

MagneW FLEX+/PLUS+
Electromagnetic Flowmeter Detector
Model MGG11/18/MGG12/19/MGF11/MGS11U/28U
User's Manual



Azbil Corporation

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Safety

About This Manual

This manual contains information and warnings that must be observed to keep the model MGG/MGS Electromagnetic Flowmeter Detector operating safely. Correct installation, correct operation and regular maintenance are essential to ensure safety while using this device.

In addition to this model MGG/MGS detector user manual, please refer to model MGG10C/14C converter user's manual for start-up, calibration, trouble-shooting, operation, and maintenance of the complete Electromagnetic Flowmeter.

For the correct and safe use of this device it is essential that both operating and service personnel follow generally accepted safety procedures in addition to the safety precautions specified in this manual.

The following symbols are used in this manual to alert you to possible hazards:

WARNING

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

CAUTION

Failure to observe these precautions may produce dangerous conditions that could result in operator injury or in physical damage to the device.

Safety Messages

Carefully read this section before installing or operating this device.

WARNING

To prevent the gas or liquid in the pipe from escaping, do not remove the electrode cover or the electrodes when the detector is installed on a pipe.

WARNING

ELECTRIC SHOCK HAZARD! Turn the power supply off before wiring.

WARNING

This detector is heavy. Dropping it could cause personal injury or damage to the device.

 **WARNING**

Before removing the unit, make sure that there is no residual liquid or pressure inside the piping and the detector to avoid personal injury or damage to the unit.

 **CAUTION**

The detector must be grounded (grounding reference is $<100 \Omega$) to avoid output fluctuation, zero point instability or output drift.

 **CAUTION**

The installation location must satisfy the following conditions to avoid output errors and fluctuations.

At the installation location:

- The electrical conductivity of the fluid to be measured must match the stated specification (specs vary according to the converter used) and be more or less constant.
- The fluid to be measured must be electrochemically homogenized. For example, if two fluids are mixed at an upstream point, the device should be installed at a point so that the two fluids can be evenly mixed by the time they reach the measuring point.
- The distribution of additive matter, if any, must be nearly uniform.

 **CAUTION**

To avoid measurement problems, do not use the MagneW FLEX+/PLUS+ to measure the following fluids, even if their electrical conductivity, temperature and pressure fall within the specifications.

- Fluids that have sufficient electrical conductivity at high temperatures but do not satisfy the conductance requirements at room temperature (about 20°C (68°F)). For example, fatty acids or soap.
- Certain fluids that contain surfactants. For example, rinses, shampoos, CWM.
- Conductive adherents. For example, deposition of rosin or conductive material.
- Insulating adherents. For example, oil, kaolinite, kaolin, or calcium stearate.

 **CAUTION**

This model MGG/MGS detector can only be connected to Azbil Corporation's model MGG10C/14C converter.

No other types of converters can be used with the device.

 CAUTION

If the pipe is not filled, output errors will occur.

 CAUTION

Do not rotate the unit more than 180° (one half rotation). Any further rotation can disconnect wiring.

After removing the screws, do not pull on the terminal box. You can break the lead wire.

When you move the terminal box, make sure the O-ring remains in the groove to insure an air-tight seal when the unit is reassembled.

 CAUTION

Before installing the detector, make sure any foreign matter is flushed from the interior passage of the detector. Residual foreign matter could cause output fluctuations.

Do not touch the electrodes or allow oil or fat to come into contact with them to avoid output fluctuations.

Align the direction mark on the detector in the direction of the liquid flow. Misalignment can result in a negative output.

 CAUTION

The correct fastening torque must be used to prevent leakage. To avoid damage to the detector, do not exceed the listed fastening torque.

 CAUTION

Before installing the detector, make sure that the pipe is exactly straight and centered. Any irregularity could cause leakage or other hazards.

 CAUTION

Never attempt to force the detector between two flanges if the space is too narrow. It can damage the detector.

 CAUTION

Make certain the bore diameters of the pipe and the detector are exactly the same and install the detector so that the gasket does not protrude into the internal bore of the pipe, as this could result in leakage or other hazards.

 CAUTION

Tighten each bolt a little at a time and apply uniform pressure to all the bolts. If leakage continues after tightening the bolts, make sure that the pipe is not off center, then continue to tighten each bolt a little at a time.

 CAUTION

Using a gasket with too small a diameter can affect the flow velocity distribution, resulting in inaccurate measurement.

Using a gasket with too large a diameter can cause leakage. Also, any solid substance in the fluid to be measured could accumulate between the gasket and the flange, resulting in inaccurate measurement.

 CAUTION

The necessary materials and the installation method vary according to the material of the ring and that of the pipe on which the detector is to be installed. Select the appropriate method of installation from the following table after confirming the specifications of the detector to be installed and the conditions of installation. Improper installation can result in leakage or damage to the pipe flanges.

 CAUTION

The use of anything other than the PTFE gaskets provided can result in leakage. The use of rubber gaskets is not recommended and can cause leakage.

 CAUTION

The use of rubber gaskets and a lower fastening torque is not recommended and can cause insufficient surface pressure between the lining and the grounding ring, resulting in leakage.

 CAUTION

Insufficient grounding can cause output fluctuations, instability of the zero point, or output drift. Secure single point grounding with a grounding resistance of 100 Ω or less is recommended.

Do not ground a welder to the detector to avoid damaging the detector.

Cautions to Disposal of Electrical and Electronic Equipment

Disposal of Electrical and Electronic Equipment (for Environmental Protection)

This is an industrial product subject to the WEEE Directive.

Do not dispose of electrical and electronic equipment in the same way as household waste.

Old products contain valuable raw materials and must be returned to an authorized collection point for correct disposal or recycling.

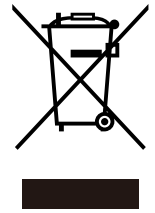


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Chapter 1 : Introduction

1.1 : Principle of operation

The flowmeter consists of two parts: a detector which is mounted in the pipeline and through which the measured liquid flows, and a converter which may be mounted either integral with the detector or separately. The converter conditions and outputs the electrical signal from the detector or separately. The converter conditions and outputs the electrical signal from the detector.

The flowmeter works based on the principle of Faraday's law of electromagnetic induction, which states that if an electrical conductor, in this case the measured conductive liquid, passes through a magnetic field a small electromotive force (EMF) is induced perpendicular to the field and flow (refer to Figure 1-1).

