

Instruction Manual &
Technical Bulletin of
Explosion-proof Photoelectric Smoke Detector
FLS-02EC(-H2)

Thank you very much for purchasing. This Instruction manual contains the important points in preventing accidents and how to handle it. Please do read thoroughly and comprehend this manual. After reading it, please keep it in a convenient place for reference.

Contents

1.	OVERVIEW	3
2.	FEATURE.....	3
3.	SPECIFICATION	3
4.	STRUCTURE.....	4
5.	OPERATION	5
5.1.	Status LED	5
5.2.	Relay	5
5.3.	Automatic Test Function.....	5
6.	INSTALLATION.....	5
6.1.	Installation Environments.....	6
6.2.	Mounting.....	6
6.3.	Wiring	7
6.3.1.	Specification	7
6.3.2.	Procedure.....	7
7.	MAINTENANCE AND INSPECTION	10
8.	ORDERING INFORMATION.....	11
9.	CONTACT US.....	11

Warranty Period and Warranty Scope

【Warranty Period】

Warranty of the product is valid for only malfunctions occurring in the course of normal and correct use of the product as per the Instructions Manual, and warranty period is 1 (one) year after the product is delivered to the consignee specified at the time of order placement.

【Warranty Scope】

For the malfunctions occurring in the product due to reasons attributable to the supplier in the aforementioned warranty period, supplier will repair the returned product at its own responsibility. However, the following cases are excluded from the warranty scope.

1. Malfunctions and loss due to fire, earthquake, flood, lightning, and other natural disasters.
2. Malfunctions and loss due to inappropriate handling during movement and transportation at customer's side after the product delivery.
3. Root cause of the malfunction is not attributable to the product.
4. Malfunction and loss due incorrect use of the product, or if repair, remodeling, erroneous connection etc by other vendor.
5. Wear and tear of relay connections, and life span of relay parts due to welding.

Also, warranty here refers to warranty for the delivered product only, and does not cover damages resulting from the malfunction of the product.

1. OVERVIEW

FLS-02EC(-H2) Explosin Proof Smoke Detector has Division and Zone explosion-proof ratings. This detector is a sensor of the smoke using the scattered light, detecting the scattering of the light reflected by the smoke. There are light emitter (Infrared LED) and the detector (photo-diode) inside, the former emits the light through the lens, and the latter detects the light scattered by smoke to detect the smoke in the hazardous area. This detector outputs include a localized LED, and relays.




An example of the installation location of this detector is as follows:

- Battery rooms
- Combustible storage facilities
- Chemical plants
- Engine room, etc

2. FEATURE

- Since the structure is pressure-resistant, explosion-proof, it can be fitted in a hazardous area
- It also tolerates the hydrogen explosion.
- FM Approved for use in Class I, Division 2 hazardous locations. and FM Approvals for smoke detector.
- IECEx & ATEX Zone approved
- LED provides detector status.

3. SPECIFICATION

Type		(Standard) (Hydrogen gas compatible)	FLS-02EC FLS-02EC-H2	
Electronic specification	Rating	DC24V,5mA(Standby),10mA(Alarm)		
	Range of the voltage	DC24V±10%		
	Alarm Level	1.8 to 3.1 %/ft		
	Status LED	Color : Red Normal : Blinks once in 10 seconds Alarm : Blinks once in 2 seconds Trouble : Light out		
	Output Relay	Alarm Relay : Form A, DC24V 1A. Trouble Relay:Form B, DC24V 1A.		
	Range of the temperature	Operating	0 to +50 degree C	
		Storage	-20 to +70 degree C	
Range of the operation humidity		30 to 85 %RH (no condensation)		
Mechanical specification	external dimensions	136×136×100		
	material	aluminum alloy (ADC12)		
	color	Black		
	Weight	Approx 3kg		
Certification		For complete approval details, refer to the Appendix A.   		

