

Instruction Manual

Model BA11 Active Junction Box



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PREFACE

Thank you for purchasing the BA11 Active Junction Box.

Please read this Instruction Manual carefully before installing and using the BA11 Active Junction Box.

Please also read the instructions that are associated with the sensors and devices you are connecting to the junction box. The purpose of these user's manuals is not to warrant that the product is well suited to any particular purpose but rather to describe the functional details of the product.

No part of the user's manuals may be transferred or reproduced without prior written consent from Yokogawa Process Analyzers (hereafter simply referred to as YOKOGAWA). YOKOGAWA reserves the right to make improvements in the user's manuals and product at any time, without notice or obligation. If you have any questions, or you find mistakes or omissions in the user's manuals, please contact our sales representative or your local distributor.

Some drawings may be partially emphasized, simplified, or omitted, for the convenience of description.

1. Introduction

1-1. Unpacking and Checking

Upon delivery, unpack the BA11 Active Junction Box carefully and inspect it to ensure that it is not damaged during shipment. If damage is found, retain the original packing material and immediately notify the owner and the relevant local Yokogawa Sales office. Make sure the Model Code and Serial Number on the BA11 (see figure 1) are the same as on the packing list. Also check if option(s) that were ordered are included and correct.

1-2. Warranty and Service

Yokogawa products are guaranteed free from defects in workmanship and materials under normal use and service for a period of (typically) 12 months from the date of shipment from the manufacturer. Individual Sales organizations can deviate from the typical warranty period, and the conditions of sale relating to the original purchase order should be consulted. Damage caused by wear and tear, inadequate maintenance, corrosion, or by the effects of chemical processes is excluded from this warranty coverage. In the event of a warranty claim, the defective goods should be sent (freight paid) to the Service Department of the relevant Yokogawa Sales office for replacement (at Yokogawa's discretion).

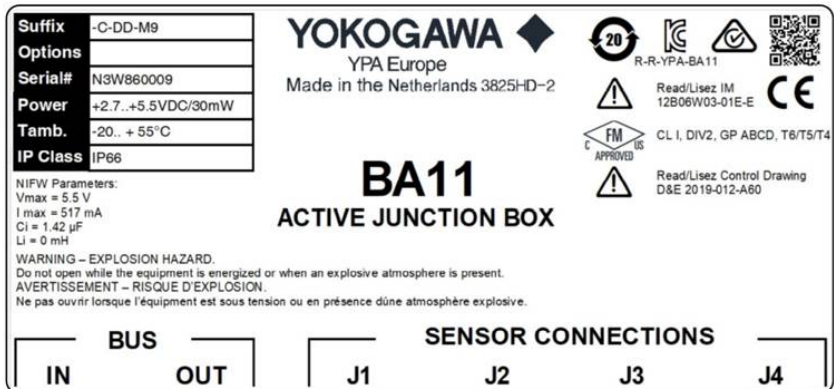


Figure 1. Example of BA11 product label

The following Information must be included in the letter accompanying the returned goods:

- Model Code and Serial Number
- Original Purchase Order and Date
- Length of time in service
- Description of the fault and circumstances of the failure
- Process/environmental conditions that may be related to the failure of the sensor
- Statement as to whether warranty or non-warranty service is requested
- Complete shipping and billing instructions for return of material, plus the name and phone number of a contact person that can be reached for further information

1-3. Serial Number definition

The Serial Number is defined by nine (9) alphanumeric characters:

- X₁,X₂: Production Location
X₃, X₄: Year/Month code
X₅, X₆, X₇, X₈, X₉: Tracking number

Example: N3P600028
See table 1 and 2.