Faraday's law:

$$E = k BDV \text{ when}$$

E = Induced voltage (EMF)

B = Strength of the magnetic field

D = Conductor width (electrode spacing)

V = Velocity of the conductor

k = Correction factor

This induced EMF is proportional to the average flow rate and is detected by two electrodes (E_1 and E_2) mounted in the wall of the detector and then fed to the converter.

The only variable in this application of Faraday's law is the flow rate (V) of the conductive measured liquid, because field strength (B), is controlled constant and electrode spacing (D) is fixed.

Therefore, the output electromotive force is directly proportional to liquid flow rate, resulting in the linear output of a magnetic flowmeter.

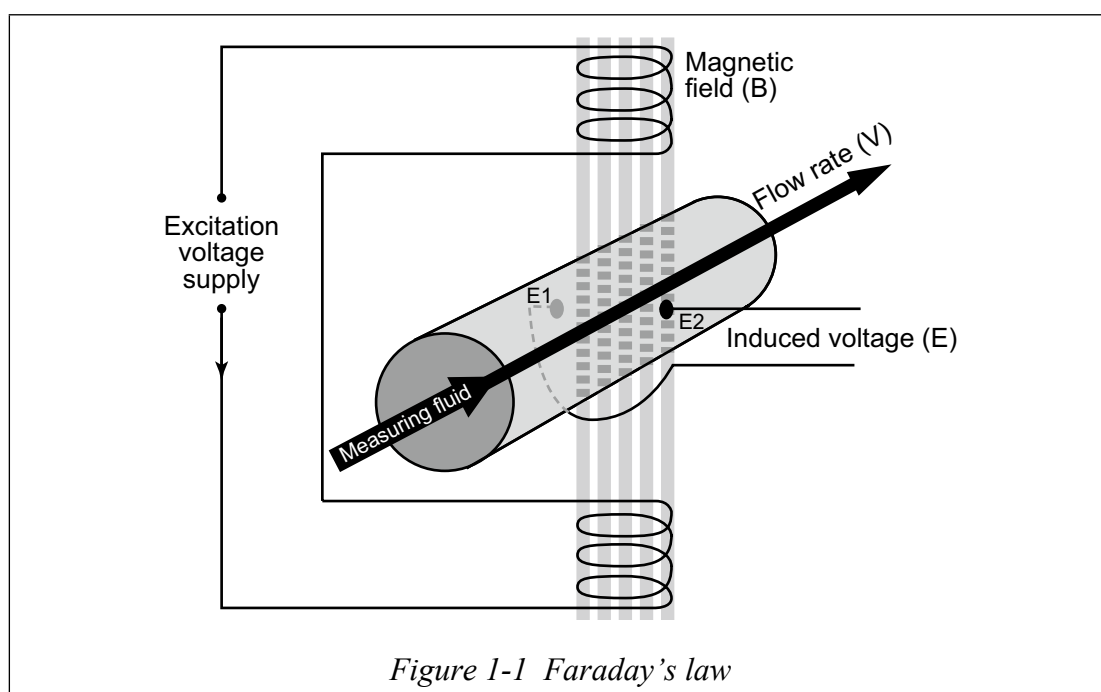


Figure 1-1 Faraday's law

1.2 : System operation

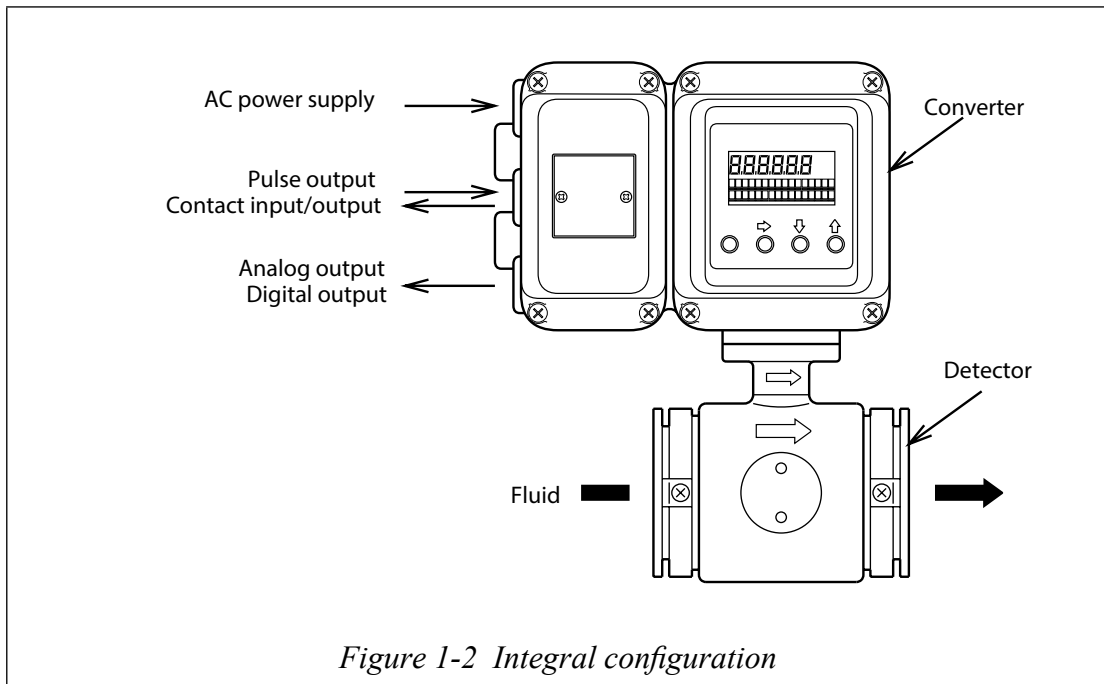
Introduction

Depending on how it is combined with the converter, this product is available in two configurations, integral and remote.

