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RX

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

Installation & Operation Manual

OVERVIEW

The Solexy RX 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) RX 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 RX coupler can easily be used with most passive antennas. When a radio must be used in a safe area, the RX 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 RX explosion proof and intrinsically safe Antenna Coupler must be installed and maintenance 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 with applicable code practice.
- Read this first and keep this instruction manual always available.
- For proper installation, see the applicable control drawing DDCD-0006 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 following certificate:

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

WARNINGS

1. Solexy RX series antenna coupler must be connected to RF source with 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 RX series antenna coupler does not provide any RF power limitation. The threshold power must be limited by the user in order to achieve the levels defined in IEC/EN60079-0 Table 4.
4. The RX 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 be applicable to the specific area of use (i.e. Gas or Dust).
5. In case of use of a Ex tb enclosure with metric entries ensure 5 engaged threads minimum or use an appropriate gasket.
6. In case of use of a Ex tb enclosure with NPT entries ensure 3,5 engaged threads minimum.
7. It is 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 painted from the user.
12. If the equipment is likely to come in to contact with aggressive substances, it is 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 control drawing DDCD-0006.

INSTALLATION

For proper installation, see the applicable **control drawing DDCD-0006**

1. Do not attach radio connection to radio until housing has been fully threaded into enclosure.
2. If lightning suppressor is used, connect to 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. RX series antenna couplers with M25 straight threads (RX*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 threaded joint prior to mounting the RX antenna coupler to the Ex d enclosure so the joint is secured against loosening.

PRODUCT SPECIFICATIONS

Ambient temperature range			
Max RF Power Input (Pi)	Dust	Gas	T amb
6 W (37.8 dBm)	100°C 80°c	T5 T6	-40°C ≤ Ta ≤ +80°C -40°C ≤ Ta ≤ +65°C
2 W (33 dBm)	100°C 80°C	T5 T6	-40°C ≤ Ta ≤ +85°C -40°C ≤ Ta ≤ +70°C

Refer to product marking for max RF Power Input (Pi) allowed and related ambient temperature

Maximum Fault Voltage (Um)	250 VDC 250 VAC 50-60 Hz
Frequency Range	≤ 6 GHz
Impedance	50 Ω

Maximum RF Threshold Power *(table 4 in IEC/EN60079-0)*	
ATEX/IECEx 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)

Refer to product marking for maximum RF Input Power (Pi) allowed (see product specification table above).

This value do not consider any cable loss between the RF transmitter and the RX coupler and may therefore be considered as the maximum allowable RF transmitter output power when the RX coupler is directly connected to a RF transmitter.
Added cable loss between the RF transmitter and the RX 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 RX 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 4 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 RX input, or the RX output and the antenna may also be factored in.

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

- 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 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 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 individual frequency.
- High gain directional antennas on the same device should not be directed in the same direction.

ANTENNA CONNECTION

The antenna connected to the RX coupler must be installed in accordance with the earthing requirements of IEC/EN 60079-14.
Antenna's earthing need to evaluate in function of RX coupler series as follows:

Model RXF, RXN, RXS, RXT, RXB
In case of antenna direct mounting on RX coupler (without coax cable) the antenna is earthed through the enclosure earth connection via RX body.
In case of remote antenna installation using a coax cable the antenna need to be installed on an isolate earth support in order to grant a single earth connection through the enclosure earth connection.

Model RX1, RX2, RX3 (ISOLATE GROUND)
In case of antenna direct mounting on RX coupler (without coax cable) the antenna ground is isolated from earth.
In case of remote antenna installation using a coax cable the antenna can be earthed through adequate connection.

MAXIMUM JOULES CALCULATION IN CASE OF COAX CABLE INSTALLATION

In case of coax cable installation (radio/RX coupler and RX coupler/Antenna) the adding cable need 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 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= RX Capacitance + Coax cable capacitance (see below RX series reference value)
R = Impedance (50Ω)
P = Radio power output
1.5 = Safety Factor

RX Coupler capacitance	
Type	**pF**
J	81.6
R	18
L	56.4

Example

RF Radio Power Output = 2 W
Antenna cable capacitance = 1195 pF
RX (J type) Coupler capacitance = 81.6 pF
Input cable capacitance = 73 pF
Total Capacitance C = 1349.6pF

$$E = \frac{1}{2} * \left\{ 1349.6\, pF * \left[\left(1.5 * \left(\sqrt{50 * 2} \right) \right] ^2 \right\} \right. = 0.152 \mu J$$

Answer = 0.152µJ 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 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 the product and the components in the environment.

MODEL NOMENCLATURE

RX	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
- 1 N Female (isolate ground)
- 2 TNC Female (isolate ground)
- 3 BNC Female (isolate ground)