Table 1: Production Year code

Year	Year code	Year	Year code
2014	P	2027	4
2015	R	2028	5
2016	S	2029	6
2017	T	2030	7
2018	U	2031	8
2019	V	2032	9
2020	W	2033	A
2021	X	2034	B
2022	Y	2035	C
2023	Z	2036	D
2024	1	2037	E
2025	2	2038	F
2026	3	2039	G

Table 2: Production Month code

Month	Month code
January	1
February	2
March	3
April	4
May	5
June	6
July	7
August	8
September	9
October	A
November	B
December	C

1-4. Safety Precautions

In order to protect the system controlled by the product and the product itself and ensure safe operation, observe the safety precautions described in this user’s manual. We accept no liability for safety if users fail to observe these instructions when operating the product. If this instrument is used in a manner not specified in this user’s manual, the protection provided by this instrument may be impaired. If any protection or safety circuit is required for the system controlled by the product or for the product itself, prepares it separately.

Be sure to use the spare parts defined by YOKOGAWA for replacement. Modification of the product is strictly prohibited because it may be hazardous to operate. Please contact Yokogawa before making any repair or modification.

The following safety symbols are used on the product as well as in this manual.



This symbol indicates that an operator must follow the instructions laid out in this manual in order to avoid the risks, for the human body, of injury, electric shock, or fatalities. The manual describes what special care the operator must take to avoid such risks.

General



WARNING

- The BA11 should only be used with equipment that meets the relevant EU, American, Canadian, and Japanese standards. Yokogawa accepts no responsibility for the misuse of this unit;
- The BA11 is packed carefully with shock absorbing materials, nevertheless, the BA11 may be damaged or broken if subjected to strong shock, such as if the BA11 is dropped. Please handle with care;
- The BA11 contains devices that can be damaged by electrostatic discharge. When servicing the BA11, please observe proper procedures to prevent such damage;
- Do not use an abrasive or organic solvent in cleaning the BA11.

The BA11 is an IEC/EN61326-1 Class A product, and it is tested for use in the industrial environment.

Specific Conditions of Use

If the BA11 product is not installed using Nonincendive Field Wiring, then the BA11 product shall be installed in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application, including a tool removable cover.

To maintain the IP66 rating, the BA11 product shall be installed using the WU11 cables or the original connector caps supplied with the BA11 product.

To maintain the Type 4X rating, the BA11 product shall be installed using the WU11 cables or the original connector caps supplied with the BA11 product, and the BA11 product shall be installed using the tool secured, NEMA 4X identified mounting bracket which is part of option UM.

Product Disposal

The instrument should be disposed of in accordance with local and national legislation/regulations.

1-5. Warning and Disclaimer

The product is provided on an "as is" basis. YOKOGAWA shall have neither liability nor responsibility to any person or entity with respect to any direct or indirect loss or damage arising from using the product or any defect of the product that YOKOGAWA cannot predict in advance.

1-6. Copyright and Trademark Notices

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We do not use TM or ® mark to indicate those trademarks or registered trademarks in this user's manual.

2. Specifications

The main function of BA11 is auto switching of 120 Ω line termination at RS-485 bus to keep the communication balanced when Modbus slave device is disconnected. The BA11 box detects if a Modbus slave device is connected to the port (J1..J4). If not, the communication terminator is connected. If a Modbus slave is connected to a port (J1..J4), the terminator is disconnected automatically.

2-1. Environment and operational conditions

- Power supply voltage	+2.7 VDC to +5.5 VDC
- Max. power consumption*	< 30 mW (@ +5.5 VDC, without connection of field devices)
- Operational temperature	-20°C to +55°C (-5 °F to +130 °F).
- Storage Temperature	-30°C to +70°C (-20 °F to +160 °F)
- Maximum ambient humidity	93% at +40°C (+100 °F) (non-condensing)

Note: Total power consumption depends on number of Field Devices and the amount of Modbus registers read from individual Field Device in time.

Other

- IP classification	IP66 (acc. ANSI/IEC 60529:2004; C22.2 No. 60529:2016)
- NEMA classification	Type 4X (acc. NEMA 250:2014; ANSI/UL 50E:2015)

Mechanical

- Size (LxWxH)	150 x 64 x 34 mm (5.9 x 2.5 x 1.3 inch)
- Color	Grey (RAL 7001)
- Material	Aluminium Die Cast housing
- Applicable torque on cover screw (to meet IP66)	Min. 1.1 Nm Max. 2.5 Nm
- Applicable torque on BA11 connector screws and protection caps (to meet IP66)	0.25 Nm
- Mounting options	/UM Universal Mounting

Connection

- Bus-Input (BUS-IN)	M9 5-pin male connection to Modbus HOST/Master (e.g. FLXA 402).
- Bus-Output (BUS-OUT)	M9 5-pin female connection (for future application purpose)
- Field device Inputs (J1..J4)	M9 5-pin female connection.

