ISB

Intrinsically Safe Barrier

Technical Manual

16102800A
07/01.00

CUSTOMER FEEDBACK

Your feedback is important to us! If you have a problem with this product or its documentation, or a suggestion on how we can serve you better, please fill out and send this form to us. Or, send your feedback via email to: quality_feedback.mtwt@mt.com. If you are in the United States, you can mail this postpaid form to the address on the reverse side or fax it to (614) 438-4355. If you are outside the United States, please apply the appropriate amount of postage before mailing.

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		Part / Model Number:
		Serial Number:
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	Met and exceeded my needs
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RESPONSE: Include Root Cause Analysis and Corrective Action Taken.

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INTRODUCTION

This publication is provided solely as a guide for individuals who have received Technical Training in servicing the METTLER TOLEDO product.

Information regarding METTLER TOLEDO Technical Training may be obtained by contacting:

METTLER TOLEDO
1900 Polaris Parkway
Columbus, Ohio 43240
(US and Canada) 614- 438-4511
(All Others) 614-438-4888

FCC Notice

This device complies with Part 15 of the FCC Rules and the Radio Interference Requirements of the Canadian Department of Communications. Operation is subject to the following conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

METTLER TOLEDO RESERVES THE RIGHT TO MAKE REFINEMENTS OR CHANGES WITHOUT NOTICE.

PRECAUTIONS

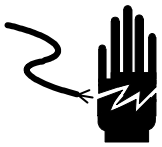
READ this manual BEFORE operating or servicing this equipment.

FOLLOW these instructions carefully.

SAVE this manual for future reference.

DO NOT allow untrained personnel to operate, clean, inspect, maintain, service, or tamper with this equipment.

ALWAYS DISCONNECT this equipment from the power source before cleaning or performing maintenance.

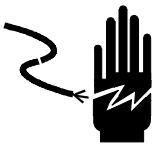


WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.



WARNING

ONLY PERMIT QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN PERSONAL INJURY AND/OR PROPERTY DAMAGE.

CAUTION

BEFORE CONNECTING OR DISCONNECTING ANY INTERNAL ELECTRONIC COMPONENTS OR INTERCONNECTING WIRING BETWEEN ELECTRONIC EQUIPMENT, ALWAYS REMOVE POWER AND WAIT AT LEAST THIRTY (30) SECONDS. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT, OR BODILY HARM.

WARNING

METTLER TOLEDO ASSUMES NO RESPONSIBILITY FOR CORRECT INSTALLATION OF THIS BARRIER IN A HAZARDOUS AREA APPLICATION. THE INSTALLER MUST BE FAMILIAR WITH ALL WIRING CODES AND ALL INSTALLATION REQUIREMENTS.

⚠ WARNING

ALL METTLER TOLEDO ISB BARRIERS ARE DESIGNED TO WORK WITH TERMINALS THAT PROVIDE POSITIVE EXCITATION VOLTAGE REFERENCED TO LOGIC GROUND ONLY. THEY ARE NOT COMPATIBLE WITH TERMINALS WHICH PROVIDE NEGATIVE EXCITATION VOLTAGE. CONNECTING THIS BARRIER TO AN INCOMPATIBLE TERMINAL COULD RESULT IN DAMAGE TO THE BARRIER.

⚠ WARNING

IN ORDER TO USE THIS BARRIER UTILIZING THE FM APPROVAL FOR AN AREA CLASSIFIED AS CLASS I, II OR III, DIVISION 1 OR 2, GROUPS A, B, C, D, E, F OR G, TEMPERATURE CODE T6, METTLER TOLEDO CONTROL DRAWING 159672R MUST BE FOLLOWED WITHOUT EXCEPTION. IN ORDER TO USE THE BARRIER UTILIZING THE KEMA APPROVAL AS [EEx ia] IIC, OR EEx d IIB+H2 [ia] IIC T6, THE APPROVAL CERTIFICATE EX-01.E.1055 AND EX-01.E.2071X AND ALL LOCAL REGULATIONS MUST BE FOLLOWED WITHOUT EXCEPTION. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

⚠ WARNING

THE ISB05X AND ISB15X HAVE A TEMPERATURE RATING OF T6 (85°C / 185° F). THEY MUST NOT BE USED IN AREAS WHERE THE AUTO IGNITION TEMPERATURE OF THE HAZARDOUS ENVIRONMENT IS BELOW THIS RATING.

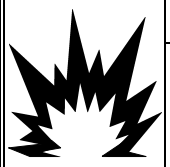
⚠ WARNING

BEFORE SERVICING THE ISB05X OR ISB15X, BE SURE THE AREA HAS BEEN CLEARED OF ALL HAZARDS AND OFFICIAL NOTIFICATION OF SUCH HAS BEEN RECEIVED. DO NOT SERVICE THESE MODELS IF THE HAZARD IS STILL PRESENT IN THE AREA.

CONTENTS

1 Introduction

This manual describes the METTLER TOLEDO intrinsically safe barrier (ISB), models ISB05/ISB05X and ISB15/ISB15X, and provides installation guidelines for installing the KEMA and Factory Mutual approved ISB.



⚠ WARNING

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Models

METTLER TOLEDO offers four ISB models based upon the different excitation voltages of the terminal connected to the barrier and the environment in which the barrier will be located.

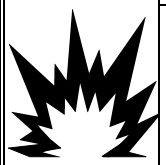
MODEL	OPERATING VOLTAGE RANGE	ENCLOSURE / ENVIRONMENT
ISB05 000	+1 to +5 VDC	General Purpose / Safe Area
ISB05X 000	+1 to +5 VDC	NEMA type 7/9 Flameproof / Hazardous Area
ISB15 000	+5 to +15 VDC	General Purpose / Safe Area
ISB15X 000	+5 to +15 VDC	NEMA type 7/9 Flameproof / Hazardous Area

The ISB05 and ISB15 models are designed for use in a safe area such as a control room or similar environment. The ISB05X and ISB15X models include NEMA type 7/9 flameproof enclosures for installation within a hazardous area. Wiring connections to all models are made via removable terminal strip connectors.

There are no sealing fittings or adapters included with the ISB05X or ISB15X models for the two 3/4″ NPT (national pipe thread) access holes in the enclosure. There is an optional kit (0917-0308-000) which contains two 3/4″ conduit seals. There is also an optional kit (0917-0309-000), which includes two adapters to convert the 3/4″ NPT threaded holes to 20mm threaded holes for compatibility with metric fittings. The adapters have the following approval:

BASEEFA - EEx d IIC & EEx e II

The ISB05 and ISB05X models are designed to work with terminals providing a maximum excitation voltage of +5 volts DC referenced to signal ground. The ISB15 and ISB15X models are designed to work with terminals providing a maximum of from +5 volts DC to +15 volts DC excitation voltage as referenced to signal ground. The excitation must be unipolar. The positive excitation voltage must always be positive, (never be negative) and the negative excitation voltage must be at ground potential. These barriers are NOT compatible with bipolar positive and negative "gated" load cell excitation.



WARNING

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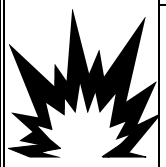
In the Appendix of this manual, there are METTLER TOLEDO control drawings and agency approval certificates. The ISB must be installed according to this information. No exceptions to these drawings or certificates are permitted. In addition, the installer must be familiar with all other wiring and installation codes and requirements.



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Hazardous Area Classification

The hazardous area must be classified by an agent of the customer. **METTLER TOLEDO DOES NOT CLASSIFY HAZARDOUS AREAS!**

After the classification of the hazardous area has been determined, the suitability of the barrier must be confirmed. If there are any concerns regarding the suitability of the ISB, consult your authorized METTLER TOLEDO sales or service representative before installing the barrier and applying power.

Specifications

	ISB05	ISB15	ISB05X	ISB15X
Physical Dimensions (W x D x H)	4.3 x 4.4 X 1.4 in (110 x 115 x 35 mm)		5.8 x 7.6 x 5.6 in (150 x 195 x 140 mm)	
Weight	0.8 lb (0.37 kg)		7.5 lb (3.4 kg)	
Construction	Covers are ABS plastic		Cast aluminum alloy containing not more than 6% magnesium by weight	
Mounting	Directly to NS35 DIN rail (including locking lever) or surface mount using four #6 or M4 screws.		Surface mount using two 5/16″ or M8 bolts	
Hazardous Area Approvals	FM - JI #3010967 KEMA No. Ex-01.E.1055 CSA - Application Submitted		FM - JI #3010967 KEMA No. Ex-01.E.2071X CSA - Application Submitted	
Metrology Approvals	NTEP – Approval Pending NMi - As Instrument Peripheral Canada - Application Submitted			
Environment	Dry, non-hazardous areas only		Washdown, within hazardous areas	
Operating Voltages	+1 to +5 VDC	+5 to +15 VDC	+1 to +5 VDC	+5 to +15 VDC
Replaceable Fuses	Yes - special 125 mA cartridge type Qty. 6 on ISB05 and qty. 1 on ISB15			
Operating Temperature	14˚ to 104˚ F (-10˚ to 40˚ C)			
Storage Temperature	-4˚ to 140˚ F (-20˚ to 60˚ C)			
Non-IS Screw Terminal Wire Size	#24 - 12 AWG (0.2 - 2.5mm^2)			
IS Screw Terminal Wire Size	#28 - 16 AWG (0.14 - 1.5mm^2)			
Grounding Method and Terminal Wire Size	Nickel plated brass lug on PCB - #12 AWG (2.5 mm^2) max		Nickel plated brass lug on PCB - #12 AWG (2.5 mm^2) max and #10 grounding screw external to enclosure	
Shipping Weight	2.1 lb (0.95 kg)		9.6 lb (4.4 kg)	
Shipping Dimensions (W x D x H)	10.3 x 12.5 X 5.3 in (260 x 320 x 135 mm)		16.1 x 13.3 x 10 in (410 x 340 x 255 mm)	

NOTES

2 Hazardous Area Approvals

The ISB05 and ISB15 models have been designed to be mounted in a safe area such as a control room or similar environment. If the ISB is to be installed within a hazardous area, the ISB05X or ISB15X models (NEMA type 7/9 flame-proof enclosure version) must be used.

