



Danfoss IXA - Installation Guide

MES 1001 Installation Guide

In Situ Marine Emission Sensor



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1 Safety

1.1 Safety Message Types

The following symbols are used in this manual.

Definitions



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



Indicates a potentially hazardous situation, which, if not avoided, could result in minor or moderate injury. It may also be used to alert against unsafe practices.



Indicates important information, including situations which may result in damage to equipment or property.

1.2 General Safety



This manual contains important instructions that must be followed during installation and maintenance of the marine emission sensor.



BEFORE INSTALLATION

Check for damage to equipment and packaging. If in doubt, contact the supplier before commencing installation.



Personnel conducting maintenance must be:

- Trained and authorized in general safety rules for work on electrical equipment.
- Familiar with local requirements, rules, and regulations for the installation.



HOT SURFACES

Burn hazards may appear in the surrounding environment at the installation point due to hot surfaces.



When planning the installation site, ensure that the product label and warning labels remain visible.



Handle the marine emission sensor with care. Ensure safe mounting by lifting and moving the marine emission sensor carefully. Two people may be necessary to carry the unit.

The weight of the marine emission sensor is considerable and may cause injury if dropped. Wear safety boots.

2 Introduction

2.1 Purpose of this Guide

The *Installation Guide* provides information required to install the marine emission sensor.

Other available resources:

- *MES 1001 Data Sheet* (100300-DSH)
- *MES 1001 User Guide* (100320-MAN)
- *MES 1001/MES1001 MARPOL Spare Parts and Accessories Catalogue* (100058-CAT)

These documents are available for download at <https://danfoss-ixa.com/services-and-support>, or from the supplier of the marine emission sensor.

2.2 Abbreviations

Abbreviation	Description
CCD	Charged Coupled Device
COG	Center of gravity
DIN	Deutsche Industrie Norm
NH ₃	Ammonia
NO	Nitric oxide
NO ₂	Nitrogen dioxide
NO _x	A generic term for NO and NO ₂ (nitric oxide and nitrogen dioxide)
ppm	Parts Per Million
RoHS	Restriction of Hazardous Substances
SCR	Selective Catalytic Reduction
SO ₂	Sulfur dioxide
UV	Ultraviolet
WEEE	Waste Electrical and Electronic Equipment Directive

Table 1: Abbreviations

2.3 Considerations

Consider the following when installing the marine emission sensor:

- General product information – see section 3 Product Introduction
- Installation Point and Flange – see section 4 Mechanical Installation
- Connection points for sensor – see section 5 Connection Area
- Compressed air quality and installation – see section 6 Pneumatic Installation
- Cabling, Cables and Connector types – see section 7 Electrical Installation
- Configuration and communication – see section 8 Configuration and Communication

2.4 Items Supplied

The product is delivered with:

- USB stick
- Installation Guide, supplied on USB
- User Guide, supplied on USB
- Data Sheet, supplied on USB
- Calibration Certificate, supplied on USB

2.5 Identification



Illustration 1: Example of Product Label

Part no.	100100-003
Rev.	D
Ser. no.	1745-0007 or 1745-0007-0001

Table 2: Example of MES 1001 Product Label Information

3 Product Introduction

This section covers the following subjects:

- Product Description
- System Overview
- Dimensions

3.1 Product Description

The MES 1001 is a marine emission sensor intended for measuring gases in maritime exhaust gas applications. It is designed to withstand harsh environments. The ability of the MES 1001 to operate in harsh environments with a low maintenance rate makes the sensor suitable for demanding applications. The sensor measures the content of NO_x, SO₂ and NH₃ in the engine exhaust gas. The marine emission sensor is an in-situ sensor, i.e. it performs the measurement directly in the exhaust gas. The sensor unit is mounted on the side of the exhaust pipe and measures the exhaust gas passing the sensor probe.



Illustration 2: MES 1001

Features of the MES 1001

- Measures NO_x, SO₂, and NH₃
- Designed as a standalone unit
- Designed for easy installation on site: 2 persons can mount the marine emission sensor using standard tools and installation instructions
- Installation and setup/configuration do not take longer than 1 hour (as a prerequisite, the required infrastructure must be available and appropriately prepared (cable, flange etc.))

3.2 System Overview

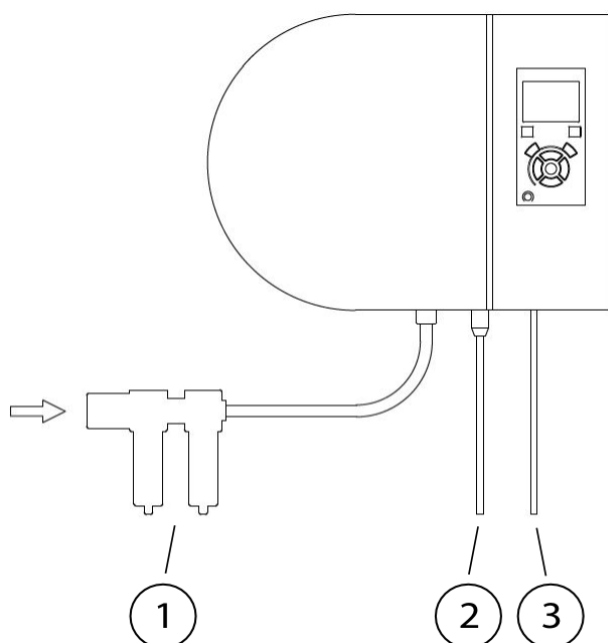


Illustration 3: System Overview

Item	Description
1	Filter for compressed air
2	24 V DC
3	Interfaces

Table 3: Legend to Illustration 3

3.3 Dimensions

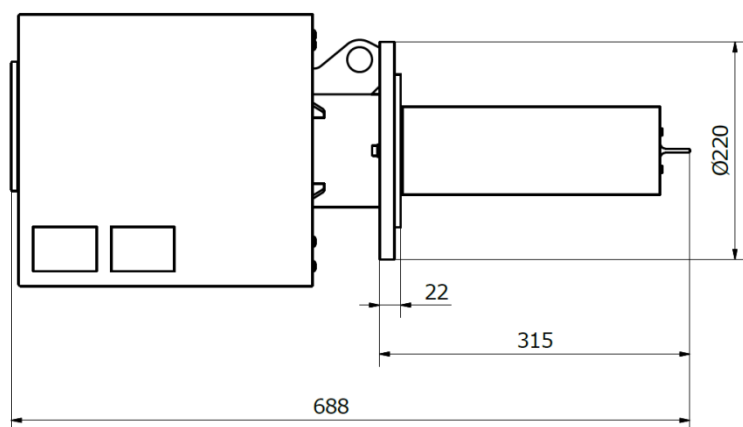


Illustration 4: Dimensions

All dimensions are in mm.

3.4 MES 1001 Probe Orientation

NOTICE

The sensor **MUST** be installed on the exhaust pipe correctly according to the sensor configuration. The sensor must not be reconstructed for alternative configurations. However, in case another configuration is required, it is essential to consult Danfoss IXA for specific guidance.

