

OVERVIEW

The Solexy M series intrinsically safe antenna barrier is a multichannel protection device that facilitates non-Ex certified radio antenna installation in hazardous areas. The M series features a barrier circuit which blocks power voltage in the event of a radio transmitter/receiver fault. By limiting transmitted power per local regulations and ensuring the threshold power requirements for the area of installation are met, the M series can easily be used with most passive antennas. The M series protect the radio 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 M series intrinsically safe antenna barrier 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 DDCCD-0012 attached.

ATEX / IECEx MARKING



I M2 (M1) [ia Ma] I
II 2 (1) G [ia Ga] IIA/IIB/IIC
II 2 (1) D [ia Da] IIIC

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 M series shall only be installed in a non-hazardous location (safe area or inside an approved enclosure, e.g. Ex d, Ex t enclosure or Ex p panel)
2. Solexy M series antenna barrier must be connected to RF source with a minimum internal impedance of 50Ω.
3. 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).
4. Solexy M series antenna barrier 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.
5. The user should not repair this equipment.
6. The user should not modify the unit.
7. The unit should not paint from the user.
8. 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.
9. Maximum RF power input shall not exceed the value listed into product specification paragraph below and control drawing DDCCD-0012.
10. The device can only be supplied by equipment rated for max overvoltage category II.
11. The device must be installed following the earthing requirements of IEC/EN 60079-14 using the ground connection available on the device's housing.

INSTALLATION

For proper installation, see the applicable **control drawing DDCCD-0012**

1. If the lightning suppressor is used, connect to the output side of the coupler.
2. Antenna and cable connections should be finger tightened only. Over tightening can cause permanent damage resulting in equipment failure.

PRODUCT SPECIFICATIONS

Ambient temperature range	-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 M series and may therefore be considered as the maximum allowable RF transmitter output power when the M series is directly connected to an RF transmitter.

Added cable loss between the RF transmitter and the M series 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 M series is less than or equal to the above values.

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

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 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 M series input, or the M series output and the antenna may also be factored in.

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

- 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 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 M series must be installed following the earthing requirements of IEC/EN 60079-14.

The device must be installed following the earthing requirements of IEC/EN 60079-14 using the ground connection available on the device's housing.

MAXIMUM JOULES CALCULATION IN CASE OF COAX CABLE INSTALLATION

The using of coax cable for installation (radio/M series and M series/Antenna) needs to be evaluating to ensure that the maximum energy stored on cable not exceeded the value allowable per IEC/EN 60079-11 for each channel:

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:

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

Where:

E = Energy

C = M series Capacitance + Coax cable capacitance
(see below M 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

M Series capacitance = 29 pF

Input cable capacitance = 73 pF

Total Capacitance C = 1297 pF

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

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

M	X	X	0	X	XX	XX	X	XX	-	XXXXX
1	2			3	4	5	6	7	-	8

1 Number of channel

2 Coupler Series

F	RP-SMA Female
N	N Female
S	SMA Female
T	TNC Female
B	BNC Female

3 Materials

X	various, see sales literature
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4 Coaxial Radio Connector

XX	various, see sales literature
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5 Coaxial Cable Length

00	no cable (direct RF connection)
XX	cable length in inches

6 Version (frequency range)

x	various, see sales literature
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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
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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 M series intrinsically safe antenna barrier must be installed and maintained according to suitable standards for electrical application in potentially explosive atmospheres.
- Installation must be following 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 to with applicable code practice.
- Read this first and keep this instruction manual always available.
- For proper installation, see the applicable control drawing DDCCD-0013 attached.

MARKING



ASSOCIATED APPARATUS FOR INSTALLATION IN NON-HAZARDOUS LOCATION
Class I, Zone 1, AEx [ia Ga] IIA/IIB/IIC
Zone 21, AEx [ia Da] IIIC
Ex [ia Ga] IIA/IIB/IIC
Ex [ia Da] IIIC
Ex [ia Ga] CL I, DIV 1, Group A,B,C,D
Ex [ia Da] CL II, DIV 1, Group E,F,G

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

QPS File: LR1504-3

WARNINGS

1. Solexy M series shall only be installed in a non-hazardous location (safe area or inside an approved enclosure or p panel)
2. Solexy M series antenna barrier must be connected to RF source with a minimum internal impedance of 50Ω.
3. Connected antennas must be assessed, installed and maintained according to suitable standards for electrical application in potentially explosive atmospheres and/or other national standards.
4. Solexy M 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 the control drawing DDCCD-0013 attached.
5. The user should not repair this equipment.
6. The user should not modify the unit.
7. The unit should not paint from the user.
8. 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.
9. Maximum RF power input shall not exceed the value listed into product specification paragraph below and control drawing DDCCD-0013.
10. The device can only be supplied by equipment rated for max overvoltage category II.
11. The device must be installed following the earthing requirements per local codes using the ground connection available on the device's housing.

INSTALLATION

For proper installation, see the applicable **control drawing DDCCD-0013**

1. If the lightning suppressor is used, connect to the output side of the coupler.
2. Antenna and cable connections should be finger tightened only. Over tightening can cause permanent damage resulting in equipment failure.

PRODUCT SPECIFICATIONS

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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 4 in UL60079-0)	
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 M series and may therefore be considered as the maximum allowable RF transmitter output power when the M series is directly connected to an RF transmitter.

Added cable loss between the RF transmitter and the M series 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 M series is less than or equal to the above values.

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

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 UL60079-0, 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 UL60079-0 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 M series input, or the M series output and the antenna may also be factored in.

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

- 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 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 M series must be installed following the earthing requirements of suitable standards for electrical application in potentially explosive atmospheres. Installation must be following article 504 of the National Electrical Code, NFPA70, the Canadian electrical code and all applicable local codes.

MAXIMUM JOULES CALCULATION IN CASE OF COAX CABLE INSTALLATION

In case of coax cable installation (radio/M series and M series/Antenna) the adding cable needs 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 the following equation:

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

Where:

E = Energy

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

R = Impedance (50Ω)

P = Radio power output

1.5 = Safety Factor

Example

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Answer = 0.14 μJ acceptable for any Group

MAINTENANCE

- The verification and maintenance of the electrical equipment must be performed according to 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 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

M	X	X	0	X	XX	XX	X	XX	-	XXXXX
1	2			3	4	5	6	7	-	8

- 1 Number of channel
- 2 Coupler Series
F RP-SMA Female
N N Female
S SMA Female
T TNC Female
B BNC Female
- 3 Materials
X various, see sales literature
- 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
NO North America & Canada standards
XN ATEX / IECEx and North America & Canada standards (dual marking)
xx various, consult Solexy
- 8 Special execution
XXXXX various, consult Solexy

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. THE DEVICE CAN ONLY BE SUPPLIED BY EQUIPMENT RATED FOR MAX OVERVOLTAGE CATEGORY II

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



AMBIENT TEMPERATURE RANGE	MAX RF POWER INPUT (Pi)
-40°C ≤ T _{as} ≤ +85°C	7W (38.4 dBm)

[illegible]