ARL-BR-IS Series

Safety Barriers

User Manual

ARLYN SCALES

INDUSTRIAL, VETERINARY & CUSTOM SCALES

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Doc #5902– Revision 1.1

Contents

1. OVERVIEW

This instruction manual contains all information needed to install and maintain the ARL-BR-IS range of safety barriers. Indicated below are the manual's current revision and number of pages. Please check this manual and its control drawings for missing pages. The installation cannot continue unless all pages are present.

Table 1: List of Controlled Documents as part of this manual.

Document	Description	Number of Pages
Document #5902	ARL-BR-IS Series Instruction Manual	
Control Drawing #5210	ARL-BR-IS General Dimensions	1
Control Drawing #5211	ARL-BR-IS Barrier Label Drawing	2
Control Drawing #5213	ARL-BR-IS Installation and Wiring Diagram	4

Please check Section 5 for a list of safety checks that need to be done when using the ARL-BR-IS series Safety Barriers for Intrinsically Safe (IS) interfaces between safe and hazardous areas. This section must be consulted each time before beginning any installation of the barriers.

It is assumed that all necessary system design, specification and engineering factors have been taken into account **before** installation of the barriers. Please refer to the above documentation listed to assist in pre-planning your installation. The documents consist of theory, design, application, specifications and certifications of the safety barrier.

If not supplied with the product, these publications are available either from our website (www.arlynscales.com) or on request from our factory.

2. FACTORY MUTUAL APPROVAL AND INTRINSIC SAFETY

The ARL-BR-IS Safety Barrier has been rated intrinsically safe by Factory Mutual only if the installation is performed by a qualified technician who conforms to the guidelines described in this manual. Consult the chapter titled "Installation and Wiring" along with the control drawings in the back of this document for information pertaining to the installation and wiring of the approved barrier.

This system, when installed in accordance with this document, has been approved by Factory Mutual for use in the following classified areas:

Associated Intrinsically Safe Apparatus providing connections for use in Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; Class I, Zone 0, Aex ia IIC Ga; in accordance with Control Drawing No. 5213; Hazardous (Classified) Locations. Associated Nonincendive Apparatus providing connections for use in Class I, II, III Division 2, Groups A, B, C, D, F, and G; in accordance with Control Drawing No. 5213; Hazardous (Classified) Locations

3. DESCRIPTION

3.1. Introduction

The ARL-BR-IS series set of Safety Barriers are anywhere from 1- to 5-channel devices that use intrinsically safe explosion proof techniques to pass electrical signals between safe and hazardous areas while limiting energy transfer to a level that cannot ignite flammable atmospheres.

When the ARL-BR-IS series of safety barriers are connected in series with wiring entering any hazardous area, these barriers prevent explosions in all normally occurring explosive atmospheres – including mixtures of air with flammable gases, vapors, dusts and fibers - if a fault or faults develop in the safe area.

3.2. ARL-BR-IS Series Barriers

The series is based on the most common uses in dealing with a very specific set of entity parameters. They are primarily designed to work with Arlyn's MKE-5-IS(-C) Intrinsically Safe Weighing System and Arlyn's Intrinsically Safe load cells. However, these barriers are

built in such a way that they can also handle general application configurations as long as they fall within the specified entity parameters.

4. SAFETY CHECKS

The following checks should be carried out to ensure the safety of barrier installation. Use the checklist below to prevent important safety consideration being overlooked when installing, commissioning, modifying or servicing installation of ARL-BR-IS Series of safety barriers. Check the list before and after the safety barrier is installed. Each item in the list is cross-referenced to the appropriate section in the manual.

For Factory Mutual based installations see FM certification information.

Table 2: Installation Checks

Item	Installation Check
1	Before beginning installation, check that the safety documentation confirms that the proposed system is fully certified (if applicable) and complies with the recommendations contained in the relevant sections of IEC 60079-14 for the gas group, temperature classification and area classification required.
2	Make sure the barriers are of the correct type and polarity as specified in the safety documentation.
3	Make sure the barriers are mounted the right way around and are properly attached so that the necessary earth contact is made securely in accordance with the safety documentation and in compliance and recommendations of IEC 60079-14.
4	Inspect all the connected cables carefully between the barriers and the hazardous area equipment. Make sure that the cables are the type specified in the safety documentation and that they are connected to the correct terminals.
5	Make sure all hazardous area cables are well secured and are segregated from all other cables.
6	Make sure all hazardous area cable parameters for hazardous area circuits are not exceeded (see relevant control drawings).
7	Make sure all hazardous area cables and cable screens are terminated correctly, the latter preferably via the earth “ground lug” on the hazardous side of each barrier.
8	Make sure all unused hazardous area cables are safely connected to earth ground.
9	Make sure all hazardous area energy storing devices are independently and appropriately certified.
10	Inspect all tagging or identification labels and make sure they relate to the correct barrier types, polarities and circuit loop numbers.
11	Inspect carefully all cables connected to the safe area equipment and make sure they are connected to the safe area terminals of the barriers.
12	Make sure all barriers are protected adequately against moisture, dust, dirt, vibration, excessive temperatures, physical damage and unauthorized modifications.

5. WIRING CONNECTIONS

5.1. Overview

The ARL-BR-IS Series barriers come in 6 different models, but its body form is the same for all six models. Depending on the model, only certain terminals will be available on the barrier for wiring.

The terminals are positioned in clearly marked designations for hazardous and safe area connectivity.

5.2. Signal Connections

Before connecting any signal lines, the following precautions must be taken to ensure safety of the barrier installation.