WARNING

TO USE THIS BARRIER UTILIZING THE FM APPROVAL FOR AN AREA CLASSIFIED AS CLASS I, II OR III, DIVISION 1 OR 2, GROUPS A, B, C, D, E, F OR G, TEMPERATURE CODE T6, METTLER TOLEDO CONTROL DRAWING 159672R MUST BE FOLLOWED WITHOUT EXCEPTION. TO USE THE BARRIER UTILIZING THE KEMA APPROVAL AS [EEx ia] IIC, OR EEx d IIB+H2 [ia] IIC T6, THE APPROVAL CERTIFICATE EX-01.E.1055 AND EX-01.E.2071X AND ALL LOCAL REGULATIONS MUST BE FOLLOWED WITHOUT EXCEPTION. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

System Approvals for the Barrier

Depending upon the base or load cells used with the ISB and the geographic location, safety approvals may be based upon a "system" approval. A "system" approval evaluates the combination of certain load cells with the barrier as a complete system instead of evaluating each part individually. A control drawing listing the load cells that are approved for use with the barrier is then created. Any of the load cells on the control drawing may then be used with the barrier in an approved system. In order to properly apply the ISB using the system approval, certain guidelines must be followed. These guidelines will be listed on either the control drawing of the barrier or the control drawing listing the load cells. Specifics for any "system" approval for the ISB will be described in the following approval agency sections of this manual.

Entity Approvals for the Barrier

Depending upon the base or load cells used with the ISB and the geographic location, safety approvals may be based upon an entity parameter approval. This type of approval permits the application of individually approved components (even from various manufacturers) to be used together to build a solution which is approved. Applying the ISB using entity values requires comparison of the approval values from the different components.

In order to properly apply the barrier using entity parameters, a comparison must be made between the entity parameters of the barrier and the entity values of the load cells including all connecting cables. These entity parameters include voltage, current, power, capacitance and inductance. The barrier and load cells (including connecting cables) must compare as follows in order for the wiring to be considered intrinsically safe:

V_{max} or U_i (Maximum voltage permitted) ≥ V_t or U_o (Total voltage output)

I_{max} or I_i (Maximum current permitted) ≥ I_t or I_o (Total current output)

P_{max} or P_i (Maximum power permitted) ≥ P_t or P_o (Total power output)

C_i (Unprot. capacitance) + C_{cable} (Cable capacitance) ≤ C_a or C_o (Allowable capacitance)

L_i (Unprotected inductance) + L_{cable} (Cable inductance) ≤ L_a or L_o (Allowable inductance)

The descriptions for the entity parameters associated with the ISB are underlined in the above formulas. The other parameters are related to the base, load cells or the connecting cable.

If the above conditions are not true, then the circuit will not be intrinsically safe and must not be installed in a hazardous area. If the parameters compare favorably as shown above, then the circuit is intrinsically safe and can be installed in a hazardous area. Always refer to the electrical regulations for the country of installation for specific wiring requirements.

European Approvals

The European safety approvals for the ISB are based upon entity values. The system approval is not applicable for this product in European countries. The ISB05 and ISB15 barriers were submitted to KEMA for compliance to CENELEC standards EN 50014 and EN 50020. The ISB05X and ISB15X barriers were submitted for compliance to EN50014 and EN 50018. They were approved as intrinsically safe devices and issued the following certificates:

ISB05 & ISB15 - KEMA Ex-01.E.1055 as [EEx ia] IIC

ISB05X & ISB15X - KEMA Ex-01.E.2071X as EEx d IIB+H_2 [ia] IIC T6

A copy of the approval certificates may be found in the Appendix of this manual.

The following chart lists the entity values for all ISB models. Be sure to use the values for the correct barrier when making the calculations described above.

ISB Barrier Entity Values for KEMA Approval		
	ISB05 & ISB05X	**ISB15 & ISB15X**
U_o (Total voltage output)	8.6 VDC	17.3 VDC
I_o (Total current output)	300 mA	302 mA
P_o (Total power output)	340 mW	1 W
C_o (Allowable capacitance)	6.2 uF	0.353 uF
L_o (Allowable inductance)	0.3 mH	0.15 mH

United States Approvals

The U.S. safety approvals for the ISB are based on both entity values and a "system" approval. Newer products utilize entity approval. Older existing products use the system approval. Reports on the ISB were submitted to Factory Mutual for compliance to FM Approval Standards Class No. 3600, 3610, 3615 and 3810. They must be installed per ANSI/ISA standards S82.01-1994 and S82.03-1998. They were approved as intrinsically safe devices and issued a certificate of compliance using FM Original Approval Job Identification #3010967.

ISB05000 and ISB15000

AIS/I,II,III/1/ABCDEFG - 159672R and 122502

AIS/I,II,III/1/ABCDEFG - 159672R; Entity

[I/O] /AEx [ia] / IIC - 159672R: Entity

ISB05X000 and ISB15X000

XP/I/1/CD/T6; DIP/II,III/1/EFG/T6; AIS/I,II,III/1/CDEFG - 159672R and 122502

XP/I/1/CD/T6; DIP/II,III/1/EFG/T6; AIS/I,II,III/1/CDEFG - 159672R; Entity

I/1/AEx d IIB+H2 /T6; [I/1]/AEx [ia] / IIB+H2 - 159672R: Entity

When using the system approval of the ISB from Factory Mutual, the load cells used must be listed on METTLER TOLEDO control drawing 122502R. A copy of the control drawing and agency approval certificates are found in the Appendix of this manual.

The following chart lists the Factory Mutual entity values for the ISB barriers. Be sure to use the values for the correct barrier when making the calculations described in the section above "Entity Approvals for the Barrier".

ISB Barrier Entity Values for Factory Mutual Approval		
	ISB05 & ISB05X	**ISB15 & ISB15X**
V_t (Total voltage output)	8.6 VDC	17.3 VDC
I_t (Total current output)	295 mA	301 mA
P_t (Total power output)	325 mW	1 W
C_a (Allowable capacitance)	6.2 uF	0.353 uF
L_a (Allowable inductance)	0.3 mH	0.15 mH
L_a/R_a (Inductance/ohm ratio)	0.48 (mH / ohm)	0.47 (mH / ohm)

Canadian Standards Association Approval

The Canadian safety approvals for the ISB will be based upon both entity values and "system" approval. Current METTLER TOLEDO products utilize the system approval while the entity approval permits use of the barrier with other manufacturers' load cells. Reports on the ISB05 and ISB15 barriers were submitted to CSA for compliance to Canadian standards C22.2 No 157-92 and No. 213-M1987. In addition, reports on the ISB05X and ISB15X barriers were submitted for compliance to C22.2 No. 30M1986. At this time, CSA has not issued a Certificate of Compliance.

Temperature Rating

It is very important that the temperature rating of the ISB.X models be appropriate for the environment in which they will be used. The ISB.X barriers have been approved by FM and KEMA with a temperature rating of T6. This indicates that the maximum surface temperature of the NEMA type 7/9 flame-proof enclosure for the barrier will not exceed 85°C (185°F). This value must be lower than the Auto Ignition Temperature (AIT) of the hazardous environment in order to be safe. If the AIT of the hazardous environment is lower than the T6 rating of the barrier, the barrier **MUST NOT BE USED** in that environment.

WARNING

THE ISB05X AND ISB15X BARRIERS HAVE A TEMPERATURE RATING OF T6 (85°C / 185° F). THEY MUST NOT BE USED IN AREAS WHERE THE AUTO IGNITION TEMPERATURE OF THE HAZARDOUS ENVIRONMENT IS BELOW THIS RATING.

3 Calculations

To properly apply an ISB using its entity approval, five simple calculations must be completed. Some older approvals do not list the "power" entity value. In these cases, only four calculations are required. Examples of these calculations are given in this chapter. If you have any questions regarding these calculations, DO NOT complete the installation until the questions have been resolved. Please contact your METTLER TOLEDO representative for assistance.

Application Example Using Entity Values

The following is an example of applying a LYNX® terminal, an ISB15X, a model 2158 VERTEX® floor scale and 50 feet (15.2 meters) of load cell cable in a Division 1 application. For this example, the customer required a Factory Mutual approval so the FM entity values were used. The FM approved entity parameters for all devices and cables in the load cell line (including the load cells and junction box) must be known. They can be found by reviewing the control drawings of the specific equipment.