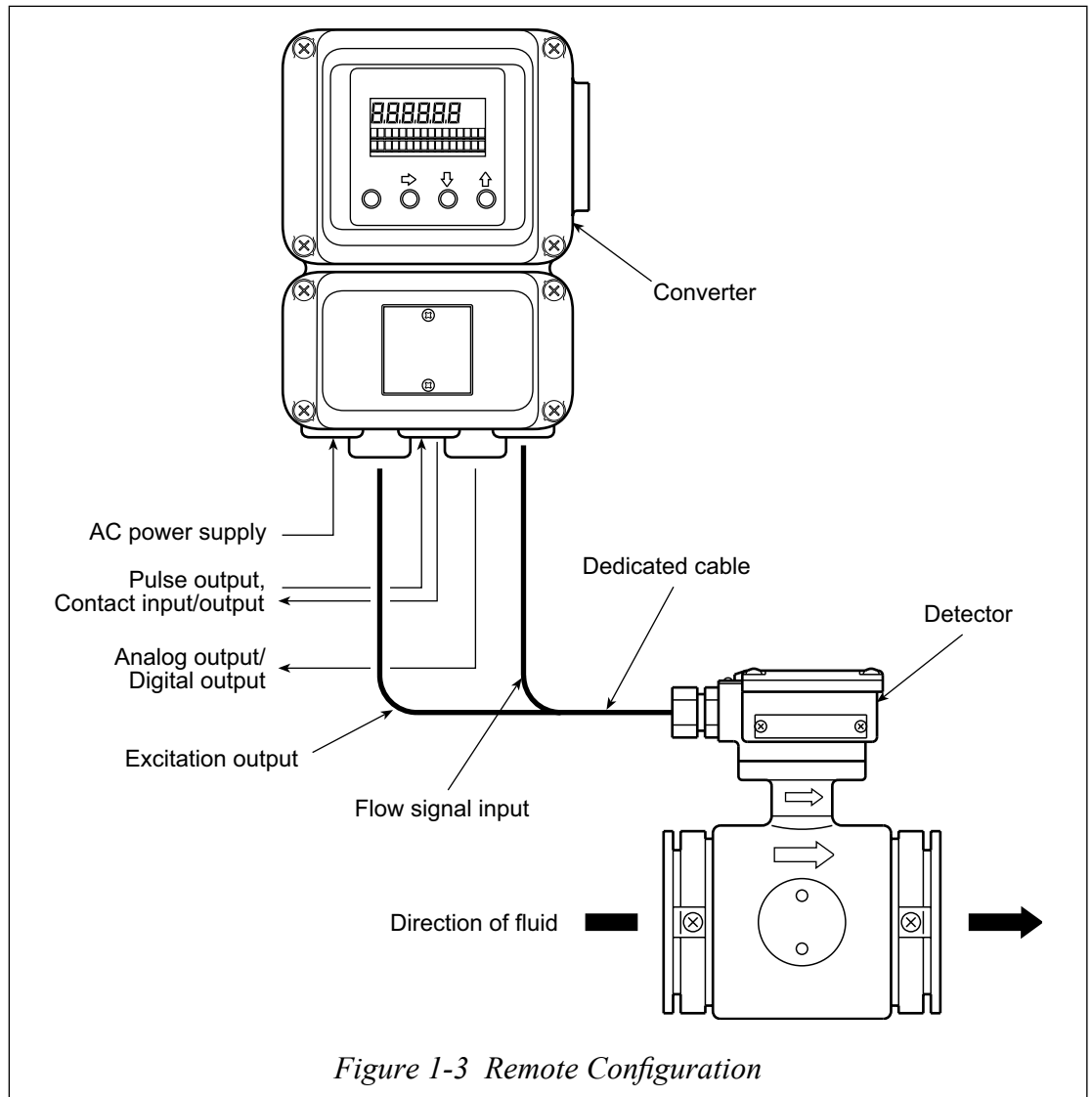
- Integral: Detector and converter are installed as an integrated unit on a pipe.
- Remote: Detector and converter are installed connected by cable.

1.2.1: Integral type

Figure 1-2 and Figure 1-3 show examples of measurement systems using the device.



1.2.2: Remote type



1.3 : Main components

Detector

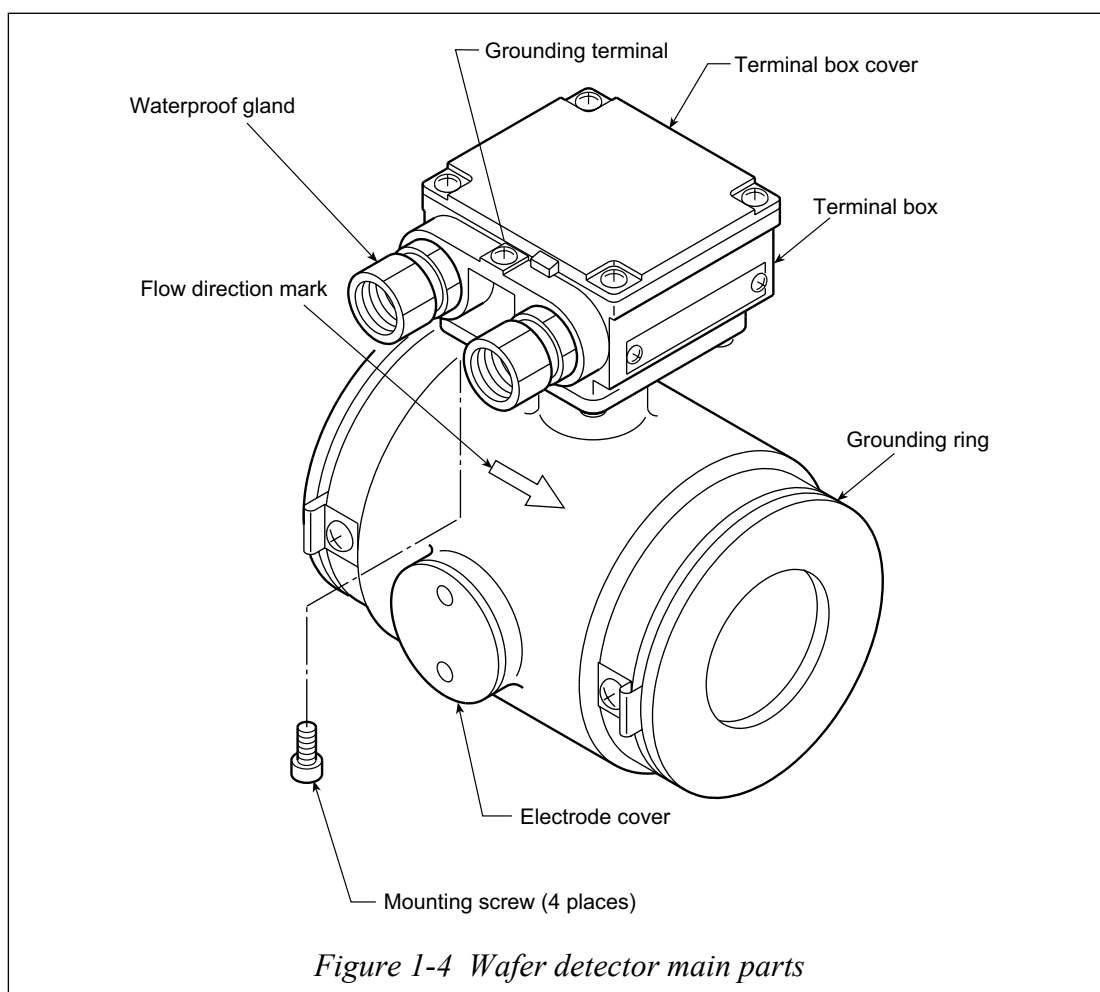
There are three types of model MGG/MGS Electromagnetic Flowmeter Detectors: Wafer detectors, Flange detector, and Union / Hose / Clamp detector. The type of detector you choose depends on your specific installation requirements. All types of detectors function such that when a conductive fluid passes through the detectors, an electromotive force signal proportional to the flow rate is generated.