5.2.1. Precautions

Clearly designate hazardous area and safe area cabling as defined by relevant codes of practice and route cabling to the barriers through clearly separated and identified conduits or trunking. Deal with spare cable cores or screens as described later in this manual.

Before making any signal connections from the hazardous are, make sure any Intrinsically Safe energy-storing devices (i.e. devices **not** classified as "simple apparatus") are certified as being compatible with the barriers to which they will be connected. Check also that the connecting cables conform with the cable types specified by the safety documentation and that the maximum cable parameters specified in the IS catalogue are not exceeded. In general, cable parameters are unlikely to present problems except in installations where cables longer than 500 meters are called for in IIC applications.

5.2.2. Wiring

The following steps outline how to connect the signal line connections to an ARL-BR-IS Series Safety Barrier. Please note, in most cases, the Barrier will come pre-wired using the recommended cable specifications so you do not have to perform these steps.

1. Unscrew the top 6 screws from the enclosure and remove the lid to access the barrier board inside it.
2. The barrier board will have clearly marked screw terminals for connecting the signal lines. For illustrations on how the barrier terminals are mapped to their respective signal lines, please refer to page 2 of the ARL-BR-IS Series Datasheet (Doc #6200). Note – Based on your barrier model, only certain terminal blocks will be populated on the board.
3. Pass your cable wire into the provided strain relief from the safe area. Do the same for the hazardous area.
4. Connect the wires as designated below depending on your barrier model type.

Table 3: Wiring Map

MODEL	SIGNAL EXAMPLES	SAFE AREA		HAZARDOUS AREA	
		Terminal Block	Pin	Terminal Block	Pin
ARL-BR-IS-PWR	5VDC Line (or less)	PWR-485 (P+)	1	PWR (P+)	9
	GND	PWR-485 (P-)	2	PWR (P-)	10
ARL-BR-IS-LC	LC Excitation + (E+) *or RS422 (A)*	Loadcell-LC (E+)	5	LC-EXC (E+)	13
	LC Excitation - (E-) *or RS422 (B)*	Loadcell-LC (E-)	6	LC-EXC (E-)	14
	LC Signal + (S+) *or RS422 (Y)*	Loadcell-LC (S+)	7	LC-SIG (S+)	15
	LC Signal - (S-) *or RS422 (Z)*	Loadcell-LC (S-)	8	LC-SIG (S-)	16
ARL-BR-IS-RS	RS-485 (A)	PWR-485 (A)	3	485 (A)	11
	RS-485 (B)	PWR-485 (B)	4	485 (B)	12
ARL-BR-IS-PWR-RS	5VDC Line (or less)	PWR-485 (P+)	1	PWR (P+)	9
	GND	PWR-485 (P-)	2	PWR (P-)	10
	RS-485 (A)	PWR-485 (A)	3	485 (A)	11
	RS-485 (B)	PWR-485 (B)	4	485 (B)	12
ARL-BR-IS-PWR-LC	5VDC Line (or less)	PWR-485 (P+)	1	PWR	9
	GND	PWR-485 (P-)	2	PWR	10
	RS422 (A)	Loadcell-LC (E+)	5	LC-EXC (E+)	13
	RS422 (B)	Loadcell-LC (E-)	6	LC-EXC (E-)	14
	RS422 (Y)	Loadcell-LC (S+)	7	LC-SIG (S+)	15
	RS422 (Z)	Loadcell-LC (S-)	8	LC-SIG (S-)	16

5. Make sure all the connections are correct.
6. Screw the lid back onto the barrier enclosure using the previously removed screws.
7. Connect the Earth ground in the provided ground lug.
8. Remount the barrier as instructed in the previous sections.

5.2.3. Power Supply Connections, Grounding and General Considerations

Care must be taken that if the barriers are connected to the a safe are power supply, these connections must be made correctly. If the internal fuse blows, it will destroy the ARL-BR-IS-Series barriers.

The barrier is equipped with a green ground lug. Use this ground lug to accomplish your IS ground requirements. Please refer to Doc #5213 – Installation and Wiring Diagram for further details.

6. ENTITY PARAMETERS (RATINGS)

The following ratings apply for the ARL-BR-IS Safety Barrier.

ARL-BR-IS-PWR Entity/NIFW Output Parameters: Uo = 4.935V, Io = 1.7A, Po = 760mW, Co = 100uF, Lo = 12.3uH

ARL-BR-IS-LC Entity/NIFW Output Parameters: Uo = 5.715V, Io = 72mA, Po = 80mW, Co = 46uF, Lo = 6.8mH

ARL-BR-IS-RS Entity/NIFW Output Parameters: Uo = 5.715V, Io = 36mA, Po = 40mW, Co = 46uF, Lo = 27.4mH

ARL-BR-IS-PWR-RS Entity/NIFW Output Parameters: Uo = 6.135V, Io = 1.736A, Po = 850mW, Co = 34uF, Lo = 11.7uH

ARL-BR-IS-PWR-LC Entity/NIFW Output Parameters: Ut = 6.135V, It = 1.772A, Po = 850mW, Co = 34uF, Lo = 11.3uH

7. MAINTENANCE

7.1. General Considerations

Provided they are correctly installed and connected (as described in Sections 5 and 6 in this manual), and that the system they are protecting are not themselves defective, barrier faults are highly unlikely to occur. Therefore, servicing of barrier installations consists mainly of routine inspection and earth testing as described in this section.

More information about the maintenance of barrier installations is given in the Standards Document BS EN 60079-17.