4. STRUCTURE

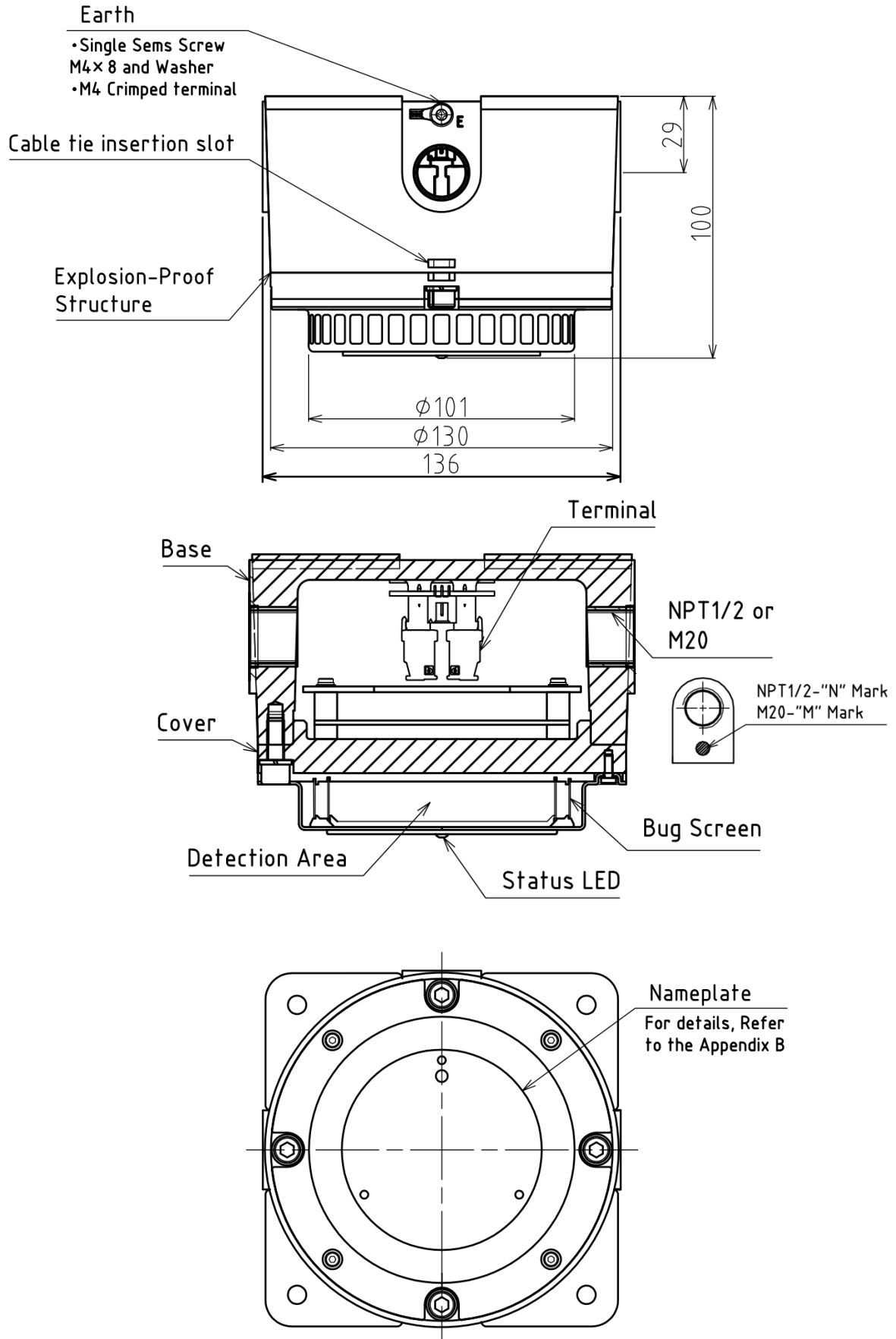


Figure 1 : FLS-02EC(-H2) Structure

5. OPERATION

5.1. Status LED

Status LED indicates the state of equipment. Table 1 indicates the condition of the LED for each status. Alarm condition takes priority over trouble condition.

