

# TIENet® 350 Ex Area Velocity Sensor Safety and Certification Sheet



Safety Sheet #69-4853-003  
Rev. C, Mar. 02, 2022

## Overview

This document contains the required safety and regulatory information for the TIENet® 350 Ex Area Velocity Sensor. The TIENet 350 Ex Area Velocity Sensor Installation and Operation Guide and Warranty Statement are available and can be downloaded from [www.teledyneisco.com](http://www.teledyneisco.com).

### CAUTION

Cautions identify a potential hazard, which if not avoided, may result in minor or moderate injury. This category can also warn you of unsafe practices, or conditions that may cause property damage.

### WARNING




Warnings identify a potentially hazardous condition, which if not avoided, could result in death or serious injury.

### DANGER

DANGER – limited to the most extreme situations to identify an imminent hazard, which if not avoided, will result in death or serious injury.

## Hazard Symbols

### Warnings and Cautions

	The exclamation point within the triangle is a warning sign alerting you of important instructions in the instrument's technical reference manual.
	The lightning flash and arrowhead within the triangle is a warning sign alerting you of "dangerous voltage" inside the product.
	Pinch point. These symbols warn you that your fingers or hands will be seriously injured if you place them between the moving parts of the mechanism near these symbols.

## Hazard Symbols (Continued)

### Symboles de sécurité

	Ce symbole signale l'existence d'instructions importantes relatives au produit dans ce manuel.
	Ce symbole signale la présence d'un danger d'électrocution.
	Risque de pincement. Ces symboles vous avertit que les mains ou les doigts seront blessés sérieusement si vous les mettez entre les éléments en mouvement du mécanisme près de ces symboles
<b>Warnungen und Vorsichtshinweise</b>	
	Das Ausrufezeichen in Dreieck ist ein Warnzeichen, das Sie darauf aufmerksam macht, daß wichtige Anleitungen zu diesem Handbuch gehören.
	Der gepfeilte Blitz im Dreieck ist ein Warnzeichen, das Sei vor "gefährlichen Spannungen" im Inneren des Produkts warnt.
	Vorsicht Quetschgefahr! Dieses Symbol warnt vor einer unmittelbar drohenden Verletzungsgefahr für Finger und Hände, wenn diese zwischen die beweglichen Teile des gekennzeichneten Gerätes geraten.

Before installing, operating, or maintaining this equipment, it is imperative that all hazards and preventive measures are fully understood. While specific hazards may vary according to location and application, take heed in the following general warnings:

 **WARNING**

Avoid hazardous practices! If you use this instrument in any way not specified in this manual, the protection provided by the instrument may be impaired.

 **AVERTISSEMENT**

Éviter les usages périlleux! Si vous utilisez cet instrument d'une manière autre que celles qui sont spécifiées dans ce manuel, la protection fournie de l'instrument peut être affaiblie; cela augmentera votre risque de blessure.

 **WARNING**

The installation and use of this product may subject you to hazardous working conditions that can cause you serious or fatal injuries. Take any necessary precautions before entering a worksite. Install and operate this product in accordance with all applicable safety and health regulations, and local ordinances.

 **WARNING**

The mounting ring is a potential isolated charge carrier. For classified hazardous locations, your installation **MUST** satisfy earthing requirements. Refer to IEC 60079-14 section 12.2.4 and IEC 60079-11

 **Note**

This product is often installed in confined spaces. Some examples of confined spaces are manholes, pipelines, digesters, and storage tanks. These spaces may become hazardous environments that can prove fatal for those unprepared. These spaces are governed by OSHA 1910.146 and require a permit before entering.

Technical assistance for the Teledyne ISCO TIENet 350 EX Area VelocitySensor can be obtained from:

**Teledyne ISCO**  
4700 Superior St.  
Lincoln NE 68504

Phone: (800) 228-4373 or (402) 464-0231  
Fax: (402) 465-3022  
E-mail: [iscowatersupport@teledyne.com](mailto:iscowatersupport@teledyne.com)

**Installation in  
Hazardous Locations**

Read all labels carefully before installing the equipment!