7.2. Routine Inspection

At intervals not exceeding two years (more frequently for harsh environments), make a visual check of the barrier installation. Personnel undertaking these checks should comply with all regulations relating to the safety of plant and personnel. Care must be taken to prevent any inadvertent direct connection between hazardous- and safe area circuits and, at all times, the safety precautions discussed in section 5 MUST be observed.

Check that:

a) Barriers are of the types and polarities specified in the safety documentation.

b) The barriers are attached securely and correctly Earth Ground to make sure that the earth connection is safe. If the barrier came with the optional DIN rail mount, make sure that the barriers are mounted correctly according to that specification.

c) There are no apparent signs of damage or corrosion to the barriers, the plant earth connections, and if fitted, any earth rail assemblies.

d) All hazardous area and safe area cable connections are made correctly and the terminals properly tightened.

e) Interconnecting cables are of the type and rating specified by the safety documentation and that they are not frayed or otherwise damaged.

f) All earth returns and cable screens from the hazardous area are connected to earth through the barrier, a dummy barrier or earth rail.

g) Visually examine the earth conductors and make sure they are not damaged in any way that their terminations are secure and free from corrosion.

h) Using a low-voltage low-current test meter (i.e. a meter with an output not exceeding 3V and 50mA), measure the resistance of the earth ground and the neutral star-point of the supply to make sure it doesn't exceed 1Ω. Record the

reading and compare it with readings taken from previous inspections. A consistent reading repeated over a long period of time is a reassuring sign indicating a sound earth return which is likely to remain so.

WARNING: Do not try to carry out a high-current earth resistance test unless it is confirmed by the authority in charge of the plant that the plant is gas free.

8. LIMITED WARRANTY

Arlyn Scales warrants that your Arlyn Scales equipment and systems, when properly installed will operate per written specifications. All systems and components are warranted against defects in materials and workmanship for a period of one year.

Arlyn Scales warrants that the equipment sold hereunder will conform to the written specifications authorized by Arlyn Scales. Arlyn Scales warrants the equipment against faulty workmanship and defective materials. If any equipment fails to conform to these warranties, Arlyn Scales will, at their option, repair or replace such goods returned within the warranty period subject to the following conditions:

Upon discovery by Buyer of such nonconformity, Arlyn Scales will be given prompt written notice with a detailed explanation of the alleged deficiencies.

Individual electronic components returned to Arlyn Scales for warranty purposes must be packaged to prevent electrostatic discharge (ESD) damage in shipment.

Examination of such equipment by Arlyn Scales confirms that the nonconformity actually exists, and was not caused by accident, misuse, neglect, alteration, improper installation, improper repair or improper testing; Arlyn Scales will be the sole judge of all alleged non-conformities.

Such equipment has not been modified, altered or changed by any person other than Arlyn Scales. Arlyn Scales will have reasonable time to repair or replace the defective equipment. The buyer is responsible for shipping both ways.

In no event will Arlyn Scales be responsible for travel time, or on-location repairs, including assembly or disassembly of equipment, nor will Arlyn Scales be liable for the cost of any repairs made by others.

THESE WARRANTIES EXCLUDE ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ARLYN SCALES WILL NOT, IN ANY EVENT, BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES

ARLYN SCALES AND BUYER AGREE THAT ARLYN SCALES SOLE AND EXCLUSIVE LIABILITY HEREUNDER IS LIMITED TO REPAIR OR REPLACEMENT OF SUCH GOODS. IN ACCEPTING THIS WARRANTY, THE BUYER WAIVES ANY AND ALL OTHER CLAIMS TO WARRANTY.

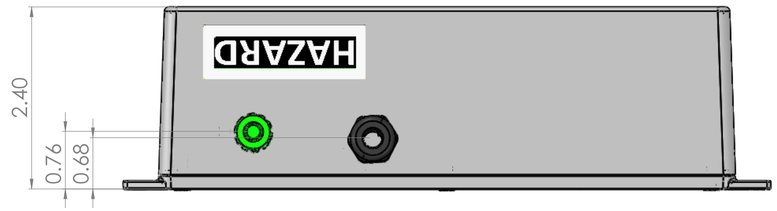
SHOULD THE SELLER BE OTHER THAN ARLYN SCALES, THE BUYER AGREES TO LOOK ONLY TO THE SELLER FOR WARRANTY CLAIMS.

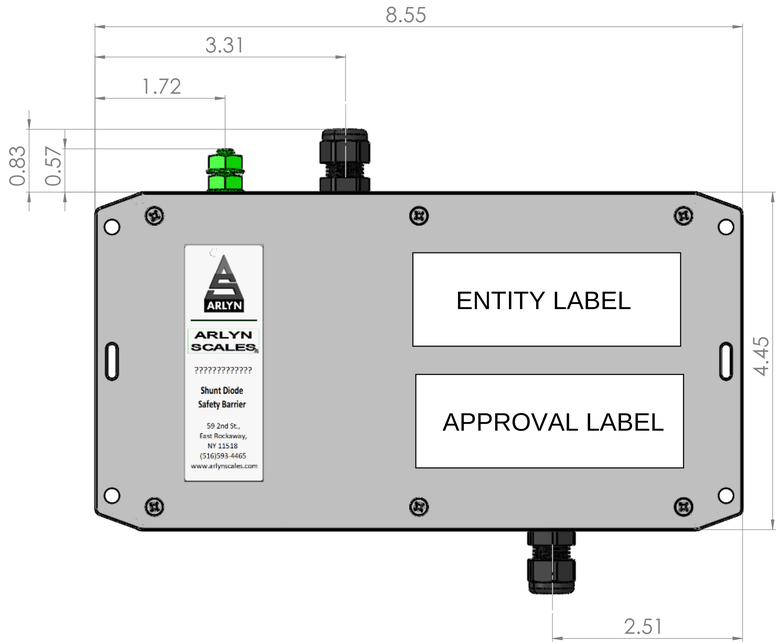
NO TERMS, CONDITIONS OR UNDERSTANDING, OR AGREEMENTS PURPORTING TO MODIFY THE TERMS OF THIS WARRANTY SHALL HAVE ANY LEGAL EFFECT UNLESS MADE IN WRITING AND SIGNED BY A CORPORATE OFFICER OF ARLYN SCALES AND THE BUYER.