 **WARNING**

To prevent the gas or liquid in the pipe from escaping, do not remove the electrode cover or the electrodes when the detector is installed on a pipe.

1.3.1: Wafer type detector

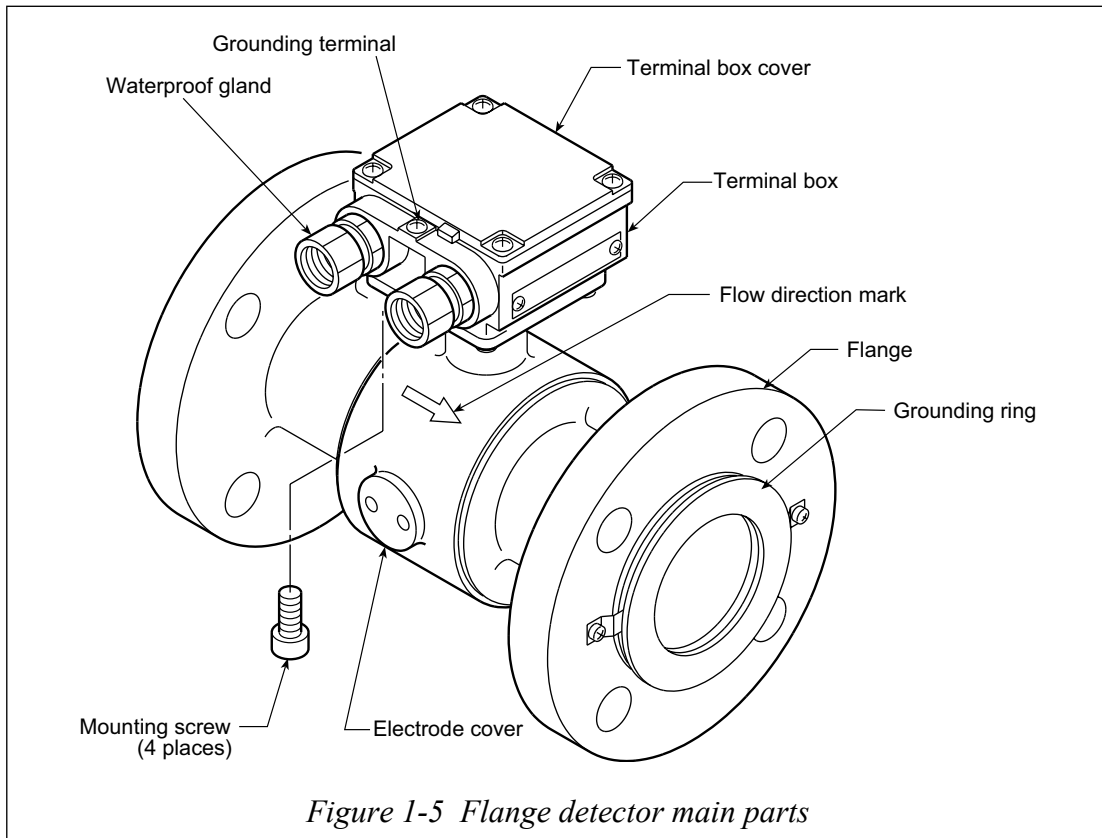
A wafer detector consists of the components shown in the figure below.



Name	Function
Flow direction mark	Indicates the direction of fluid flow. Mount the detector so that the measured fluid flows in the direction indicated by this mark.
Electrodes	Detect an electromagnetic force signal proportional to the flow rate of the fluid passing through the detector. The electrode material varies depending on the corrosion characteristics of the fluid to be measured.
Electrode cover	Houses the electrodes. Do not remove the cover with the detector installed on a pipe.
Grounding rings	Keep reference voltage as zero by grounding the unit. The grounding ring material varies depending on the corrosion characteristics of the fluid to be measured.
Terminal box (Remote model only)	Houses the connection terminals used for applying a standard voltage. Houses the excitation and signal terminals.
Terminal box cover (Remote model only)	Keeps the terminals dry and protected. Keep the terminal box cover on during operation.