The 350 Ex device is ATEX-approved for use in potentially explosive atmospheres when specific conditions are met, as described in this section in reference to "X" Marking.

The 350 Ex is Group II, Category 1G equipment for use in gas hazard zones 0, 1, and 2 (European standards), or Class I Division 1 (North American standards).

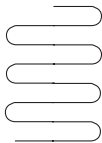
The braid-drain lead depicted in Figure 1 is normally bonded to earth through the Flowmeter connector case terminals or conduit.

Installation must be performed only by trained, qualified personnel. Barriers or isolators required for certifiable safe installation are the responsibility of the user. Refer to the control drawings provided in Figures 2-6.

 **CAUTION**

**Use only non-sparking metal for US mounting hardware. Check with local authorities.**

*Serpentine loop*



 **WARNING**

**Do not coil the sensor cable; this will form an inductor and create a hazard. The cable should be kept as short as is practical. If necessary, use a serpentine loop (see figure at left) instead.**

## Important Information Regarding “X” Marking

The ATEX labeling on the serial tag of the 350 Ex device includes a number ending in “X.” The X marking indicates that there are specific conditions that must be met in order for the equipment to comply with intrinsic safety requirements. These specific conditions are as follows for ATEX and IECEx:

- The enclosure of the 350 Ex sensor is made of non-conductive Kynar which can create an electrostatic hazard. When not installed under water, a conductive mounting bracket must be used. After installation, the bracket must ensure that the area of each uncovered surface is less than 25 cm<sup>2</sup>.

### **WARNING**

**Potential electrostatic charging hazard. See instructions.**

### **AVERTISSEMENT**

**Danger potentiel de charges électrostatiques – Voir instructions.**

- The metallic mounting inserts are isolated from the circuit and are not grounded. The maximum measured value of capacitance from the insert to earth is 6.2pF. To eliminate this potential hazard install the sensor using metal mounting hardware in the flow channel or mount the sensor to the nose of a LaserFlow Ex in its normal Surcharge application.

## Electrical Requirements

Always refer to the electrical values listed 350 Ex Control Drawing when connecting associated apparatus (i.e., power supply, network interface, etc.).

This control drawing indicates the maximum input voltage (U<sub>i</sub>), maximum input current (I<sub>i</sub>), and maximum power (P<sub>i</sub>) that can be present at the specified terminals without invalidating intrinsic safety.

The power supply parameter allowances must exceed maximum internal capacitance (C<sub>i</sub>) and the maximum internal inductance-to-resistance ratio (L<sub>i</sub>/R<sub>i</sub>) of the 350 Ex device and cable. These parameters are established on the control drawing Figure 2-6.

## Ambient Environment

Installation in designated hazardous areas must fall within temperature range of 0 to +60 °C, as specified on the serial tag labeling.



**DANGER**

The 350 Ex **MUST** be installed in accordance with control drawing, in Figure 2 thru Figure 6 in this document, and in accordance with the requirements of the authority that has jurisdiction for the installation of equipment in hazardous areas at your specific installation site.

The certified control drawing details the only approved method of installing the 350 Ex. Where specific ISCO part numbers appear, they represent the only approved equipment certified to be used with the 350 Ex. Any equipment substitutions or installations not specifically detailed on the control drawing will automatically void the intrinsically safe certification of the 350 Ex and could result in fire or explosion!