Table 1 - Status LED Operation

Status of detector	LED Indicator
Normal	Blinks once in 10 seconds
Alarm	- Blinks once in 2 seconds - this indication latching until power-cycle a system.
Trouble	- Light out - this indication non-latching.

5.2. Relay

FLS-02EC(-H2) has alarm and trouble relays. All relays are rated to DC24V / 1A. Table 2 indicates the operation of each relays.

Table 2 - Relays Operation

Relay Name	Condition				Note
	Power OFF	Normal	Alarm	Trouble	
Alarm	Open	Open	Close	Open	this relay latching until power-cycle a system.
Trouble	Open	Close	Close	Open	this relay non-latching.

5.3. Automatic Test Function

Every hour, detector supervises changes of smoke signal due to aging and dirt of sensor. When changes of smoke signal reaches to the limit, it will result in Trouble condition.

And, detector supervises the light emission state of detection area every 24 hours (and after 60 seconds since turning on the power). When detection area is light out, it will result in Trouble condition.

6. INSTALLATION

WARNING

- FLS-02EC(-H2) must be properly installed and used according to this manual and the specific approval certificates. Improper installation and use will invalidate warranty and product certifications.
- Do not disassemble or repair the detector without permission. Detector repair should be performed only by the manufacturer.
- Be certain that installation complies with all local codes. If you have questions, consult the authority having jurisdiction before installation the system.
- Please install the detector after turning off the power.
- The FLS-02EC and FLS-02EC-H2 include flameproof joints, consult Fenwal Control of Japan if repair of the flameproof joints is necessary.

6.1. Installation Environments

1. Temperature : 0 to +50 degree C
2. Humidity : 30 to 85%RH (However, no condensation)
3. Caution :
 - Installed Indoors
 - Avoid drops of water, moisture, corrosive gases, and vapors of organic solvents.
 - Avoid direct sunlight and radiation by high temperature.
 - The Dust Cover (see Figure 2) keeps dust and particles out of the smoke chamber that may enter. Don't remove it until installation is over.

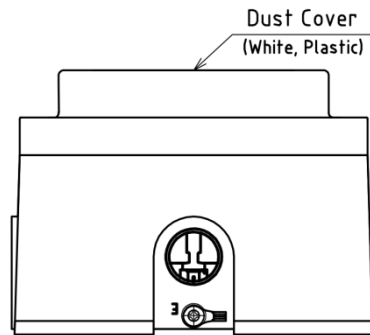


Figure 2 : Dust Cover

6.2. Mounting

- 1) Fix the FLS-02EC(-H2) to the wall with four M5 or M6 bolts using base 4- ϕ 7 hole (See Figure 3) . bolt length more than 11 (eleven) mm. It must be mounted on a ceiling or wall of sufficient strength to support the weight.
- 2) It is normally mounted on the ceiling no less than 0.6 m (twenty-four inch) from a side wall, and vice versa (See Figure 3).

