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SX

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

Installation & Operation Manual

OVERVIEW

The Solexy SX 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) SX 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 SX coupler can easily be used with most passive antennas. When a radio must be used in a safe area, the SX 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 SX 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 DDCD-0009 attached.

MARKING

C PSQ 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 SX 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 SX 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 DDCD-0009 attached.
4. The SX 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 DDCD-0009.

INSTALLATION

For proper installation, see the applicable **control drawing DDCD-0009**

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. SX series antenna couplers with M25 straight threads (SX*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 SX 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 SX coupler and may therefore be considered as the maximum allowable RF transmitter output power when the SX coupler is directly connected to a RF transmitter.
Added cable loss between the RF transmitter and the SX 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 SX 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 SX input, or the SX output and the antenna may also be factored in.

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

- 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 SX 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.
In case of antenna direct mounting on SX coupler (without coax cable) the antenna is earthed through the enclosure earth connection via SX 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.

MAXIMUM JOULES CALCULATION IN CASE OF COAX CABLE INSTALLATION

In case of coax cable installation (radio/SX coupler and SX 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 µJ
Group C	250 µJ
Group D, F, G	950 µJ

The calculation can be done according to following equation:

$$E = \frac{1}{2} * \left\{ C * \left[\left(1.5 * \left(\sqrt{R * P} \right) \right]^2 \right\} + 0.0014\ \mu J$$

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

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

Example

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

$$E = \frac{1}{2} * \left\{ 1349.6\ pF * \left[\left(1.5 * \left(\sqrt{50 * 2} \right) \right]^2 \right\} + 0.0014 \mu J = 0.1534 \mu J$$

Answer = 0.1534µJ 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

SX	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 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)

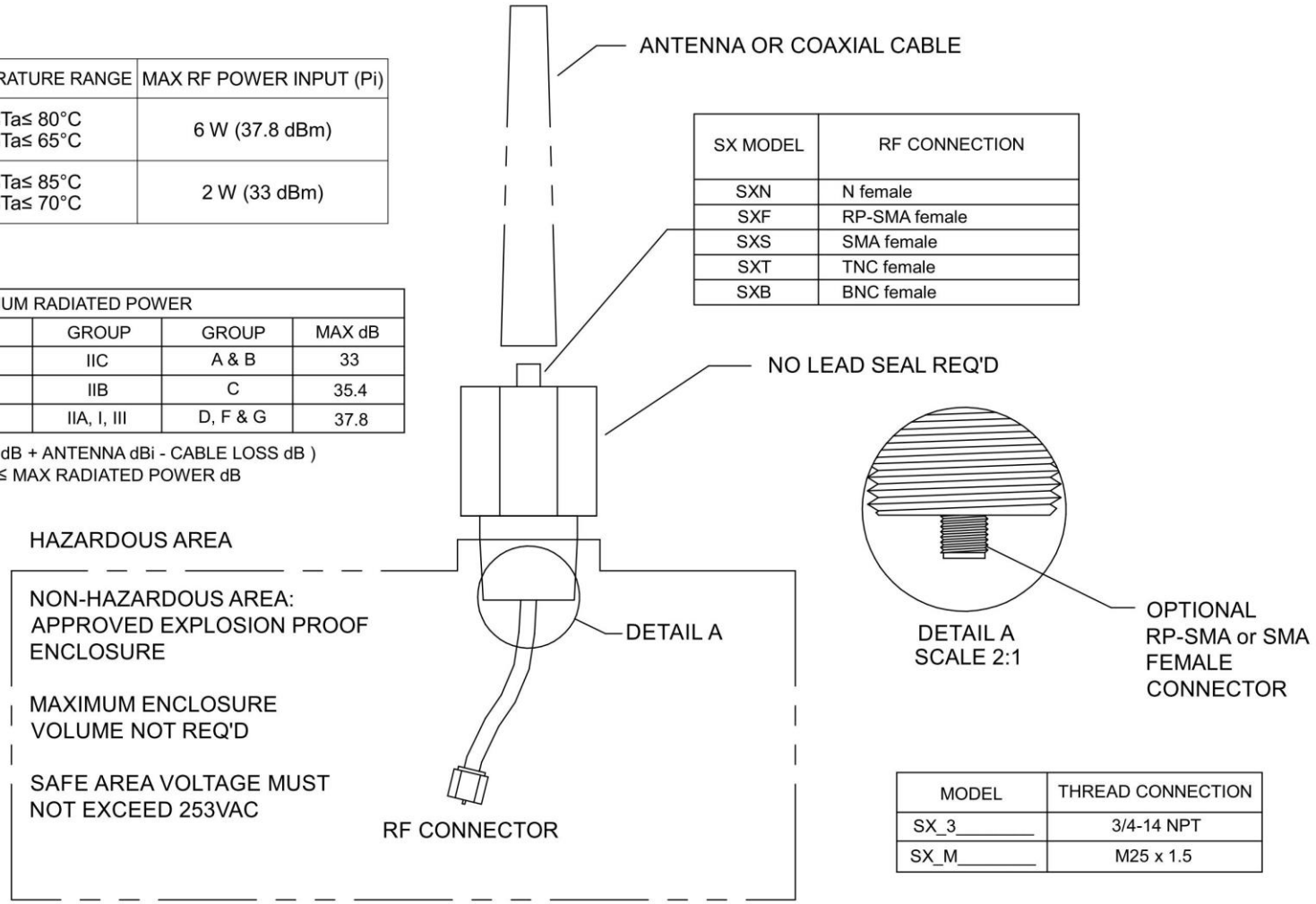
7 Certification Mark
- X0 ATEX / IECEx
- XN ATEX / IECEx and North America & Canada standards (dual marking)

8 Special execution
- XXXXX varies, consult Solexy

AMBIENT TEMPERATURE RANGE	MAX RF POWER INPUT (Pi)
T5:-40°C ≤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	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



SX MODEL	RF CONNECTION
SXN	N female
SXF	RP-SMA female
SXS	SMA female
SXT	TNC female
SXB	BNC female

MODEL	THREAD CONNECTION
SX_3_____	3/4-14 NPT
SX_M_____	M25 x 1.5

NOTES:
1. INSTALLATION MUST BE IN ACCORDANCE WIT H 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 RESPONSABILITY TO THE INSTALLER TO ENSURE AN IP6x LEVEL AT THE THREADED JOINT BETWEEN ANTENNA COUPLER AND Ex tb ENCLOSURE

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 12/10/2018	TITLE: CONTROL DRAWING SX SERIES QPS
	CHECK BY GS	DATE 12/10/2018	
	APPR'D BY GS	DATE 15/10/2018	SIZE A / DRAWING NUMBER DDCD-0009-S / REV 00

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