

F39-TGR-CL-W-IBOX_

**Connection Box for
F3S-TGR-CL
Safety Sensors**

**Installation and operation manual
Original instruction**

**Addition to the Installation and operation
manual F05E and F06E**

Notice:

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to property.



DANGER Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

OMRON Product References

All OMRON products are capitalized in this manual. The word “Unit” is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.



Note Indicates and emphasizes essential information of particular interest for efficient and convenient operation of the product.

1,2,3... 1. Indicates lists of one sort or another, such as procedures, checklists, etc.

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Read and understand this document

Please read and understand this document before using the products. Please consult your OMRON representative if you have any questions or comments.

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NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

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DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

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1 Safety precautions

In order to use the F3S-TGR-CL safety sensor together with a F39-TGR-CL-W-IBOX_ connection box safety, the precautions listed in this manual indicated by alert symbols and descriptions must be followed in addition to the precautions listed in the manual of the F3S-TGR-CL safety sensor. Failure to follow all precautions and alerts may result in an unsafe use or operation. For additional information, please refer to the:

- F05E-__-__ Installation and operation manual for F3S-TGR-CL Finger- and hand protection sensors
- F06E-__-__ Installation and operation manual for F3S-TGR-CL Body protection sensors
- F07E-__-__ Precautions for F3S-TGR-CL safety sensor range

The following indications and symbols are used for the application:



WARNING This sign indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.

2 Alert statements in this manual

The alert statements shown in this manual are specific for the F39-TGR-CL-W-IBOX_. Refer to the installation and operation manual of the safety sensor for alert statements that are specific for the safety sensor.

2.1 For users



WARNING When changes are made to each function using the selector switches, the administrator must manage the detail of the changes and perform the changes. Accidental functional setting change may result in a serious injury.

2.2 For installations



WARNING After unpacking and before installing the F39-TGR-CL-W-IBOX_ system please check the mechanical condition of the system carefully. Do not install a mechanically damaged product. Return this to your OMRON service for inspection or repair. Failure to do so may result in serious injury.



WARNING Do not drop the products. Dropping the products may lead to internal or external damage. Please return a F39-TGR-CL-W-IBOX_ system that was dropped on the floor to your OMRON service for inspection or repair. Failure to do so may result in serious injury.



WARNING Make sure to test the operation of the F39-TGR-CL-W-IBOX_ system after installation to verify that the F39-TGR-CL-W-IBOX_ system operates as intended. Make sure to stop the machine until the test is complete. Unintended function settings may cause a person to go undetected, resulting in serious injury.



WARNING Make sure that the F39-TGR-CL-W-IBOX_ system is securely mounted and its cables and connectors are properly connected.



WARNING Make sure that foreign objects such as water, oil, or dust do not enter the inside of the F39-TGR-CL-W-IBOX_ system while the cover for the selector switches is open and tighten the screws of the cover firmly after changing the settings.

2.3 For wiring



WARNING Do not short-circuit the output line to the +24 V line. Otherwise, the output is always ON. Also, the 0 V of the power supply must be grounded so that the output does not turn ON due to grounding of the output line.



WARNING Do not connect each line of F39-TGR-CL-W-IBOX_ system to a DC power supply of more than 24 VDC+20%. Also, do not connect to an AC power supply. Failure to do so may result in electric shock.



WARNING For the F39-TGR-CL-W-IBOX_ system to comply with IEC 61496-1 and UL 508, the DC power supply unit must satisfy all of the following conditions:

- Must be within the rated power voltage (24 V DC \pm 20%)
- Must have tolerance against the total rated current of devices if it is connected to multiple devices
- Must comply with EMC directives (industrial environment)
- Double or reinforced insulation must be applied between the primary and secondary circuits
- Automatic recovery of overcurrent protection characteristics
- Output holding time must be 200 ms or longer
- Must satisfy output characteristic requirements for class 2 circuit or limited voltage current circuit defined by UL508
- Must comply with laws and regulations, regarding EMC and electrical equipment safety, of the country or region where the F3S-TGR-CL system is used (Ex: In EU, the power supply must comply with the EMC Directive and the Low Voltage Directive).



WARNING Double or reinforced insulation from hazardous voltage must be applied to all input and output lines. Failure to do so may result in electric shock.



WARNING Extension of the cable must be within a specified length. If it isn't, safety function may not work properly, resulting in danger.



WARNING Use the separate cable glands if you need to use 240VAC in your application to separate from 24V lines.