Terminal model:	LYNX (Model LTHA 1000 000)
Barrier model:	ISB15X 000
Base model:	VERTEX (Model 2158 002024-A)
Load cell model:	METTLER TOLEDO 0745A (Division 1 entity approved)
Quantity of load cells:	4
Load cell cable length:	50 feet (15.2 meters)
Junction box PCB p/n:	13640300A
Area Classification:	U.S.A. - Division 1, Class I, Group D, AIT 255˚C

Since the LYNX terminal will be installed in the safe area, the only concern regarding it is matching the excitation voltage of the LYNX terminal to the proper barrier. By reviewing the LYNX technical manual and sales literature, it is determined that the standard LYNX terminal (LTHA 1000) uses 15 volts for excitation. The ISB15X **is compatible** with the 15-volt excitation level from the LYNX terminal so this combination is acceptable.

Next, the location of the barrier must be checked. This installation requires installation of the barrier inside the hazardous area so the barrier model number must be confirmed. The model ISB15X barrier is in a NEMA Type 7/9 enclosure which **is** rated for the Division 1, Class I, Group D area. The AIT of the hazard is 255˚C which **is** above the T6 rating of the ISB15X. These two checks indicate the ISB15x barrier **is acceptable** for installation inside the hazardous area with the LYNX terminal in the safe area.

Next, the barrier's entity parameters must be listed and compared to the entity parameters of the load cells used in the VERTEX floor scale. The ISB15X FM entity parameters (from control drawing 159672R) are:

V_t = 17.3 VDC
I_t = 301 mA
P_t = 1 W
C_a = 353 nF
L_a = 150 uH

Load cell entity values from model 745A load cell control drawing 158574R:

V_{max} = 25 VDC
I_{max} = 600 mA
P_i = 1.25 W
C_i = 0 µF
L_i = 29 µH
T-rating = T4

Load cell cable default values from the ISB control drawing 159672R:

C_{cable} = 60 pF / foot
L_{cable} = 0.2 µH / foot

The 2158 floor scale junction box PCB was determined to not have significant capacitance or inductance impact. Values shown below should be used.

C_i = 0 pF
L_i = 0 µH

Now, compare these values using the entity parameter formulas provided in the previous chapter and determine if all five criteria pass or fail. Note that the entity values for capacitance (but not the inductance) of the load cell must be multiplied by the quantity of load cells used. Also note that the entity values for the load cell cable must be multiplied by the total load cell cable length.

Formula	**Pass or Fail**
V_{max} must be $\geq V_t$	
25 VDC $\geq$ 17.3 VDC	**PASS**
I_{max} must be $\geq I_t$	
600 mA $\geq$ 301 mA	**PASS**
P_i must be $\geq P_t$	
1.25 W $\geq$ 1 W	**PASS**
$C_i + C_{cable} \leq C_a$	
C_i = 0 µF * 4 cells = 0 µF (load cells)	
C_i = 0 µF (junction box)	
C_{cable} = 60 pF / foot * 50 feet = 3000 pF = 3 nF	
(0 µF + 0 µF + 3 nF) $\leq$ 353 nF	**PASS**
$L_i + L_{cable} \leq L_a$	
L_i = 29 µH (largest inductance value from one load cell used)	
L_i = 0 µH (junction box)	
L_{cable} = 0.2 µH / foot * 50 feet = 10 µH	
(29 µH + 0 µH + 10 µH) $\leq$ 150 uH	**PASS**

Since all five entity values compare favorably and pass the formula evaluation, the products listed in this example may be safely connected in the application. They must be installed according to the Factory Mutual control drawing 159672R using all pertinent local and national standards.

Finally, the temperature rating of the load cells must be checked for suitability in the hazardous environment. The model 745A load cell is rated as T4 which has a temperature value of 135˚C (275˚F). The AIT of the hazard is 255˚C which **is** above the T4 rating of the cells. This check indicates the load cells **are acceptable** for installation inside the hazardous area as part of the solution.

NOTES

4 Installation

The standard ISB05 and ISB15 modules were designed for use in a safe area with connections to approved load cells located within a hazardous area. They cannot be installed directly into a hazardous area without additional environmental protection. ISB05X and ISB15X are versions of the barrier in NEMA type 7/9 flameproof enclosures. These models can be installed within a hazardous area if the approvals are acceptable.

Before installing the ISB, read and understand the METTLER TOLEDO control drawing 159672R and the KEMA approval certificates in the last chapter of this manual. Make note of all special wiring and grounding requirements for proper operation of the barrier. The installer must be familiar with all other wiring and installation codes and requirements.

Installation Warnings

WARNING

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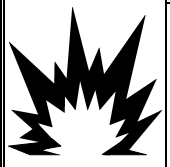


WARNING

IN ORDER TO USE THIS BARRIER UTILIZING THE FM APPROVAL FOR AN AREA CLASSIFIED AS CLASS I, II OR III, DIVISION 1 OR 2, GROUPS A, B, C, D, E, F OR G, TEMPERATURE CODE T6, METTLER TOLEDO CONTROL DRAWING 159672R MUST BE FOLLOWED WITHOUT EXCEPTION. IN ORDER TO USE THE BARRIER UTILIZING THE KEMA APPROVAL AS [EEx ia] IIC, OR EEx d IIB+H_2 [ia] IIC T6, THE APPROVAL CERTIFICATE EX-01.E.1055 AND EX-01.E.2071X AND ALL LOCAL REGULATIONS MUST BE FOLLOWED WITHOUT EXCEPTION. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

Mounting the ISB05 and ISB15 Barrier

After it has been determined that the ISB will be used in an approved application by performing the checks mentioned in the previous chapter, it must be properly mounted. When the ISB05 or ISB15 models are used in a safe area, they can be mounted by either using four mounting screws as shown in Figure 4-1 (M4 screws provided) or by attaching to an NS35 DIN rail (Figure 4-2) per the following drawings.

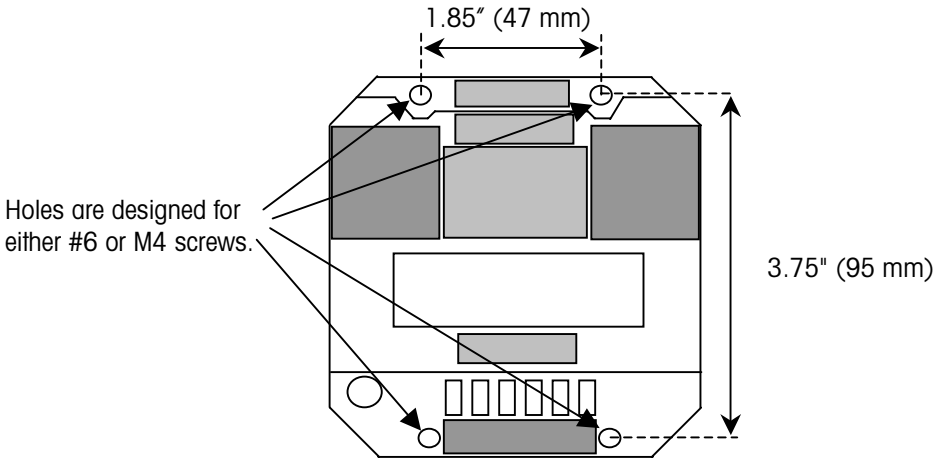


Figure 4-1 Surface Mounting

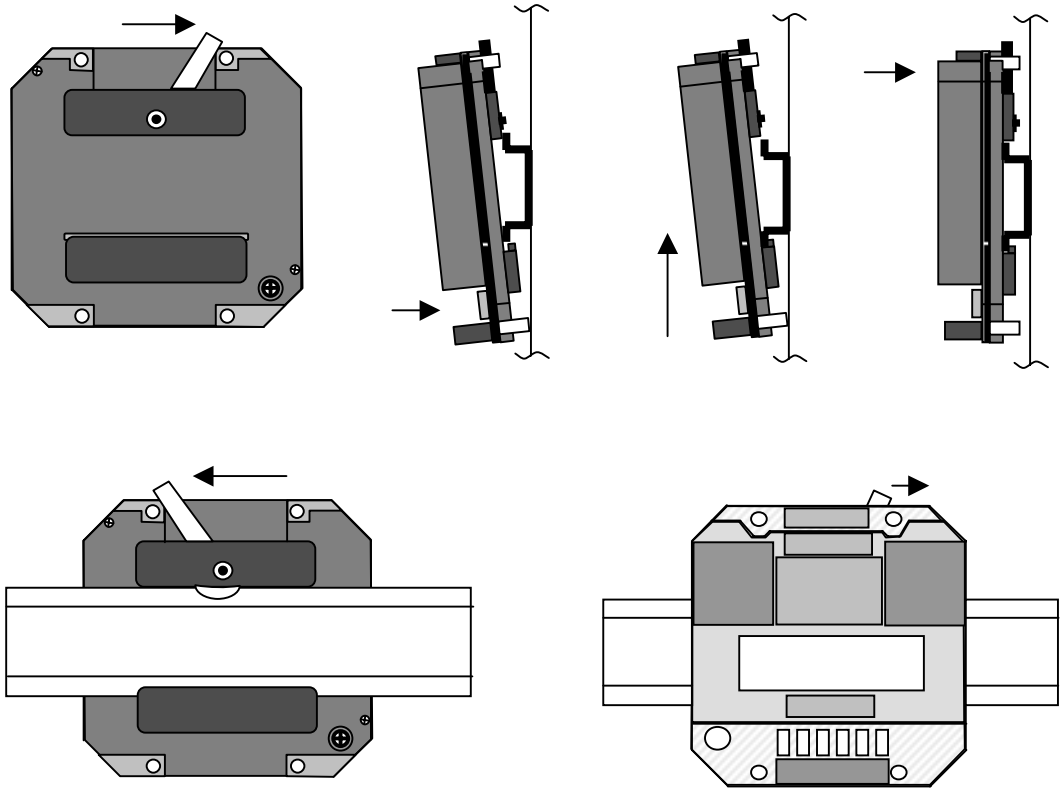


Figure 4-2 DIN Rail Mounting

Mounting the ISB05X and ISB15X (NEMA Type 7/9 Flameproof Barrier)

The NEMA type 7/9 flameproof enclosure is mounted by use of two flanges at diagonal corners of the housing. Refer to Figure 4-3 below for installation measurements.