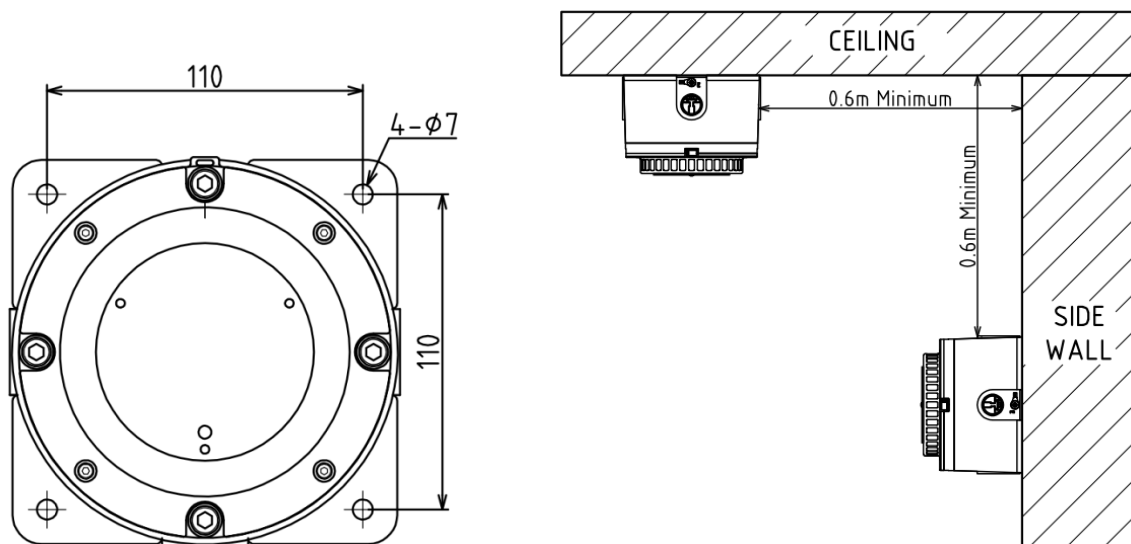


Figure 3 : Mounting

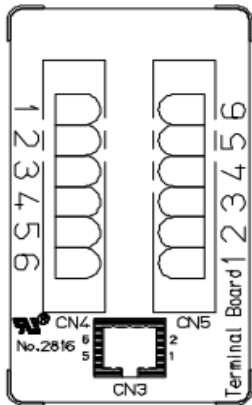
[NOTE] FLS-02EC(-H2) separates the base and cover and packs it

6.3. Wiring



Be certain that wiring complies with all local codes. If you have questions, consult the authority having jurisdiction before wiring the system.

6.3.1. Specification



- Table 3 shows the pin assignments of the terminal blocks CN4 and CN5 (See Figure 4 for exterior view).

Table3 - Pin assignments of Terminal Board

Pin No	Function
1	+24V
2	0V
3	Alarm contact-Normal Open
4	Alarm contact-Common
5	Trouble contact-Normal Close
6	Trouble contact-Common

Figure 4 - Terminal Board external view

- The diameter of usable wiring is as follows.
 Wiring Diameter : (Minimum) 0.2mm² (Maximum) 2.5mm²
 Case of AWG : (Minimum) 24 (Maximum) 12
- The screws must be tightened down with a torque 0.5 to 0.6 N·m.
- The environmental specification of the cable should be sufficient to withstand the surrounding environment.

6.3.2. Procedure

- 1) Install the base according to "6.2 Mounting", and complete the installation of the system conduit. Insert the external cable within the base and close the unused NPT1/2 or M20 entry with the plug (See Figure 5). Conductor insulation of external wiring should be stripped off with a bare conductor length of about 0.3 inch (7 mm)

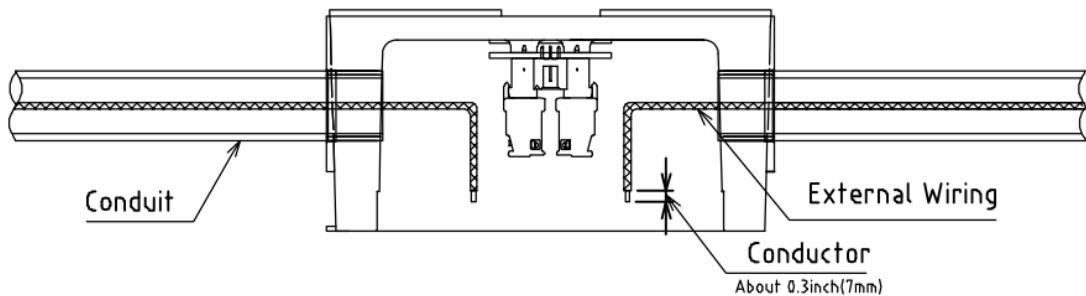


Figure 5 - Install Base

- 2) Connect the external wiring to the appropriate terminals according to "6.3.1 Specification". Refer to Figure 6 for the earth terminal location and Figure 10 for the wiring diagram.