2.4 Other



WARNING Do not try to disassemble, repair, or modify this product. Doing so may cause the safety functions to stop working properly.



WARNING Do not use the F39-TGR-CL-W-IBOX_ system in environments where flammable or explosive gases are present. Doing so may result in an explosion.



WARNING Perform daily and 6-monthly inspections for the F39-TGR-CL-W-IBOX_ system. Otherwise, the system may fail to work properly, resulting in serious injury.



WARNING If the F39-TGR-CL-W-IBOX_ system is used in an environment where foreign materials such as spatter may adhere to the product, use a cover to protect the F39TGR-CL-W-IBOX_ system or inspect and clean the F39-TGR-CL-W-IBOX_ system periodically.



WARNING Do not use the F39-TGR-CL-W-IBOX_ system in an atmosphere containing oil mist or corrosive gas. Failure to do so may result in damage of the product.



WARNING When scrapping the F39-TGR-CL-W-IBOX_ system, please make sure to comply with the waste treatment regulations of the country where the product has been used.

2.5 Precautions for Safe Use

Make sure to observe the following precautions that are necessary for ensuring safe use of the product.

- Thoroughly read this manual and understand the installation procedures, operation check procedures, and maintenance procedures before using the product.
- Loads must satisfy both of the following conditions:
 - Not short-circuited
 - Not used with a current that is higher than the rating
- Do not drop the product
- Dispose of the product in accordance with the relevant rules and regulations of the country or area where the product is used.

2.6 Precautions for Correct Use

Observe the precautions described below to prevent operation failure, malfunctions, or undesirable effects on product performance.

2.7 Installation environment

Do not install the F3S-TGR-CL system in the following types of environments:

- Areas exposed to intense interference light, such as direct sunlight
- Areas with high humidity where condensation is likely to occur
- Areas where corrosive gases are present
- Areas exposed to vibration or shock levels higher than in the specification provisions
- Areas where the product may come into contact with water
- Areas where the product may come into contact with oil that is an adhesive solvent

Do not use radio equipment such as cellular phones, walkie-talkies, or transceivers near the F39-TGR-CL-W-IBOX_ system.

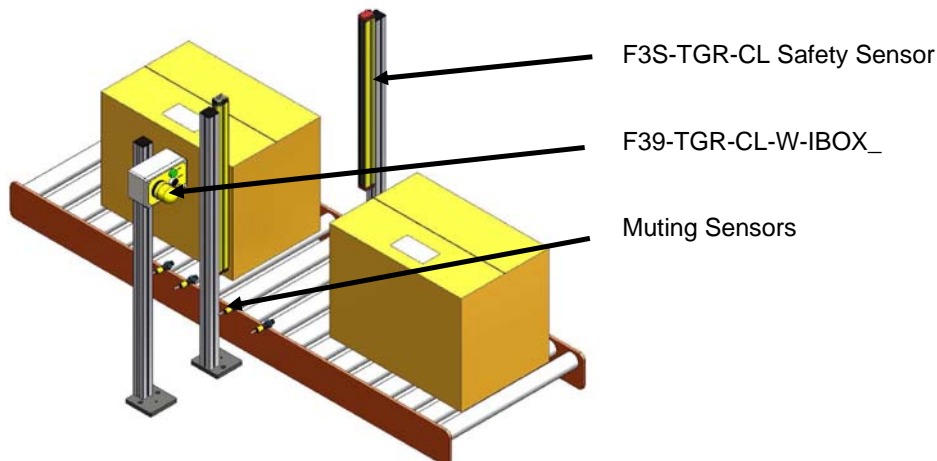
2.8 Wiring and installation

- Make sure to perform wiring while the power supply is OFF. Otherwise, the F39-TGR-CL-W-IBOX_ system may fail to operate due to the diagnosis function.
- When replacing the cable connectors with other types of connectors, use connectors that provide a proper grade of protection.
- Properly perform the wiring after confirming the signal names of all the terminals.
- Do not operate the control system until 2 seconds or more (2.2 seconds or more in case of series connection) after turning ON the power of the entire F3S-TGR-CL system.
- Be sure to route the F3S-TGR-CL system cable separate from high potential power lines or through an exclusive conduit.
- When using a commercially available switching regulator power supply, make sure to ground the FG terminal (frame ground terminal).

2.9 Cleaning

Do not use thinner, benzene, or acetone for cleaning, they affect the product's resin parts and paint on the case.