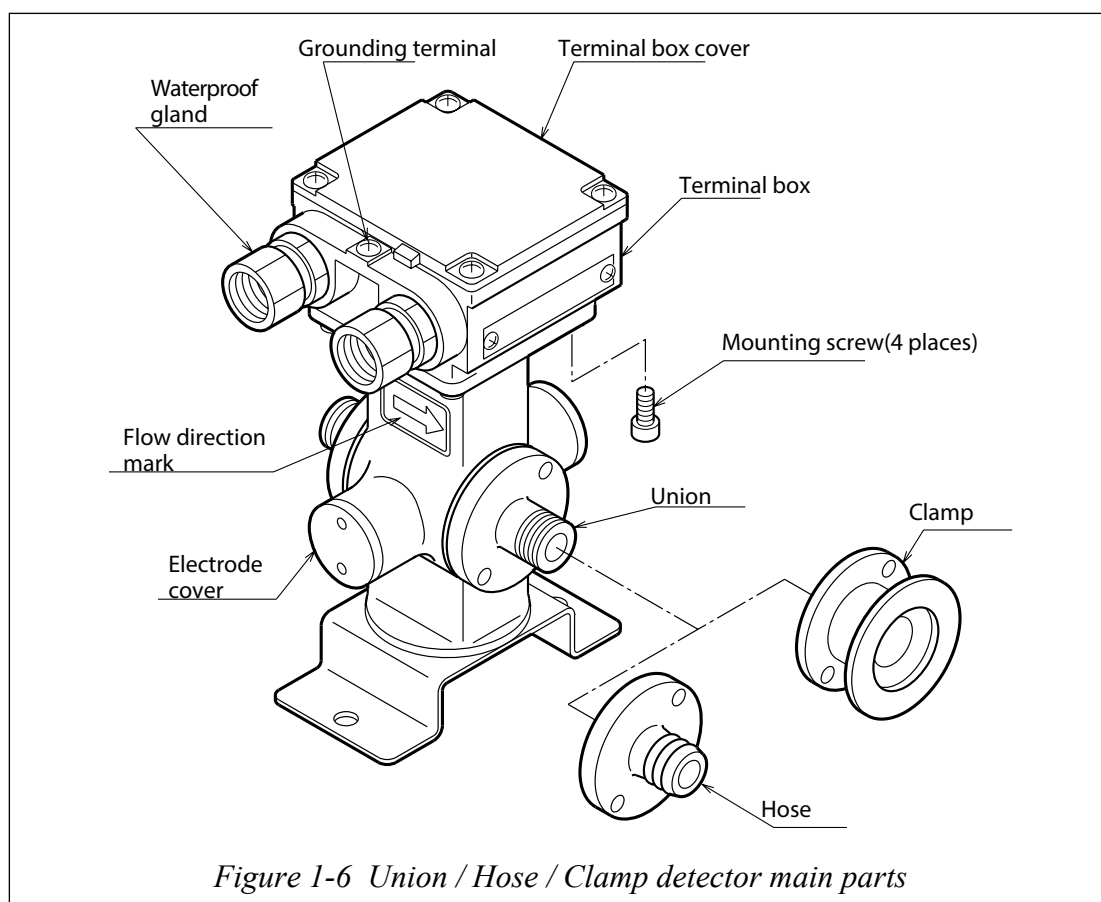
1.3.2: Flange type detector

A Flange detector consists of the components shown in the figure below.



Name	Function
Flow direction mark	Indicates the direction of fluid flow. Mount the detector so that the measured fluid flows in the direction indicated by this mark.
Electrodes	Detect an electromagnetic force signal proportional to the flow rate of the fluid passing through the detector. The electrode material varies depending on the corrosion characteristics of the fluid to be measured.
Electrode cover	Houses the electrodes. Do not remove the cover with the detector installed on a pipe.
Grounding rings	Keep reference voltage as zero by grounding the unit. The grounding ring material varies depending on the corrosion characteristics of the fluid to be measured.
Terminal box (Remote model only)	Houses the connection terminals used for applying a standard voltage. Houses the excitation and signal terminals.
Terminal box cover (Remote model only)	Keeps the terminals dry and protected. Keeps the terminal box cover on during operation.

1.3.3: Union / Hose / Clamp type detector



Name	Function
Flow direction mark	Indicates the direction of fluid flow. Mount the detector so that the measured fluid flows in the direction indicated by this mark.
Electrodes	The electrodes generate an electromotive force signal proportional to the flow rate of the fluid passing through the detector. The electrode material varies depending on the corrosion characteristics of the fluid to be measured.
Electrode cover	Houses the electrodes. Do not remove the cover with the detector installed on a pipe.
Union (Connected by screws) Hose Clamp	The connection uses a union, hose, and clamp. The material is SUS316. Applicable for detector bore diameters of 2.5 to 15 mm.
Terminal box (Remote model only)	Houses the connection terminals used to apply a standard voltage. Houses excitation and signal terminals.
Terminal box cover (Remote model only)	Keeps the terminals box cover on during operation.

1.3.4: Sanitary type detector

Figure 1-7 shows the structure of the detector and the names of its major parts.

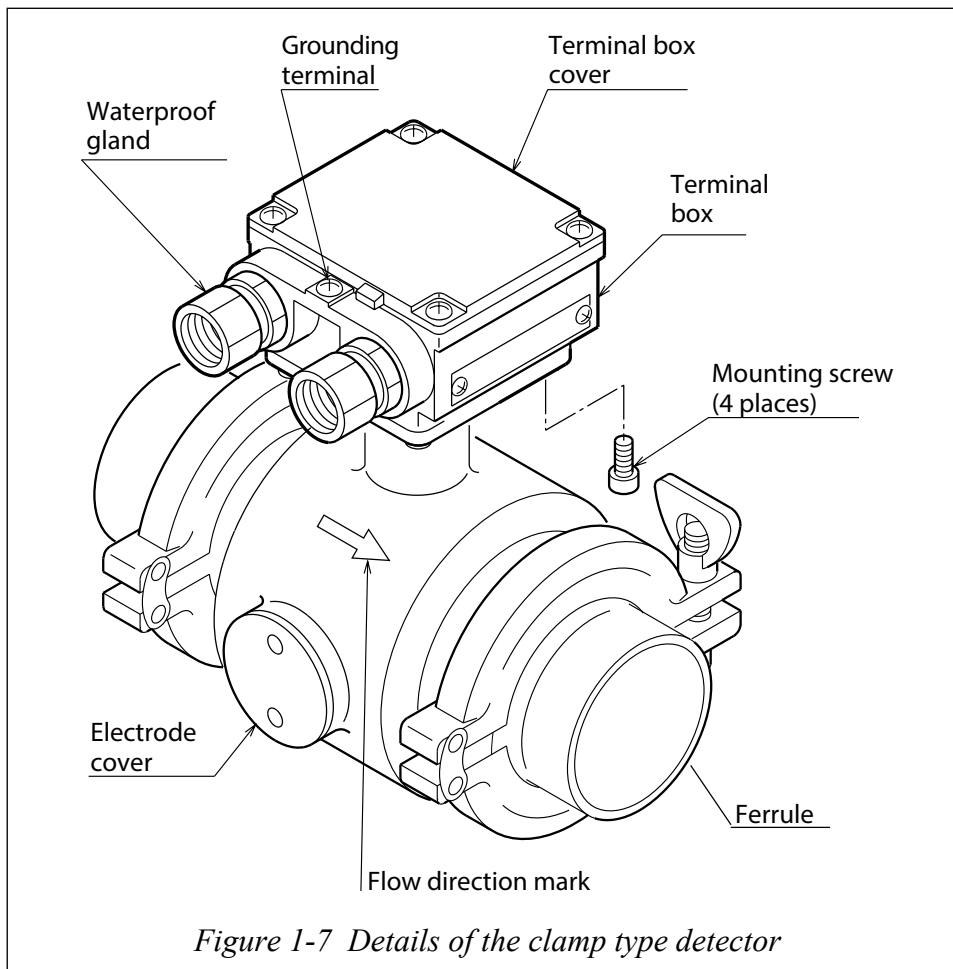


Figure 1-7 Details of the clamp type detector

Name	Function
Flow direction mark	Indicates the direction of fluid flow. Mount the detector so that the measured fluid flows in the direction indicated by this mark.
Electrodes	The electrodes generate an electromotive force signal proportional to the flow rate of the fluid passing through the detector. The electrode material varies depending on the corrosion characteristics of the fluid to be measured.
Electrode cover	Houses the electrodes. Do not remove the cover with the detector installed on a pipe.
Clamp	Clamp structure varies IDF clamp and tri-clamp.
Terminal box (Remote model only)	Houses the connection terminals used to apply a standard voltage. Houses excitation and signal terminals.
Terminal box cover (Remote model only)	Keeps the terminals box cover on during operation.