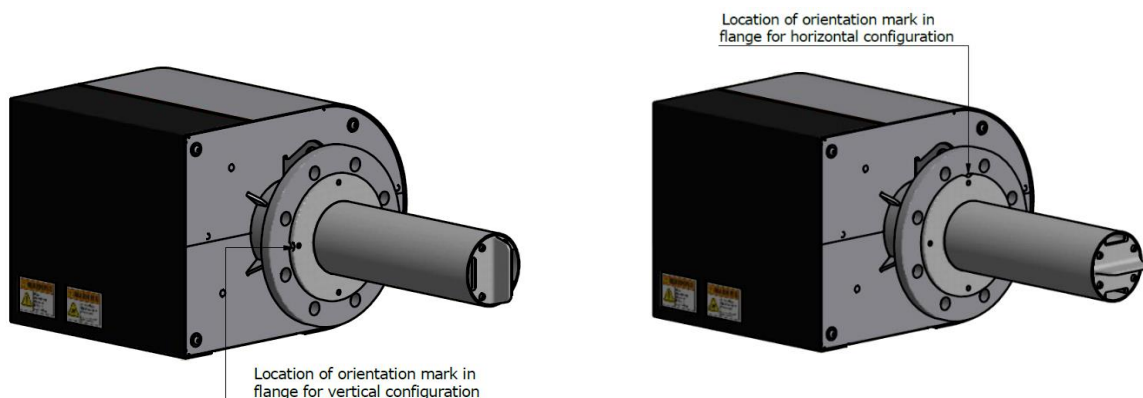


Illustration 5: Location of orientation mark for vertical and horizontal Configuration

Orientation	Specification
Vertical (Left)	Location of orientation mark in flange for vertical configuration sensors
Horizontal (Right)	Location of orientation mark in flange for horizontal configuration sensors

Table 4: Legend to Illustration 5

4 Mechanical Installation

This section covers the following subjects:

- General installation requirements
- Preparation
 - Planning the installation site and planning phase
- Installation Point
 - Distance to SCR
 - Distance to a bend or branch
- Flange for installation point
 - Welding Neck Dimensions and Insertion Depth
 - Positioning of the flange
 - Mounting of the flange
- Lifting
- Mounting

4.1 General Installation Requirements

CAUTION

Read the safety instructions before installing the unit. Failure to follow the recommendations could result in personal injury.

NOTICE

It is important to plan the installation of the unit. Neglecting to plan may result in extra work during and after installation as well as risk of damaging the unit.

NOTICE

When receiving the unit, make sure that the packaging is intact. Also be aware of any damage that might have occurred to the unit during transport. In case damage has occurred, immediately contact the shipping company to claim the damage as per applicable incoterms.

4.2 Preparation

4.2.1 Planning the Installation Site

NOTICE

- Determine the installation location. Observe the ambient conditions.
- Always pay attention to the flow direction and consider this when mounting the unit.
- Observe the space requirements and clearances. Provide for additional space for maintenance work.
- Provide the appropriate power supply. Observe the power requirements stated in the data sheet for MES1001.
- The flange must be prepared appropriately e.g., load-carrying capacity of the welded flange. The material must be compatible with the surrounding environment,
- Provide compressed air according to the data sheets for MES1001.

NOTICE

To prevent contamination of optics and unnecessary use of the Advanced High-Power Light Source, Danfoss IXA strongly recommends installing the sensor at the installation point as late as possible until continuous air supply can be applied. Failing to do so may result in damaging the sensor as well as extra cost for repair.

4.3 Installation Point

The positioning of the installation point for the MES 1001 is important to ensure optimal measurement conditions for the sensor. The following section provides requirements for positioning of the installation point for the MES 1001 sensor.

The marine emission sensor is a flexible product, which can be installed in several suitable positions in the exhaust line, e.g., after the turbocharger or after the SCR. The minimum diameter of the exhaust pipe at the installation point is 250 mm. Below requirements and illustrations are to assist positioning the installation point for the MES 1001 sensor with optimal measurement conditions.

NOTICE

The requirements for positioning of the installation point for the MES 1001 are to ensure the optimal measurement conditions for the sensor, hence the sensor will not be damaged if the requirements are not complied with.

4.3.1 Distance to SCR

Illustration 6 shows the distance from the installation point to the outlet of the SCR and the recommended guideline for the distance is described in Table 5.

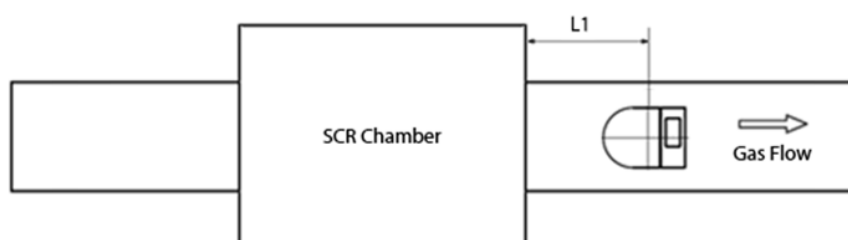


Illustration 6: Distance from installation point to outlet of the SCR

No.	Description
L1	The installation point of the MES 1001 Sensor should have a distance to the outlet of the SCR which ensures that the exhaust gas is appropriately homogeneous to get valid measurements.

Table 5: Legend to Illustration 6

NOTICE

The sensor cannot be damaged if the installation point is too close to the SCR.

4.3.2 Distance to a Bend or Branch

Illustration 7 shows the distance from the installation point to a bend when the installation point is positioned upstream of the bend and downstream of the bend and the distances are shown in Table 6.

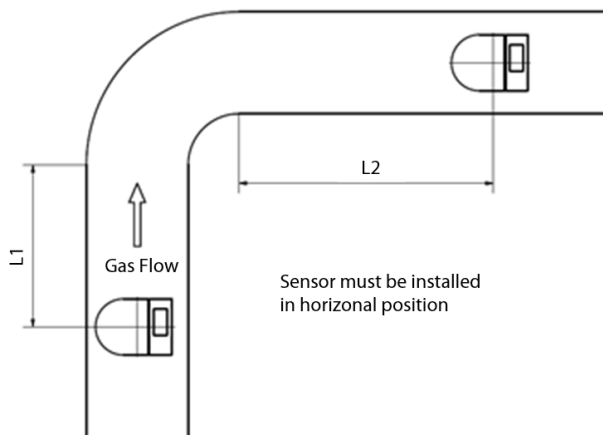


Illustration 7: Distance from installation point to a bend

No.	Description
L1	At least 0.5 m
L2	At least 1.5 m

Table 6: Legend to Illustration 7

The distance requirements from the installation point to a branch when the installation point is positioned upstream of the bend and downstream of the branch are identical to the requirements for a bend as shown in Illustration 8.

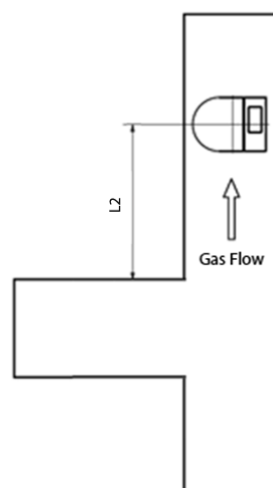
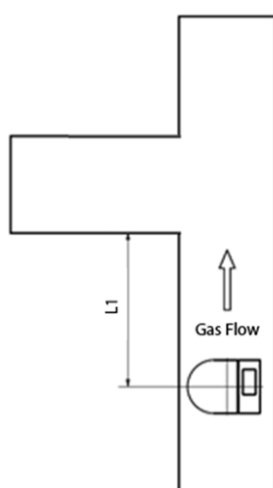


Illustration 8: Distance from installation point to a branch

No.	Description
L1	At least 0.5 m
L2	At least 1.5 m

Table 7: Legend to Illustration 8

4.4 Flange for Installation Point

This section describes considerations regarding flange dimensions, positioning of the flange and mounting of the flange on the stack. The flange is customer-built according to Danfoss IXA specifications.