3 System overview



3.1 Intended use

The F39-TGR-CL-W-IBOX_ connection boxes are accessories for the F3S-TGR-CL series of safety sensors. The connection boxes are available in four versions:

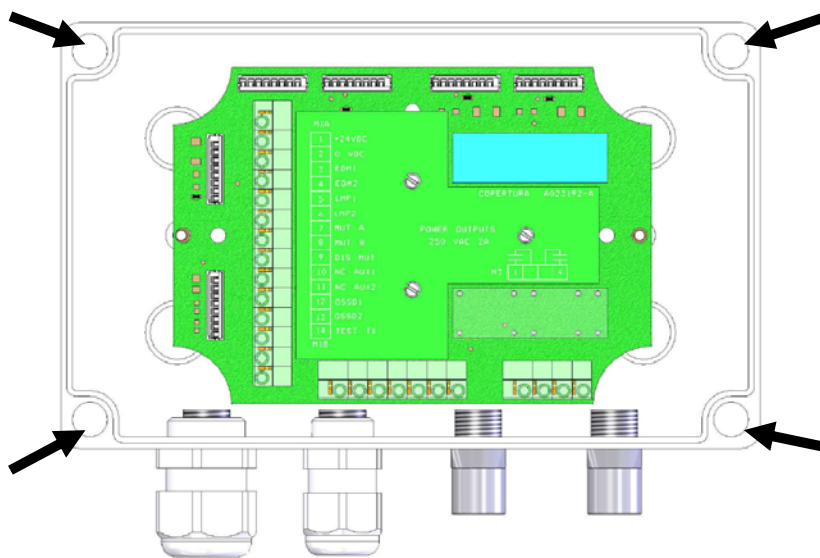
Model Name	Features
F39-TGR-CL-W-IBOX1	Connection box with Test- and Restart-Button
F39-TGR-CL-W-IBOX2	Connection box with Test- and Restart-Button and muting indicator
F39-TGR-CL-W-IBOX3	Connection box with Test- and Restart-Button and muting lamp
F39-TGR-CL-W-IBOX4	Connection box with Test- and Restart-Button, OSSD indicator and muting lamp Separate M12 connectors for each muting sensor



Note Do not use the F39-TGR-CL-W-IBOX_ with other safety sensor than F3S-TGR-CL series. Failure to do so may cause damage of the safety sensor or the connection box.

4 Mechanical setup:

Mount the F39-TGR-CL-W-IBOX_ on a flat and even surface using the mounting holes in the corners of the box.



For easy mounting, there is a drilling jig on the back part of this manual.

Perform the electrical installation according to chapter 5 after finalizing the mechanical installation.

5 Electrical installation



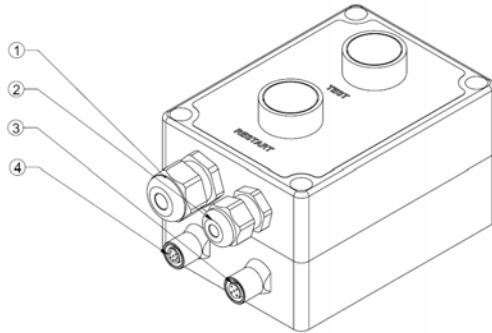
WARNING Use the separate cable glands if you need to use 240VAC in your application to separate from 24V lines.

5.1 General

Simple wiring of the entire system is provided by the plug-and-play concept using M12 connectors

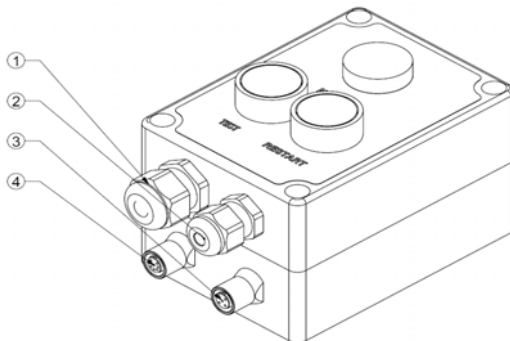
5.2 External connections

5.2.1 F39-TGR-CL-W-IBOX1



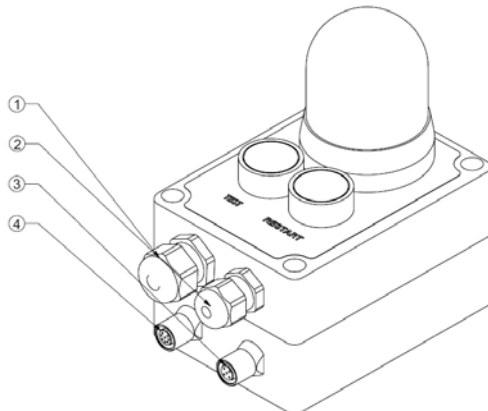
- 1 Cable gland (M20) for control signals
- 2 Cable gland (M16) for Relay outputs
- 3 M12-connector for Safety Sensor Transmitter
- 4 M12-connector for Safety Sensor Receiver