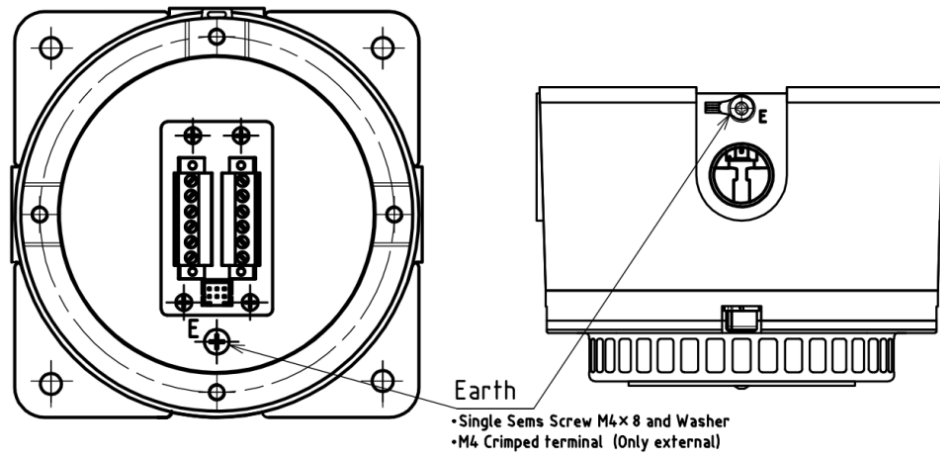


Figure 6 - Earth terminal

- 3) Hang the cover with a cable tie on the base, and main board connector connect to CN3 of terminal board (See Figure 7).

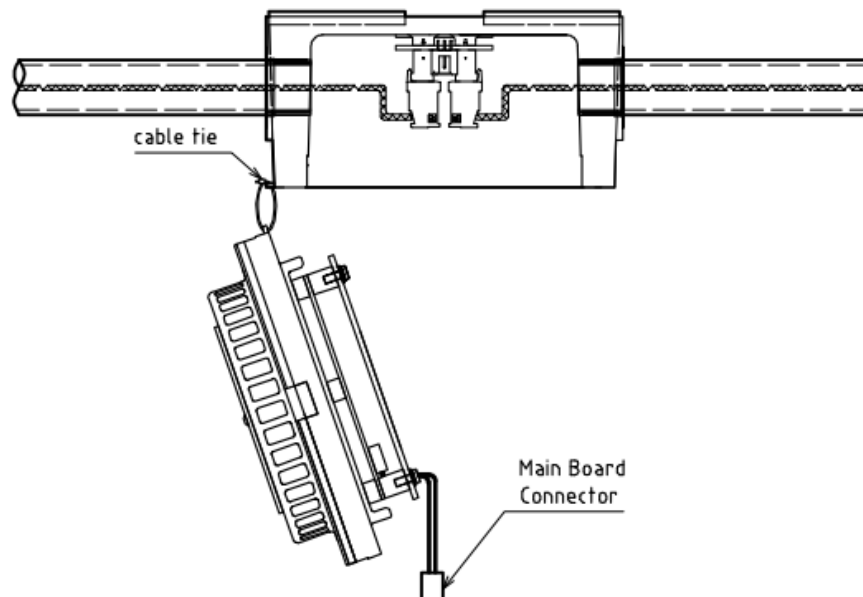


Figure 7 - Connection between main board and terminal board

- 4) Attach the cover to the base and align the binding band insertion slot (See Figure 8).

