



## EU Type Examination Certificate    CML 17ATEX1112X    Issue 0

- 1    Equipment intended for use in Potentially Explosive Atmospheres Directive 2014/34/EU
- 2    Equipment        **EM6 and EM6-X**
- 3    Manufacturer    **Metermatic (PTY) Ltd.**
- 4    Address            1 Angus Crescent,  
                          Longmeadow Business Estate East,  
                          Modderfontein,  
                          Johannesburg,  
                          South Africa
- 5    The equipment is specified in the description of this certificate and the documents to which it refers.
- 6    Certification Management Limited, Unit 1 Newport Business Park, New Port Road, Ellesmere Port CH65 4LZ, UK, Notified Body Number 2503, in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 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 to the Directive.

The examination and test results are recorded in the confidential reports listed in Section 12.

- 7    If an 'X' suffix appears after the certificate number, it indicates that the equipment is subject to conditions of safe use (affecting correct installation or safe use). These are specified in Section 14.
- 8    This EU Type Examination certificate relates only to the design and construction of the specified equipment or component. Further requirements of Directive 2014/34/EU Article 13 apply to the manufacture of the equipment or component and are separately certified.
- 9    Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the confidential report, has been demonstrated through compliance with the following documents:

EN 60079-0:2012:A11:2013

EN 60079-1:2014

EN 60079-11:2012

- 10    The equipment shall be marked with the following:



II 2 1 (1) (2) G

Ex db ia [ia Ga] [ib Gb] IIA T4 Gb

Ta=-20°C to +60°C

*A Snowden*



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## 11 Description

The EM6 or EM6-X can be installed on a vehicle that enters the hazardous area, or a Gantry which is in a hazardous area.

The EM6 or EM6-X comprises an aluminium enclosure with approximate dimensions of 347mm x 226mm x 91mm. It has an external cover and an internal flameproof (FLP-101) cover.

The external cover of the Type EM6 can be fitted with an optional i-button reader, two polycarbonate windows and a keypad in the cover. Two LCD displays are visible through the two windows. The type EM6-X comprises a blank cover. The external cover(s) is secured with four M6 fasteners.

Two different power supply modules are used for the different voltage levels, these modules are internal to the FLP-101 enclosure:

- The power supply module type is marked on the module at the end user termination / connection facilities inside the flameproof enclosure to facilitate correct selection of Um values.
- Power supply module APM-100 fitted: Um 250Vac.
- Power supply module DPM-100 fitted: Um 35Vdc.

The enclosure comprises two chambers / enclosures. The flameproof (FLP-101) chamber with the flameproof cover and cable entries into this chamber are part of the flameproof concept. The cover has a separate label (FLP-101) to make clear that it is a flameproof enclosure. The flameproof enclosure (chamber) contains electronics including the associated apparatus circuits for the external intrinsic safety circuits. The associated apparatus connects to the electronics in the non-flameproof chamber, as well as external intrinsic safety equipment, e.g. sensors.

The following cable entries are provided for in the enclosure:

- Four threaded entries (M20 x 1.5 – 6H) are provided on the one side in the external wall of the flameproof (FLP-101) enclosure, as well as three threaded entries (M20 x 1.5) into the intrinsically safe chamber.
- In the opposite external wall, an optional M16 x 1.5 – 6H threaded entry is provided in the flameproof (FLP- 101) enclosure. The B-ANT-EXD bushing with hard wired ANT-GSM antenna is located in this entry.
- An M16 x 1.5 – 6H threaded entry is provided in an extrusion of the internal cast flameproof (FLP-101) cover.

Some intrinsically safe circuits exit the flameproof enclosure via internal tracks in a PCB, which is sandwiched in the flange flamepath of the flameproof (FLP-101) enclosure, between the base and the cover. The PCB has copper layers forming the flange flamepath on both sides of the PCB. The cover is secured with sixteen M6 x 1.0 x 25mm – grade 12.9 SHCS (socket head cap screw). Washers are fitted to the fastener up to 3.1mm thick.