5.2.2 F39-TGR-CL-W-IBOX2



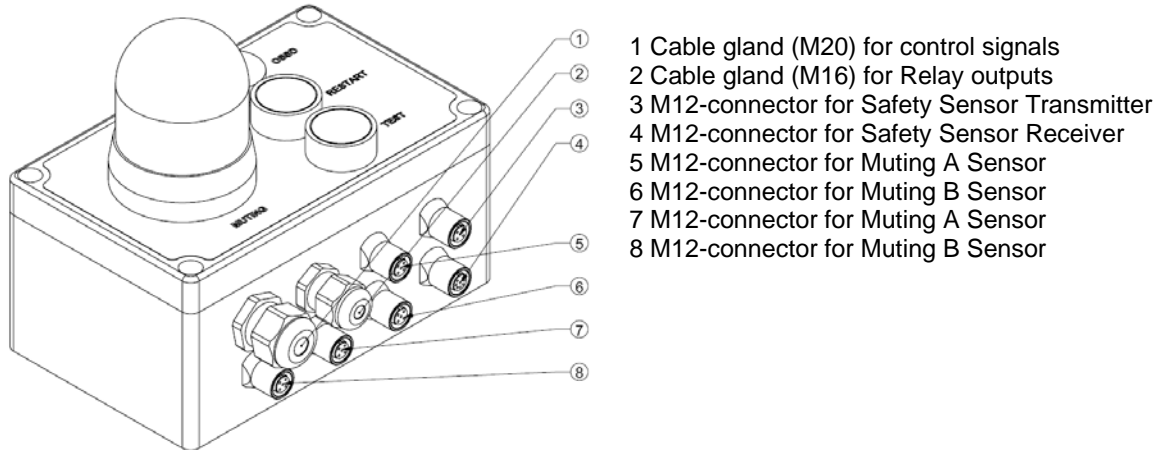
- 1 Cable gland (M20) for control signals
- 2 Cable gland (M16) for Relay outputs
- 3 M12-connector for Safety Sensor Transmitter
- 4 M12-connector for Safety Sensor Receiver

5.2.3 F39-TGR-CL-W-IBOX3



- 1 Cable gland (M20) for control signals
- 2 Cable gland (M16) for Relay outputs
- 3 M12-connector for Safety Sensor Transmitter
- 4 M12-connector for Safety Sensor Receiver

5.2.4 F39-TGR-CL-W-IBOX4



5.3 External connections

5.3.1 Connection to the safety sensor system

First connect the safety sensor F3S-TGR-CL by using the M12 connection cables. Then connect the muting sensors by using the M12 connectors if F39-TGR-CL-W-IBOX4 is in use. This is not needed for the other F39-TGR-CL-W-IBOXes.

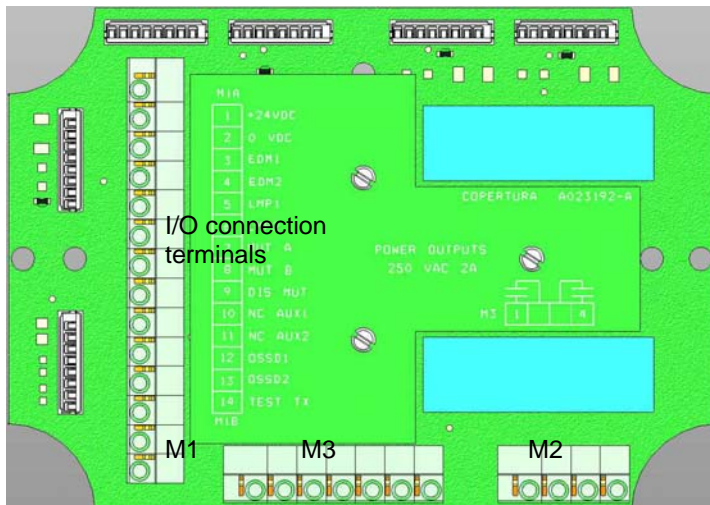
Note Make sure to enable the EDM function on the F3S-TGR-CL safety sensor system. This setting is mandatory since the correct operation of the safety relays in the F39-TGR-W-IBOX_ is monitored.