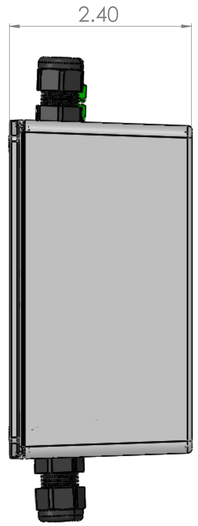
9. CONTROL DRAWINGS

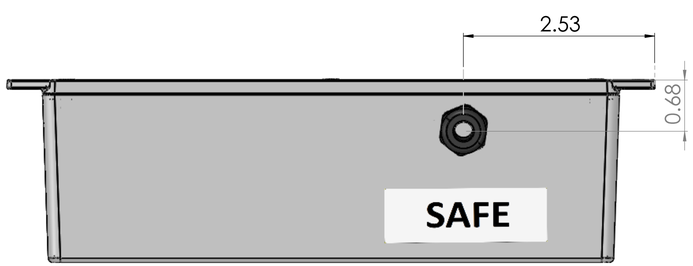
The following drawings, required for the installation of the ARL-BR-IS Safety Barrier, are listed below and are included on the following pages.

Doc No	**Title**
5210	ARL-BR-IS General Dimensions
5211	ARL-BR-IS Label Drawing
5213	ARL-BR-IS Installation and Wiring Diagram









		NAME	DATE
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES	DRAWN	DIEGO	10/4/2019
	CHECKED	MMK	10/4/2019

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EAST ROCKAWAY, NY 11518

TITLE:
ARL-BR-IS GENERAL HOUSING DIMENSIONS

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DWG. NO. 5210

REV 1.00

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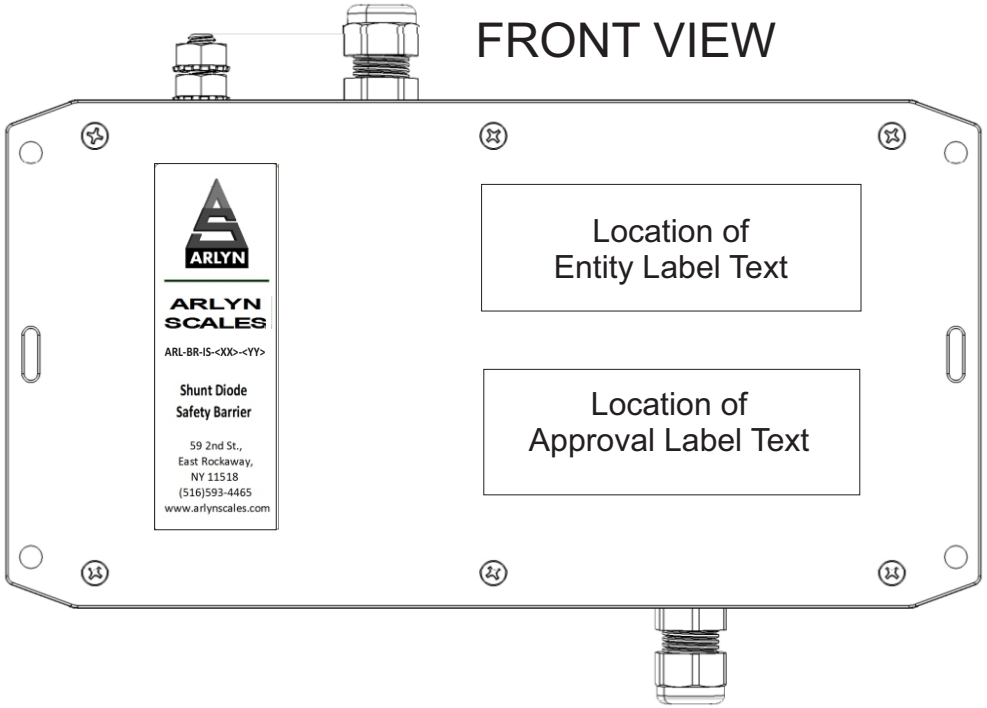