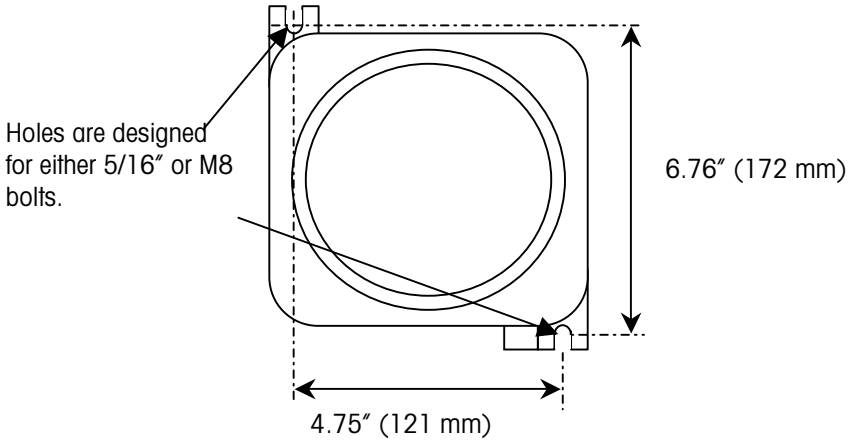


Figure 4-3

Wiring the Barrier

Figure 4-4 is a drawing of the ISB showing the input and output terminal block connections. The following paragraphs describe these connections.

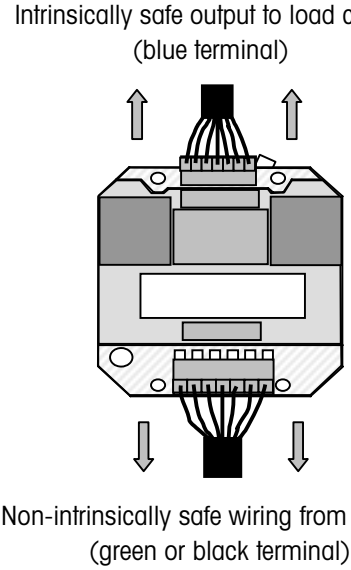
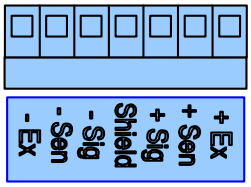


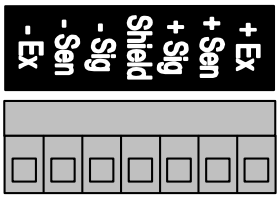
Figure 4-4

Both the safe area and NEMA type 7/9 flameproof versions are wired in the same manner. The input wiring from a terminal connects to the bottom removable terminal block of the barrier. This terminal block will be either black (ISB05) or green (ISB15) and is the larger of the two terminal blocks. Refer to the load cell signal names on the label above the terminal block to connect the terminal correctly. You must know which color wire in your load cell cable contains which signal.

The intrinsically safe output wiring from the barrier to the load cells connects to the top removable terminal block of the barrier. This terminal block will be blue in color and is the smaller of the two terminal blocks. Refer to the load cell signal names on the label below the terminal block to connect the terminal correctly.



Intrinsically Safe
Load Cell Output
(blue)



Non Intrinsically Safe
Load Cell Input
(green or black)

You must know which color wire in your load cell cable contains which signal. A sample of the standard six-wire color code for METTLER TOLEDO is shown below.

Label	Signal Name	4-Wire Color Code	6-Wire Color Code
+ Ex	+ Excitation	Green	White
+ Sen	+ Sense	--	Yellow
+Sig	+ Signal	White	Green
Shield	Cable Shield	Yellow	Shield
- Sig	- Signal	Red	Black
- Sen	- Sense	--	Red
- Ex	- Excitation	Black	Blue

Make sure a safe distance is kept between the non-intrinsically safe wiring and the intrinsically safe wiring on the barrier. **They must not touch**. As a suggestion, the wiring should be kept separated by a minimum of 2″ (50mm) free space as shown in Figure 4-5 below. This required separation distance might vary based on the country of installation so check local regulations. If using the NEMA type 7/9 flameproof version, make sure this separation is maintained after enclosure lid is installed.

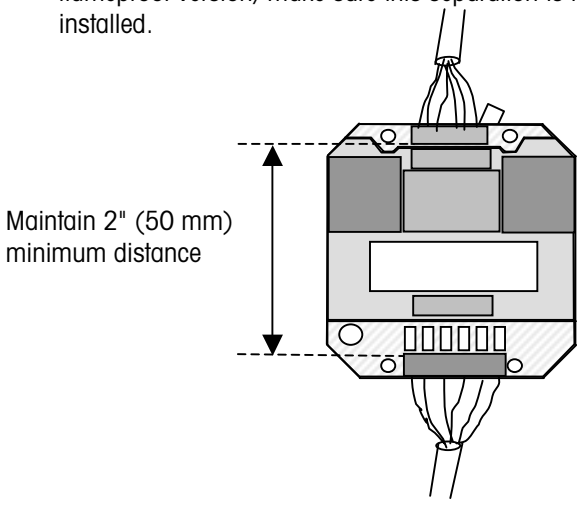


Figure 4-5

Grounding

All grounding and equal potential bonding connections must be made according to local regulations based upon the country of installation. Refer to local codes and the control drawings in the Appendix section of this manual for more specific information regarding grounding. There is an internal ground lug on the ISB05 and ISB15 barriers as shown in Figure 4-6. In addition to this ground connection, an external ground screw is also available on the ISB05X and ISB15X versions. Figure 4-7 shows the external ground connection.

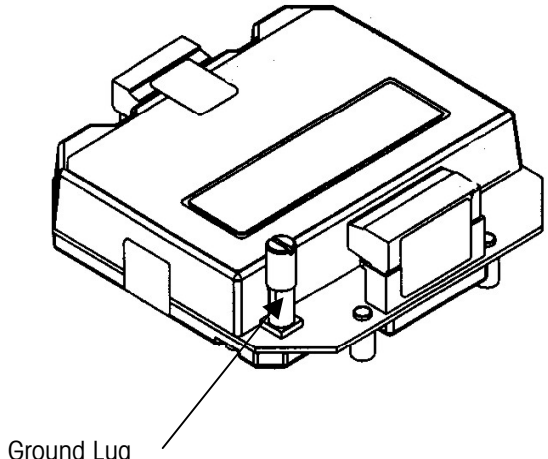


Figure 4-6

⚠ WARNING

Note that mounting the ISB05 or ISB15 barrier to the DIN rail DOES NOT make the required ground connection. A separate ground connection must be made to the appropriate ground lug.

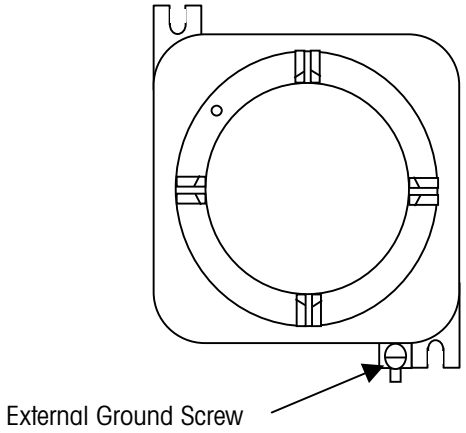


Figure 4-7

Sealing (Metrology)

In certain legal for trade or "approved" applications and geographic locations, there may be regulations which require that the ISB be sealed to prevent tampering. The next two sections describe how to seal both the safe area and NEMA type 7/9 flameproof enclosure versions.

ISB05 and ISB15 Barriers

The ISB05 and ISB15 models are sealed using four tamper-proof sealing labels. The labels are METTLER TOLEDO part number B12363300A and they are available through service parts. The labels must be applied as shown in Figure 4-8. Note that there is also a sealing label on the bottom of the opposite side which cannot be seen in the figure below.

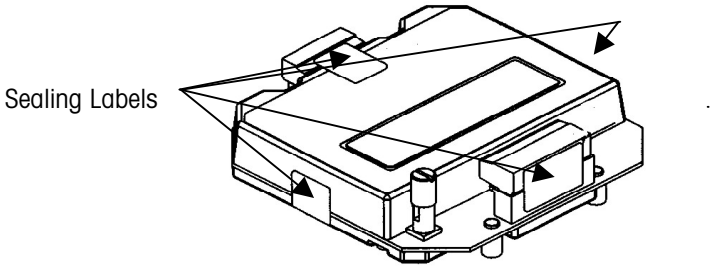


Figure 4-8

ISB05X and ISB15X Barriers

The ISB05X and ISB15X models (NEMA type 7/9 flameproof barriers) are sealed using a single tamper-proof sealing label (METTLER TOLEDO part number B12363300A) which is available through service parts. The label must be applied as shown in Figure 4-9 over the top of the set screw that secures the lid to the housing. The set screw must be tightened before applying the label.