5.3.2 Connection to the control circuit

External connections are provided by cage clamp connectors inside the connector box. The connectors can hold wires in a range from 0.2mm² to 1.5mm² (solid and stranded). If ferrules are used, section specification covers 0.2mm² to 0.75mm² and AWG 24 (min) to AWG 16 (max).

There are three terminal blocks inside the box that can be used to connect external signals:

- M1** provides the connections to and from the cabinet
- M2** provides the connections to the safety relay outputs of the F39-TGR-CL-W-IBOX_
- M3** provides the connections to the front panel of the connection box



Front panel connection Relay out

The signals names are listed on the internal cover for easy reference:

Signals on connector M1

Nr	Name	Function	Note
1	+24Vdc	Power supply for the safety system.	Includes power for safety sensor, muting sensors and muting lamp
2	0Vdc		
3	EDM1	EDM function. Connect the two N.C. contacts of external forcibly guided contacts in series. (See Note 2)	Shortened by default. Connect the N.C. contacts of the external contactors in series.
4	EDM2		
5	LMP1	Additional muting lamp	Total consumption should not exceed 6W
6	LMP2		
7	MUT A	Input for muting channel A	
8	MUT B	Input for muting channel B	See Note 1
9	DISABLE MUTING	Digital signal active-high to disable the muting function	See Note 1
10	NCAUX1	Terminals of Auxiliary contact	
11	NCAUX2		
12	OSSD1	Safety output of the SLC	
13	OSSD2 / CODE	Safety output of the SLC	Terminals 13 and 14 are used when the coding function of the F3S-TGR-CL safety sensor is used.
14	TEST on TX / CODE	Test on transmitter	

Note 1: When F39-TGR-CL-W-IBOX_ is used in combination with F39-TGR-MCL_ muting actuators, connect the Muting disable signal on terminal 8 instead of terminal 9 and make sure terminal 9 is not connected to other signals when F39-TGR-MCL_ is used.

Note 2: Make sure to enable the EDM function on the F3S-TGR-CL safety sensor system. This setting is mandatory since the correct operation of the internal safety relays in the F39-TGR-W-IBOX_ is monitored, independent if external relays are connected or not.

Signals on connector M2

Nr	Name	Function	Note
1	OSSD 1 A	Pins of normally open safety contact 1	Max allowed current 2A
2	OSSD 1 B		
3	OSSD 2 A	Pins of normally open safety contact 2	Max allowed current 2A
4	OSSD 2 B		



If current is exceeding 2A, external forcibly guided relays or contactors have to be used. Use the EDM function to monitor proper operation of the external parts. EDM connection is provided on the M1 terminal block.

Connector M3 is used to connect the pushbuttons and lamps on the front of the box.

5.4 Connection to Safety sensor and muting sensors

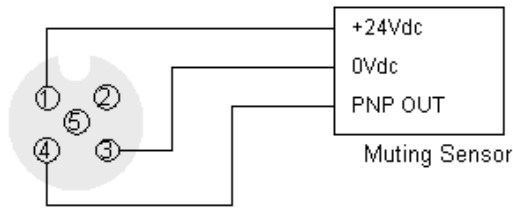
The connection cable between TX connector and Transmitter of the F3S-TGR-CL - system has to be pin-to-pin (4-pin M12, male and female).

Example: F39-TGR-CVL-B-2-EE

The connection cable between RX connector and Receiver or Transceiver of the F3S-TGR-CL - system has to be pin-to-pin (8-pin M12, male and female).

Example: F39-TGR-CVL-B-2-RR

The wiring for all muting sensors inputs is shown in below picture



5-pin M12 connectors are used for each muting sensor input.

