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UX

Explosion Proof / Intrinsically Safe Antenna Coupler
for use in Hazardous Areas

Installation & Operation Manual

OVERVIEW

The Solexy UX series explosion proof and intrinsically safe antenna coupler is an integrated protection device that facilitates non-Ex certified radio antenna installation in hazardous areas. The patented (7.057.577) UX series coupler features a barrier circuit which blocks power voltage in the event of a radio transmitter/receiver fault and is encapsulated and housed in an explosion proof stainless steel body. By limiting transmitted power per local regulations and ensuring the threshold power requirements for the area of installation are met, the UX coupler can easily be used with most passive antennas. When a radio must be used in a safe area, the UX coupler can still protect the output signal using a cable to connect to an antenna that is installed in a hazardous area.

Note: The information in this manual is intended to assist with equipment design and ensure proper installation.

READ THIS INSTRUCTION FIRST

To avoid serious or fatal personal injury or major property damage, read and follow all safety instruction in this manual. If you require additional assistance, please contact SOLEXY.

SAFETY INSTRUCTION TO HAZARDOUS AREA INSTALLATION

- The Solexy UX explosion proof and intrinsically safe Antenna Coupler must be installed and maintained according to suitable standards for electrical application in potentially explosive atmospheres (IEC/EN 60079-14, IEC/EN60079-17 and/or other national standards).
- Suitably trained personnel shall carry out installation according to applicable code practice.
- Read this first and keep this instruction manual always available.
- For proper installation, see the applicable control drawing DDCD-0010 attached.

ATEX / IECEx MARKING

I M2 (M1)	Ex db mb [ia Ma] I Mb
II 2 (1) G	Ex db mb [ia Ga] IIA/IIB/IIC T6…T5 Gb
II 2 (1) D	Ex mb tb [ia Da] IIIC T80°C…T100°C Db

This instruction refers to certified equipment covered by the following certificate:

ATEX: TÜV CY 18 ATEX 0206158 X
IECEx: IECEx MSC 19.0001X

WARNINGS

1. Solexy UX series antenna coupler must be connected to RF source with a minimum internal impedance of 50Ω.
2. Connected antennas must be assessed, installed and maintained according to suitable standards for electrical application in potentially explosive atmospheres (e.g. IEC/EN60079-0, IEC/EN60079-14, IEC/EN60079-17 or other national standards).
3. Solexy UX series antenna coupler does not provide any RF power limitation. The threshold power must be limited by the user to achieve the levels defined in IEC/EN60079-0 Table 5.
4. The UX series antenna coupler is designed to be used with a suitable enclosure with mechanical protection of the input side that utilizes one of the protection types listed in Clause 1 of IEC/EN60079-0 when it is installed in an Ex area. The protection type utilized shall apply to the specific area of use (i.e. Gas or Dust).
5. In case of use of an Ex tb enclosure with metric entries ensure 5 engaged threads minimum or use an appropriate gasket.
6. In case of use of an Ex tb enclosure with NPT entries ensure 3,5 engaged threads minimum.
7. It is the responsibility to the installer to ensure an IP6x level at the threaded joint between antenna coupler and Ex tb enclosure.
8. When installed in a safe area the input side must be protected from sun exposure. For example by using a housing or by being in an indoor area.
9. The user should not repair this equipment.
10. The user should not modify the unit.
11. The unit should not paint from the user.
12. If the equipment is likely to come in to contact with aggressive substances, it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised. Aggressive substances: example Acids, liquids, gases with can affected metals.
13. Maximum RF power input shall not exceed the value listed into product specification paragraph below and control drawing DDCD-0010.
14. The device can only be supplied by equipment rated for max overvoltage category II.

INSTALLATION

For proper installation, see the applicable **control drawing DDCD-0010**

1. Do not attach radio connection to radio until housing has been fully threaded into the enclosure.
2. If the lightning suppressor is used, connect to the output side of the coupler.
3. Antenna and cable connections should be finger tightened only. Over tightening can cause permanent damage resulting in equipment failure.
4. UX series antenna couplers with M25 straight threads (UX*M) must be secured from loosening when installed in an Ex d enclosure. Use of LOCTITE® or similar sealing adhesive is acceptable and shall be applied to the threaded joint before mounting the UX antenna coupler to the Ex d enclosure so the joint is secured against loosening.