NOTICE

The circular welding neck flange is based on NT 16, DN100, DIN2633, PN16, ISO standard.

4.4.1 Welding Neck Dimensions and Insertion Depth

The welding neck length for the flange are determined based on the requirements regarding insertion depth of the probe for the sensor and a minimum clearance for installation of bolts and nuts when mounting the sensor.

The requirements regarding insertion depth of the tip of the probe are minimum 10 % of the stack diameter into the stack and maximum 50 % of the stack diameter into the stack when the sensor is installed at the flange which is shown on Illustration 9.

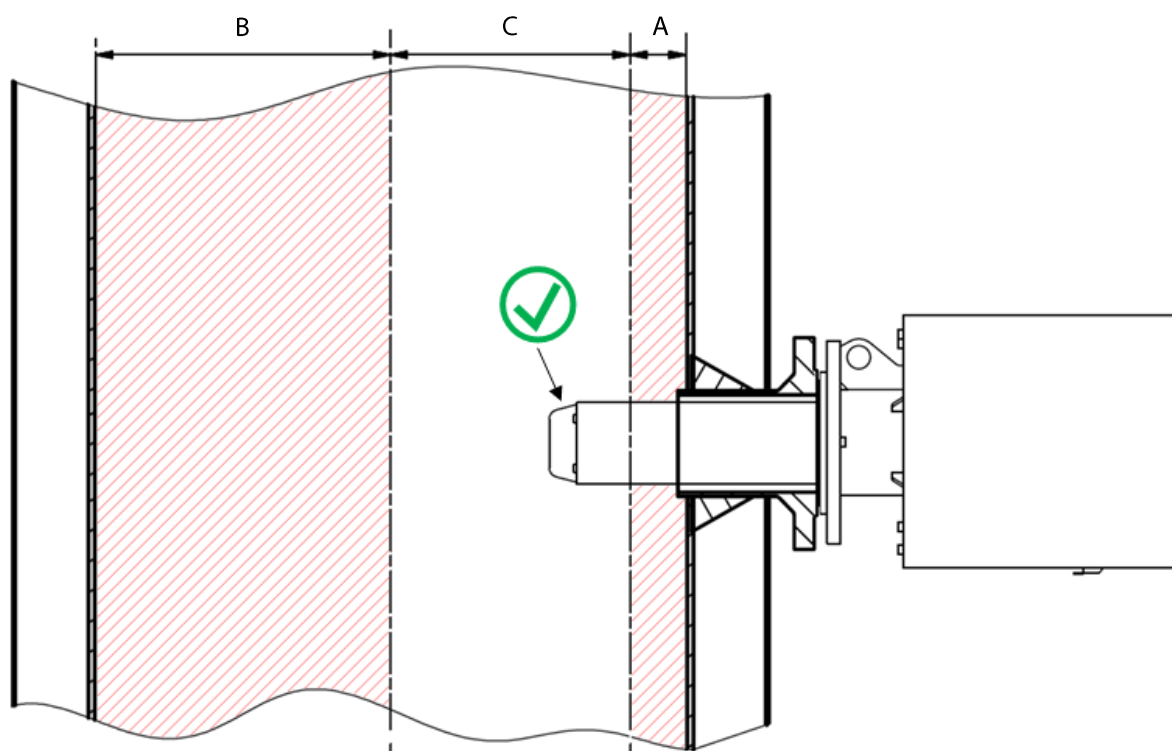


Illustration 9: Insertion depth of probe

Area	Description
A	0-10 % of stack diameter – Area in which the tip of the probe must <u>not</u> be positioned when installed.
B	50-100 % of stack diameter - Area in which the tip of the probe must <u>not</u> be positioned when installed.
C	10-50 % of stack diameter – Area in which the tip of the probe must be positioned when installed.

Table 8: Legend to Illustration 9

The minimum clearance for installation of bolts and nuts are 30 mm from stack or stack insulation to flange which is shown in Illustration 10. Distance A on Illustration 10 is decided by the requirement for insertion depth from Illustration 9 and distance B requirement from Illustration 10.

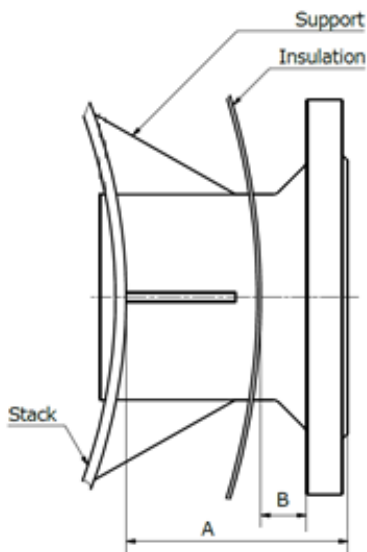


Illustration 10: Welding Neck Dimensions for the Flange

Distance	Description
A	Distance from stack or stack insulation to MES 1001 flange.
B	Min. 30 mm clearance from stack or stack insulation to circular flange to ensure room for bolts and nuts.

Table 9: Legend to Illustration 10

For stack diameters between 250 mm and 1250 mm the recommended length of distance A from Illustration 10 is 135 mm, however below formula can be used to calculate distance A for the specific installation point. Table 10 contains a description of the symbols in the formula.

$$ID = \frac{PL - A}{SD} \cdot 100 \%$$

$$10\% \leq ID \leq 50\%$$

Symbol	Description
ID	Insertion Depth
PL	Probe Length (260 mm)
A	Distance from Illustration 10 (min. 30 mm)
SD	Stack Diameter (min 250 mm)

Table 10: Legend to formula for calculating distance A from Illustration 10

4.4.2 **Positioning of the Flange**

The positioning of the flange must be aligned to the center of the exhaust pipe according to Illustration 11. The hole in the exhaust pipe must be Ø115 mm.

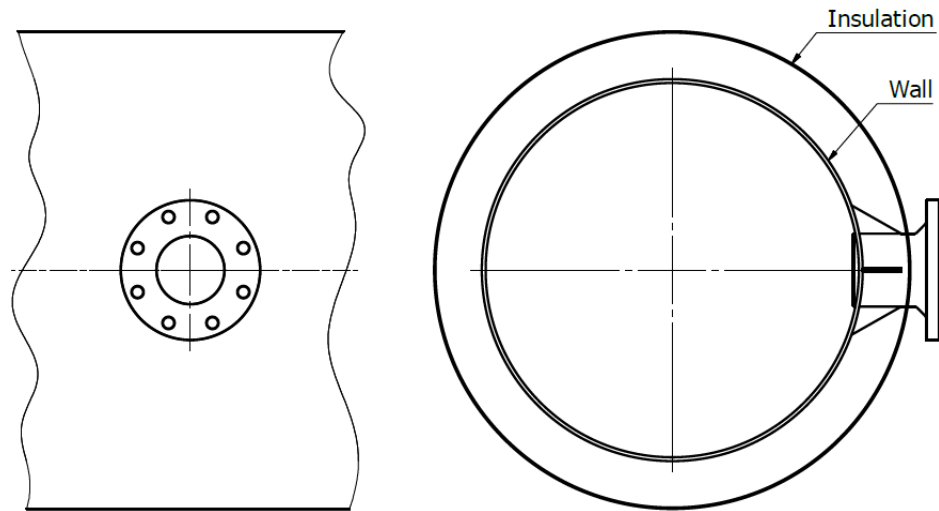


Illustration 11: Alignment of the flange

The flange is positioned in the hole (Ø115) and the flange and the bolt holes must be orientated according to Illustration 12. A maximum deviation of 10° from vertical (A) or horizontal (B) alignment is accepted.