All connections have to be used with the correct Yokogawa WU11 Interconnection cable up to a length of 100 meter (328 ft).

For connection method and maximum allowed cable length in a Class I, DIV 2 location, then refer to the enclosed Control Drawing D&E 2019-012-A60.

2-2. Regulatory standards

- **CE** (768/2008/EC) By applying:

 - EN-ISO 9001: 2008.

- EMC Directive** (2014/30/EU) By applying:

 - IEC 61326-1:2012 Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements.
Emission: Class B, control and laboratory use.
Immunity: For use in industrial locations.
 - EN 61326-1:2013 Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements.
Emission: Class B, control and laboratory use.
Immunity: For use in industrial locations.
 - CISPR 11:2015 Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics Limits and methods of measurement.
Emission: Radiated emission up to 1 GHz (SAC).
 - EN 55011:2009 +A1:2010 Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics Limits and methods of measurement.
Emission: Radiated emission up to 1 GHz (SAC).

- LVD Directive** (2014/35/EU) By applying:

 - IEC/EN 61010-1:2010 Safety requirements for electrical equipment for measurement, control and laboratory use.
 - IEC 61010-2-030:2017 Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 2-030: Particular requirements for testing and measuring circuits.
 - EN 61010-2-030:2010 Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 2-030: Particular requirements for testing and measuring circuits.
 - IEC 60529:1989 + A1:1999 + A2:2013 Degrees of protection provided by enclosures (IP Code).
 - EN 60529:1991 + A1:2000 + A2:2013 Degrees of protection provided by enclosures (IP Code).

- RoHS 2 Directive** (2011/65/EU) By applying:

 - EN 50581:2012 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.

- **Non-Incendive**

FM-United States Nonincendive for Class I, Division 2, Groups A, B, C & D Hazardous (Classified) Location, Indoors/Outdoors with a Temperature code T6/T5/T4 for $-20^{\circ}\text{C} \leq T_a \leq +55^{\circ}\text{C}$ when connected in accordance with Control Drawing D&E 2019-012-A60.

By applying:

- FM3600: 2018 Electrical Equipment for Use in Hazardous (Classified) Locations, General Requirements
- FM3611: 2018 Nonincendive Electrical Equipment for Use in Class I and II, Division 2, and Class III, Divisions 1 and 2, Hazardous (Classified) Locations
- FM3810: 2018 Electrical and Electronic Test, Measuring and Process Control Equipment
- UL 121201: 2017 Nonincendive Electrical Equipment for Use in Class I and II, Division 2, and Class III, Divisions 1 and 2, Hazardous (Classified) Locations
- ANSI/ISA 61010.1: 2012 Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements

Certificate no.: FM19US0166X. For Specific conditions of Use refer to section 1-4.

FM-Canada Nonincendive for Class I, Division 2, Groups A, B, C & D Hazardous (Classified) Location, Indoors/Outdoors with a Temperature code T6/T5/T4 for $-20^{\circ}\text{C} \leq T_a \leq +55^{\circ}\text{C}$ when connected in accordance with Control Drawing D&E 2019-012-A60.

By applying:

- CSA-C22.2 No. 0.4: R2013 Bonding of Electrical Equipment
- CSA-C22.2 No. 213: 2017 Nonincendive Electrical Equipment for Use in Class I, Division 2, Hazardous Locations
- C 22.2 No. 61010.1: 2012 Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements
- C22.2 No. 94.2: 2015 Enclosures for Electrical Equipment, Environmental Considerations

Certificate no.: FM19CA0089X. For Specific conditions of Use refer to section 1-4.