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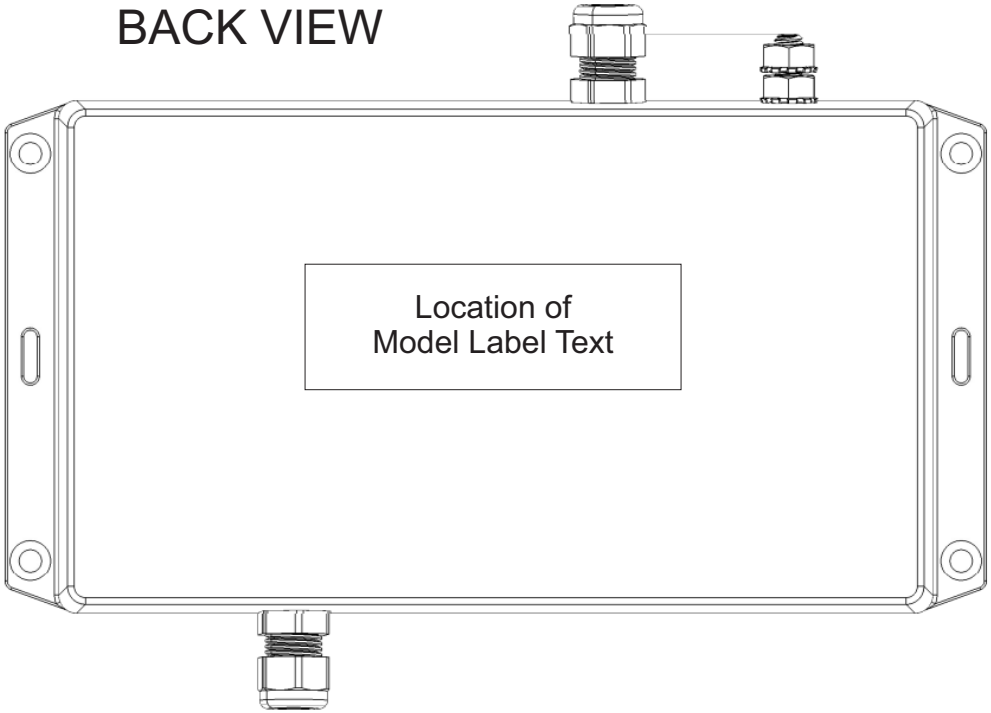

Model Label Text Sample

ARLYN SCALES

Shunt Diode Safety Barrier (-25°C ≤ Ta ≤ +60°C)

Model: ARL-BR-IS-<XX>-<YY>

S/N: 123456

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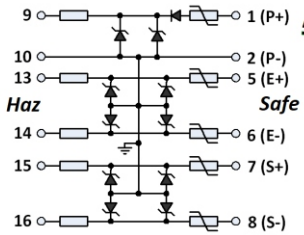
Entity Label Text Sample



ARL-BR-IS-PWR-LC (-25°C ≤ Ta ≤ +60°C)

Entity/NIFW Output Parameters

Total
Voc = 6.135V
Isc = 1.772A
Po = 850mW
Co = 34uF
Lo = 11.3uH

Approval Label Text Sample

ARL-BR-IS SERIES SAFETY BARRIER

FACTORY MUTUAL (FM) APPROVED FOR

Associated intrinsically safe apparatus providing connections for:	Associated non-incendive apparatus providing connections for:
CL I,II,III DIV 1, GP A,B,C,D,E,F & G	CL I,II,III DIV 2, GP A,B,C,F & G
CL I, ZN 0, AEx ia IIC Ga	(when installed as per Control Drawing #5213)

FM APPROVED

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CHECKED MMK	DRG NO DOC 5211	REV 1.00	PAGE 1 of 2

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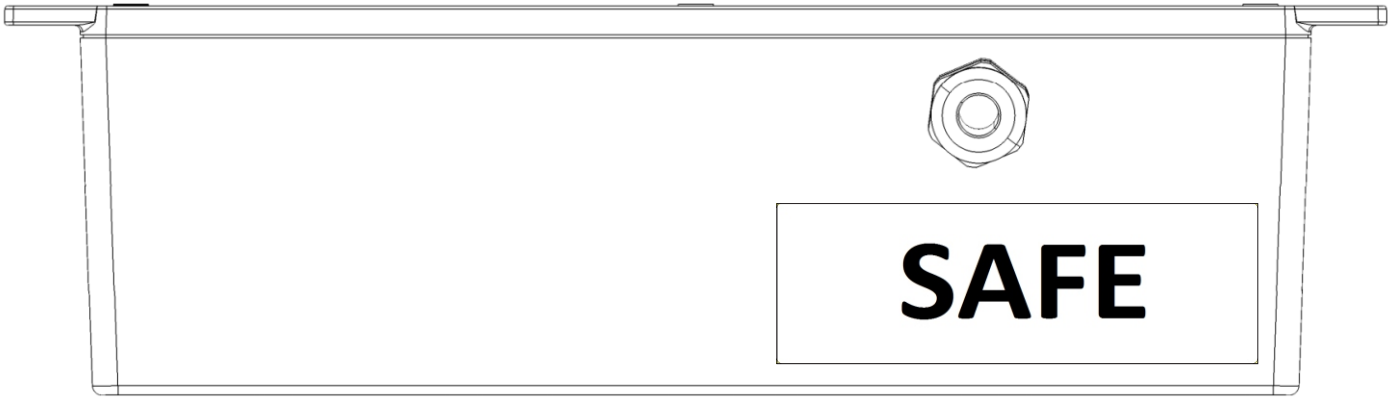
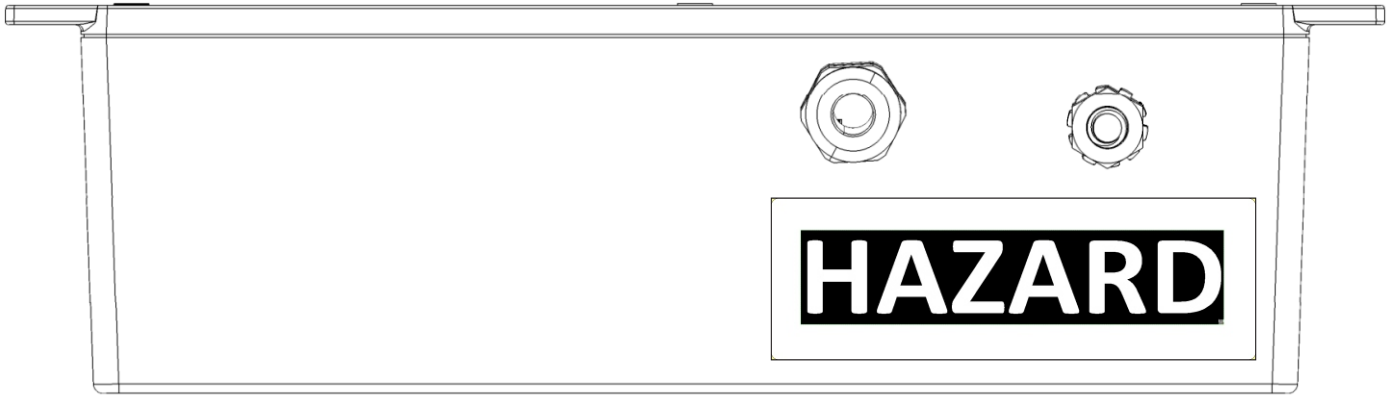
TOP VIEW