PRODUCT SPECIFICATIONS

Gas	Dust	Ambient temperature range
T6	100°C	-40°C ≤ Ta ≤ +75°C
T5	80°C	-40°C ≤ Ta ≤ +85°C

Maximum Fault Voltage (Um)	250 VDC 250 VAC 50-60 Hz
Frequency Range	≤ 10 GHz
Max RF Power Input (Pi)	7 W (38.4 dBm)
Impedance	50 Ω
Max capacitance	29 pF

Maximum RF Threshold Power *(table 5 in IEC/EN60079-0)*	
Equipment Group	Threshold Power
Group I, IIA, III	6 W (37.8 dBm)
Group IIB	3.5 W (35.4 dBm)
Group IIC	2 W (33.0 dBm)

MAXIMUM RF INPUT POWER (Pi)

This value does not consider any cable loss between the RF transmitter and the UX coupler and may therefore be considered as the maximum allowable RF transmitter output power when the UX coupler is directly connected to an RF transmitter.
Added cable loss between the RF transmitter and the UX coupler may allow the RF transmitter output power to exceed the value above as long as the cable loss ensures the power at the input of the UX coupler is less than or equal to the above values.

$$RF\ transmitter\ output\ power_{(dBm)} - Coax\ cable\ loss_{(dB)} \leq Maximum\ RF\ Input\ Power\ (Pi)$$

It is permissible limited the maximum power output of the transmitter by a programmable or software setting but it must not be possible for an end-user to override it.

MAXIMUM PERMITTED RF THRESHOLD POWER (Pth)

The RF threshold power, sometimes called the effective isotropic radiated power (EIRP), as defined in IEC/EN60079-0, is the product of the effective output power of a radio transmitter multiplied by the power gain of a connected antenna. The maximum threshold powers for each equipment group as defined by Table 5 in IEC/EN60079-0 are provided above.

Because most antennas list the gain relative to an isotropic radiator (dBi) instead of the raw power gain, it is often easier to simply add the antenna gain in dBi to the radio output power in decibel-milliwatts (dBm). Any added cable loss between the RF transmitter output and the UX input, or the UX output and the antenna may also be factored in.

$$Pth_{(dBm)} = RF\ Transmitter\ output_{(dBm)} + Antenna\ Gain_{(dBi)} - Cable\ loss\ between\ Radio\ and\ UX_{(dB)} - Cable\ loss\ between\ UX\ and\ antenna_{(dB)}$$

- The resulting threshold power calculated by the above formula MUST be below the threshold power for the operating area group rating given above.
- Consideration of fault conditions in the radio transmitter is not necessary. The max radio transmitter's RF power output should be taken from the manufacturer's datasheet in normal operation.
- A radio output power lower than those provided above may be used to allow for an antenna with a higher gain.
- In case of a device with multiple outputs and multiple antennas, each threshold power is calculated separately for each output/antenna.
- Gain of multiband antennas should be evaluated separately at each frequency.
- High gain directional antennas on the same device should not be directed in the same direction.

ANTENNA CONNECTION

The antenna connected to the UX coupler must be installed following the earthing requirements of IEC/EN 60079-14.

In case of antenna direct mounting on UX coupler (without coax cable) the antenna is earthed through the enclosure earth connection via UX body.
In case of remote antenna installation using a coax cable the antenna needs to be installed on an isolate earth support to grant a single earth connection through the enclosure earth connection.

MAXIMUM JOULES CALCULATION IN CASE OF COAX CABLE INSTALLATION

In case of coax cable installation (radio/UX coupler and UX coupler/Antenna) the adding cable needs to be evaluating to ensure that the maximum energy stored on cable not exceeded the value allowable per IEC/EN 60079-11:

Max energy (Joules) allowed per IEC/EN 60079-11	
Group I	1500 µJ
Group IIA	950 µJ
Group IIB	250 µJ
Group IIC	50 µJ

The calculation can be done according to the following equation:

$$E = \frac{1}{2} * \left\{ C * \left[\left(1.5 * \left(\sqrt{R * P} \right) \right] ^2 \right\} \right.$$