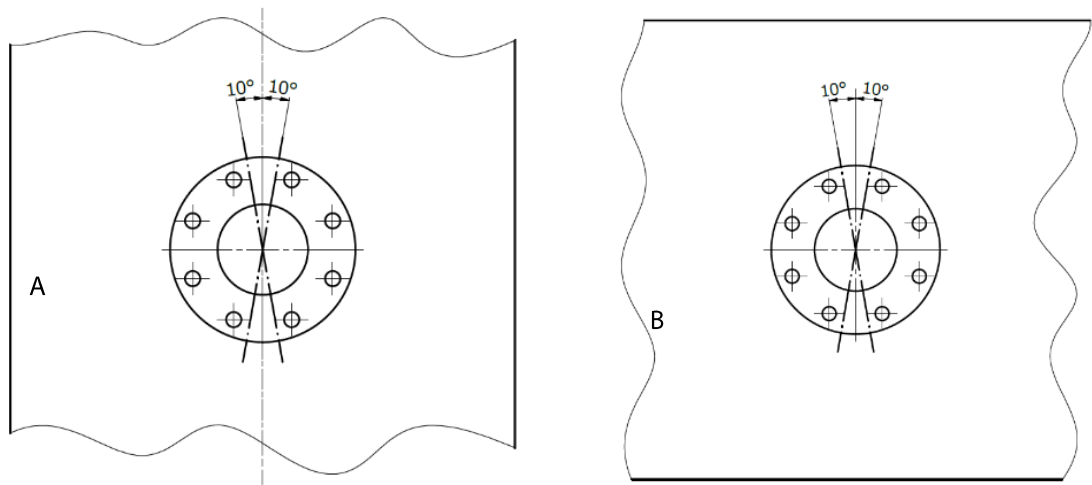


Illustration 12: Positioning tolerance of the flange

Tolerances	Specification
Vertical (A)	10° / 10°
Horizontal (B)	

Table 11: Legend to Illustration 12

4.4.3 Mounting the Flange

The fixation of the flange shall be designed in accordance with the environmental and mechanical specifications of the actual location. The flange is fully welded to the exhaust pipe from the outside. The thickness of the welding must be appropriate for the installation.

Additional support of the flange may be required. The Center of Gravity (COG) for the marine emission sensor is 100 mm from the flange, see distance A on Illustration 13 and mass of sensor is 350 N.

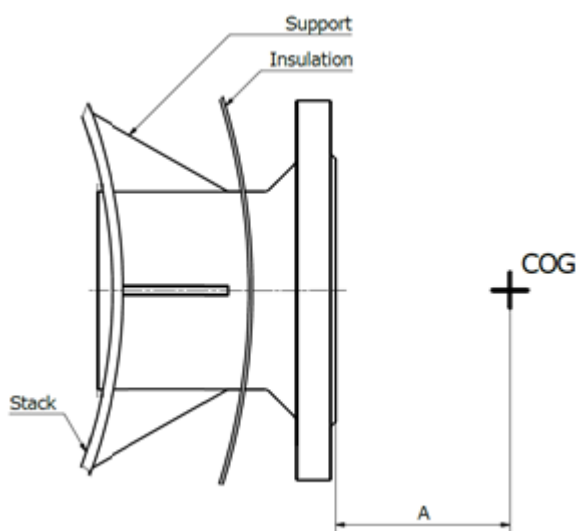


Illustration 13: Welding of the Flange

Item	Description
A	Distance from flange to COG = 100 mm

Table 12: Legend to Illustration 13

4.5 Lifting

When lifting the unit, use the dedicated lifting eye (1). The diameter of the hole is Ø25 mm. Ensure the lifting equipment can accommodate the weight of the unit (35 kg).

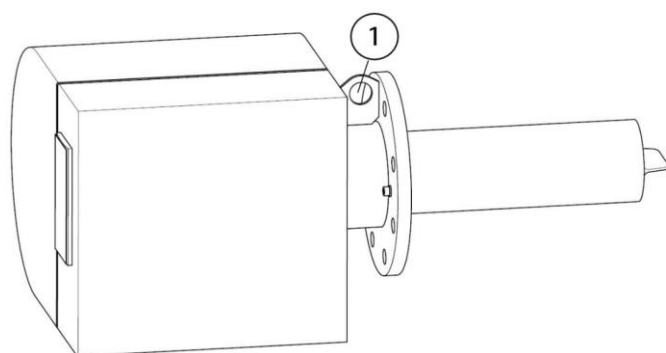


Illustration 14: Lifting eye on MES 1001

No.	Description
1	Lifting eye, inner diameter Ø25 mm

Table 13: Legend to Illustration 14

4.6 Mounting

Illustration 15 shows an exploded view on how to install the gasket for the flange and the fasteners correctly when mounting the sensor.

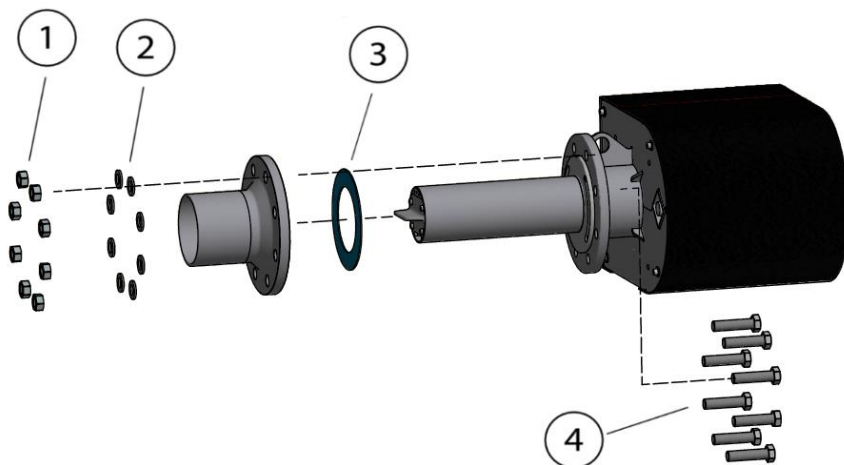


Illustration 15: Exploded view

No.	Description	Specification
1	Nuts (8)	Hex nut, M16, DIN 934, Steel Class 8, zinc finish or similar
2	Steel washers (8)	M16, DIN 125.A, Steel, zinc finish or similar
3	Gasket (1)	For flange, Steffca, FSS-DN100 - 000691-108. PN10 or similar
4	Bolts (8)	Bolts M16 x 65, DIN 931, Steel 8.8, zinc finish or similar

Table 14: Legend to Illustration 15



HOT SURFACE - Be aware that the marine emission sensor flange and the surrounding environment may become hot during engine operation.

Tighten bolts with the appropriate tightening torque:

Item	Tool	Tightening torque
Bolts M16 x 65	Wrench 24 mm	200 Nm

Table 15: Torque specification



Make sure to tighten the bolts using a crosswise tightening sequence three times all the way around.

5
 Connection Area

This section covers the following subjects:

- Overview of Connection Area

5.1
 Overview of Connection Area

All connection points to the MES 1001 are in the Connection Area. Illustration 16 shows the connection area on the MES 1001 sensors and legends for Illustration 16 are in Table 16.

All connectors required to install the MES 1001 sensors are supplied by Danfoss IXA. Information on the specific connectors are included in the *Marine Emission Sensor 1001 Spare Parts and Accessories Catalogue* (100058-CAT).