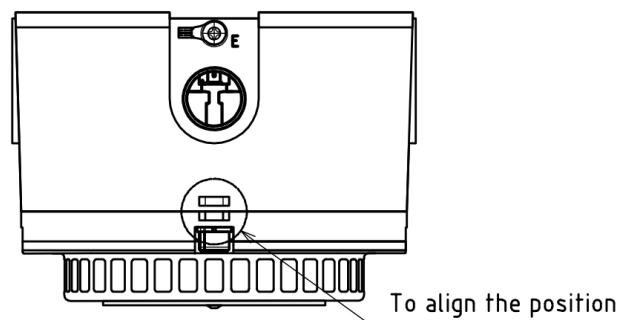


Figure 8 - Attaching the cover

- 5) Fix the 4 places with the attached M6 screw. And, close the unused NPT1/2 or M20 entry with the plug.

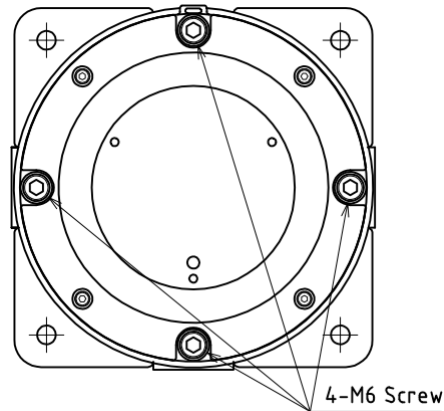


Figure 9 - Fix the cover

! WARNING

- Please use the plug attached to the detector or one that has been certification to withstand explosion-proof (Ex d). An example of explosion-proof plug is shown below.

NPT1/2 : CMP-757-D-T1-5 (R.STALL, INC.)

M20×P1.5 : CMP-757-D-M2-5 (R.STALL, INC.)

- Consult with Fenwal Controls of Japan, Ltd. for genuine replacement cover fasteners: M6X20 hexagon bolts of A2-70 strength class SUS304 stainless steel or better are acceptable alternatives.

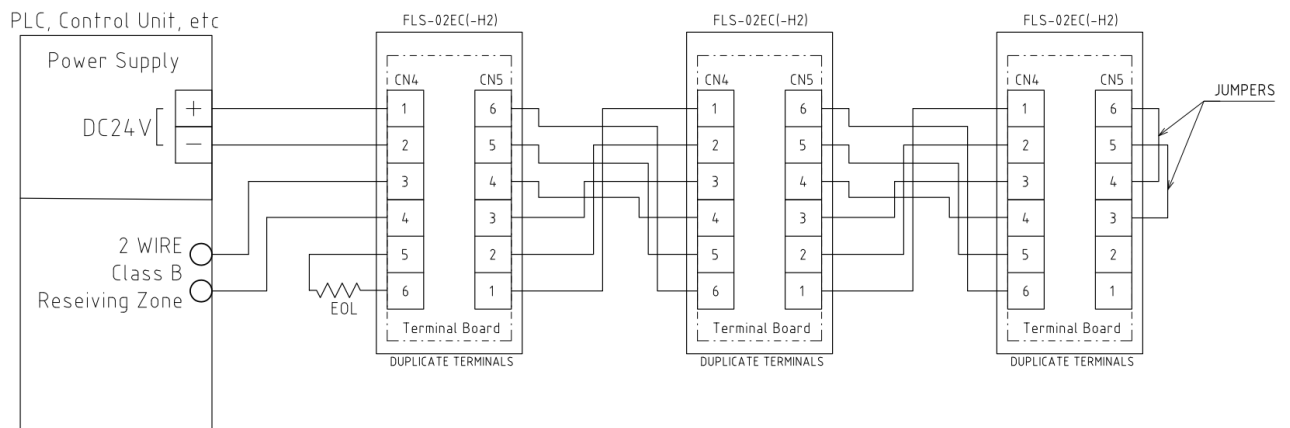


Figure 10 - Wiring Diagram

7. MAINTENANCE AND INSPECTION

In order to check that the system is functioning correctly, it is recommended to perform maintenance and inspection according to environment (Standard once a year).