Where:
E = Energy
C= UX Capacitance + Coax cable capacitance
(see below UX series reference value)
R = Impedance (50Ω)
P = Radio power output
1.5 = Safety Factor

Example

RF Radio Power Output = 2 W
Antenna cable capacitance = 1195 pF
UX Series capacitance = 29 pF
Input cable capacitance = 73 pF
Total Capacitance C = 1297 pF

$$E = \frac{1}{2} * \left\{ 1297\ pF * \left[\left(1.5 * \left(\sqrt{50 * 2} \right) \right] ^2 \right\} \right. = 0.14\ \mu J$$

Answer = 0.14 µJ acceptable for any Group

MAINTENANCE

- The verification and maintenance of the electrical equipment must be performed according to IEC/EN 60079-17.
- The user should guarantee the keeping of the safety characteristic of the device after maintenance.
- The maintenance related to the components used for wiring must be performed according to manufacturer instruction.

DISPOSAL / RECYCLING

Disposal and recycling of the product according to national regulation for waste disposal and recycling.
WARNING: Do not dispose of the product and the components in the environment.

MODEL NOMENCLATURE

UX	X	X	X	XX	XX	X	XX	-	XXXXX
	1	2	3	4	5	6	7	-	8

1 Coupler Series
- F RP-SMA Female
- N N Female
- S SMA Female
- T TNC Female
- B BNC Female

2 Threads
- 3 ¾" NPT
- M M25x1.5

3 Materials
- S AISI 303
- C AISI 316
- L AISI 316L

4 Coaxial Radio Connector
- XX various, see sales literature

5 Coaxial Cable Length
- 00 no cable (direct RF connection)
- XX cable length in inches

6 Version (frequency range)
- x various, see sales literature

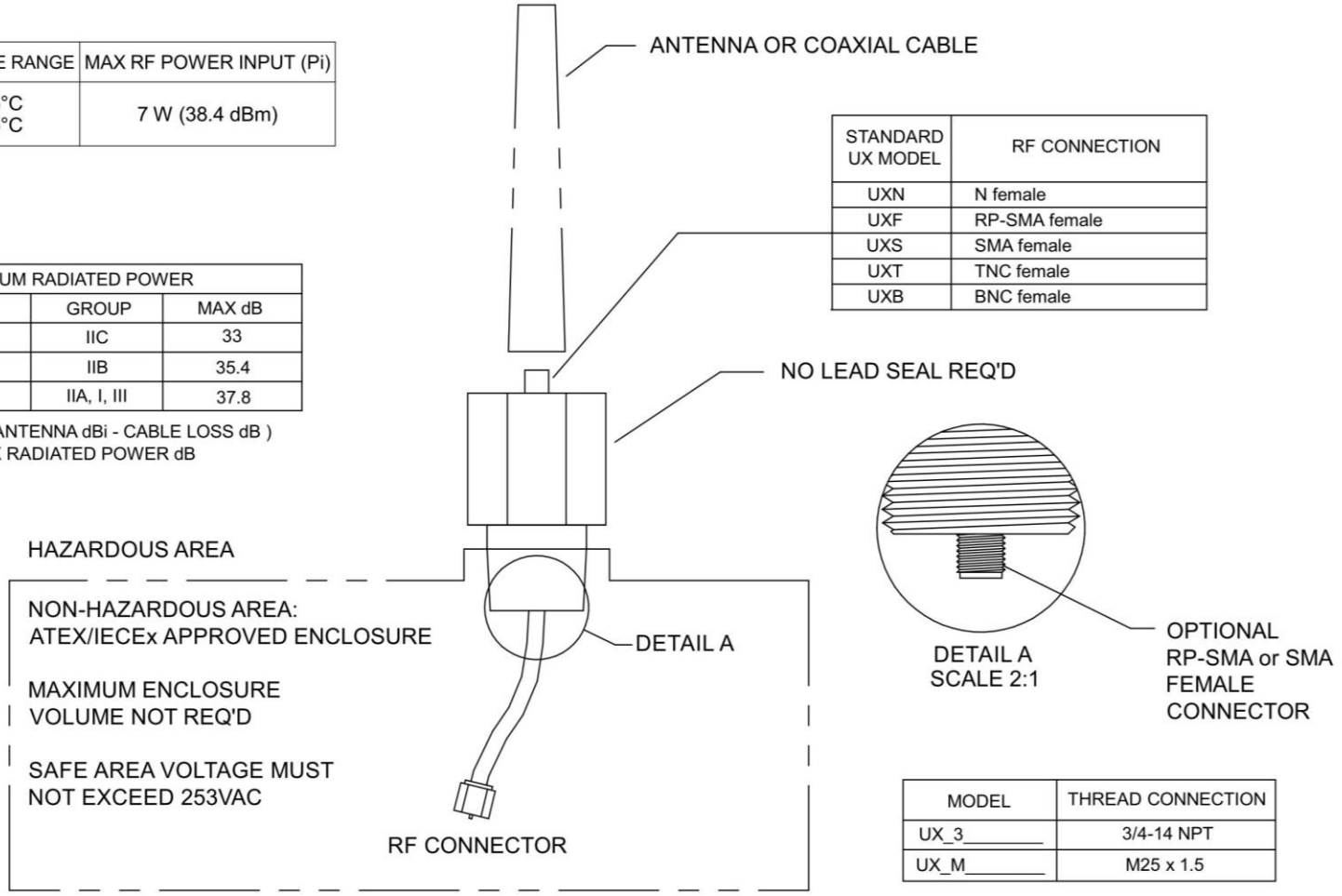
7 Certification Mark
- X0 ATEX / IECEx
- XN ATEX / IECEx and North America & Canada standards (dual marking)
- xx various, consult Solexy