- **Compliance**
 - AS/NZS CISPR 11
 - KC Registration of broadcasting and communication equipment KCC-R-R-YPA-BA11

- **Recommendations and guidelines**

NAMUR Precompliance checked by applying:

- NAMUR NE21: 2017 Electromagnetic compatibility (EMC) of industrial process and laboratory.

2-3. External dimensions and pin assignment of connectors

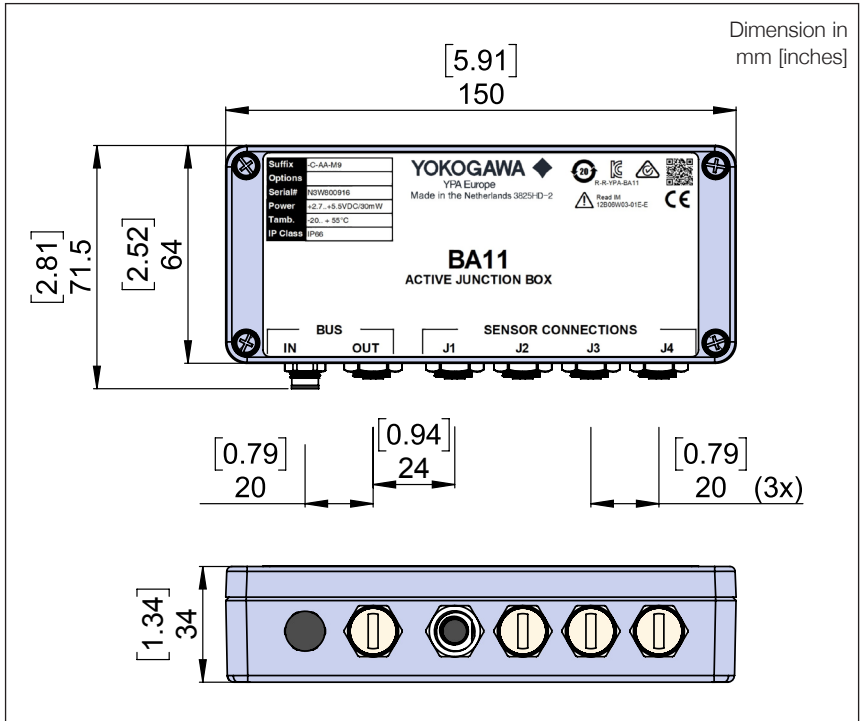


Figure 2. Dimensions BA11 Active Junction Box

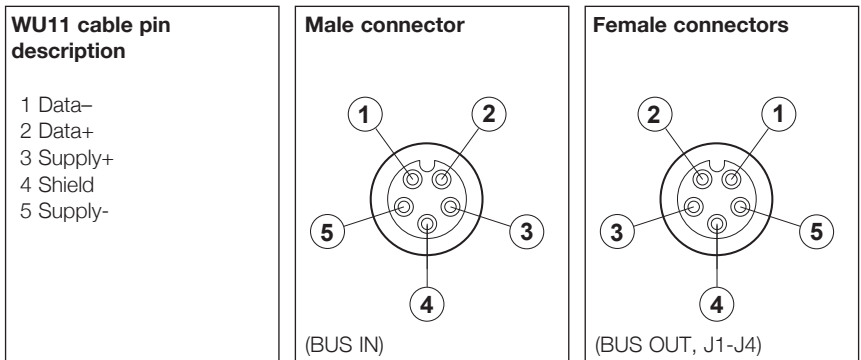


Figure 3. Connection assignment

3. Preparation

3-1. Installation

The BA11 Active Junction Box is used to allow multiple Modbus Terminal/Slave units (e.g. SENCOM SA modules) to a Master/Host unit.

Before use, remove the dust- and protection caps of the applicable connectors.