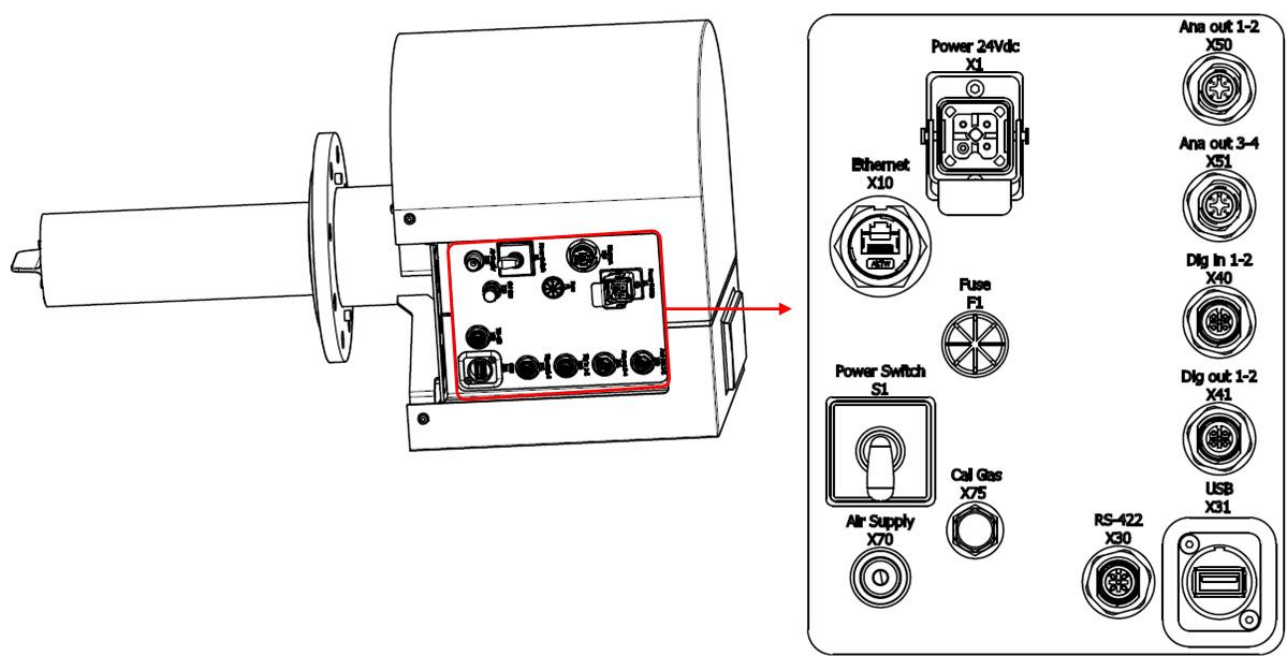


Illustration 16: Overview of the Connection Area

Reference	Description	Interface specification
S1	ON/OFF switch	
F1	Fuse	Section 7.3 - Fuse Specification
X1	Power input 24 VDC	Section 7.2.1 - Connector for Power Supply
X10	Ethernet	Section 7.2.5 - Connector for Ethernet Connection
X30	RS-422	Section 7.2.6 - Connector for GPS Input
X31	USB	
X41	Digital output 1 and 2	Section 7.2.4 - Connector for Digital Outputs
X40	Digital input 1 and 2	Section 7.2.3 - Connector for Digital Inputs
X50	Analog out 1 Analog out 2	Section 7.2.2 - Connectors for Analog Outputs
X51	Analog out 3 Analog out 4	Section 7.2.2 - Connectors for Analog Outputs
X70	Air supply	
X75	Cal Gas	Not applicable - only available at MARPOL version

Table 16: Legend to Illustration 16

6 Pneumatic Installation

This section covers the following subjects:

- General Pneumatic Installation Requirements

6.1 General Pneumatic Installation Requirements

The compressed air supplied to the sensor through an appropriate filter must be supplied from the vessel's service air supply.

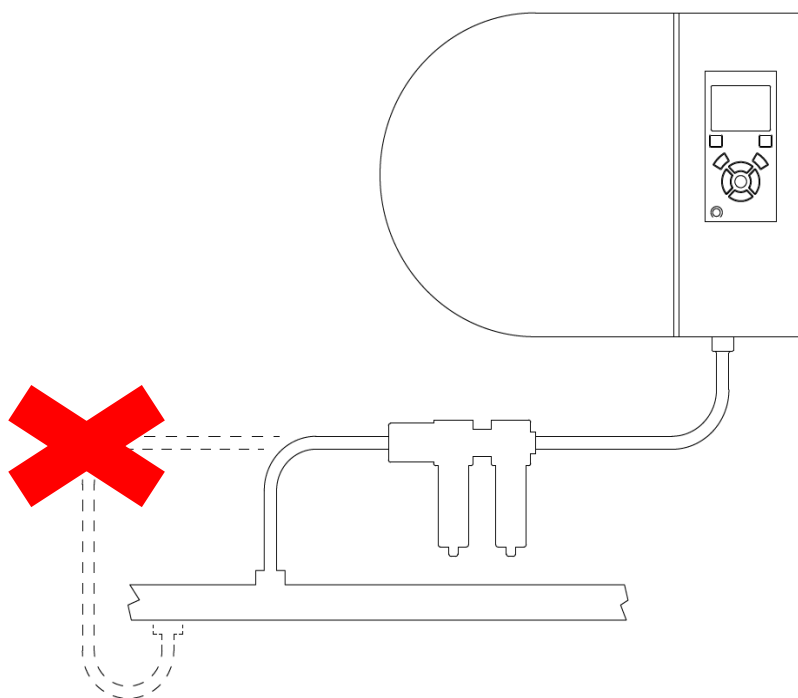


Illustration 17: Correct positioning of compressed air line to the MES 1001 sensor

The air outlet to the sensor must be placed above the compressed air line as shown on Illustration 17 to avoid intake of condensate in the sensor and the compressed air line must be positioned below the sensor.

6.2 Air Quality

Ensure installation of a separate filter complying with the air quality requirements from *Marine Emission Sensor 1001 Data Sheet* (100300-DSH). Filter must be ordered separately and Danfoss IXA offers a wide range of filters which provides the required air quality.

Mount the filter unit at a maximum distance of 3 m from the marine emission sensor, positioned before the marine emission sensor in the flow direction. The filter unit must be mounted in such a way that the metal bowls are pointing down to ensure that condensate will be (automatically) drained out. Ensure that the drain outlets are open and not blocked.



Shutting off the air supply is only permitted when no exhaust gas is present in the system.

NOTICE

Flexible tubes for the air filter can be supplied by Danfoss IXA. The flexible tubes are reinforced with double stainless steel wire braid and recommended tightening torque is 13 Nm.

7 Electrical Installation

This section covers the following subjects:

- General Electrical Installation Requirements
 - Shield Installation
 - Power Supply Cable
 - Signal Cables
- Connectors for Interfaces
 - Connector for Power Supply
 - Connectors for Analog Outputs
 - Connector for Digital Inputs
 - Connector for Digital Outputs
 - Connector for Ethernet Connection
 - Connector for RS-422 Interface
- Fuse specification

7.1 General Electrical Installation Requirements

Connect all required cables. Ensure correct cable connections.

CAUTION

DO NOT apply power before cables are properly connected. Hold cables in place with cable ties.

NOTICE

Allow enough excess cable length between the sensor and the first fixation point to enable the sensor to move freely in vibrating environments.

