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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 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.
- Installation must be in accordance with article 504 of the National Electrical Code, NFPA70, the Canadian electrical code and all applicable local codes.
- 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 DDCCD-0007 attached.

MARKING



C US

Class I, Div. 1, Group A,B,C,D

Class II, Div. 1, Group E,F,G

Class I, Zone 1, AEx db mb [ia Ga] IIA/IIB/IIC T6...T5 Gb

Zone 21, AEx mb tb [ia Da] IIIC T80°C...T100°C Db

Ex db mb [ia Ga] IIA/IIB/IIC T6...T5 Gb

Ex mb tb [ia Da] IIIC T80°C...T100°C Db

This instruction refers to certified equipment covered by following certificate:

QPS File: LR1504-3

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 and/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 the control drawing DDCCD-0007 attached.
4. The RX Antenna Coupler is designed to be used with a suitable enclosure with mechanical protection of the input side such as Class I or Class II rated enclosures. Can also be located in a "Safe Area" and cabled into a hazardous area.
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 DDCCD-0007.

INSTALLATION

For proper installation, see the applicable **control drawing DDCCD-0007**

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.
5. Screw coupler into enclosure following local electrical code (UL1203 requires 5 threads minimum engagement).

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 UL60079-0)	
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.

$$\begin{aligned}
 &RF \text{ transmitter output power}_{(dBm)} \\
 &\quad - \text{Coax cable loss}_{(dB)} \\
 &\leq \text{Maximum RF Input Power (Pi)}
 \end{aligned}$$

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.

$$\begin{aligned}
 &P_{th(dBm)} \\
 &= RF \text{ Transmitter output}_{(dBm)} + \text{Antenna Gain}_{(dBi)} \\
 &\quad - \text{Cable loss between Radio and RX}_{(dB)} \\
 &\quad - \text{Cable loss between RX and antenna}_{(dB)}
 \end{aligned}$$

- 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 suitable standards for electrical application in potentially explosive atmospheres. Installation must be in accordance with article 504 of the National Electrical Code, NFPA70, the Canadian electrical code and all applicable local codes.

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 UL 60079-11:

Max energy (Joules) allowed per UL 60079-11	
Group A, B	50 μ J
Group C	250 μ J
Group D, F, G	950 μ J

The calculation can be done according to following equation:

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

Where:

E = Energy

C= RX Capacitance + Coax cable capacitance
(see below RX series reference value)

R = Impedance (50 Ω)

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

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

Answer = 0.152 μ J acceptable for any Group

MAINTENANCE

- The verification and maintenance of the electrical equipment must be performed according suitable standards for electrical application in potentially explosive atmospheres and/or other national standards.
- 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 (typ J, L or R)

7 Certification Mark

X0 ATEX / IECEx
XN ATEX / IECEx and North America & Canada standards (dual marking)