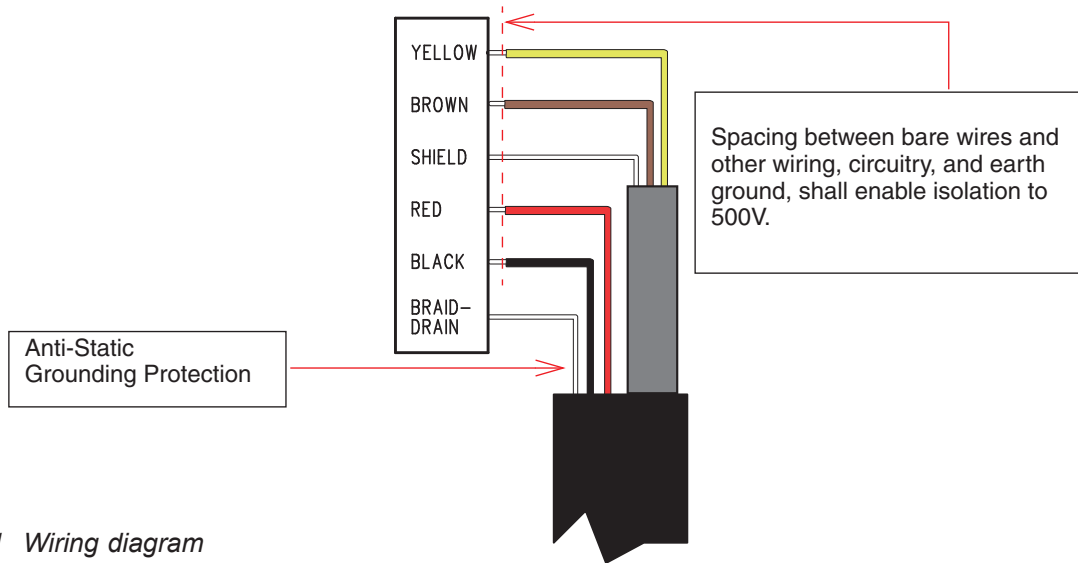
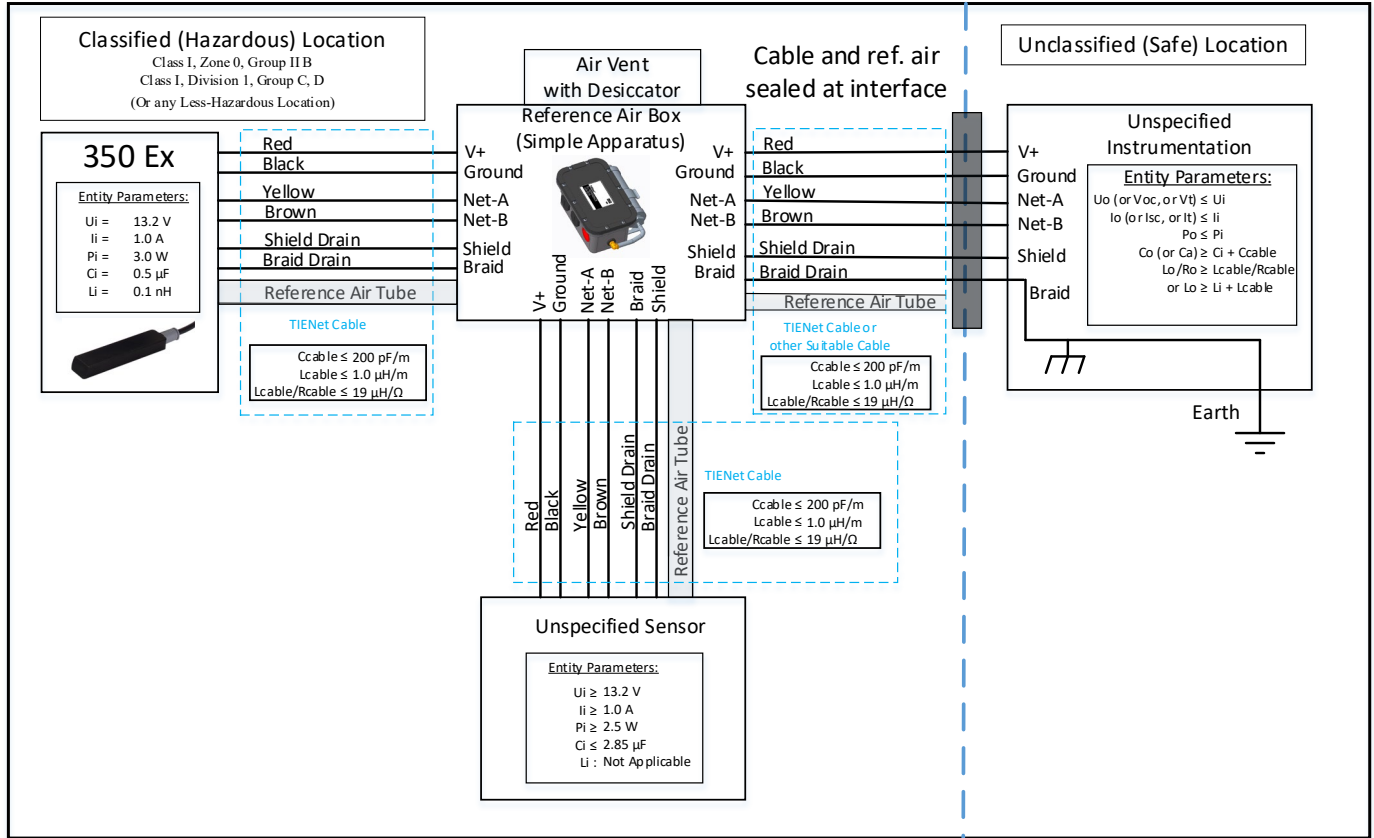