The external cover(s) protects all the internal electronics (outside the flameproof compartment), as well as the flameproof (FLP-101) cover.

The intrinsically safe electronics outside the flameproof enclosure is powered from the associated apparatus circuits in the flameproof enclosure and allows for connection to external intrinsic safety equipment, e.g. sensors.



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A GSM Module may be fitted only when the DPM-100 power module is fitted. Output to an antenna is facilitated via a flameproof certified B-ANT-EXD bushing in the side of the flameproof enclosure.

The EM6 and EM6-X have the following intrinsically safe parameters:

**Power to the non-i.s. electronics in the flameproof enclosure:**

Um = 250Vac (powered with APM-100)

Um = 35Vdc (powered with DPM-100)

**ANT [Ex ib] (824MHz to 1990MHz) – Only used when powered with Um = 35Vdc (DPM-100)**

Uo = 4V

Io = 2.94A

Po = 80mW

Co = 1.2uF

Lo = 32.9uH

The J8 connector may be configured to one of three different options. The CANBUS system is typically daisy chained between units, using J8. In this state, power is only supplied by a single EM6 / EM6-X unit to multiple EM6-X units, or other equipment fitting the safety description below.

**J8 – CANBUS [Ex ia] (Configured as 1.6W – JP9)**

Uo = 5.88V

Io = 1.800A

Po = 1.622W

Co = 980uF

Lo = 87.7uH

Lo/Ro = 107uH/Ω

**J8 – CANBUS [Ex ia] (Configured as 1.2W – JP9)**

Uo = 5.88V

Io = 844mA

Po = 1.194W

Co = 980uF

Lo = 399uH

Lo/Ro = 229uH/Ω

**J8 – CANBUS [Ex ia] (Configured as loop powered passive connection)**

Ui = 8V

Ii = 3.33A

Ci = 12.1uF

Li = 0

**J9 - PROXY INTERFACE [Ex ia] (Pin 1 w.r.t. Pin 2 and Pin 3 w.r.t. Pin 4)**

Uo = 7.88V

Io = 14.82mA

Po = 29.2mW

Co = 120uF

Lo = 1.29H

Lo/Ro = 9.74mH/Ω



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**J10 and J11 combined – TEMPERATURE INTERFACE [Ex ia]**

**Note:** From an intrinsic safety perspective, J10 and J11 is a single i.s. circuit.

$U_o = 6.88V$   
 $I_o = 553mA$   
 $P_o = 1.04W$   
 $C_o = 400\mu F$   
 $L_i = 930\mu H$   
 $L_o/R_o = 261\mu H/\Omega$

**J12 and J13 individually – PULSAR INTERFACE [Ex ia] (pins 1, 2 and 3 w.r.t pin 4)**

**Configured as “NORMAL” – Jumper JP11-JP14 used.**

$U_o = 7.88V$   
 $I_o = 435mA$   
 $P_o = 857mW$   
 $C_o = 990\mu F$   
 $L_o = 1.5mH$   
 $L_o/R_o = 332\mu H/\Omega$

**J12 and J13 individually – PULSAR INTERFACE [Ex ia] (pins 2 and 3 respectively w.r.t pin 4 – open collector)**

**Configured as “NORMAL” – Jumper JP11-JP14 used.**

$U_o = 7.88V$   
 $I_o = 4.11mA$   
 $P_o = 8.1mW$   
 $C_o = 990\mu F$   
 $L_o = 16.8H$   
 $L_o/R_o = 35mH/\Omega$

**J12 and J13 individually – PULSAR INTERFACE [Ex ia] (pin 1 w.r.t pins 2 and 3 respectively)**

**Configured as “NAMUR” – Jumper JP11-JP14 used.**

$U_o = 7.88V$   
 $I_o = 6.8mA$   
 $P_o = 13.5mW$   
 $C_o = 990\mu F$   
 $L_o = 6.15H$   
 $L_o/R_o = 21mH/\Omega$

**J14 – DALLAS TAG INTERFACE [Ex ia]**

$U_o = 6.88V$   
 $I_o = 553mA$   
 $P_o = 1.04W$   
 $C_o = 100\mu F$   
 $L_o = 930\mu H$   
 $L_o/R_o = 261\mu H/\Omega$

Where safety parameters are not allocated, it was not required to be limited for intrinsic safety.