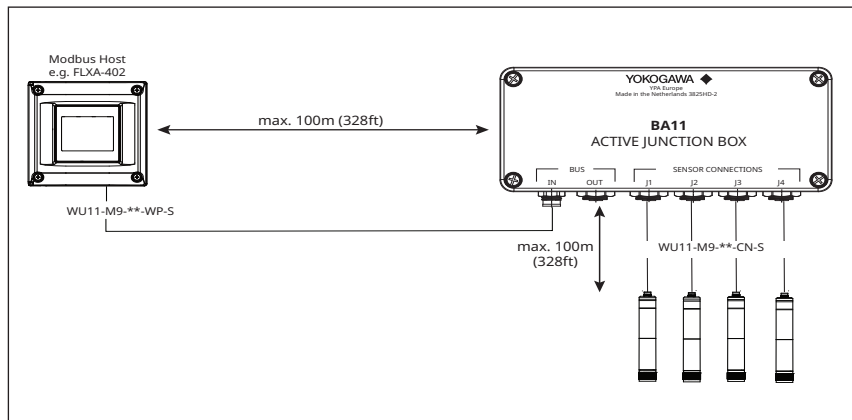


Figure 4. Example of system configuration

For installation in Class I, Division 2 Hazardous (Classified) Location, refer to Control Drawing D&E 2019-012-A60

3-2. Mounting options for BA11 Active Junction Box

The BA11 Active Junction Box can be mounted on a wall, pipe or backside of FLXA402 analyzer. Mounting materials can be ordered as option (/UM) or as spare part (K1548PM). In the mounting instructions explained it is a choice to also mount the NEMA 4X bracket.

3-2-1. Instructions for mounting BA11 on the mounting bracket, with or without using the NEMA 4X bracket

Fasten BA11-base firmly on the mounting bracket using the two M6 screws supplied with the option /UM. If applicable, the NEMA 4X bracket has to be mounted too according the explanation figure 5.