Figure 1 Wiring diagram

### 350 Ex Area Velocity Sensor with Safe Area Host Device



## 350 Ex Area Velocity Sensor with Safe Area Host Device Cont.

### Notes:

1. "Unspecified Instrumentation" must be installed in accordance with its manufacturer's control drawing.
2. In the United States, wiring methods must be in accordance with the National Electrical Code (NEC), ANSI/NFPA 70, Article 504. In Canada, wiring methods must follow the Canadian Electric Code (CEC), Section 18. In countries that follow the IECEx certification scheme, wiring methods must follow IEC 60079-14. Installations in other countries must follow local installation codes.
3. Keep unshielded wire lengths as short as possible.
4. Wiring from the 350 Ex to the Reference Air Box must use the integral TIENet cable. Maximum total length of cable between the "Unspecified Instrumentation" and the 350 Ex is 150 meters.
5. Capacitance of the wiring from the "Unspecified Instrumentation" to the 350 Ex and any additional sensors shall be calculated and must be included in the system calculations. The marked capacitance,  $C_o$  or  $C_a$ , must be greater than the 350 Ex capacitance ( $C_i$ ), plus capacitance of any additional sensors ( $C_i$ ), plus combined capacitance of all cables ( $C_{cable}$ ). See Table 1 for figures pertaining to 350 Ex with integral TIENet cable.
6. For inductance calculations, cable length restrictions may be ignored if the  $L_{cable}/R_{cable}$  ( $L_i/R_i$ ) is less than the  $L_o/R_o$  of the "unspecified instrumentation". If  $L_{cable}/R_{cable}$  ( $L_i/R_i$ ) is not available for the wiring or if the 'Unspecified Instrumentation' is not provided with  $L_o/R_o$ , then total inductance ( $L_{total}$ ) must be calculated for the wiring using  $L_i + L_{cable}$  and  $L_{total}$  must not exceed the  $L_o$  of the 'Unspecified Instrumentation'.
7. The reference tube from the 350 Ex sensor must terminate in the classified area. Use a Reference Air Box (simple apparatus) to terminate the reference tube. Any reference tube exiting the classified area must be terminated in the classified area.
8. The entire cable (including any reference tube) exiting the classified area must be terminated in accordance with NEC, CEC, or other local installation code.

### "X" Marking

The "X" marking on the 350 Ex sensor label indicates potential hazards if the following specific conditions are not met:

1. The enclosure of the 350 Ex sensor is made of non-conductive Kynar which can create an electrostatic hazard. When not installed under water, a conductive mounting bracket must be used. After installation, the bracket must ensure that the area of each uncovered surface is less than  $25 \text{ cm}^2$ .