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The above load parameters apply where;

- a) The external circuit contains no combined lumped inductance (Li) or lumped capacitance (Ci) greater than 1% of the above values. OR
- b) The external circuit contains either only lumped inductance (Li) or lumped capacitance (Ci) in combination with a cable. OR
- c) The inductance and capacitance are distributed as in a cable. In all other situations, e.g. the external circuit contains combined lumped inductance and capacitance, up to 50% of each of the inductance and capacitance values are allowed.

## **12 Certificate history and evaluation reports**

<b>Issue</b>	<b>Date</b>	<b>Associated report</b>	<b>Notes</b>
0	22 Sep 2017	R2217A/00	Issue of prime certificate

Note: Drawings that describe the equipment or component are listed in the Annex.

## **13 Conditions of manufacture**

The following conditions are required of the manufacturing process for compliance with the certification.

- 13.1 Where the product incorporates certified parts or safety critical components, the manufacturer shall ensure that any changes to those parts or components do not affect the compliance of the certified product that is the subject of this certificate.
- 13.2 The flameproof enclosure shall be marked with a label stating 'Do not open when energised or an explosive atmosphere is present'.

## **14 Special Conditions for Safe Use (Conditions of Certification)**

The following conditions relate to safe installation and/or use of the equipment.

- 14.1 Earth (High Quality Earth) / circuit Ground is infallibly electrically connected/bonded to the enclosure. This shall be considered for the intrinsic safe installation. (Therefore, the 500Vrms isolation is not maintained.)
- 14.2 A GSM Module and flameproof certified B-ANT-EXD bushing in the side of the flameproof enclosure shall only be fitted when the DPM-100 power module is fitted.
- 14.3 The intrinsic safety system approval of peripheral devices is not part of the certification.
- 14.4 The bushing material shall not be subjected to direct UV exposure or mechanisms of generating static electricity.
- 14.5 The B-ANT-EXD shall be installed as to not be subjected to any mechanical stress on the cable.
- 14.6 Some flamepaths are more restrictive than the minimum requirements in EN 60079-1. If repairs to the flamepaths are to be made, information with respect to the flamepaths shall be obtained from the manufacturer as required.

# Certificate Annex



**Certificate Number** CML 17ATEX1112X  
**Equipment** EM6 and EM6-X  
**Manufacturer** Metermatic (PTY) Ltd.

The following documents describe the equipment or component defined in this certificate:

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Drawing No	Sheets	Rev	Approved date	Title
MM162601	1 of 1	4	22 Sep 2017	EM6 APPROVAL BLOCKDIAGRAM – IECEx
RBM-MM162202-3	1 to 7	1	22 Sep 2017	BILL OF MATERIAL – EM6
RCDMM162202	1 of 16	3	22 Sep 2017	EM6
MM162202	2 of 16	3	22 Sep 2017	POWER INPUT - PCB
MM162202	3 of 16	3	22 Sep 2017	EXD PROCESSOR
MM162202	4 of 16	3	22 Sep 2017	PROCESSOR CAN BARRIER
MM162202	5 of 16	3	22 Sep 2017	EXD PULSAR INTERFACE
MM162202	6 of 16	3	22 Sep 2017	OUTPUT INTERFACE
MM162202	7 of 16	3	22 Sep 2017	INPUT INTERFACE
MM162202	8 of 16	3	22 Sep 2017	EXD COMMS
MM162202	9 of 16	3	22 Sep 2017	IS POWER SUPPLY
MM162202	10 of 16	3	22 Sep 2017	IS Microprocessor
MM162202	11 of 16	3	22 Sep 2017	CAN BUS INTERFACE
MM162202	12 of 16	3	22 Sep 2017	IS PULSAR INTERFACE
MM162202	13 of 16	3	22 Sep 2017	TEMPERATURE INTERFACE
MM162202	14 of 16	3	22 Sep 2017	PROXY INTERFACE
MM162202	15 of 16	3	22 Sep 2017	DALLAS TAG INTERFACE
MM162202	16 of 16	3	22 Sep 2017	PERRIPHERAL INTERFACE
MM162202	1 of 1	3	22 Sep 2017	EM6 (Bottom Layer)
MM162202	1 of 1	3	22 Sep 2017	EM6 (Bottom Overlay)
MM162202	1 of 1	3	22 Sep 2017	EM6 (Internal Plane 1)
MM162202	1 of 1	3	22 Sep 2017	EM6 (Internal Plane 3)
MM162202	1 of 1	3	22 Sep 2017	EM6 (Mid Layer 1)
MM162202	1 of 1	3	22 Sep 2017	EM6 (Mid Layer 2)
MM162202	1 of 1	3	22 Sep 2017	EM6 (Top Layer)
MM162202	1 of 1	3	22 Sep 2017	EM6 (Top Overlay)
RDW – MM170402	1 to 4	3	22 Sep 2017	EM6 PCB ASSEMBLY
MM162208	1 of 1	1	22 Sep 2017	EM6 FUSEPLATE

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**Manufacturer** Metermatic (PTY) Ltd.



Drawing No	Sheets	Rev	Approved date	Title
RDW-MM163501	1 of 1	5	22 Sep 2017	EM6 APPROVAL LABEL
RDW-MM170202	1 to 3	3	22 Sep 2017	EM6 & EM6-X ASSEMBLY
MM112601	1 of 1	5.1	22 Sep 2017	GPRS MODULE
RBM-MM112601-5	1 of 1	3	22 Sep 2017	BILL OF MATERIAL (GSM-100 PCB)
MM 112601	1 of 1	5	22 Sep 2017	GSM MODULE – (Top Overlay)
MM 112601	1 of 1	5	22 Sep 2017	GSM MODULE – (Top Layer)
MM 112601	1 of 1	5	22 Sep 2017	GSM MODULE (Bottom Overlay)
MM 112601	1 of 1	5	22 Sep 2017	GSM MODULE – (Bottom layer)
MM153401	1 of 1	5	22 Sep 2017	ANTENNA Exd BUSH
MM161702	1 of 1	3	22 Sep 2017	ANTENNA BUSH ASSEMBLY
MM161703	1 of 1	2	22 Sep 2017	ANTENNA EXD BUSH POTTING
MM162301	1 of 1	2	22 Sep 2017	APM-100 BLOCKDIAGRAM
RBM-MM162201-2	1 of 1	1	22 Sep 2017	BILL OF MATERIAL APM-100 PCB
MM162201	1 of 1	2	22 Sep 2017	APM-100
MM162201	1 of 1	2	22 Sep 2017	APM-100 – (BOTTOM LAYER)
MM162201	1 of 1	2	22 Sep 2017	APM-100 – (BOTTOM SILKSCREEN)
MM162201	1 of 1	2	22 Sep 2017	APM-100 – (TOP LAYER)
MM162201	1 of 1	2	22 Sep 2017	APM-100 – (TOP SILKSCREEN)
--	1 to 6	--	22 Sep 2017	LCD Assessment – TOPWAY LM240160CCW
MM150903	1 to 6	5	22 Sep 2017	Ex d ENCLOSURE CERTIFICATION DRAWING