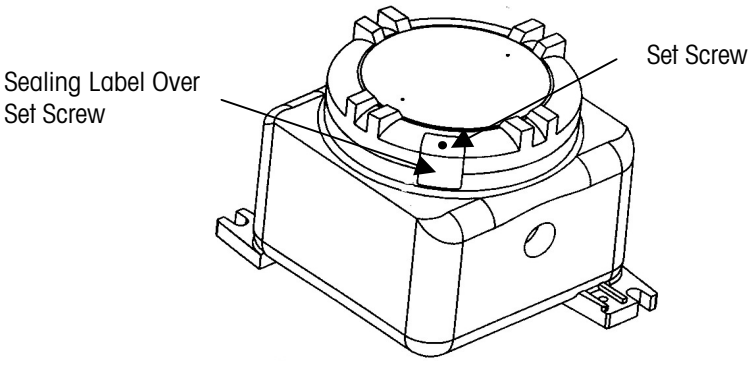


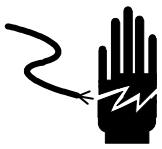
Figure 4-9

5 Service

When an ISB is used as part of an intrinsically safe system, some special service requirements must be understood. This chapter discusses these items. The METTLER TOLEDO control drawing for FM (159672R) and the KEMA approval certificates Ex-01.E.1055 and Ex-01.E.2071X must also be reviewed for any special requirements.

Before Servicing

Before servicing an ISB, make sure the terminal connected to the barrier has been removed from AC power. There must not be any voltage to the barrier during servicing.



⚠ WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

In addition, if the model being serviced is the ISB05X or ISB15X inside the hazardous area, the area must be made safe before service is performed.

⚠ WARNING

BEFORE SERVICING THE ISB05X OR ISB15X, BE SURE THE AREA HAS BEEN CLEARED OF ALL HAZARDS AND OFFICIAL NOTIFICATION OF SUCH HAS BEEN RECEIVED. DO NOT SERVICE THESE MODELS IF THE HAZARD IS STILL PRESENT IN THE AREA.

Fuse Replacement

There are small ceramic fuses on the ISB which are designed to blow should there be an over voltage or over current through the barrier. If you suspect that one of these replaceable fuses has blown, the fuse can be checked with an ohm meter.

Remove the input terminal strip to the barrier (black or green depending upon model) and then measure the resistance from one end of the fuse to the other. Be cautious when checking these fuses as they are only rated for 125mA. If the fuse is open, it must be removed and replaced with a known good fuse.

When replacing a fuse, the correct size pliers or tweezers must be used. If the jaws of the tool are too large, the fuse holder might be damaged requiring replacement of the complete barrier. METTLER TOLEDO recommends using a special tool (part number 16231000A) to remove and replace the fuses.

An exploded view of the fuse and fuse holder is shown below in Figure 5-1. Note the small metal flanges on the side of the holder. Do not damage these flanges or the fuse may no longer make good electrical contact.

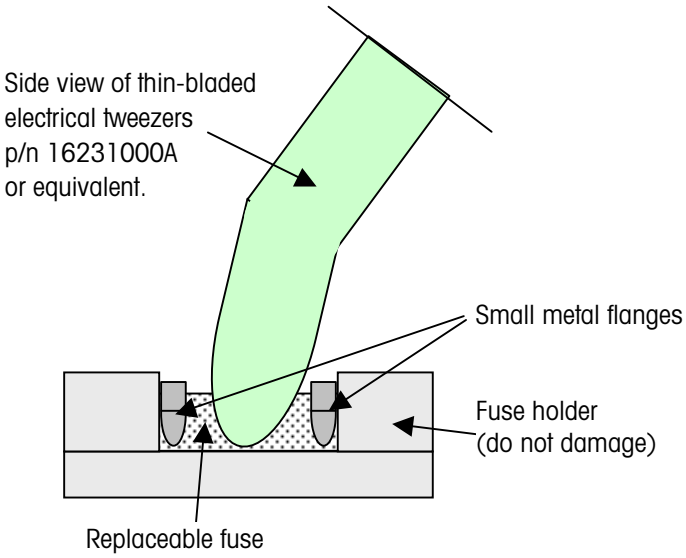


Figure 5-1

After the fuse has been removed, a new fuse can be inserted with the same pliers or tweezers or by hand. After fuse replacement, check for correct operation of the ISB.

Replacement Parts

There are only a few field serviceable and replaceable parts on the barrier. These include the following items as shown in Figure 5-2:

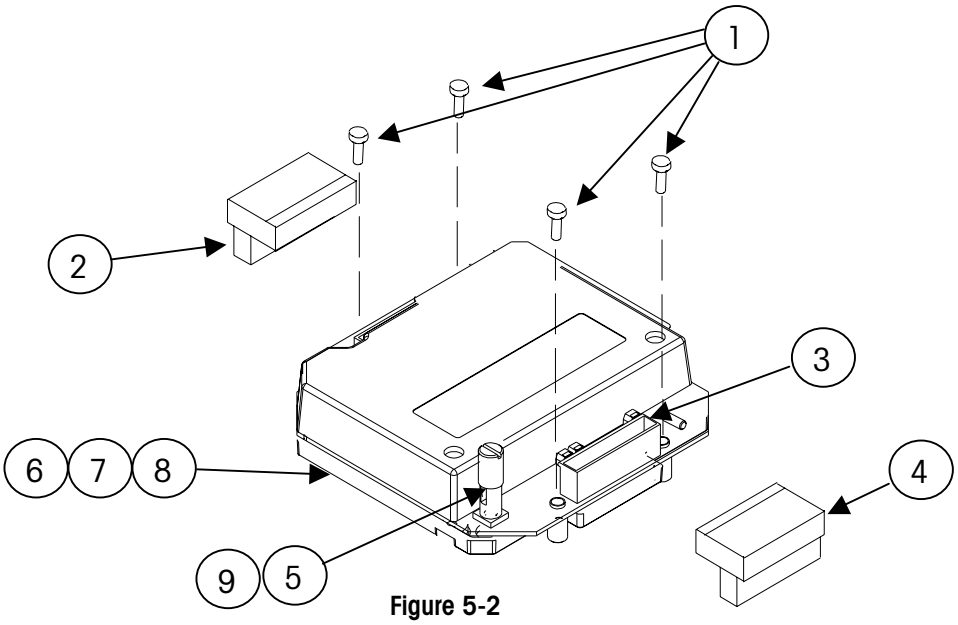


Figure 5-2

Ref.	Part Number	Description	Qty
1	R0384500A	Screws, M4 x 18	4
2	15967800A	IS Blue Connector	1
3	15997600A	Replaceable 125 mA Fuse	6*
4	15967900A	Non-IS Black Connector (ISB05, ISB05X)	1
	11924100A	Non-IS Green Connector (ISB15, ISB15X)	1
5	15116000A	Ground Lug	1
6	16065400A	Bottom Cover	1
7	16065700A	DIN Rail Mounting Tang	1
8	R0245900A	Plastic Rivet	1
9	R0512000A	Screw, M4 x 6	1
NS	B12363300A	Metrology Sealing Labels	4**
NS	16231000A	Fuse Removal Tool	1

* Note - Replaceable fuse quantity 1 for ISB15 and ISB15X.
** Note - Sealing labels quantity 1 for ISB05X and ISB15X.
NS - Not shown in the drawing.

NOTES

6 Control Drawings and Approval Certificates

CE

DECLARATION OF CONFORMITY

Konformitätserklärung
Déclaration de conformité
Declaración de Conformidad
Conformiteitsverklaring
Dichiarazione di conformità

METTLER TOLEDO

We/Wir/Nous/Wij/Noi: **Mettler-Toledo, Inc.**
1150 Dearborn Drive
Worthington, Ohio 43085
USA

declare under our sole responsibility that the product,
erklären, in alleiniger Verantwortung, daß dieses Produkt,
déclarons sous notre seule responsabilité que le produit,
declaramos, bajo nuestra sola responsabilidad, que el producto,
verklaren onder onze verantwoordelijkheid, dat het product,
dichiariamo sotto nostra unica responsabilitá, che il prodotto,

Model/Type: ISB05000 and ISB15000 (Intrinsic Safety Barrier)

to which this declaration relates is in conformity with the following standard(s) or other normative document(s).
auf das sich diese Erklärung bezieht, mitder/den folgenden Norm(en) oder Richtlinie(n) übereinstimmt.
Auquel se réfère cette déclaration est conforme à la (aux) norme(s) ou au(x) document(s) normatif(s).
Al que se refiere esta declaración es conforme a la(s) norma(s) u otro(s) documento(s) normativo(s).
Waarnaar deze verklaring verwijst, aan de volende norm(en) of richtlijn(en) beantwoordt.
A cui si riferisce questa dichiarazione è conforme alla/e sequente/i norma/e o documento/i normativo/i.

in combination with an approved and compatible indicator and weighing platform produced by Mettler-Toledo is in conformity with the following directives and standards.