BOTTOM VIEW



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OVERVIEW

The following wiring diagrams illustrate the connectivity of each model of the ARL-BR-IS Series of Safety Barriers. The models demonstrated are:

(a) ARL-BR-IS-PWR (1-channel)
(b) ARL-BR-IS-RS (2-channel)
(c) ARL-BR-IS-PWR-RS (3-channel)
(d) ARL-BR-IS-LC (4-channel)
(e) ARL-BR-IS-PWR-LC (5-channel)

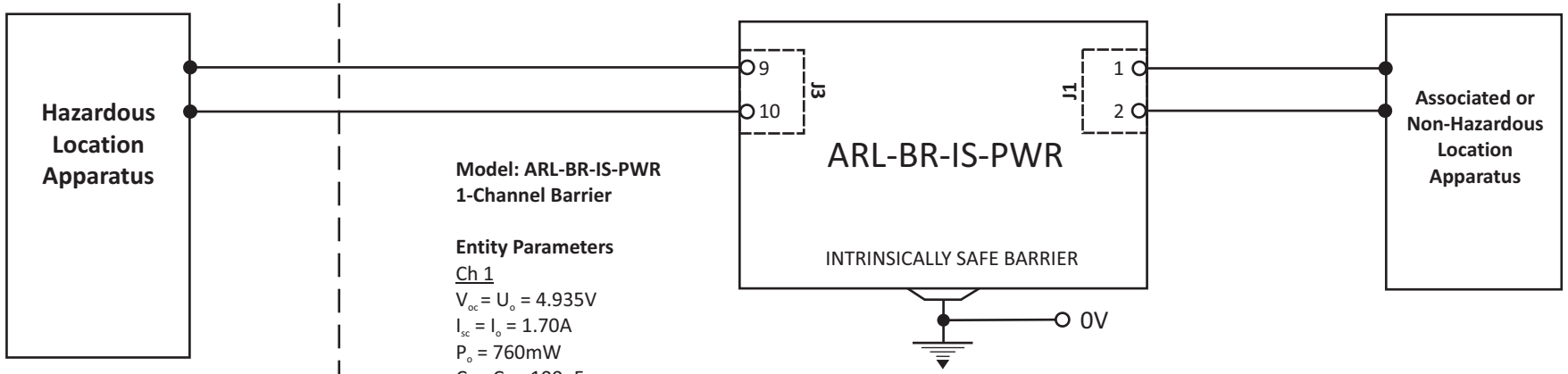
The Entity Concept stated below as well the Hazardous Area Approvals apply to all models listed here.

HAZARDOUS AREA APPROVALS

This system, when installed in accordance with this document, has been approved by Factory Mutual for use in the following classified areas:

Associated intrinsically safe apparatus providing connections for
Class I, II, III, Division 1, Groups A, B, C, D, E, F and G
Class I, Zone 0, Aex ia IIC Ga
Associated non-incendive apparatus providing connections for
Class I, II, III Division 2, Groups A, B, C, D, F, and G
Hazardous (Classified) Locations

(a)



Model: ARL-BR-IS-PWR
1-Channel Barrier

Entity Parameters
Ch 1
$V_{oc} = U_o = 4.935V$
$I_{sc} = I_o = 1.70A$
$P_o = 760mW$
$C_a = C_o = 100uF$
$L_a = L_o = 12.3uH$

Ch 2, 10 - Ground

ENTITY CONCEPT (ALL SHEETS)

The Entity Concept allows interconnection of intrinsically safe apparatus with associated apparatus when the following is true:

Vmax (or Ui) ≥ Voc, Vt, or Uo
Imax (or Ii) ≥ Isc, It or Io (*Combined Isc, It or Io for ALL BARRIERS ≤ Imax)
Po ≤ Pi
Ca (or Co) ≥ Ci + Ccable
La (or Lo) ≥ Li + Lcable