1.3.5: Detector terminal box

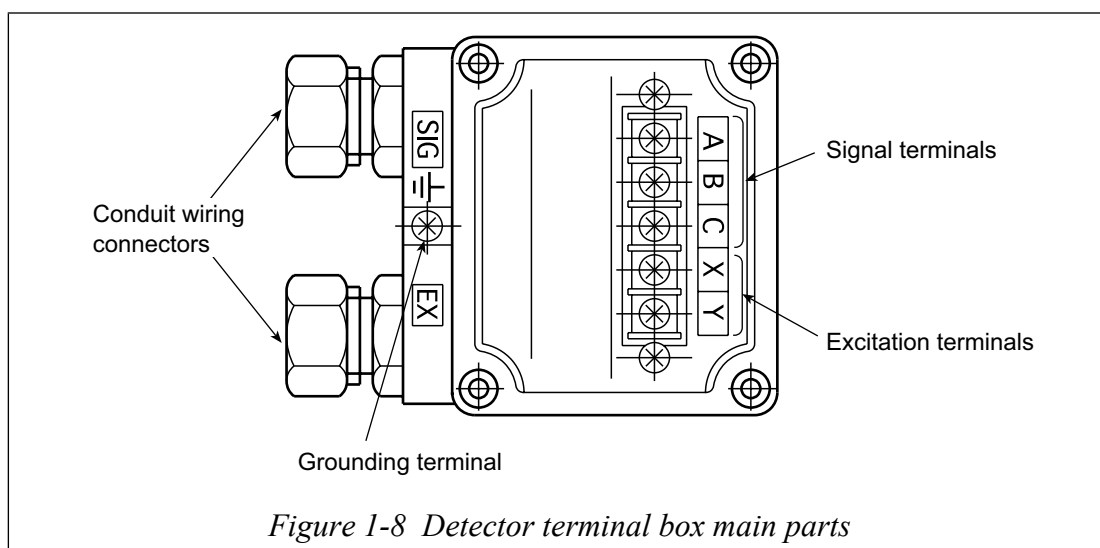
The detector terminal box houses the connection terminals used for applying a standard voltage. Houses the excitation and signal terminals.

⚠ WARNING

ELECTRIC SHOCK HAZARD! Turn off power to the converter side before wiring.

⚠ CAUTION

The detector must be grounded (grounding resistance is $<100 \Omega$) to avoid output fluctuation, zero point instability or output drift.



Name	Function
Signal terminals	Marked A, B and C.
Excitation terminals	Marked X and Y.
Conduit wiring connectors	The excitation cable and the signal cable are wired through these connectors.
Grounding terminal	This terminal is used to ground the detector (grounding resistance is $<100 \Omega$).

1.3.6: Approval of this device

Overview

If 1/2 NPT wiring connection is selected, this device functions as an FM/CSA, non-incendive -approved model. In this case, the installation standards described in this section must be followed.

Installation of this device

FM/CSA Nonincendive model

THIS EQUIPMENT IS SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS (A, B, C, D), CLASS II/III, DIVISION 2, GROUPS (F, G), OR NON-HAZARDOUS LOCATIONS ONLY.

CAUTION

- (1) Power supply and internal voltage of ordinary equipment to the earth shall not exceed 250 V AC 50/60 Hz, 250 V DC in case on normal / formal conditions.
- (2) Ambient temperature is from -25 to 60°C
- (3) Process temperature is from -40 to 160°C (Remote model).
Process temperature is from -40 to 120°C (Integral model)

1.3.7: European Pressure Equipment Directive (2014/68/EU)

This product is subject to the European Pressure Equipment Directive (PED).

Article 4 of the PED differentiates pressure equipment according to the degree of danger. The maximum allowable pressure of this product is stated in the specification sheet (No. SS2-MGG200-0100). Note, however, that because this product is designed and manufactured in accordance with sound engineering practice (SEP) as described in article 4, section 3 of the PED, there are restrictions on the pressure range when this product is used in a country where PED is applicable. Determine the maximum allowable pressure by checking the following items.

(1) Group of the fluid

Check the group of the fluid according to article 13 of the PED.

- Group 1: Hazardous fluids
- Group 2: Non-hazardous fluids

(2) Vapor pressure at the maximum allowable temperature of the measured fluid

Check the applicable category, (i) or (ii).

- (i) Liquid whose vapor pressure at the maximum allowable temperature is greater than 0.5 bar above normal atmospheric pressure (1013 mbar)
- (ii) Liquid having a vapor pressure at the maximum allowable temperature of not more than 0.5 bar above normal atmospheric pressure (1013 mbar)

(3) Nominal size (DN) of the electromagnetic flowmeter

Check the nominal size of the flowmeter.

(4) Maximum allowable pressure for equipment designed by SEP.

In table 1-1, find the cell where the results of (1), (2), and (3) meet.

“Tables 6–9” shown in table 1-1 below are taken from article 4 and annex II of the PED.

(5) Maximum pressure

Whichever of the pressures below is the lowest is the applicable pressure.

- Maximum pressure for this product: see specification sheet No. SS2-MGG200-0100
- Maximum pressure for SEP equipment defined by the PED: see (4) above
- Maximum pressure for the flange: see the applicable standard