Council directive on the harmonization of the laws of the Member states:	**standards:**	**certificate number (if applicable)**
relating to non-automatic weighing instruments (90/384/EEC) Article 1.2.a. amended by directive (93/68/EEC)	EN 45501: 1992/1993	See approved and compatible indicator certificate
relating to electromagnetic compatibility (89/336/EEC) amended by directive (93/68/EEC; 92/31/EEC)	EN 55022-A	
relating to electrical apparatus for potentially explosive atmospheres (84/47/EEC)	EN 50014: 1992, General requirements and EN 50020: 1994, Intrinsic safety "i"	Ex-01.E.1055 (rating: [EEx ia] IIC)

Worthington, Ohio USA, May, 2001 **Mettler-Toledo, Inc.**

Darrell Flocken, Manager - Weights & Measures
Office of Weights and Measures

DECLARATION OF CONFORMITY

Konformitätserklärung
Déclaration de conformité
Declaración de Conformidad
Conformiteitsverklaring
Dichiarazione di conformità

We/Wir/Nous/Wij/Noi: **Mettler-Toledo, Inc.**
1150 Dearborn Drive
Worthington, Ohio 43085
USA

declare under our sole responsibility that the product,
erklären, in alleiniger Verantwortung, daß dieses Produkt,
déclarons sous notre seule responsabilité que le produit,
declaramos, bajo nuestra sola responsabilidad, que el producto,
verklaren onder onze verantwoordelijkheid, dat het product,
dichiariamo sotto nostra unica responsabilitá, che il prodotto,

Model/Type: ISB05X00 and ISB15X00 (Intrinsic Safety Barrier, installed in flameproof enclosure)

to which this declaration relates is in conformity with the following standard(s) or other normative document(s).
auf das sich diese Erklärung bezieht, mitder/den folgenden Norm(en) oder Richtlinie(n) übereinstimmt.
Auquel se réfère cette déclaration est conforme à la (aux) norme(s) ou au(x) document(s) normatif(s).
Al que se refiere esta declaración es conforme a la(s) norma(s) u otro(s) documento(s) normativo(s).
Waarnaar deze verklaring verwijst, aan de volende norm(en) of richtlijn(en) beantwoordt.
A cui si riferisce questa dichiarazione è conforme alla/e sequente/i norma/e o documento/i normativo/i.

in combination with an approved and compatible indicator and weighing platform produced by Mettler-Toledo is in conformity with the following directives and standards.

Council directive on the harmonization of the laws of the Member states:	**standards:**	**certificate number (if applicable)**
relating to non-automatic weighing instruments (90/384/EEC) Article 1.2.a. amended by directive (93/68/EEC)	EN 45501: 1992/1993	See approved and compatible indicator certificate
relating to electromagnetic compatibility (89/336/EEC) amended by directive (93/68/EEC; 92/31/EEC)	EN 55022-A	
relating to electrical apparatus for potentially explosive atmospheres (84/47/EEC)	EN 50014: 1992, General requirements and EN 50018: 1994 Flameproof enclosure "d" and EN 50020: 1994, Intrinsic safety "i"	Ex-01.E.2071 X (rating: EEx d IIB + H_2 [ia] IIC T6)

Worthington, Ohio USA, May, 2001 **Mettler-Toledo, Inc.**

Darrell Flocken, Manager - Weights & Measures
Office of Weights and Measures

KEMA
REGISTERED QUALITY

(1) **CERTIFICATE OF CONFORMITY**

(2) KEMA No. **Ex-01.E.1055**

(3) This certificate is issued for the electrical apparatus:

Barrier Model ISB with barrier factory numbers ISB05000 and ISB15000

(4) Manufacturer:

Mettler-Toledo, Inc.
1900 Polaris Parkway
Columbus, OH 43240
U.S.A.

(5) This electrical apparatus and any acceptable variation thereto is specified in the Annex to this certificate and the documents therein referred to.

(6) KEMA, being an Approved Certification Body in accordance with Article 14 of the Council Directive of the European Communities of 18 December 1975 (76/117/EEC), confirms that the apparatus has been found to comply with the harmonised European standards:

Electrical apparatus for potentially explosive atmospheres

EN 50014: 1997, General requirements
EN 50020: 1994, Intrinsic safety "i"

and has successfully met the examination and test requirements which are recorded in confidential report No. 93260.

(7) The apparatus marking shall include the code:

[EEx ia] IIC

(8) The manufacturer of the electrical apparatus referred to in this certificate, has the responsibility to ensure that the apparatus conforms to the specification laid down in the Annex to this certificate and has satisfied routine verifications and tests specified therein.

(9) This apparatus may be marked with the Distinctive Community Mark specified in Annex II to the Commission Directive of 16 January 1984 (84/47/EEC).

Arnhem, 4 May 2001
by order of the Board of Directors of N.V. KEMA

L.M.J. Vries
Certification Manager

KEMA Registered Quality B.V.
Utrechtseweg 310, 6812 AR Arnhem, The Netherlands
P.O. Box 9035, 6800 ET Arnhem, The Netherlands
Phone +31 26 3 56 34 28, Telefax +31 26 3 52 58 00

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ACCREDITATION

2nd issue
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KEMA

ANNEX

to Certificate of Conformity KEMA No. Ex-01.E.1055

Description

The barriers Model ISB with barrier factory numbers ISB05000 and ISB15000 are an interface for intrinsically safe signal transmission and supply of a weighing system.

The connection with the circuits on either side of each barrier is made by means of a 7 pin connector (the smallest is for the intrinsically safe circuits and has a bright blue colour).

Each barrier contains six circuits. The electrical data of the intrinsically safe circuits of each barrier are based upon the combination of all the circuits (i.e. assuming all circuits are shorted together). The barrier contains fuses which may be replaced.

The part of the barrier containing the instrinsically safe circuits, is protected by a construction providing a degree of ingress protection IP20. The other part of the barrier containing the replaceable fuses, has no ingress protection.

Ambient temperature range -40 °C ... +60 °C.

Electrical data

Barrier factory number ISB05000

Signal/supply circuit ..... 5 V, 200 mA, 1 W
(green connector) Um = 250 Vac

Signal/supply circuit ..... in type of explosion protection intrinsic safety EEx ia IIC,
(blue connector) with the following maximum values:

U_o = 8,6 V
I_o = 300 mA
P_o = 340 mW

Maximum allowed external capacitance C_o = 6,2 µF,
maximum allowed external inductance L_o = 0,3 mH.

Barrier factory number ISB15000

Signal/supply circuit ..... 15 V, 200 mA, 3 W
(green connector) Um = 250 Vac

Signal/supply circuit ..... in type of explosion protection intrinsic safety EEx ia IIC,
(blue connector) with the following maximum values:

U_o = 17,3 V
I_o = 302 mA
P_o = 1 W

Maximum allowed external capacitance C_o = 353 nF,
maximum allowed external inductance L_o = 150 µH.

KEMA

ANNEX

to Certificate of Conformity KEMA No. Ex-01.E.1055

Installation instructions

1. The earth connection of the barrier must be connected to the potential equalising system in accordance with the applicable installation standard.

2. The barrier must be installed outside the hazardous area, unless it is protected by an other type of explosion protection and the combination is certified.

3. When a higher ingress protection than IP20 is required, this must be achieved by an additional enclosure which is suitable for the applicable environmental conditions.

Routine tests

A routine test shall be performed on each completed barrier per clause 11.1.1 of EN 50020.

Test documentation

		dated
1. Drawing No.	159669R)	
	A15966800A)	
	130934 (3 sheets))	
	16063400A)	
	16063200A)	
	15116000A)	
	16065300A)	
	16065400A)	
	160659R)	
	)	06.04.2001
	15967000A (3 sheets))	
	16066100A)	
	16065600A)	
	A16066000A)	
	)	
	15967300A (3 sheets))	
	16088200A)	
	16065500A)	
	A16065800A)	

2. Samples

Arnhem, 4 May 2001
by order of the Board of Directors of N.V. KEMA

L.M.J. Vries
Certification Manager

2nd issue
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KEMA
REGISTERED QUALITY

(1) CERTIFICATE OF CONFORMITY

(2) KEMA No. **Ex-01.E.2071 X**

(3) This certificate is issued for the electrical apparatus:

Barrier Model ISB with barrier factory numbers ISB05X000 and ISB15X000

(4) Manufacturer:

Mettler-Toledo Inc.
1900 Polaris Parkway
Columbus, OH 43240
U.S.A.

(5) This electrical apparatus and any acceptable variation thereto is specified in the Annex to this certificate and the documents therein referred to.

(6) KEMA, being an Approved Certification Body in accordance with Article 14 of the Council Directive of the European Communities of 18 December 1975 (76/117/EEC), confirms that the apparatus has been found to comply with the harmonised European standards:

Electrical apparatus for potentially explosive atmospheres

EN 50014: 1992, General requirements
EN 50018: 1994, Flameproof enclosure "d"
EN 50020: 1994, Intrinsic safety "i"

and has successfully met the examination and test requirements which are recorded in confidential report no. 93260.

(7) The apparatus marking shall include the code:

EEx d IIB + H_2 [ia] IIC T6

(8) The manufacturer of the electrical apparatus referred to in this certificate, has the responsibility to ensure that the apparatus conforms to the specification laid down in the Annex to this certificate and has satisfied routine verifications and tests specified therein.

(9) This apparatus may be marked with the Distinctive Community Mark specified in Annex II to the Commission Directive of 16 January 1984 (84/47/EEC).