NOTICE

It is important that each connector is mounted on the cable according to the manufacturer's specification.

NOTICE

Incorrect mounting of the cable shielding in the connector may cause the sensor to malfunction.

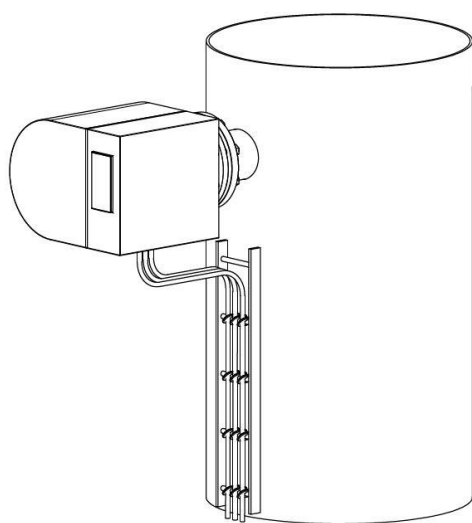


Illustration 18: Example of correct cable installation

7.1.1 Shield installation

The connectors contain EMC cable glands or shielded connectors. Illustration 19 shows the correct installation of the shield in the EMC cable glands.

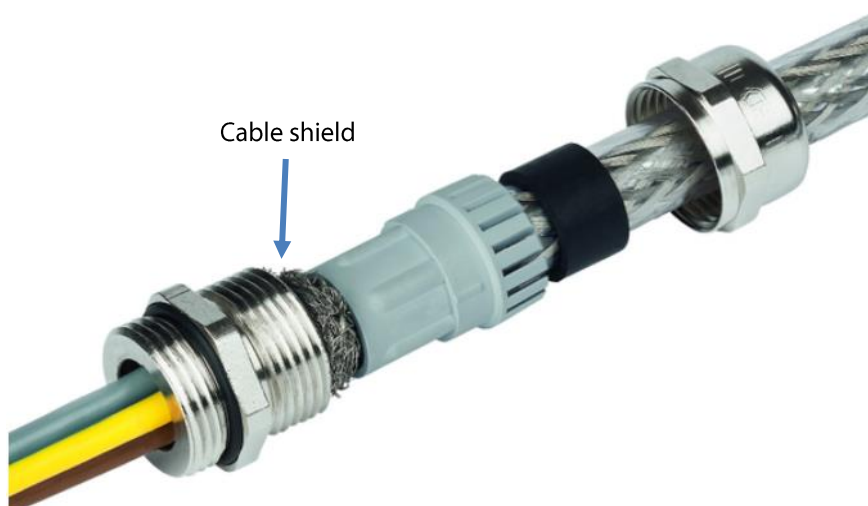


Illustration 19: Correct Installation of the Shielded Cable in the EMC Cable Gland

NOTICE

Incorrect mounting of the cable shielding in the EMC cable gland may cause the sensor to malfunction.

7.1.2 Power Supply Cable

The power supply cable for the MES 1001 sensors should be shielded marine cable with two conductors. Section 7.2.1 shows the electrical diagram for wiring the power supply and the standard Power Supply Connectors for MES 1001 sensors can be supplied by Danfoss IXA.

7.1.3 Signal Cables

The signal supply cables for analog outputs, digital outputs and digital inputs to the MES 1001 sensors should be shielded marine cable. Sections 7.2.2, 7.2.3, 7.2.4 and 7.2.6 shows the electrical diagram for wiring the connectors for analog outputs, digital outputs, digital inputs and RS-422 (GPS) Interface. These connectors for MES 1001 sensors can be supplied by Danfoss IXA.

7.2 Connectors for Interfaces

7.2.1 Connector for Power Supply

Table 17 shows the technical specifications of the power supply for the MES 1001 Sensor.

Parameter	Specification
Input Voltage Range	24 VDC \pm 25 %
Output Voltage	24 VDC
Output Current Full Load	3,125 A
Rated Power Output	75 W

Table 17: MES 1001 Sensor Power Supply Specification

Table 18 shows the technical specifications for the Power Supply Connector available for purchase from Danfoss IXA.

Connector	Outer diameter of cable	Conductor cross-section
Power Supply	10.0-15.8 mm	0.5 mm ² -2.5 mm ²

Table 18: Specification for Power Supply Connector

Table 19 and Illustration 20 shows the pinout of the contact insert for the Power Supply Connector and Illustration 21 shows the electrical diagram for the installation of the power supply cable.

Pins - Power supply Connector	Description
Pin 1	+24 VDC
Pin 2	0 DC
Pin 3	Not used
Pin \perp	Not used



Table 19: Connection Details, Power Supply

Illustration 20: Contact Insert

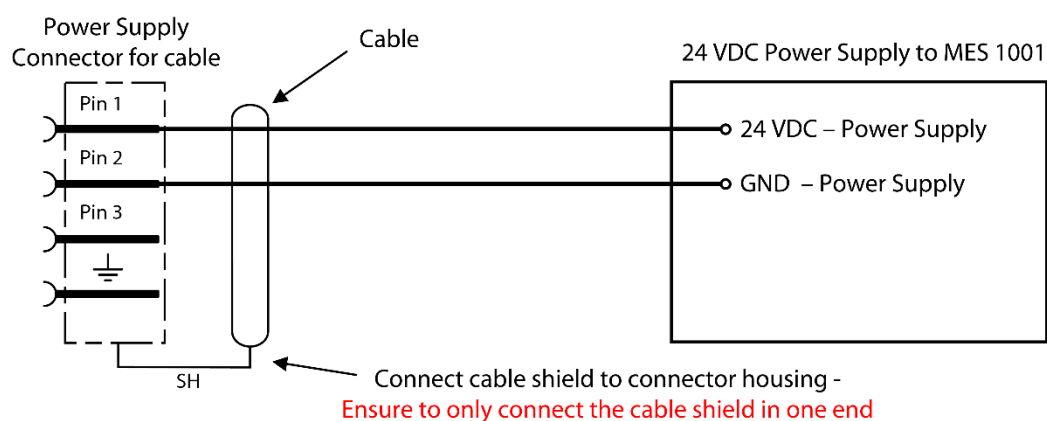


Illustration 21: Electrical Diagram, Power Supply Interface

NOTICE

Remember to connect cable shield to connector housing in one end of the cable ONLY!

7.2.2
 Connectors for Analog Outputs

The MES 1001 Sensor provides four analog outputs. Using analog output 1 and 2 requires one Analog Output Connector and using analog 3 and 4 requires an additional Analog Output Connector. Table 20 shows the technical specifications for the Analog Output Connectors.

Connection	Outer diameter of cable	Conductor cross-section
Analog Output	4-8 mm	0,14-0,5 mm ²

Table 20: Analog Output Connector Specification

Table 21, Table 22 and Illustration 22 shows the pinout of the Analog Output Connectors and Illustration 23 shows the electrical diagram for the installation of the analog output signal cables.