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DRAWN MMK	TITLE ARL-BR-IS SERIES SAFETY BARRIERS INSTALLATION AND WIRING DIAGRAM		
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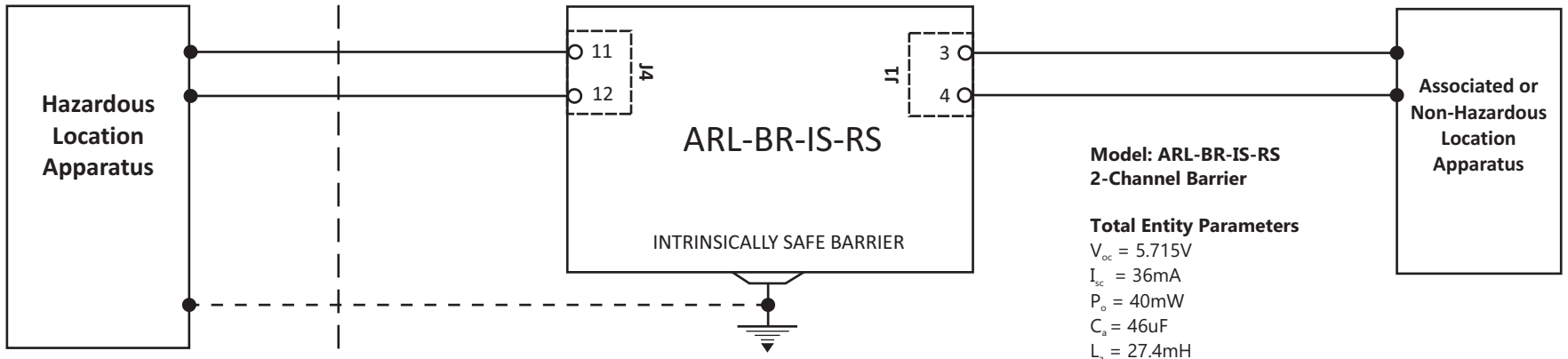
HAZARDOUS AREA

UNCLASSIFIED AREA

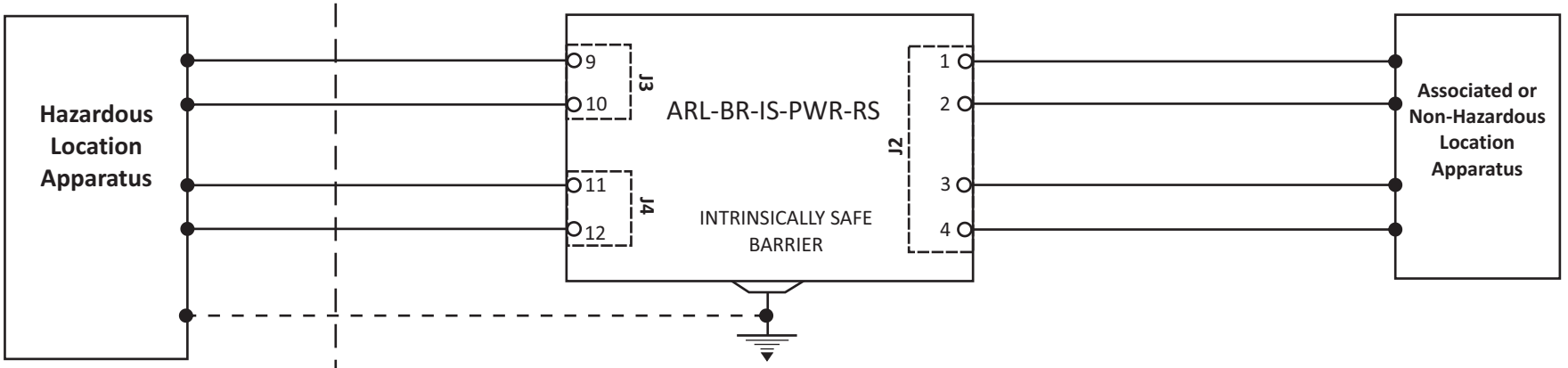
(b)



Model: ARL-BR-IS-RS
2-Channel Barrier

Total Entity Parameters
V_{oc} = 5.715V
I_{sc} = 36mA
P_o = 40mW
C_a = 46uF
L_a = 27.4mH

(c)



Model: ARL-BR-IS-PWR-RS
3-Channel Barrier

Total Entity Parameters
V_{oc} = 6.135V
I_{sc} = 1.736A
P_o = 850mW
C_a = 34uF
L_a = 11.7uH

Ch 2, 10 - Ground

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CHECKED MMK	DRG NO DOC 5213	REV 1.00	SHEET 2 of 4
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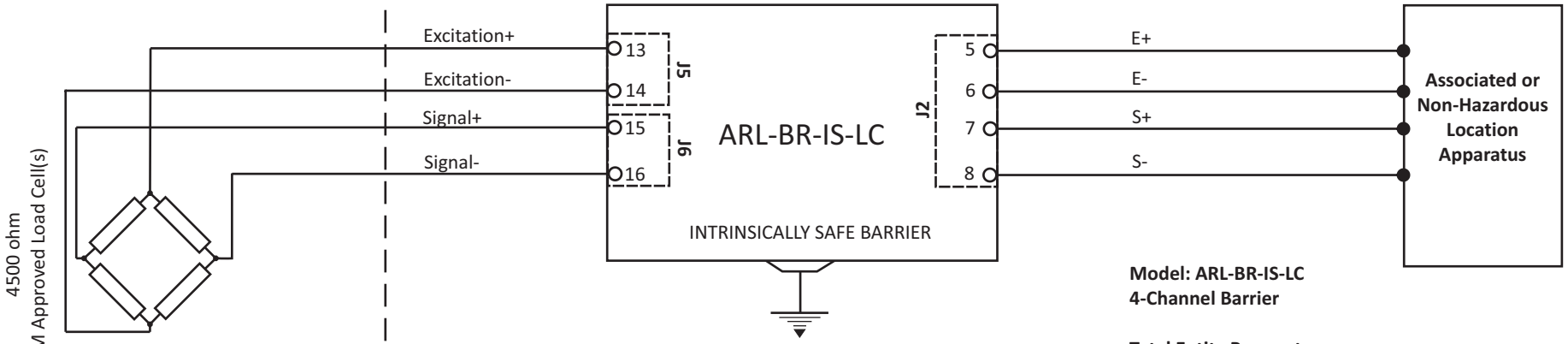
HAZARDOUS AREA