2 Threads
- 3 ¾" NPT
- M M25x1.5

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

4 Coaxial Radio Connector
- XX varies, see sales literature

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

6 Frequency Range
- X varies, see sales literature (type J, L or R)

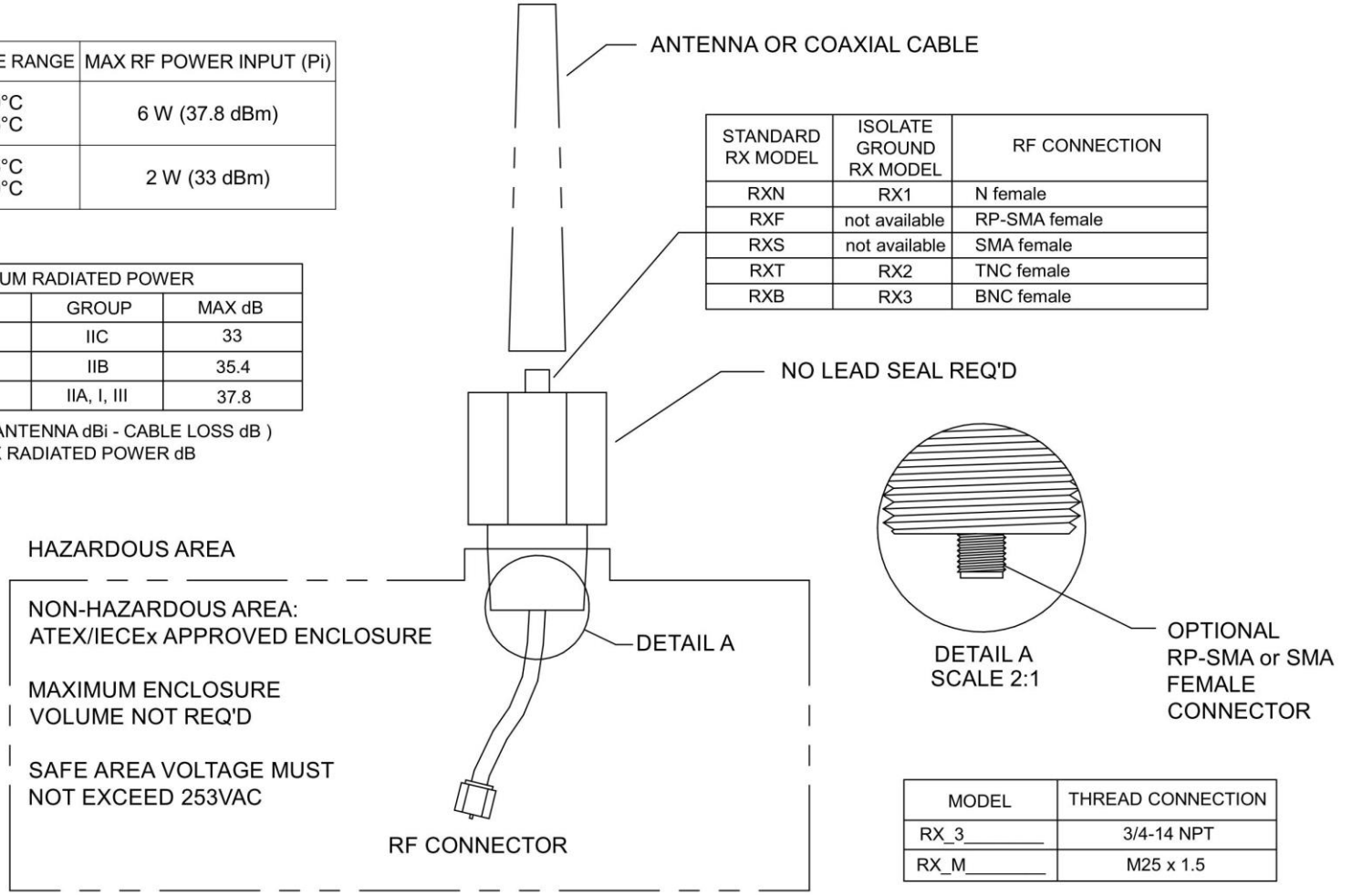
7 Certification Mark
- X0 ATEX / IECEx
- XN ATEX / IECEx and North America & Canada standards (dual marking)

8 Special execution
- XXXXX varies, consult Solexy

AMBIENT TEMPERATURE RANGE	MAX RF POWER INPUT (Pi)
T5:-40°C ≤Ta≤ 80°C T6:-40°C ≤Ta≤ 65°C	6 W (37.8 dBm)
T5:-40°C ≤Ta≤ 85°C T6:-40°C ≤Ta≤ 70°C	2 W (33 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 RX MODEL	ISOLATE GROUND RX MODEL	RF CONNECTION
RXN	RX1	N female
RXF	not available	RP-SMA female
RXS	not available	SMA female
RXT	RX2	TNC female
RXB	RX3	BNC female

MODEL	THREAD CONNECTION
RX_3_____	3/4-14 NPT
RX_M_____	M25 x 1.5

SCHEDULE DRAWING
No modifications permitted without reference to the Notified Body

NOTES:
1. REFER TO PRODUCT MARKING FOR MAX OPERATING TEMPERATURE ALLOWED
2. IN CASE OF USE OF A Ex tb ENCLOSURE WITH METRIC ENTRIES ENSURE 5 ENGAGED THREADS MINIMUM OR USE AN APPROPRIATE GASKET
3. IN CASE OF USE OF A Ex tb ENCLOSURE WITH NPT ENTRIES ENSURE 3,5 ENGAGED THREADS MINIMUM
4. IT IS RESPONSABILITY TO THE INSTALLER TO ENSURE AN IP6x LEVEL AT THE THREADED JOINT BETWEEN ANTENNA COUPLER AND Ex tb ENCLOSURE

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

UNITS N/A | SCALE NTS | MATERIAL N/A | FINISH N/A | ANGLE OF PROJECTION

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 07/09/2018	
CHECK BY GS	DATE 10/09/2018	
APPR'D BY GS	DATE 10/09/2018	

SOLEXY WIRELESS

SHEET NO. 1 OF 1

TITLE
CONTROL DRAWING
RX SERIES ATEX / IECEx

SIZE	DRAWING NUMBER	REV
A	DDCD-0006-S	00

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