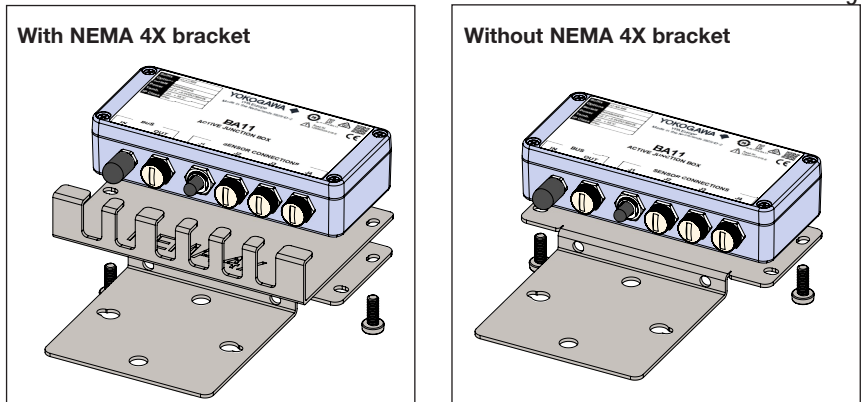


Figure 5. Bracket mounting

3-2-2. Instructions for pipe mounting

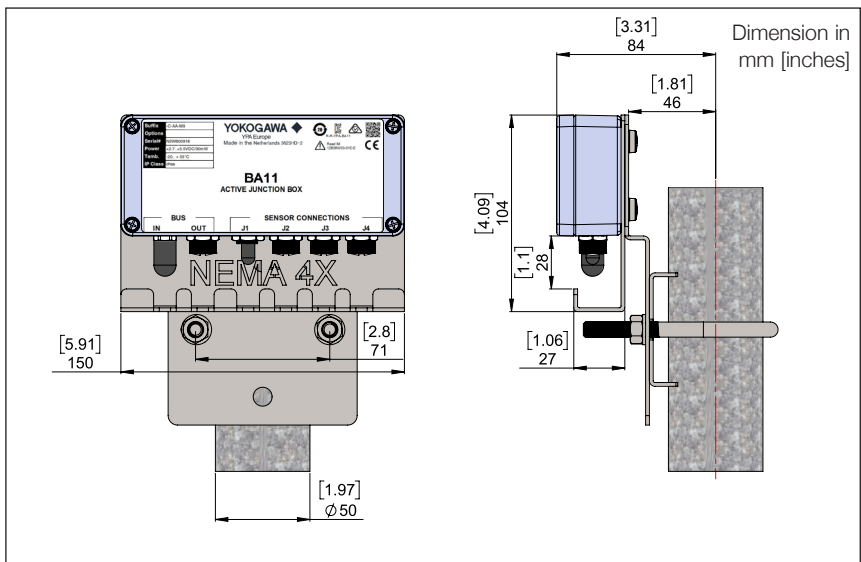


Figure 6. Pipe mounting

Refer to 3-2-1 for bracket mounting. Fasten the assembled BA11 together with the bracket on the pipe using M8 U-bolt, 2x M8 washers and two M8 nuts delivered with /UM mounting set.

3-2-3. Instructions for wall mounting

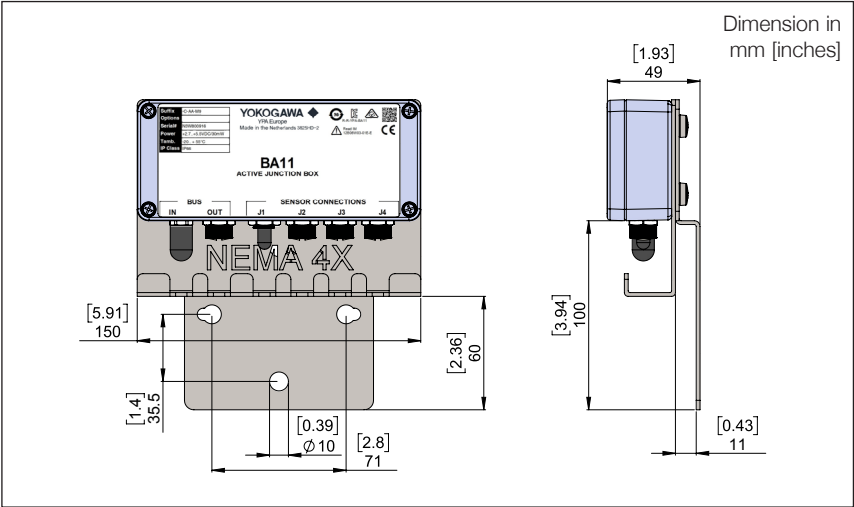


Figure 7. Wall mounting

Refer to 3-2-1 for bracket mounting. Fasten the assembled BA11 together with the bracket on the wall using the set of two 8x50 anchors and 6.3x50 screws delivered with /UM mounting set.

Note: The wall on which BA11 is mounted should be strong enough to bear the weight of more than 8 kg (17.64 pound).

3-2-4. Instructions for mounting at backside of FLXA402 analyzer

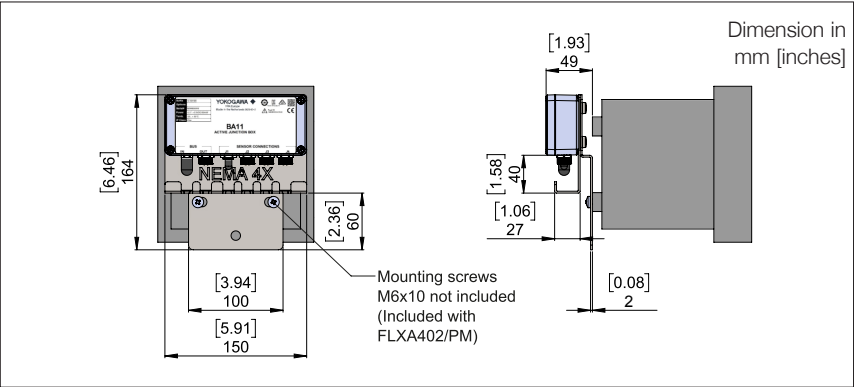


Figure 8. Application mounting

Refer to 3-2-1 for bracket mounting. Fasten the assembled BA11 together with the bracket on the FLXA402 transmitter (refer to IM document of the exact model of FLXA402 transmitter for the proper torques at M8 screws).