UNCLASSIFIED AREA

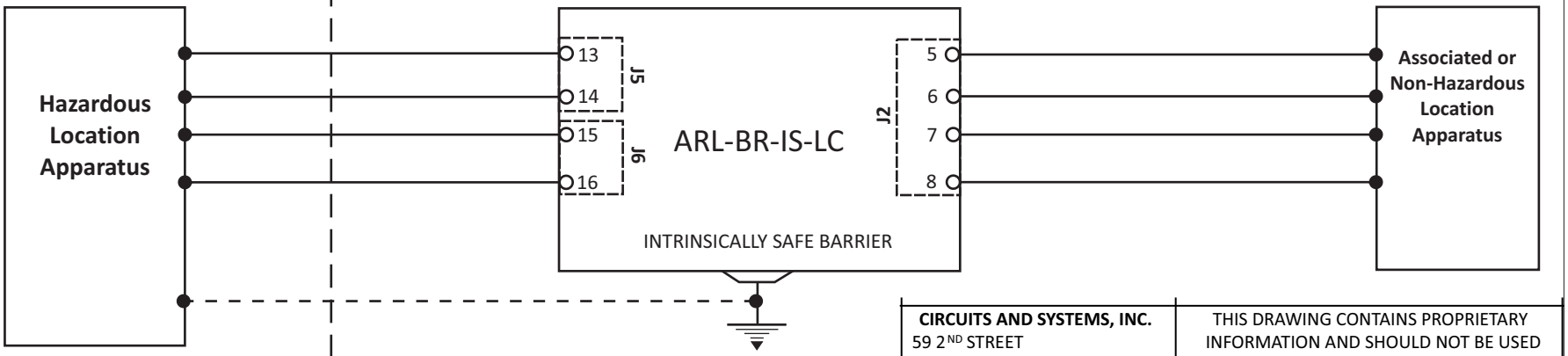
(d1)



Model: ARL-BR-IS-LC
4-Channel Barrier

Total Entity Parameters
V_{oc} = 5.715V
I_{sc} = 72mA
P_o = 80mW
C_a = 46uF
L_a = 6.8mH

(d2)



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CHECKED MMK	DRG NO DOC 5213	REV 1.00	SHEET 3 of 4
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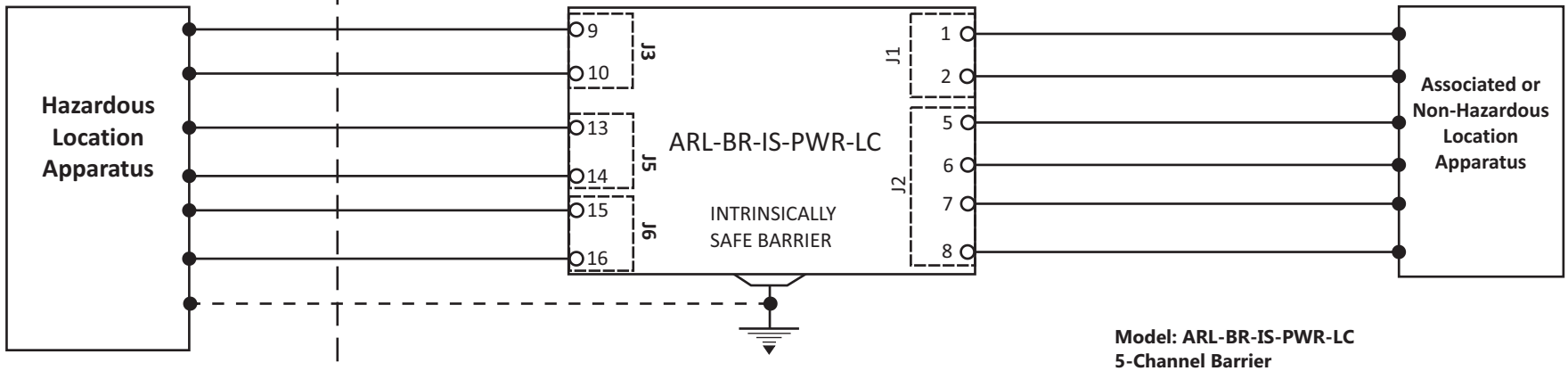
HAZARDOUS AREA

UNCLASSIFIED AREA

(e)



Model: ARL-BR-IS-PWR-LC
5-Channel Barrier

Total Entity Parameters
V_{oc} = 6.135V
I_{sc} = 1.772A
P_o = 850mW
C_a = 34uF
L_a = 11.3uH

Ch 2, 10 - Ground

GROUNDING (ALL SHEETS)

!The ARL-BR Series barriers must be grounded using the “Ground Lug” provided on the unit. The ground lug must be secured with a grounding terminasl - one end connected to a common IS grounding point, and the other end secured on the ARL-BR ground lug. These terminals are to be used for the intrinsic safety and must be capable of accommodating conductors up to 4mm in cross-section (12AWG).

CIRCUITS AND SYSTEMS, INC.
59 2ND STREET
EAST ROCKAWAY, NY 11518

DRAWN	TITLE		
MMK	ARL-BR-IS SERIES SAFETY BARRIERS INSTALLATION AND WIRING DIAGRAM		
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