FLS-02EC(-H2) can be tested using the same methods employed for any photo-electric detector. For example, test smoke can be used.

If the detector are in fails condition (do not responding to the operation test, the status indicator does not light up, etc), please turn off. Then contact us. The detector is not designed to be repaired in the field.

[Note]

If signal transfer output of an error or alarm to external devices is likely to occur during maintenance, ensure to inform the Customer's department in-charge in advance, and then conduct the inspection.

Moreover, when buzzer is going to ring, notify the people in surrounding area beforehand.

Since in many cases it is necessary to move furniture and equipments of customer during maintenance, discuss closely with the customer in advance and ensure that operators are not injured and other equipments are not damaged.

8. ORDERING INFORMATION

When ordering, please specify. Refer to FLS-02EC(-H2) Model Matrix for details.

FLS-02EC(-H2) Model Matrix

MODEL	DESCRIPTION		NOTE
FLS-02EC	Explosion Proof Smoke Detector		
	-H2	Support to hydrogen gas	See Appendix for details.
	-(None)	No support to hydrogen gas	
	-M	Metric thread (M20)	Quantity of attached plug
		NPT thread (NPT1/2)	
	1	Plug:1	
	2	Plug:2	
3	Plug:3		

9. CONTACT US

Please contact our authorized distributors, or the head office or sales offices of the Fenwal Controls of Japan, Ltd. in inquiring about the product.

Fenwal Controls of Japan, Ltd.

2nd floor, Kyouhan Kudan Bldg., 1-5-10, Iidabashi, Chiyoda-ku, Tokyo, Japan, 102-0072

Tokyo Head Office : (+81)-3-3237-3565

Web Inquiry : <http://www.fenwal.co.jp/en/form/>

APPENDIX A

FM Certification

FM18US0151X

FLS-02EC	Class I, Division 1, Group C,D T6 Class I, Zone 1, AEx db IIB T6 Gb
FLS-02EC-H2	Class I, Division 1, Group B,C,D T6 Class I, Zone 1, AEx db IIB+H2 T6 Gb

Approval Standards

ANSI / ISA 60079-0:2013	Explosive atmospheres - Part 0: Equipment - General Requirements
ANSI / UL 60079-1:2015	Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures “d”
FM 3600(2018)	Electrical Equipment for Use in Hazardous (Classified) Locations - General Requirements
FM 3615(2018)	Explosionproof Electrical Equipment General Requirements
FM 3230(2019)	Smoke Actuated Detectors For Automatic Fire Alarm Signaling

IECEX Certification

IECEX FMG 16.0040X

FLS-02EC	Ex db IIB T6 Gb
FLS-02EC-H2	Ex db IIB+H2 T6 Gb

Approval Standards

IEC 60079-0:2011 (Ed.6)	Explosive atmospheres - Part 0: Equipment - General Requirements
IEC 60079-1:2014 (Ed.7)	Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures “d”