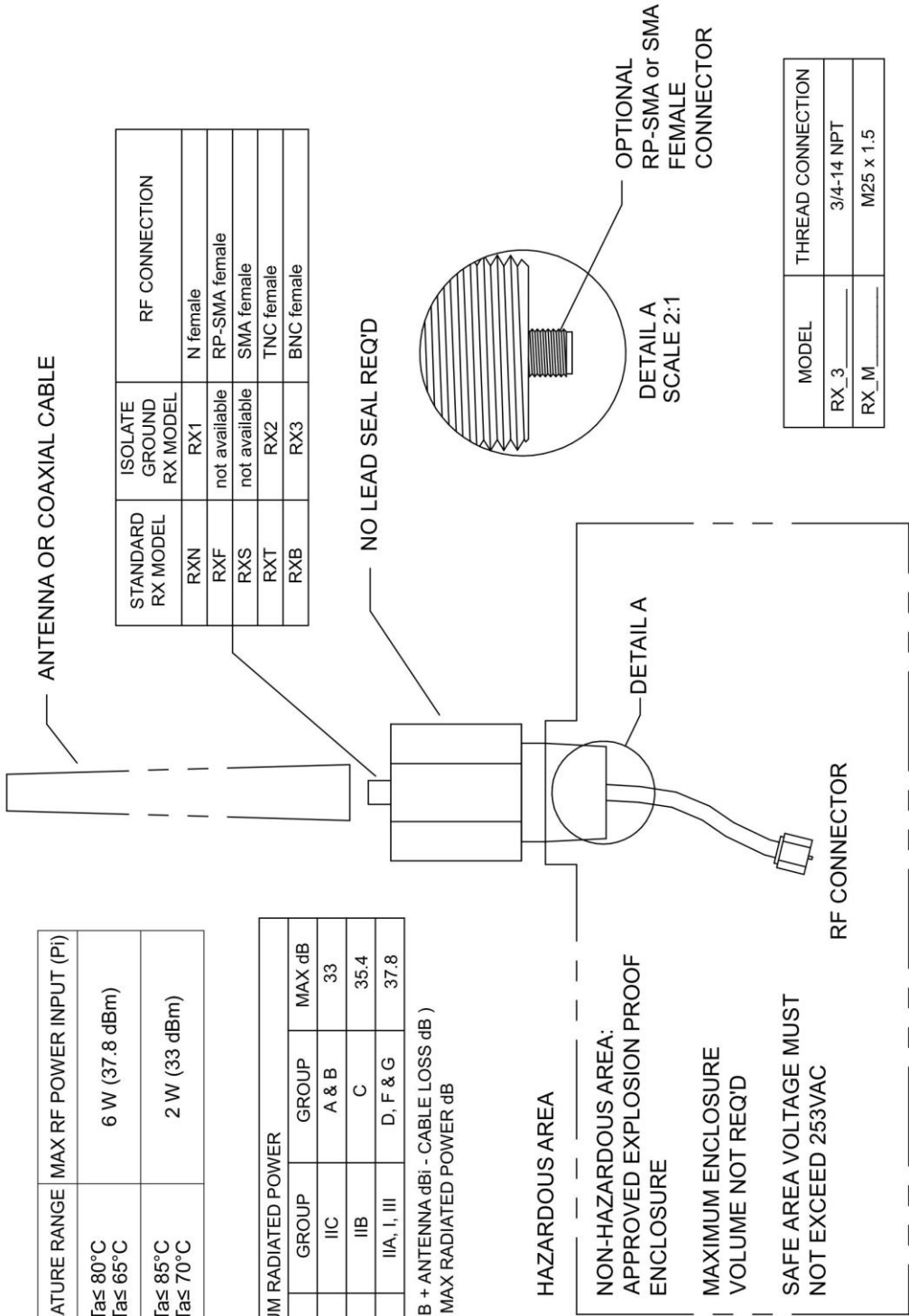
8 Special execution

XXXXX varies, consult Solexy

AMBIENT TEMPERATURE RANGE	MAX RF POWER INPUT (Pi)
T5:-40°C ≤Tas 80°C T6:-40°C ≤Tas 65°C	6 W (37.8 dBm)
T5:-40°C ≤Tas 85°C T6:-40°C ≤Tas 70°C	2 W (33 dBm)

MAXIMUM RADIATED POWER			
MAX WATTAGE	GROUP	GROUP	MAX dB
2 W	IIC	A & B	33
3.5 W	IIB	C	35.4
6 W	IIA, I, III	D, F & G	37.8

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



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. INSTALLATION MUST BE IN ACCORDANCE WITH ARTICLE 504 OF THE NATIONAL ELECTRICAL CODE, NFPA70, THE CANADIAN ELECTRICAL CODE AND ALL APPLICABLE LOCAL CODES
 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 RESPONSIBILITY 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	APPRD BY

UNITS N/A		SCALE N/A	MATERIAL N/A	SHEET NO. 1 OF 1		
		ANGLE OF PROJECTION	FINISH N/A			
UNLESS OTHERWISE SPECIFIED GENERAL TOLERANCES			DRAWN BY SS	DATE 12/10/2018	TITLE CONTROL DRAWING RX SERIES QPS	
X INCH mm ±0.020 ±0.51			CHECK BY	DATE		
XX ±0.10 ±0.25			GS	12/10/2018		
XXX ±0.05 ±0.13			APPRD BY	DATE		
CONCENTRICITY ±0.05 ±0.13			GS	15/10/2018		
ANGLES ±0°30'		SIZE DRAWING NUMBER A DDCCD-0007-S				REV 00
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