WARNING: Potential electrostatic charging hazard. See instructions,

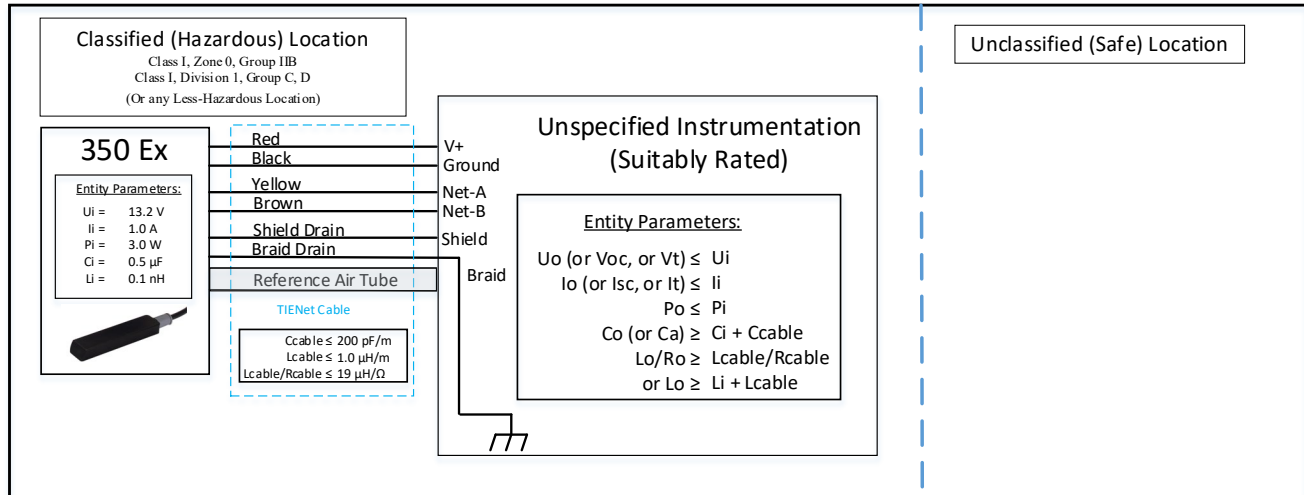
AVERTISSEMENT: Danger potentiel de charges électrostatiques – Voir instructions.

2. The metallic mounting inserts are isolated from the circuit and are not grounded. The maximum measured value of capacitance from the insert to earth is 6.2pF. To eliminate this potential hazard install the sensor using metal mounting hardware in the flow channel or mount the sensor to the nose of a LaserFlow Ex in its normal Surge application.

**Table 1**

Integral Sensor Cable Length	0m	5m	10m	23m	50m	150m
$C_i + C_{cable}$ ( $\mu\text{F}$ )	0.500	0.501	0.501	0.502	0.505	0.516
$L_i/R_i$ ( $\mu\text{H}/\Omega$ )	-	19	19	19	19	19

### 350 Ex Area Velocity Sensor with Classified Area Host Device





## 350 Ex Area Velocity Sensor with Safe Area Host Device Cont.

### Notes:

1. "Unspecified Instrumentation" must be installed in accordance with its manufacturer's control drawing.
2. In the United States, wiring methods must be in accordance with the National Electrical Code (NEC), ANSI/NFPA 70, Article 504. In Canada, wiring methods must follow the Canadian Electric Code (CEC), Section 18. In countries that follow the IECEx certification scheme, wiring methods must follow IEC 60079-14. Installations in other countries must follow local installation codes.
3. Keep unshielded wire lengths as short as possible.
4. TIENet cable is integral to the 350 Ex. No other cable may be used. Maximum total length of TIENet Cable is 150 meters.
5. Capacitance of the wiring from the 350 Ex to the "Unspecified Instrumentation" shall be calculated and must be included in the system calculations as shown above. The marked capacitance,  $C_o$  or  $C_a$  must be greater than the 350 Ex capacitance ( $C_i$ ) plus the cable capacitance ( $C_{cable}$ ). See Table 1.
6. For inductance calculations, cable length restrictions may be ignored if the  $L_{cable}/R_{cable}$  ( $L_i/R_i$ ) is less than the  $L_o/R_o$  of the "unspecified instrumentation". If  $L_{cable}/R_{cable}$  ( $L_i/R_i$ ) is not available for the wiring or if the 'Unspecified Instrumentation' is not provided with  $L_o/R_o$ , then total inductance ( $L_{total}$ ) must be calculated for the wiring using  $L_i + L_{cable}$  and  $L_{total}$  must not exceed the  $L_o$  of the 'Unspecified Instrumentation'.