Pins	Description
Pin 1	+24 VDC loop power (analog output 1)
Pin 2	+24 VDC loop power (analog output 2)
Pin 3	4-20 mA output (analog output 2)
Pin 4	4-20 mA output (analog output 1)
Pin 5	Not used

Table 21: Connection Details, Analog Output 1 and 2

Pins	Description
Pin 1	+24 VDC loop power (analog output 3)
Pin 2	+24 VDC loop power (analog output 4)
Pin 3	4-20 mA output (analog output 4)
Pin 4	4-20 mA output (analog output 3)
Pin 5	Not used

Table 22: Connection Details, Analog Output 3 and 4

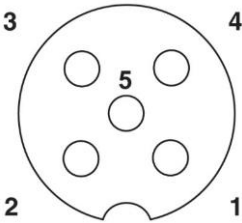


Illustration 22: Pin out for Analog Output Connectors

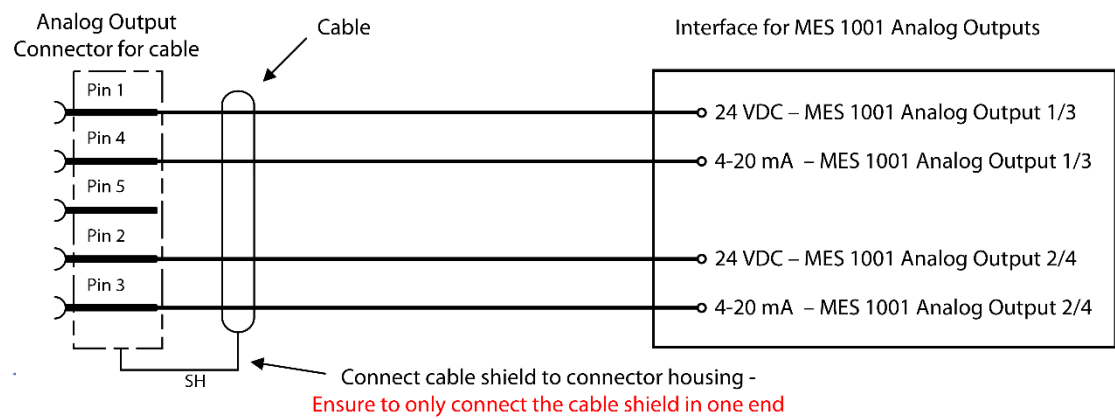


Illustration 23 Electrical Diagram, 24 V DC Loop Power to Analog Output Interface X50 or X51

NOTICE
 Remember to connect cable shield to connector housing in one end of the cable ONLY!

NOTICE
 To reduce noise in the Analog Out data signals, it is recommended to apply a sample rate of at least 20 Hz together with a running-average of at least 20 samples at the receiving end.

7.2.3
 Connector for Digital Inputs

The MES 1001 Sensor provides two digital inputs. Using digital input 1 and 2 requires one Digital Input Connector and Table 23 shows the technical specifications for the Digital Input Connector.

Connection	Outer diameter of cable	Conductor cross-section
Digital input	4-8 mm	0,14-0,5 mm ²

Table 23: Digital Input Connector Specification

Table 24 and Illustration 24 shows the pinout of the Digital Input Connector and Illustration 25 shows the electrical diagram for the installation of the digital input signal cable.

Pins	Description
Pin 1	0 VDC (digital input 1)
Pin 2	0 VDC (digital input 2)
Pin 3	+24 VDC (digital input 2)
Pin 4	+24 VDC (digital input 1)
Pin 5	Not used

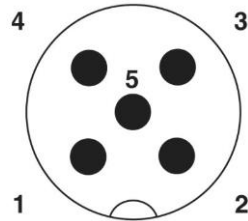


Table 24: Connection Details, Digital Input

Illustration 24: Pin out for Digital Input Connector

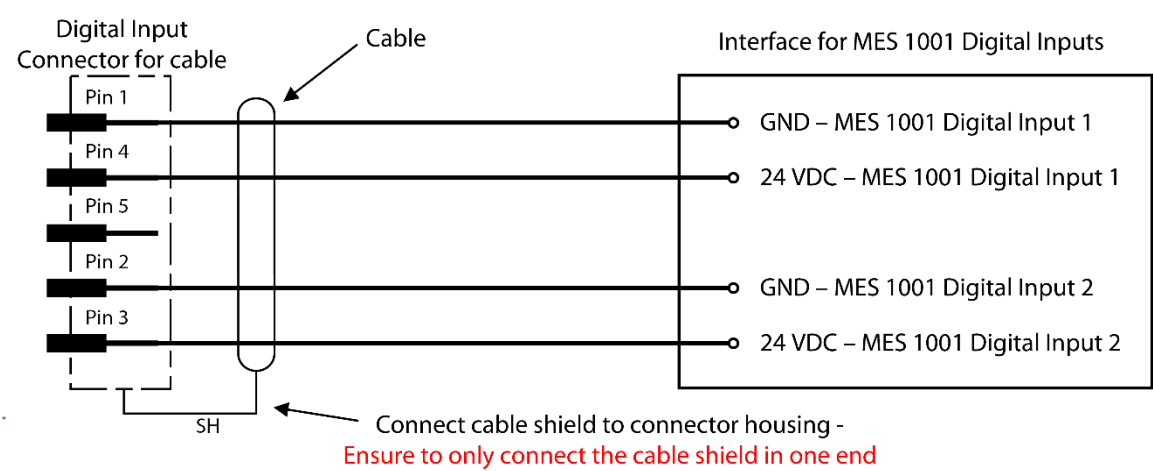


Illustration 25: Electrical wiring diagram for Digital Input Connector

NOTICE

Remember to connect cable shield to connector housing in one end of the cable ONLY!

7.2.4 Connector for Digital Outputs

The MES 1001 Sensor provides two digital outputs. Using digital output 1 and 2 requires one Digital Output Connector and Table 25 shows the technical specifications for the Digital Output Connector.

Connection	Outer diameter of cable	Conductor cross-section
Digital Output	4-8 mm	0,14-0,5 mm ²

Table 25: Digital Output Connector Specification

Table 26 and Illustration 26 shows the pinout of the Digital Output Connector and Illustration 27 shows the electrical diagram for the installation of the digital output signal cable.

Pins	Description
Pin 1	Solid state output pin A (digital output 1)
Pin 2	Solid state output pin A (digital output 2)
Pin 3	Solid state output pin B (digital output 2)
Pin 4	Solid state output pin B (digital output 1)
Pin 5	Not used

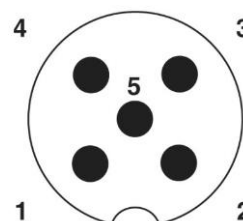


Table 26: Connection Details, Digital Output

Illustration 26: Pin out for Digital Output Connector

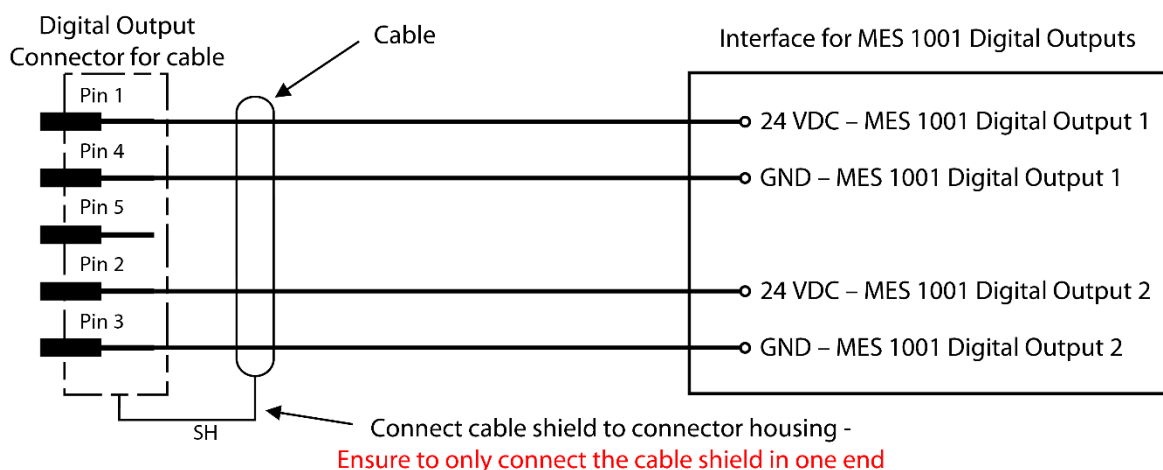


Illustration 27: Electrical wiring diagram for Digital Output Connector

NOTICE

Remember to connect cable shield to connector housing in one end of the cable ONLY!