Table 1-1 Maximum allowable pressure for SEP products

(1) Fluid group	Group 1			Group 2		Group 1		Group 2	
(2) Vapor pressure	(i)			(i)		(ii)		(ii)	
PED table	Table 6			Table 7		Table 8		Table 9	
(3) Nominal size (DN)	(4) Maximum allowable pressure								
	mm	bar	MPa	bar	MPa	bar	MPa	bar	MPa
	2.5	No limit	No limit	No limit	No limit	No limit	No limit	No limit	No limit
	5	No limit	No limit	No limit	No limit	No limit	No limit	No limit	No limit
	10	No limit	No limit	No limit	No limit	No limit	No limit	No limit	No limit
	15	No limit	No limit	No limit	No limit	No limit	No limit	No limit	No limit
	25	No limit	No limit	No limit	No limit	No limit	No limit	No limit	No limit
	40	0.5	0.05	25.0	2.50	No limit	No limit	No limit	No limit
	50	0.5	0.05	20.0	2.00	No limit	No limit	No limit	No limit
	65	0.5	0.05	15.3	1.53	No limit	No limit	No limit	No limit
	80	0.5	0.05	12,5	1.25	25.0	2.50	No limit	No limit
	100	0.5	0.05	10.0	1.00	20.0	2.00	No limit	No limit
	125	0.5	0.05	8.0	0.80	16.0	1.60	No limit	No limit
	150	0.5	0.05	6.6	0.66	13.3	1.33	No limit	No limit
	200	0.5	0.05	5.0	0.50	10.0	1.00	No limit	No limit
	250	0.5	0.05	4.0	0.40	8.0	0.80	20.0	2.00
	300	0.5	0.05	3.3	0.33	6.6	0.66	16.6	1.66
	350	0.5	0.05	2.8	0.28	5.7	0.57	14.2	1.42
	400	0.5	0.05	2.5	0.25	5.0	0.50	12.5	1.25
	450	0.5	0.05	2.2	0.22	4.4	0.44	11.1	1.11
	500	0.5	0.05	2.0	0.20	4.0	0.40	10.0	1.00
600	0.5	0.05	1.6	0.16	3.3	0.33	10.0	1.00	
700	0.5	0.05	1.4	0.14	2.8	0.28	10.0	1.00	
800	0.5	0.05	1.2	0.12	2.5	0.25	10.0	1.00	
900	0.5	0.05	1.1	0.11	2.2	0.22	10.0	1.00	
1000	0.5	0.05	1.0	0.10	2.0	0.20	10.0	1.00	
1100	0.5	0.05	0.9	0.09	1.8	0.18	10.0	1.00	

Chapter 2 : Installation

This section describes unpacking, installation and wiring of the MagneW FLEX+/PLUS+.

Depending on the grounding ring or piping material, the required parts or the method of device installation vary.

2.1 : Unpacking

This device is a precision instrument and should be handled with care to prevent damage or breakage.

WARNING

This detector is heavy. Dropping it could cause personal injury or damage to the device.

After unpacking the unit, verify that the following items are present:

- MagneW FLEX+/PLUS+ Detector
- Standard accessories
- Precautions for installation sheet

2.1.1: Verifying specifications

The specifications for this device are written on its attached identification plate. Compare these specifications with those listed in Appendix A, device standard specifications and model numbers, and verify that all specifications on the plate are correct, paying special attention to the following:

- Detector size
- Electrode material
- Lining material
- Flange rating
- Grounding ring material

If you have questions regarding the specifications of your device, contact your nearest Azbil Corporation office or the azbil Group representative. When making an inquiry, be sure to provide the model number and product number of this device.

2.2 : Storage

 **WARNING**

Before removing the unit, make sure that there is no residual liquid or pressure inside the piping and the detector to avoid personal injury or damage to the unit.

When storing this device:

- Store the device indoors at room temperature and humidity, in a place safe from vibration or shock.
- Store the device in the same condition as it was shipped.

When storing this device after use:

- (1) Rinse the inside of the detector with water to remove residual fluids and then allow it to dry.
- (2) Firmly attach the terminal box cover and the electrode cover in order to keep out moisture.
- (3) Replace the detector in its original packaging.
- (4) Store the device indoors at room temperature and humidity, in a place safe from vibration or shock.

2.3 : Site selection

In order to make full use of the functions of the device, select an optimal installation site by following the selection criteria below.

CAUTION

Install the unit in a location with an ambient temperature of -30 to +80°C (-22 to +176°F) and a relative humidity of 5% to 100%. Failing to meet these requirements could cause damage to the device or cause output errors.

Install the unit away from high-current power lines, motors and transformers to prevent damage from electromagnetic induction. Failing to meet this requirement could cause output errors.

Do not install the unit in a location subject to severe vibration or a highly corrosive atmosphere. Failing to meet this requirement could break the neck of the detector or cause other damage.

Install the unit as far from direct sunlight as possible to avoid output errors.

CAUTION

The installation location must satisfy the following conditions to avoid output errors and fluctuations.

At the installation location:

- The electrical conductivity of the fluid to be measured must match the stated specification (specs vary according to the converter used) and be more or less constant.
- The fluid to be measured must be electrochemically homogenized. For example, if two fluids are mixed at an upstream point, the device should be installed at a point so that the two fluids can be evenly mixed by the time they reach the measuring point.
- The distribution of additive matter, if any, must be nearly uniform.

CAUTION

To avoid measurement problems, do not use the MagneW FLEX+/PLUS+ to measure the following fluids, even if their electrical conductivity, temperature and pressure fall within the specifications.

Fluids that have sufficient electrical conductivity at high temperatures but do not satisfy the conductance requirements at room temperature (about 20°C (68°F)). For example, fatty acids or soap.

- Certain fluids that contain surfactants. For example, rinses, shampoos, CWM.
- Conductive adherents. For example, deposition of rosin or conductive material.
- Insulating adherents. For example, oil, kaolinite, kaolin, or calcium stearate.

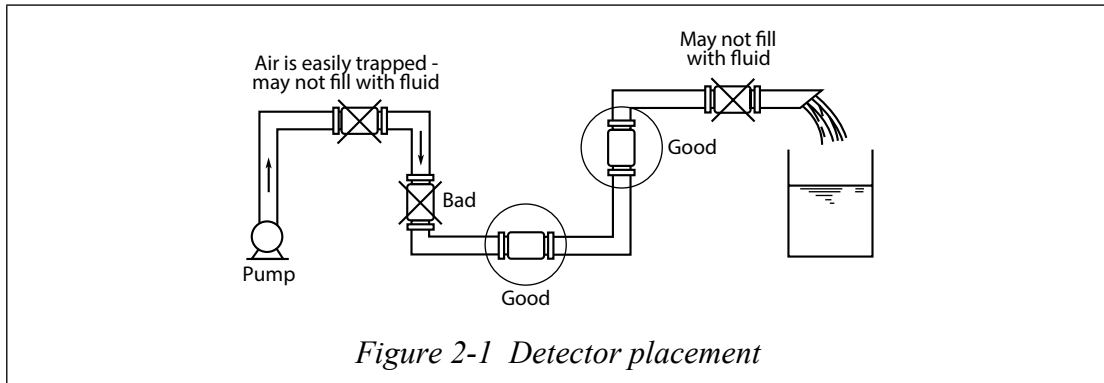
CAUTION

This model MGG/MGS detector can only be connected to Azbil Corporation's model MGG10C/14C converter.

No other types of converter can be used with the device.

2.3.1: Detector position

- Position the detector so that its inner detector passage is continuously filled with the fluid being measured. The following figure provides examples.