### "X" Marking

The "X" marking on the 350 Ex sensor label indicates potential hazards if the following specific conditions are not met:

1. The enclosure of the 350 Ex sensor is made of non-conductive Kynar which can create an electrostatic hazard. When not installed under water, a conductive mounting bracket must be used. After installation, the bracket must ensure that the area of each uncovered surface is less than 25 cm<sup>2</sup>.

WARNING: Potential electrostatic charging hazard. See instructions,

AVERTISSEMENT: Danger potentiel de charges électrostatiques – Voir instructions.

2. The metallic mounting inserts are isolated from the circuit and are not grounded. The maximum measured value of capacitance from the insert to earth is 6.2pF. To eliminate this potential hazard install the sensor using metal mounting hardware in the flow channel or mount the sensor to the nose of a LaserFlow Ex in its normal Surchage application.

**Table 1**

Integral Sensor Cable Length	0m	5m	10m	23m	50m	150m
$C_i + C_{cable}$ ( $\mu F$ )	0.500	0.501	0.501	0.502	0.505	0.516
$L_i/R_i$ ( $\mu H/\Omega$ )	-	19	19	19	19	19

Teledyne ISCO U.S.A. [www.teledyneisco.com](http://www.teledyneisco.com)  
 4700 Superior St. Lincoln NE 68504

**218X00010**  
**IP68**

**TYPE 350 Ex AREA VELOCITY SENSOR**

**PART NO. 604854XXX YY METER**

**INTRINSICALLY SAFE / SÉCURITÉ INTRINSÈQUE**

**WHEN INSTALLED PER CONTROL DRAWING 604852022**



**Ex** II 1 G Ex ia IIB T4 Ga 0°C ≤ Tamb ≤ +60°C

**DEMKO 20 ATEX 2315X; IECEx UL 20.0033X; UL21UKEX2252X**

**Class I, Division 1, Groups C-D, T4**

**Class I, Zone 0, AEx ia IIB T4 Ga**

**Ex ia IIB T4 Ga**




DESCRIPTION OF CHANGE	DATE	BY
Rev. F – Updated parameters and note 5 page 2 for multiple sensors	6/16/21	BSH
Rev. G – Updated note 6 on pages 2 and 4, added “or Lo ≥ Li + Lcable”	6/30/21	BSH
Rev. H – Updated label on page 5 for UKCA information	8/27/21	BSH

# EU DECLARATION OF CONFORMITY

We the manufacturer:

<b>Manufacturer's Name:</b>	Teledyne ISCO
<b>Manufacturer's Address:</b>	4700 Superior Street, Lincoln, NE 68504 USA

Declare, under our sole responsibility that the following equipment:


<b>Product Model:</b>	<b>350 Ex Area Velocity Sensor</b>
<b>Object of Declaration:</b>	Water flow monitoring sensor measuring water depth and water velocity. The sensor has an integral cable of 0.5m to 30m in length.
<b>ATEX Marking:</b>	 II 1 G Ex ia IIB T4 Ga (0°C ≤ Ta ≤ +60°C)
<b>EU Type-examination Certificate: Notified Body:</b>	DEMKO 20 ATEX 2315X UL LLC, 333 Pfungsten Rd Northbrook, IL 60062 USA
<b>Notified Body Number:</b>	0539
<b>Quality Assurance Notification Number:</b>	SGS ATEX 4270

Is designed and manufactured in compliance with the following applicable Directives and Standards:

Directive Union Legislation	Standard
<b>EMC 2014/30/EU</b>	EN 61326-1:2013 EN 55011:2016/A1:2017/A11:2020
<b>ATEX 2014/34/EU</b>	EN IEC 60079-0:2018 EN 60079-11:2012
<b>RoHS 2011/863/EU (including all amendments)</b>	EN IEC 63000:2018

I, the undersigned, hereby declare, by sole responsibility of the manufacturer that the design of the equipment specified above conforms to the above Directives and Standards.