Arnhem, 7 May 2001
by order of the Board of Directors of N.V. KEMA

L.M.J. Vries
Certification Manager

KEMA Registered Quality B.V.
Utrechtseweg 310, 6812 AR Arnhem, The Netherlands
P.O. Box 9035, 6800 ET Arnhem, The Netherlands
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KEMA

ANNEX

to Certificate of Conformity KEMA No. Ex-01.E.2071 X

Description

The barriers Model ISB with factory numbers ISB05X000 and ISB15X000 consist of a safety barrier with factory number ISB05000 or ISB15000 respectively, mounted inside a flameproof enclosure. The barriers are used as an interface for intrinsically safe signal transmission and supply of a weighing system.

Ambient temperature range -10 °C ... +40 °C.

Electrical data

Barrier factory number ISB05000

Signal/supply circuit ..... (green connector): 5 V, 200 mA, 1 W
Um = 250 Vac

Signal/supply circuit ..... (blue connector): in type of explosion protection intrinsic safety EEx ia IIC, only for connection to a certified intrinsically safe circuit, with the following maximum values:

U_o = 8,6 V
I_o = 300 mA
P_o = 340 mW

Maximum allowed external capacitance C_o = 6,2 µF, maximum external inductance L_o = 0,3 mH.

Barrier factory number ISB15000

Signal/supply circuit ..... (green connector): 15 V, 200 mA, 3 W
Um = 250 Vac

Signal/supply circuit ..... (blue connector): in type of explosion protection intrinsic safety EEx ia IIC, only for connection to a certified intrinsically safe circuit, with the following maximum values:

U_o = 17,3 V
I_o = 302 mA
P_o = 1 W

Maximum allowed external capacitance C_o = 353 nF, maximum external inductance L_o = 150 µH.

Installation instructions

The cable entry devices shall be in type of explosion protection flameproof enclosure "d", suitable for the conditions of use and correctly installed.

The earth connection of the barriers must be connected to the potential equalising system in accordance with the applicable installation standard.

KEMA

ANNEX

to Certificate of Conformity KEMA No. Ex-01.E.2071 X

Special conditions for safe use

See electrical data for the parameters of the intrinsically safe circuits.

Test documentation

1. Certificate of Conformity KEMA No. Ex-01.E.1055
   Component Certificate DEMKO No. Ex-99E.124129 U

signed

2. Drawing No. 14115500A rev. 1)
   160659R)
   162057R)
   A16103500A) 29.03.2001

3. Samples

Arnhem, 7 May 2001
by order of the Board of Directors of N.V. KEMA

L.M.J. Vries
Certification Manager

2nd issue
Page 3/3

FM
APPROVED

Factory Mutual Research

1151 Boston-Providence Turnpike
P.O. Box 9102 Norwood, MA 02062 USA
T: 781 762 4300 F: 781 762 9375 www.fmglobal.com

CERTIFICATE OF COMPLIANCE

HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT

This certificate is issued for the following equipment:

ISB Series. Load Cell Barriers.
AIS/I, II, III/1/ABCDEFG - 159672R and 122502
AIS/I, II, III/1/ABCDEFG - 159672R; Entity
[I/0] /AEx [ia] / IIC - 159672R; Entity

Type	Voc/Uo (V)	Isc/Io (mA)	Po (mW)	Ca/Co (µF)	La/Lo (mH)	Lo/Ro (mH/Ω)
ISB05000	8.6	295	325	6.2	0.3	0.48
ISB15000	17.3	301	1000	0.353	0.15	0.47

Special conditions of use:
1. The modules shall be installed in an enclosure meeting the requirements of ISA S82.02.01 or other applicable ordinary location standards.

ISB Series. Load Cell Barriers.
XP/I/1/CD/T6; DIP/II, III/1/EFG/T6; AIS/I, II, III/1/CDEFG - 159672R and 122502
XP/I/1/CD/T6; DIP/II, III/1/EFG/T6; AIS/I, II, III/1/CDEFG - 159672R; Entity
I/1/AEx d IIB+H_2/T6; [I/1] /AEx [ia] / IIB+H_2 - 159672R; Entity

Type	Voc/Uo (V)	Isc/Io (mA)	Po (mW)	Ca/Co (µF)	La/Lo (mH)	Lo/Ro (mH/Ω)
ISB05X000	8.6	295	325	6.2	0.3	0.48
ISB15X000	17.3	301	1000	0.353	0.15	0.47

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Equipment Ratings:

Models ISB05000 and ISB15000 were evaluated as having Intrinsically Safe outputs for connection to Class I, II and III, Division 1, Groups A, B, C, D, E, F and G and Class I, Zones 0 and 1, Group IIC indoor hazardous (classified) locations.

Models ISB05X000 and ISB15X000 were evaluated as Explosionproof for Class I, Division 1, Groups C and D; Dust-Ignitionproof for Class II/III, Division 1, Groups E, F and G; Flameproof for Class I, Zone 1 AEx d IIB+H_2 hazardous (classified) locations; indoor/outdoor (Type 4) having Intrinsically Safe outputs for connection to Class I, II and III, Division 1, Groups C, D, E, F and G and Class I, Zone 1, Group IIB+H_2 hazardous (classified) locations

Approved for:

Mettler-Toledo, Inc.
1900 Polaris Parkway
Columbus, OH 43240

Manufacturing Location:
1150 Dearborn Drive
Worthington, OH 43085

This certifies that the equipment described has been found to comply with the following Factory Mutual Research Approval Standards and other documents:

Class 3600	1998
Class 3610	1999
Class 3615	1989
Class 3810	1989

Original Approval Job Identification: 3010967 Approval Granted: June 21, 2001

Subsequent Revision Reports / Date Approval Amended

Factory Mutual Research Corporation

W Calder
Assistant Vice President
Approvals Division

21 June 01
Date

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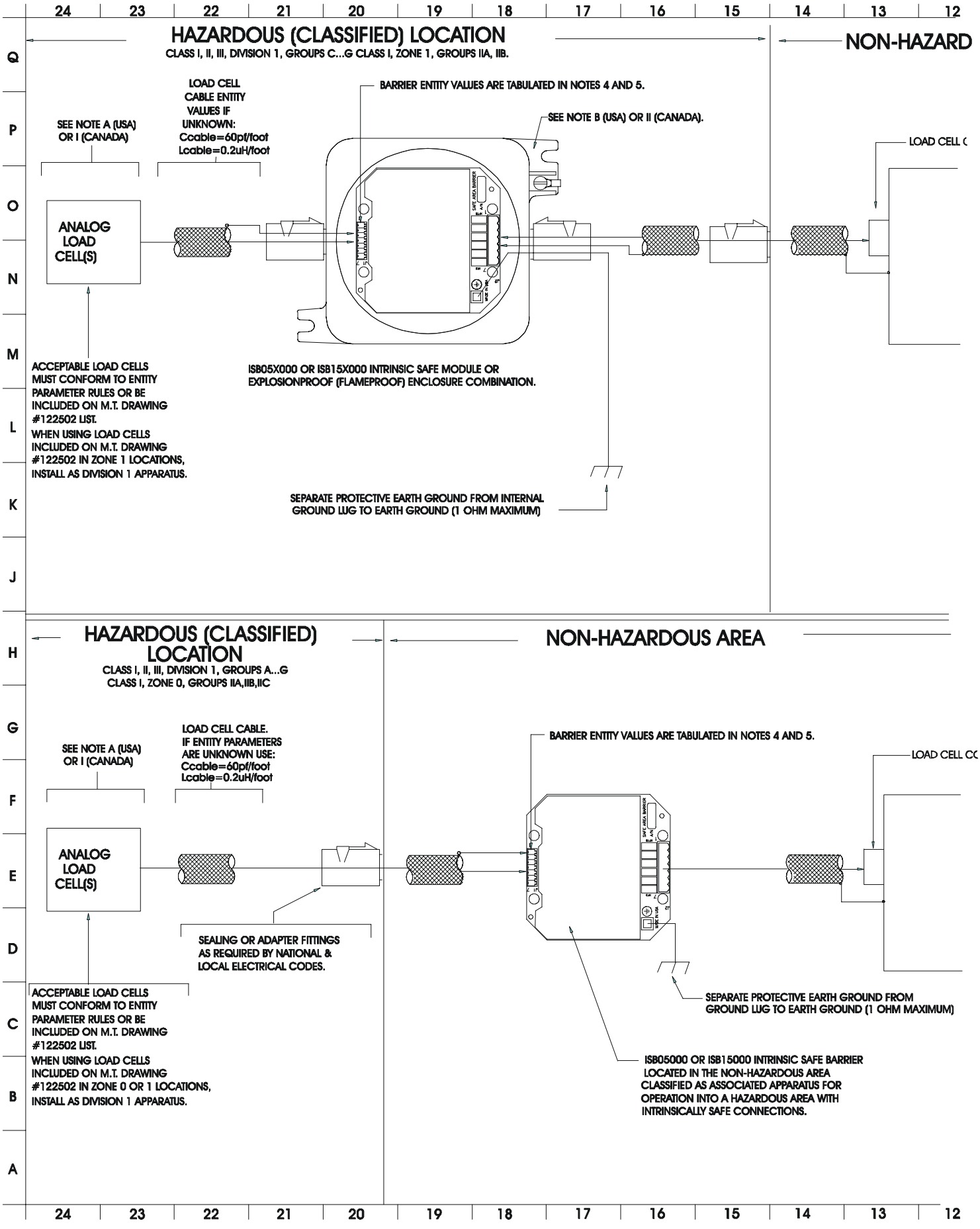
3010967