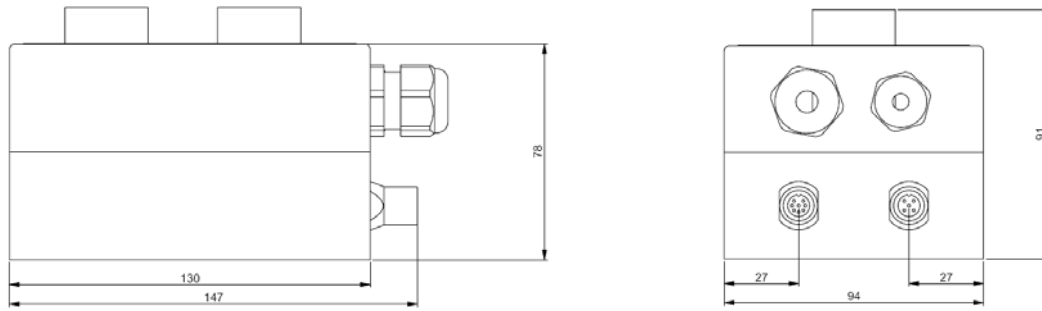
6 Technical Data

6.1 Electrical and optical data

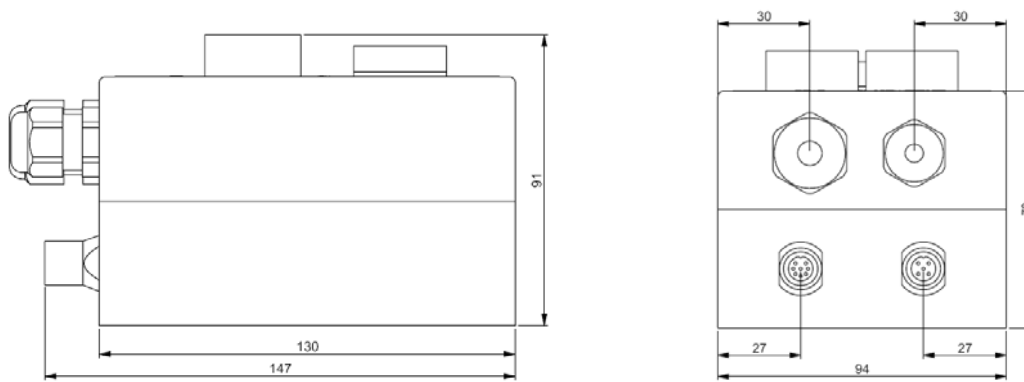
Power supply	24 Vdc \pm 10%.
Consumption	10W max
Response time	ON to OFF = 6ms
	OFF to ON= 12ms
Ambient temperature	During operation; -10 to + 55 °C (With no dew condensation)
Ambient humidity	15% to 95% (non condensing).
RX connection	M12 8 poles female
TX connection	M12 4 poles female
Cabinet connection	14 poles terminals block for I/O and 4 poles terminal block for Relay outputs Wire size: 0.2mm ² to 1.5mm ² (solid and stranded). 0.2mm ² to 0.75mm ² (ferrules) AWG 24 (min) to AWG 16 (max). Cable diameter M16 cable gland: 4.5mm to 10mm M20 cable gland: 6mm to 12mm
Sensors connector	4 x M12 4-pin female (F39-TGR-CL-W-Ibox-4 only)
Muting indicator	Flat lamp (F39-TGR-CL-W-Ibox-2) Yellow muting Lamp (F39-TGR-CL-W-Ibox-3 and F39-TGR-CL-W-Ibox-4)
Housing	Polycarbonate grey
Degree of protection	IP65
Weight	0.5kg

6.2 Dimensions

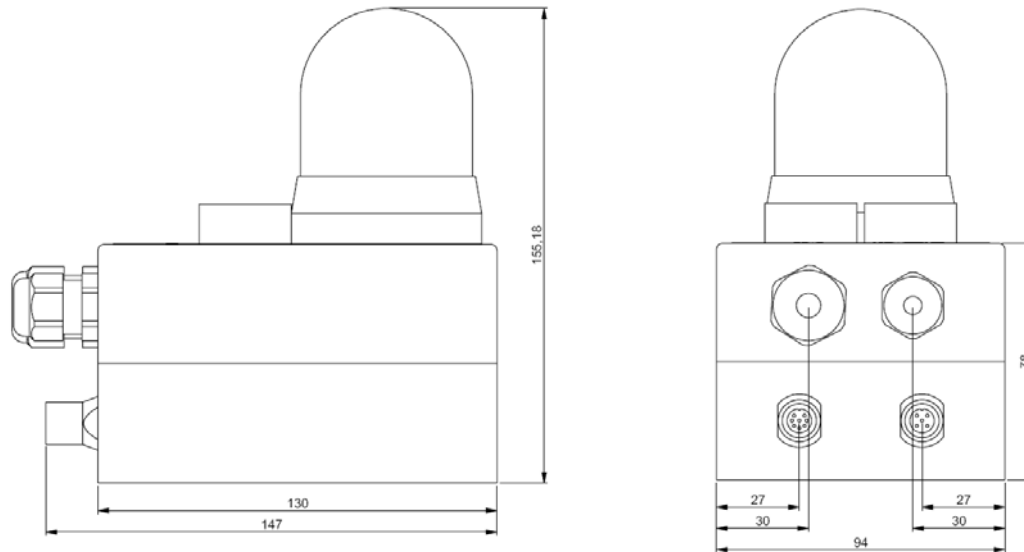
F39-TGR-CL-W-IBOX-1:



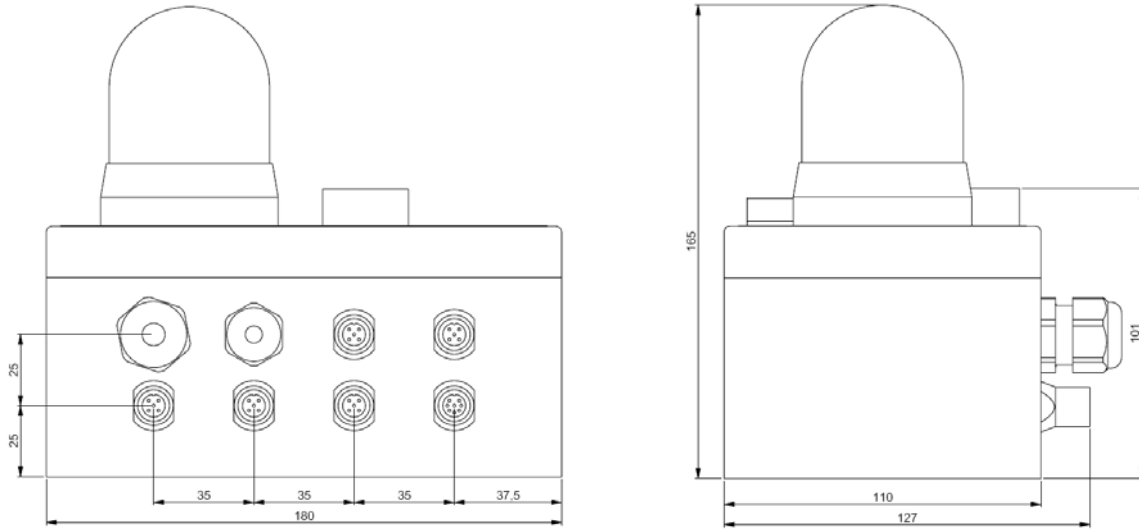
F39-TGR-CL-W-IBOX-2:



F39-TGR-CL-W-IBOX-3:



F39-TGR-CL-W-IBOX-4:



7 Accessories

Cables

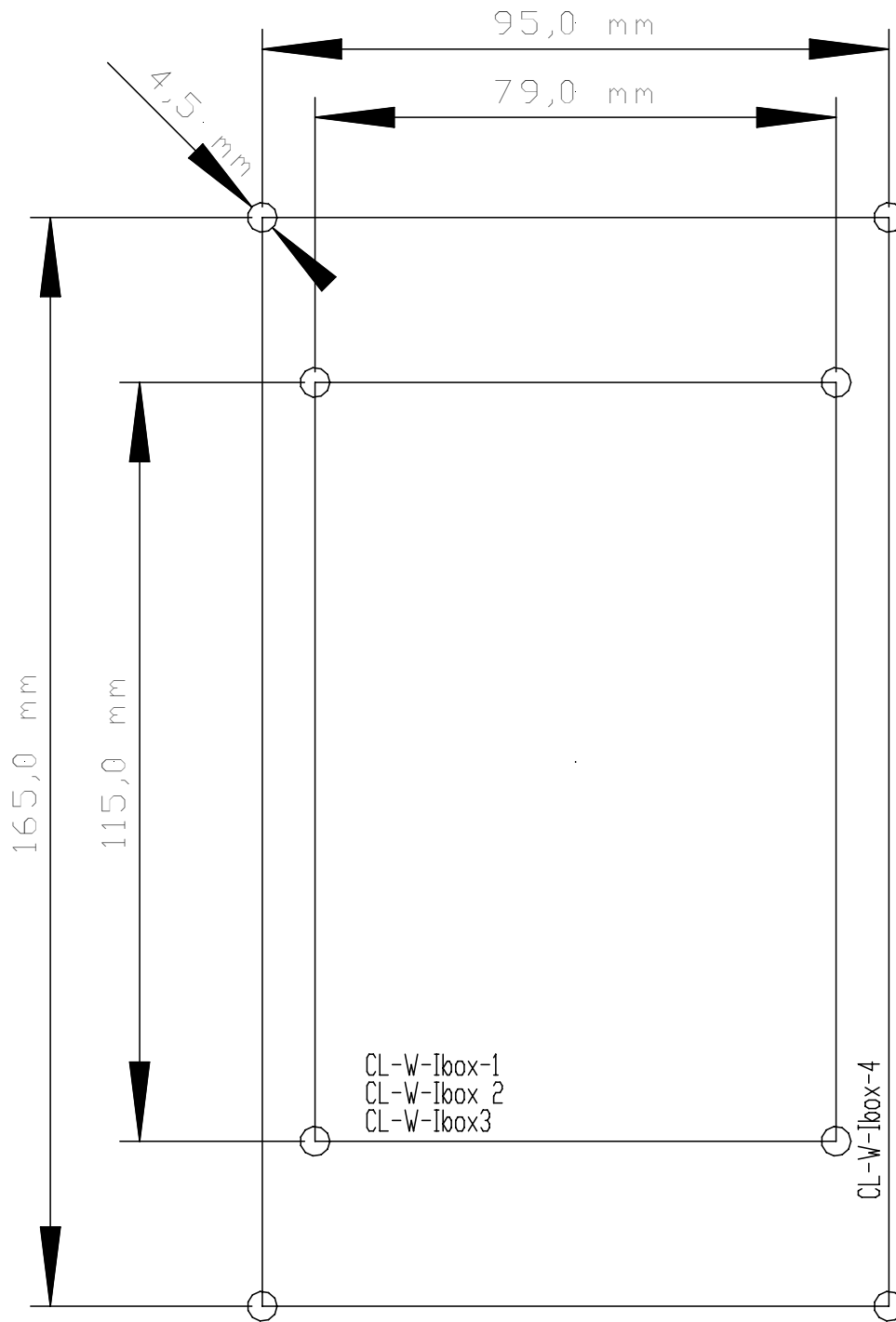
Connection of F3S-TGR-CL – Sensors to F39-TGR-CL-W-IBOX

	Transmitter cables M12-4pin, male/female connector	Receiver cables M12-8pin, male/female connector
2m	F39-TGR-CVL-B-2-EE	F39-TGR-CVL-B-2-RR
5m	F39-TGR-CVL-B-5-EE	F39-TGR-CVL-B-5-RR
10m	F39-TGR-CVL-B-10-EE	F39-TGR-CVL-B-10-RR

Connection for muting sensors to F39-TGR-CL-W-IBOX-4

	Sensor cables M12-4pin, male/female connector straight
1m	XS5W-D421-C81-A
2m	XS5W-D421-D81-A
3m	XS5W-D421-E81-A
5m	XS5W-D421-G81-A
10m	XS5W-D421-J81-A

8 Drilling jig



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9 Declaration of conformity

Ref.nr.: ETGR-010702

OMRON

EC DECLARATION OF CONFORMITY

We hereby declare that the following product is in conformity with requirements of the following EC Directives:

Product: INTERCONNECTION BOX for F3S-TGR-CL safety light curtain
Types: F39-TGR-CL-W-IBOX_

Title and No. of Directive: EMC Directive, 2004/108/EC

YEAR CE MARK AFFIXED: 2010

These products are designed and manufactured in accordance with the following standards:

Electrical safety: Electronic equipment used in power installation **EN50178:1997**

Electromagnetic immunity: Electro sensitive protective equipment **EN61496-1:2004**

Electromagnetic Emission: Industrial, scientific and medical equipment **EN55011:2007**

Description of Product:

The F39-TGR-CL-W-IBOX-_ series are equipment designed specifically to ease the connection of safety light curtain's external inputs, reducing the cabling and simplify connection of Safety Light curtain.

Product covered:

F39-TGR-CL-W-IBOX-1; F39-TGR-CL-W-IBOX-2; F39-TGR-CL-W-IBOX-3; F39-TGR-CL-W-IBOX-4

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Responsible person for documentation:

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Date: 01/07/2010

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OMRON

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