7.2.5
 Connector for Ethernet Connection

The MES 1001 Sensor provides the possibility to communicate signals and configurations from the ethernet connection on the Connection Area using a Lockable RJ-45 Connector.

Be aware that there are two types of Lockable RJ-45 Connectors for the MES 1001 sensors depending on the production date. Contact Danfoss IXA Service & Support at ixa.service@danfoss.com for further information on which Lockable RJ-45 Connector to order. Table 27 shows the technical specifications for the two types of Lockable RJ-45 Connectors.

Connection	Range of cable diameter
Lockable RJ-45 Connector – Type 1	5-10 mm
Lockable RJ-45 Connector – Type 2	5-6 mm

Table 27: Specifications for Lockable RJ-45 Connector Type 1 and Type 2

Table 28 shows the pinout of the ethernet connector, Illustration 28 shows an example of RJ-45 connector with wire assignment TIA 568 A and Illustration 29 shows the electrical diagram for the installation of the ethernet cable.

Pins	Description
Pin 1	TX+
Pin 2	TX-
Pin 3	RX+
Pin 4	Not used
Pin 5	Not used
Pin 6	RX-
Pin 7	Not used
Pin 8	Not used

Table 28: Connection Details, ethernet connector



Illustration 28: Example of RJ-45 connector with wire assignment TIA 568 A

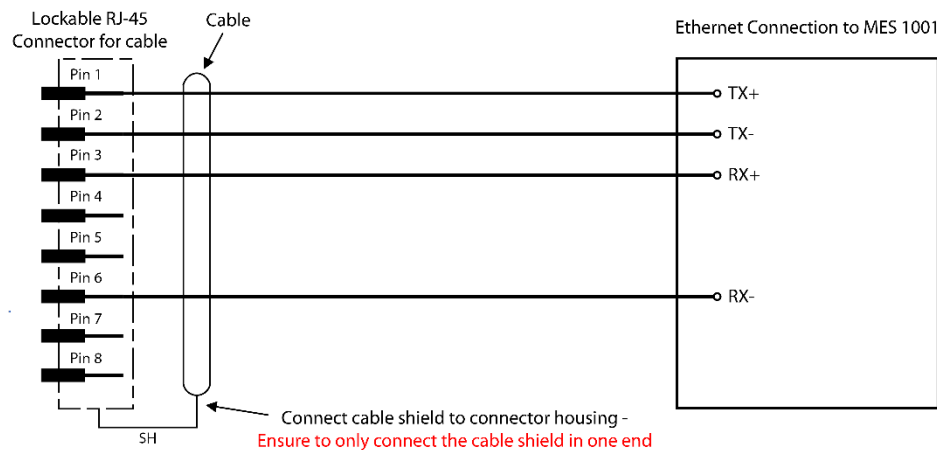


Illustration 29: Electrical wiring diagram for Ethernet Connector

NOTICE

Remember to connect cable shield to connector housing in one end of the cable ONLY!

7.2.6 Connector for GPS Input

The MES 1001 Sensor provides the possibility to receive a digital input with a GPS signal on the RS-422 connection on the Connection Area. Table 29 shows the technical specifications for the RS-422 Digital Input Connector for GPS signals.

Connection	Outer diameter of cable	Connection cross-section
RS-422 Digital Input	4-8 mm	0,14-0,5 mm ²

Table 29: RS-422 Connector Specification

Table 30 and Illustration 30 shows the pinout of the RS-422 Digital Input Connector and Illustration 31 shows the electrical diagram for the installation of the GPS signal cable.

Pins	Description
Pin 1	TxB (-)
Pin 2	RxB (-)
Pin 3	RxA (+)
Pin 4	TxA (+)
Pin 5	Not used

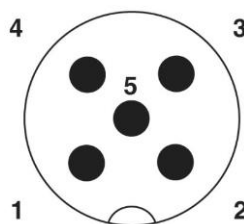


Table 30: GPS Interface Specification

Illustration 30: Pin out for GPS Input Connector

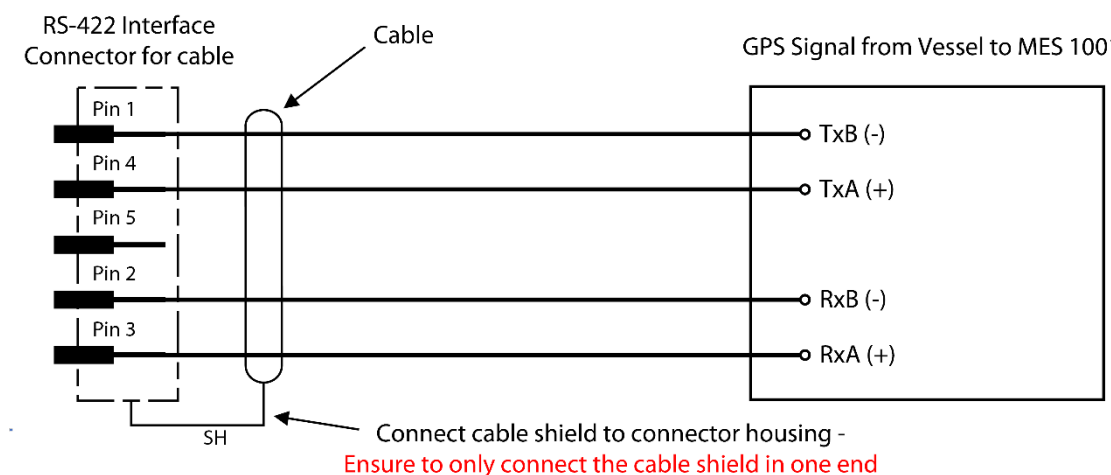


Illustration 31: Electrical wiring diagram for GPS Input Connector

NOTICE

Remember to connect cable shield to connector housing in one end of the cable ONLY!

7.3 Fuse Specification

The MES 1001 Sensor requires a fuse installed. The specifications for the fuse are shown in Table 31.

Parameter	Specification
Rated current	6.3 A
Class	T (time-lag)
Size	6.3 x 32 mm
Insulating tube	Ceramic, non-transparent with extinguishing filler

Table 31: Fuse Specification

8 Configuration and Communication

This section covers the following subjects:

- First-time Setup and Sensor Configuration
- Sensor Communication

8.1 First-time Setup and Sensor Configuration

The First-time setup and the general configuration of the sensor is described in the user guide for MES1001.

8.2 Sensor Communication

The MES 1001 Sensor provides the two types of interfaces for external communication. The analog and digital connections on the Connection Area or the ethernet connection on the Connection Area. The user guide for MES1001 describes the configuration and communication for the two types of interfaces and the first-time setup, including setup of time, date etc.

The background of the entire page is a dark, high-contrast photograph of a large container ship sailing on the ocean. The ship is viewed from a low angle, showing its massive hull and the stacks of colorful shipping containers on its deck. The water is dark, and the sky is a deep blue. The overall mood is professional and industrial.

IXA

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