ATEX Certification

FM16ATEX0107X

FLS-02EC	II 2 G Ex db IIB T6 Gb
FLS-02EC-H2	II 2 G Ex db IIB+H2 T6 Gb

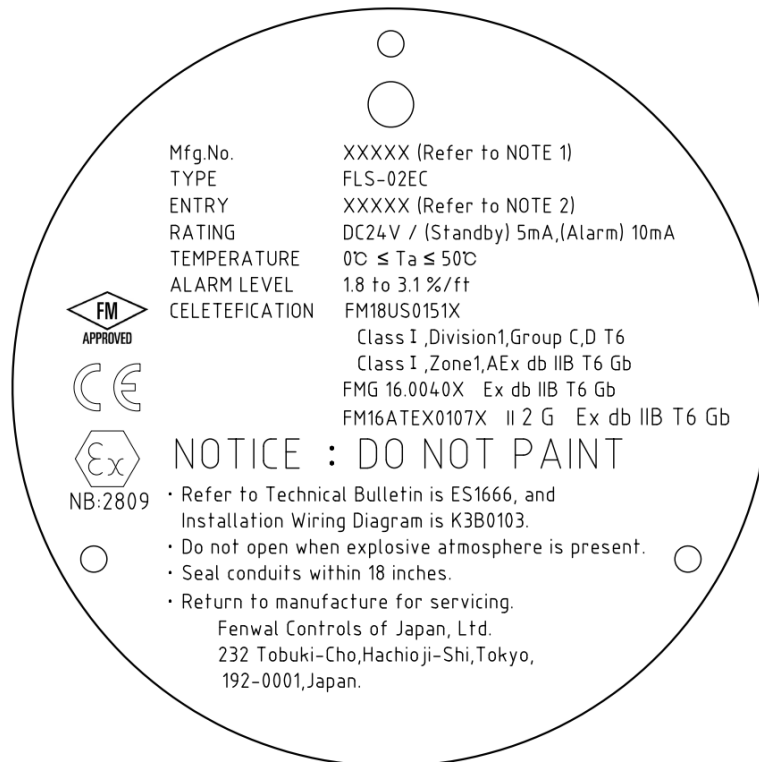
Approval Standards

EN 60079-0:2012+A11:2013	Explosive atmospheres - Part 0: Equipment - General Requirements
EN 60079-1:2014	Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures “d”

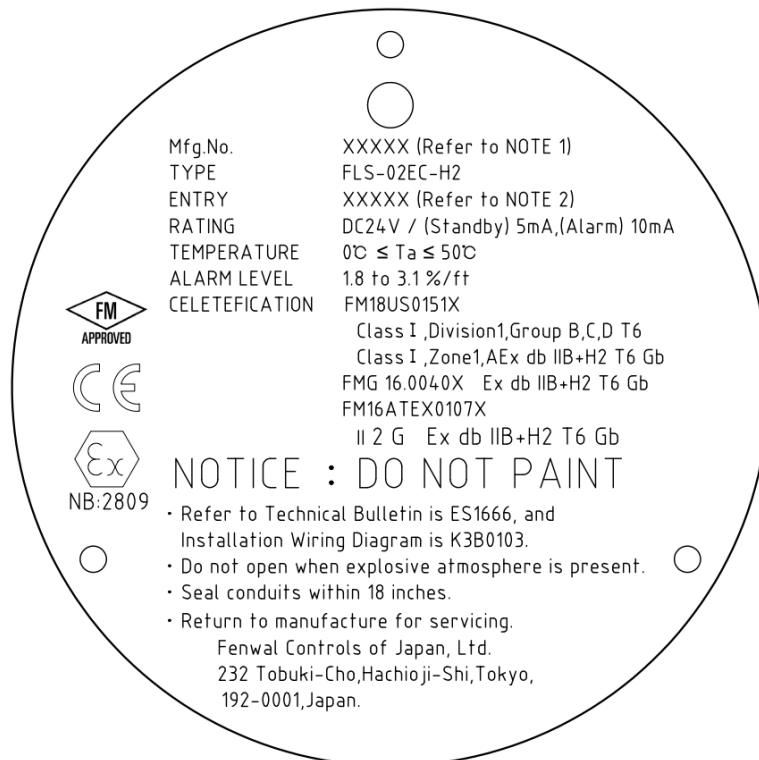
Special Conditions For Safe Use X:

1. The FLS-02EC and FLS-02EC-H2 include flameproof joints, consult Fenwal Controls of Japan, Ltd. if repair of the flameproof joints is necessary.
2. Consult with Fenwal Controls of Japan, Ltd. for genuine replacement cover fasteners: M6X20 hexagon bolts of A2-70 strength class SUS304 stainless steel or better are acceptable alternatives.

APPENDIX B



FLS-02EC Nameplate



FLS-02EC-H2 Nameplate

NOTE

1. Mfg.No. is unique number of product.
2. ENTRY is thread size (M20×P1.5 or NPT1/2).