NOTES


HAZARDOUS (CLASSIFIED) LOCATION
CLASS I, II, III, DIVISION 1, GROUPS C...G CLASS I, ZONE 1, GROUPS IIA, IIB.
NON-HAZARD
LOAD CELL CABLE ENTITY VALUES IF UNKNOWN: Ccable=60pf/foot Lcable=0.2uH/foot
BARRIER ENTITY VALUES ARE TABULATED IN NOTES 4 AND 5.
SEE NOTE A (USA) OR I (CANADA)
SEE NOTE B (USA) OR II (CANADA).
LOAD CELL C
ANALOG LOAD CELL(S)
ACCEPTABLE LOAD CELLS MUST CONFORM TO ENTITY PARAMETER RULES OR BE INCLUDED ON M.T. DRAWING #122502 LIST.
WHEN USING LOAD CELLS INCLUDED ON M.T. DRAWING #122502 IN ZONE 1 LOCATIONS, INSTALL AS DIVISION 1 APPARATUS.
ISB05X000 OR ISB15X000 INTRINSIC SAFE MODULE OR EXPLOSIONPROOF (FLAMEPROOF) ENCLOSURE COMBINATION.
SEPARATE PROTECTIVE EARTH GROUND FROM INTERNAL GROUND LUG TO EARTH GROUND (1 OHM MAXIMUM)
HAZARDOUS (CLASSIFIED) LOCATION
CLASS I, II, III, DIVISION 1, GROUPS A...G
CLASS I, ZONE 0, GROUPS IIA,IIB,IIC
NON-HAZARDOUS AREA
LOAD CELL CABLE. IF ENTITY PARAMETERS ARE UNKNOWN USE: Ccable=60pf/foot Lcable=0.2uH/foot
BARRIER ENTITY VALUES ARE TABULATED IN NOTES 4 AND 5.
SEE NOTE A (USA) OR I (CANADA)
LOAD CELL CC
ANALOG LOAD CELL(S)
SEALING OR ADAPTER FITTINGS AS REQUIRED BY NATIONAL & LOCAL ELECTRICAL CODES.
ACCEPTABLE LOAD CELLS MUST CONFORM TO ENTITY PARAMETER RULES OR BE INCLUDED ON M.T. DRAWING #122502 LIST.
WHEN USING LOAD CELLS INCLUDED ON M.T. DRAWING #122502 IN ZONE 0 OR 1 LOCATIONS, INSTALL AS DIVISION 1 APPARATUS.
SEPARATE PROTECTIVE EARTH GROUND FROM GROUND LUG TO EARTH GROUND (1 OHM MAXIMUM)
ISB05000 OR ISB15000 INTRINSIC SAFE BARRIER LOCATED IN THE NON-HAZARDOUS AREA CLASSIFIED AS ASSOCIATED APPARATUS FOR OPERATION INTO A HAZARDOUS AREA WITH INTRINSICALLY SAFE CONNECTIONS.

AZARDOUS AREA

LOAD CELL CONNECTOR

TERMINAL
(SEE NOTE 1)

LOAD CELL CONNECTOR

TERMINAL
(SEE NOTE 1)

NOTES (USA & CANADA)

1. EQUIPMENT CONNECTED TO BARRIER MUST NOT USE OR GENERATE MORE THAN 250Vrms OR 250VDC.

2. NO REVISIONS MAY BE MADE TO THIS DRAWING WITHOUT PRIOR APPROVAL OF FACTORY MUTUAL RESEARCH CO OR CANADIAN STANDARDS ASSOCIATION.

3. THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS WITH ASSOCIATED APPARATUS WHEN :
Vmax (OR Ui) > Voc (OR Uo), Imax (OR Ii) > Isc (OR Io),
Pi > Po, Ca (OR Co) > Ci + Ccable, La (OR Lo) > Li + Lcable OR
ALTERNATIVELY WHEN Li = 0 the Lo/Ro ratio > Lcable / Rcable RATIO.

4. FOR 5 VOLT BARRIER MODELS ISB05000 OR ISB05X000:
Voc = Uo = 8.6 V
Isc = Io = 295 mA
Po = Po = 325 mW
Ca = Co = 6.2 uF
La = Lo = 0.3 mH OR
Lo / Ro = 0.48 mH / Ohm.

5. FOR 15 VOLT BARRIER MODELS ISB15000 OR ISB15X000:
Voc = Uo = 17.3 V
Isc = Io = 301 mA
Po = Po = 1 W
Ca = Co = 353 nF
La = Lo = 150 uH OR
Lo / Ro = 0.47 mH / Ohm.

NOTES (USA ONLY)

A. THE INSTALLATION SHOULD BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE NFPA 70, ARTICLE 504 OR 505 AND ANSI / ISA RP12.6 "INSTALLATION OF INTRINSICALLY SAFE SYSTEMS FOR HAZARDOUS (CLASSIFIED) LOCATIONS".

B. USE ONLY APPROVED EXPLOSIONPROOF FITTINGS AND ADALET #XJXX-N4 FLAMEPROOF ENCLOSURE (MT#15967700A) WHEN THE BARRIER IS INSTALLED IN A CLASS I (CLASSIFIED) HAZARDOUS LOCATION. (ALSO ACCEPTABLE FOR CLASS II AND III LOCATIONS)

USE A DUST TIGHT ENCLOSURE AND CONDUIT SEALS WHEN INSTALLED IN CLASS II OR CLASS III (CLASSIFIED) HAZARDOUS LOCATIONS. THE ENCLOSURE MUST BE APPROVED PER FM CLASS 3610, SECTION X.

NOTES (CANADA ONLY)

I. THE INSTALLATION SHOULD BE IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE, PART 1, SECTION 18.
CLASS I (CLASSIFIED) HAZARDOUS LOCATIONS.

II. USE APPROVED EXPLOSIONPROOF FITTINGS WHEN THE BARRIER IS INSTALLED IN AN APPROVED EXPLOSIONPROOF BOX IN CLASS I (CLASSIFIED) HAZARDOUS LOCATIONS. THE ENCLOSURE MUST BE APPROVED PER CSA-C22.2 No. 30.

USE A DUST TIGHT ENCLOSURE AND CONDUIT SEALS WHEN INSTALLED IN CLASS II OR CLASS III (CLASSIFIED) HAZARDOUS LOCATIONS. THE ENCLOSURE MUST BE APPROVED PER CSA-C22.2 No. 25.

NOTICE
THIS ITEM USED IN
AGENCY APPROVED PRODUCT
DO NOT CHANGE DOCUMENT
WITHOUT APPROPRIATE APPROVAL

RECORD OF CHANGES

NO.	ZONE	DESCRIPTION	ACT BY	CHKD	APPD	ECN NO.	DATE
1		Revised note B per FM Instruction.			LC	57718	6/01

METTLER TOLEDO

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NAME CONTROL DRAWING, ISM MODULE

DWN A. TOWSLEE 4/01 | CHKD | APPD L.C. 4/01

SHEET 1 OF 1

159672R

TOL. CODE | MATERIAL SPEC. | FINISH DESCRIPTION N.A. | FINISH CODE N.A. | DIMENSIONS TOLERANCES UNLESS OTHERWISE SPECIFIED | ANGULAR | DECIMAL N.A. | ACME N.A. | DO NOT SCALE DRWG. | PROJ. NO./SPEC. NO. 5346-11 | APPROVED | APPROVED BY | APPROVED | DATE 4/01 | ENG. RELEASE NO. 57718

MANUFACTURERS DECLARATION OF COMPLIANCE

METTLER TOLEDO

We: **Mettler-Toledo, Inc.**
1150 Dearborn Drive
Worthington, Ohio 43085
USA

declare under our sole responsibility that the Intrinsic Safety Barrier (model ISB) conforms to applicable European Directives and associated standards when used in accordance with the technical requirements mentioned in the accompanying documentation. This documentation includes, but is not limited to, the technical manual and installation drawings of the model ISB and all other components combined to make up the complete instrument.

The model ISB is approved for use with the Mettler Toledo terminals/indicators listed below. Reference to the model ISB may be found on the EC test-certificate of the terminal/indicator. Installation parameters are limited to the Characteristics mentioned in the certificate(s) of the associated components. The approved terminal's/indicator's along with a few of their key characteristics are mentioned below. Refer to the actual certificate for more details.

Terminal/Indicator	Maximum Number of Verification Scale Intervals (n), by Class		Weighing Ranges		EC Test certificate Number*
	III	IIII	Multi-range	Multi-interval	
Jaguar	#10000	# 1000	yes	yes	TC2618, Revision 6
JagXtreme	#10000	# 1000	yes	yes	TC2618, Revision 6
Panther	#5000	# 1000	no	no	TC2969, Revision 5

* The certificate revision number indicates the first revision that mentions the model ISB in the Essential parts and characteristics. No modifications were made to the terminals to permit proper operation with the model ISB.

Worthington, Ohio USA, May, 2001 **Mettler-Toledo, Inc.**

Darrell Flocken, Manager - Weights & Measures

At the time of the printing of this manual, the ISB had been submitted for NTEP approval and the investigation was still in process.

NOTES

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