4. Model code

Model	Suffix Code	Option code	Description
BA11			Active Junction Box
Material	-C		Aluminium alloy, epoxy coating
Type	-AA -DD		General purpose Non Incendive for FM-US / FM-Canada
Connection type	-M9		M9 male/female connectors, 5 pins
Options		/UM	Universal mounting set

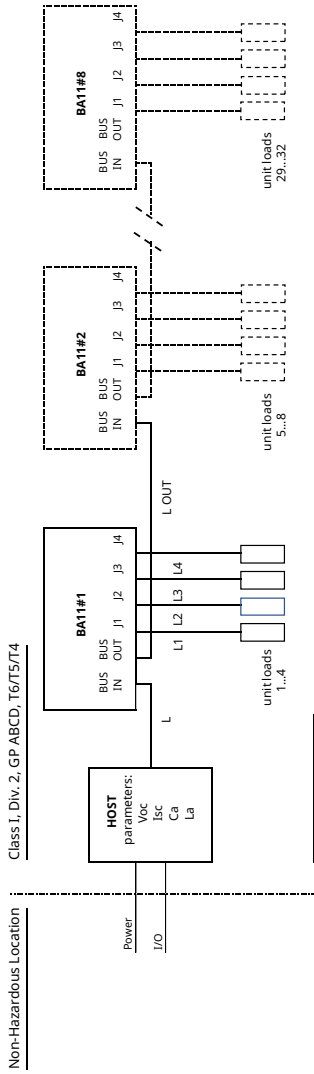
5. Spare parts

Spare part	Description
K1548DC	One set of dust- and protection caps
K1548PM	/UM universal mounting set for BA11

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6. Control Drawing

D&E 2019-012-A60



NIPW Parameters BA11	
Vmax	5.5 V
Imax	517 mA
Cl	1.42 µF
Li	0 mH

Specified Voc of the HOST shall not exceed the Vmax of the BA11 or the Vmax of any of the unit loads
Specified Isc of the HOST shall not exceed the Imax of the BA11 or the Imax of any of the unit loads
Sum of Ci values for all BA11s and all unit loads connected, plus the sum of all associated cable capacitance shall not exceed the specified Ca value of the HOST
Sum of Li values for all BA11s and all unit loads connected, plus the sum of all associated cable inductance shall not exceed the specified La value of the HOST


Sum of L IN, L OUT, L1, L2, L3, L4 ≤ 250 mtr. All cables must be type WU11 (Cable = 0.2 nF/mtr., Lcable = 0.1 µH/mtr.)

Notes:

- 1) No revision to this drawing without prior approval of FM.
- 2) Installation must be in accordance with the National Electrical Code (ANSI/NFPA 70; CSA C22.1) and relevant local codes.
- 3) WARNING - EXPLOSION HAZARD. DO NOT OPEN WHILE THE EQUIPMENT IS ENERGIZED OR WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT.
AVERTISSEMENT - RISQUE D'EXPLOSION. NE PAS OUVRIR LORSQUE L'EQUIPEMENT EST SOUS TENSION OU EN PRESENCE D'UNE ATMOSPHERE EXPLOSIVE
- 4) WARNING - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR DIVISION 2.
AVERTISSEMENT - LA SUBSTITUTION DE COMPOSANTS PEUT NUIRE À L'APTITUDE À LA DIVISION 2.
- 5) Cable connectors must be fully engaged using the positioning notch and mechanical retention.
- 6) The BA11 connectors and protection caps must be secured with a torque of 0.25 Nm. The lid screws must be secured with a torque of 1.1 Nm.
- 7) Some equipment identifies interconnection parameters using terminology associated with the Zone classification scheme. In such case, note that the following terms are equivalent:

HOST parameters	
Terminology	Division scheme:
Voc	Uo
Isc	Io
Ca	Co
La	Lo

BA11 / unit load parameters	
Terminology	Division scheme:
Vmax	Ui
Imax	Ii
Cl	Ci
Li	Li

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