8 Special execution
- XXXXX various, consult Solexy

AMBIENT TEMPERATURE RANGE	MAX RF POWER INPUT (Pi)
T5:-40°C ≤Ta≤ 85°C T6:-40°C ≤Ta≤ 75°C	7 W (38.4 dBm)

MAXIMUM RADIATED POWER		
MAX WATTAGE	GROUP	MAX dB
2 W	IIC	33
3.5 W	IIB	35.4
6 W	IIA, I, III	37.8

(RADIO dB + ANTENNA dBi - CABLE LOSS dB)
≤ MAX RADIATED POWER dB



STANDARD UX MODEL	RF CONNECTION
UXN	N female
UXF	RP-SMA female
UXS	SMA female
UXT	TNC female
UXB	BNC female

MODEL	THREAD CONNECTION
UX_3_____	3/4-14 NPT
UX_M_____	M25 x 1.5

NOTES:
1. IN CASE OF USE OF A Ex tb ENCLOSURE WITH METRIC ENTRIES ENSURE 5 ENGAGED THREADS MINIMUM OR USE AN APPROPRIATE GASKET
2. IN CASE OF USE OF A Ex tb ENCLOSURE WITH NPT ENTRIES ENSURE 3,5 ENGAGED THREADS MINIMUM
3. IT IS RESPONSABILITY TO THE INSTALLER TO ENSURE AN IP6x LEVEL AT THE THREADED JOINT BETWEEN ANTENNA COUPLER AND Ex tb ENCLOSURE
4. THE DEVICE CAN ONLY BE SUPPLIED BY EQUIPMENT RATED FOR MAX OVERVOLTAGE CATEGORY II

SCHEDULE DRAWING
No modifications permitted without reference to the Notified Body

REV	DATE	ECN	DESCRIPTION	DRAWN BY	CHECK BY	APPR'D BY

UNITS N/A	SCALE NTS	MATERIAL N/A	SHEET NO. 1 OF 1
ANGLE OF PROJECTION		FINISH N/A	
UNLESS OTHERWISE SPECIFIED GENERAL TOLERANCES INCH mm .X ±.020 ±0.51 .XX ±.010 ±0.25 .XXX ±.005 ±0.13 CONCENTRICITY ±.005 ±0.13 ANGLES ±0°30'	DRAWN BY SS	DATE 18/12/2020	TITLE CONTROL DRAWING UX SERIES ATEX / IECEx
	CHECK BY GS	DATE 18/12/2020	
	APPR'D BY GS	DATE 18/12/2020	SIZE A / DRAWING NUMBER DDCD-0010-S / REV 00

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