## Authorized Signatory

Signature:   
Name: Samuel Ramey  
Title: Director of Engineering  
Date: 3/2/2022

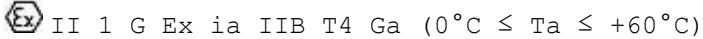


# UK DECLARATION OF CONFORMITY

We the manufacturer:

<b>Manufacturer's Name:</b>	Teledyne ISCO
<b>Manufacturer's Address:</b>	4700 Superior Street, Lincoln, NE 68504 USA

Declare, under our sole responsibility that the following equipment:

<b>Product Model:</b>	<b>350 Ex Area Velocity Sensor</b>
<b>Object of Declaration:</b>	Water flow monitoring sensor measuring water depth and water velocity. The sensor has an integral cable of 0.5m to 30m in length.
<b>ATEX Marking:</b>	
<b>UK Type-examination Certificate:</b>	UL21UKEX2252X
<b>Approved Body:</b>	UL International (UK) Ltd, 220 Cygnet Court, Centre Park, Warrington WA1 1PP United Kingdom
<b>Approved Body Number:</b>	0843
<b>Quality Assurance Notification Number:</b>	BASUKQAN4270

Is designed and manufactured in compliance with the following applicable Directives and Standards:

Regulation	Standard
<b>S.I. 2016/1091 EMC</b>	EN 61326-1:2013 EN 55011:2016/A1:2017/A11:2020
<b>S.I. 2016/1107 DSEAR (ATEX)</b>	EN IEC 60079-0:2018 EN 60079-11:2012
<b>S.I. 2012/3032 RoHS (including all amendments)</b>	EN IEC 63000:2018

I, the undersigned, hereby declare, by sole responsibility of the manufacturer that the design of the equipment specified above conforms to the above Directives and Standards, and the fulfilment of essential safety requirements and essential requirements set out in the Directives have been demonstrated.

## Authorized Signatory

Signature:



Name:

Samuel Ramey

Title:

Director of Engineering

Date:

3/2/2022

产品中有毒有害物质或元素的名称及含量

Name and amount of Hazardous Substances or Elements in the product

部件名称 Component Name	有毒有害物质或元素 Hazardous Substances or Elements					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二联苯 (PBDE)
线路板 Circuit Boards	O	O	O	O	O	O
显示 Display	O	O	O	O	O	O
接线 Wiring	O	O	O	O	O	O
内部电缆 Internal Cables	O	O	O	O	O	O
直流电机 DC Motor	O	O	O	O	O	O
接头 Connectors	O	O	O	O	O	O
电池 Battery	X	X	X	O	O	O
电磁阀 Solenoid valve	O	O	O	O	O	O

产品中有毒有害物质或元素的名称及含量：Name and amount of Hazardous Substances or Elements in the product

O: 表示该有毒有害物质在该部件所有均质材料中的含量均在ST/ 标准规定的限量要求以下。

O: Represent the concentration of the hazardous substance in this component's any homogeneous pieces is lower than the ST/ standard limitation.

X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出ST/ 标准规定的限量要求。  
(企业可在此处，根据实际情况对上表中打“X”的技术原因进行进一步说明。)

X: Represent the concentration of the hazardous substance in this component's at least one homogeneous piece is higher than the ST/ standard limitation.

(Manufacturer may give technical reasons to the "X" marks)

环保使用期由经验确定。

The Environmentally Friendly Use Period (EFUP) was determined through experience.

生产日期被编码在系列号码中。前三位数字为生产年(207 代表 2007 年)。随后的一个字母代表月份：  
A 为一月，B 为二月，等等。

The date of Manufacture is in code within the serial number. The first three numbers are the year of manufacture (207 is year 2007) followed by a letter for the month. "A" is January, "B" is February and so on.

产品中有毒有害物质或元素的名称及含量

Name and amount of Hazardous Substances or Elements in the product

部件名称 Component Name	有毒有害物质或元素 Hazardous Substances or Elements					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二联苯 (PBDE)
线路板 Circuit Boards	O	O	O	O	O	O
接线 Wiring	O	O	O	O	O	O
接头 Connectors	O	O	O	O	O	O
电池 Battery	X	X	X	O	O	O

产品中有毒有害物质或元素的名称及含量：Name and amount of Hazardous Substances or Elements in the product

O: 表示该有毒有害物质在该部件所有均质材料中的含量均在ST/ 标准规定的限量要求以下。

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