	T5	T4	T4	T3	T3	T2	T2	T1
250	T6	T5	T5	T4	T4	T3	T3	T2	T2	T1	T1
200	T5	T5	T5	T4	T4	T3	T3	T2	T2	T1	T1
150	T5	T5	T5	T4	T4	T3	T3	T2	T2	T1	T1
100	T5	T5	T5	T4	T4	T3	T3	T2			
0	T5	T5	T4	T4	T4	T3					
	60 °C	75 °C	95 °C	100 °C	130 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
PROCESS TEMPERATURE											

Table 5: Maximum Ambient Temperature : +60 °C – Maximum Terminals Current Density : 1.1 A/mm<sup>2</sup>

Neutral section length (mm)	Temperature class										
	300	T5	T5	T5	T4	T4	T3	T3	T2	T2	T1
250	T5	T5	T5	T4	T4	T3	T3	T2	T2	T1	T1
200	T5	T5	T5	T4	T4	T3	T3	T2	T2	T1	T1
150	T5	T5	T4	T4	T4	T3	T3	T2	T2	T1	T1
100	T5	T4	T4	T4	T4	T3	T3	T2			
0	T4	T4	T4	T4	T3	T3					
	60 °C	75 °C	95 °C	100 °C	130 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
PROCESS TEMPERATURE											

Table 6: Maximum Ambient Temperature : +60 °C – Maximum Terminals Current Density : 1.5 A/mm<sup>2</sup>

Neutral section length (mm)	Temperature class										
	300	T5	T5	T5	T4	T4	T3	T3	T2	T2	T1
250	T5	T5	T5	T4	T4	T3	T3	T2	T2	T1	T1
200	T5	T5	T4	T4	T4	T3	T3	T2	T2	T1	T1
150	T4	T4	T4	T4	T4	T3	T3	T2	T2	T1	T1
100	T4	T4	T4	T4	T4	T3	T3	T2			
0	T4	T4	T4	T3	T3	T3					
	60 °C	75 °C	95 °C	100 °C	130 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
PROCESS TEMPERATURE											

Table 7: Maximum Ambient Temperature : +70 °C – Maximum Terminals Current Density : 0.8 A/mm<sup>2</sup>

Neutral section length (mm)	Temperature class										
	300	T5	T5	T4	T4	T4	T3	T3	T2	T2	T1
250	T5	T5	T4	T4	T4	T3	T3	T2	T2	T1	T1
200	T5	T5	T4	T4	T4	T3	T3	T2	T2	T1	T1
150	T5	T5	T4	T4	T4	T3	T3	T2	T2	T1	T1
100	T5	T4	T4	T4	T4	T3	T3	T2			
0	T4	T4	T4	T4	T3	T3					
	60 °C	75 °C	95 °C	100 °C	130 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
PROCESS TEMPERATURE											



Table 8: Maximum Ambient Temperature : +70 °C – Maximum Terminals Current Density : 1.1 A/mm<sup>2</sup>

Neutral section length (mm)	Temperature class										
	300	T5	T5	T4	T4	T4	T3	T3	T2	T2	T1
250	T5	T5	T4	T4	T4	T3	T3	T2	T2	T1	T1
200	T4	T4	T4	T4	T4	T3	T3	T2	T2	T1	T1
150	T4	T4	T4	T4	T4	T3	T3	T2	T2	T1	T1
100	T4	T4	T4	T4	T4	T3	T3	T2			
0	T4	T4	T4	T3	T3	T3					
	60 °C	75 °C	95 °C	100 °C	130 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
	PROCESS TEMPERATURE										

Table 9: Maximum Ambient Temperature : +70 °C – Maximum Terminals Current Density : 1.5 A/mm<sup>2</sup>

Neutral section length (mm)	Temperature class										
	300	T5	T5	T4	T4	T4	T3	T3	T2	T2	T1
250	T4	T4	T4	T4	T4	T3	T3	T2	T2	T1	T1
200	T4	T4	T4	T4	T4	T3	T3	T2	T2	T1	T1
150	T4	T4	T4	T4	T4	T3	T3	T2	T2	T1	T1
100	T4	T4	T4	T4	T3	T3	T3	T2			
0	T4	T4	T3	T3	T3	T3					
	60 °C	75 °C	95 °C	100 °C	130 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
	PROCESS TEMPERATURE										

**Cable entries**

The cable entry devices used on the enclosures have to be suitably IECEx 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

**Routine tests**

In compliance with clause 7.1 of IEC 60079-7, the manufacturer has to perform the dielectric strength test 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)x1.2 V r.m.s. for t>0.1s