⚠ CAUTION

The detector must be positioned as shown by the circled areas in the figure shown above. If the pipe is not filled, output errors will occur.

- When measuring high viscosity fluid, connecting the pipe to a vertical detector is recommended (in order to secure an axial symmetrical flow).
- Install a straight pipe section on the upstream side of the detector. The following figure shows the length of the straight pipe section (D = nominal bore diameter of the detector).

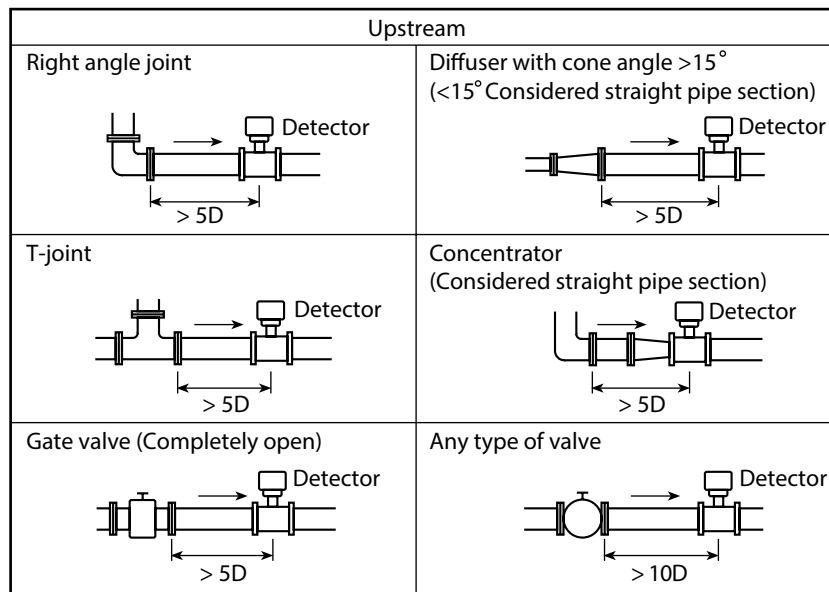
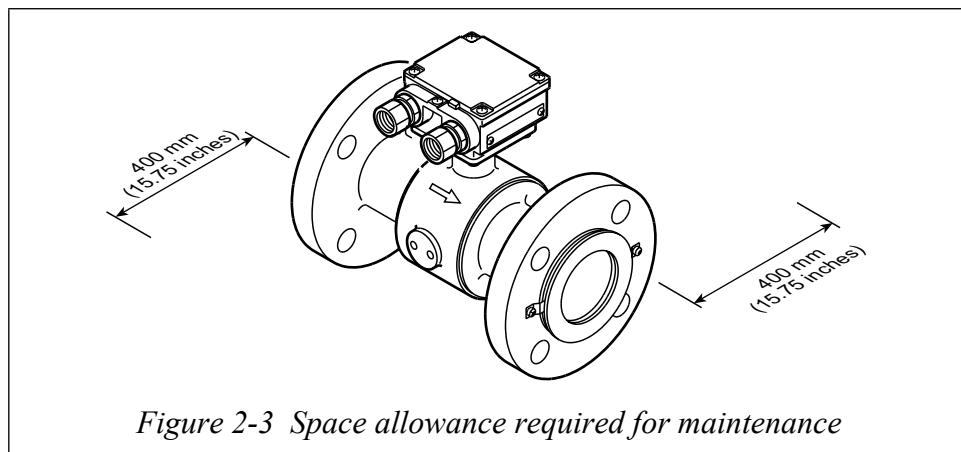


Figure 2-2 Straight pipe section on upstream side of detector

- Although a pipe section is not necessary on the downstream side, secure a section of at least $2D$ if eccentric flow appears.
- Select an installation site where there is no major pulsation or vibration (away from a pump).
- Make sure that there is adequate space around the detector after installation to perform maintenance.



2.3.2: Changing the position of the terminal box

In some locations, the direction of the terminal box may be unsuitable if the detector is installed as it is shipped. In this case, the terminal box can be repositioned before installation.

After selecting an installation site, adjust the direction of the terminal box using the method described below.

To change the position of the terminal box:

- (1) Using an M5 wrench, remove the four screws securing the terminal box to the detector.
- (2) Holding the detector, rotate the terminal box horizontally to the required position.

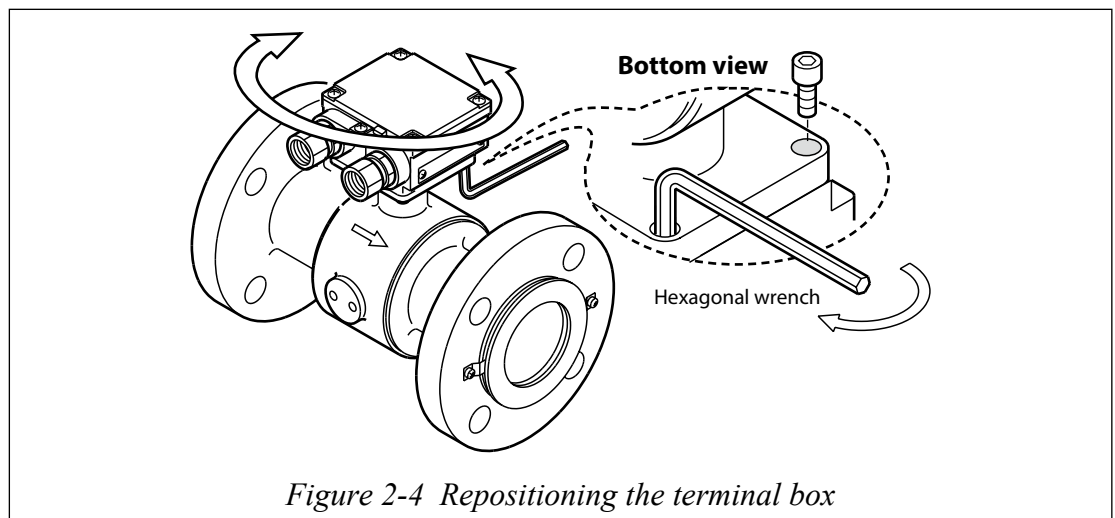
⚠ CAUTION

Do not rotate the terminal box more than 180° (one half rotation). Any further rotation can disconnect wiring.

After removing the screws, do not pull on the terminal box. The lead wire can be broken.

When you move the terminal box, make sure the O-ring remains in the groove to insure an air-tight seal when the unit is reassembled.

- (3) Using a hex wrench, retighten the four screws.



2.4 : Installing a wafer detector

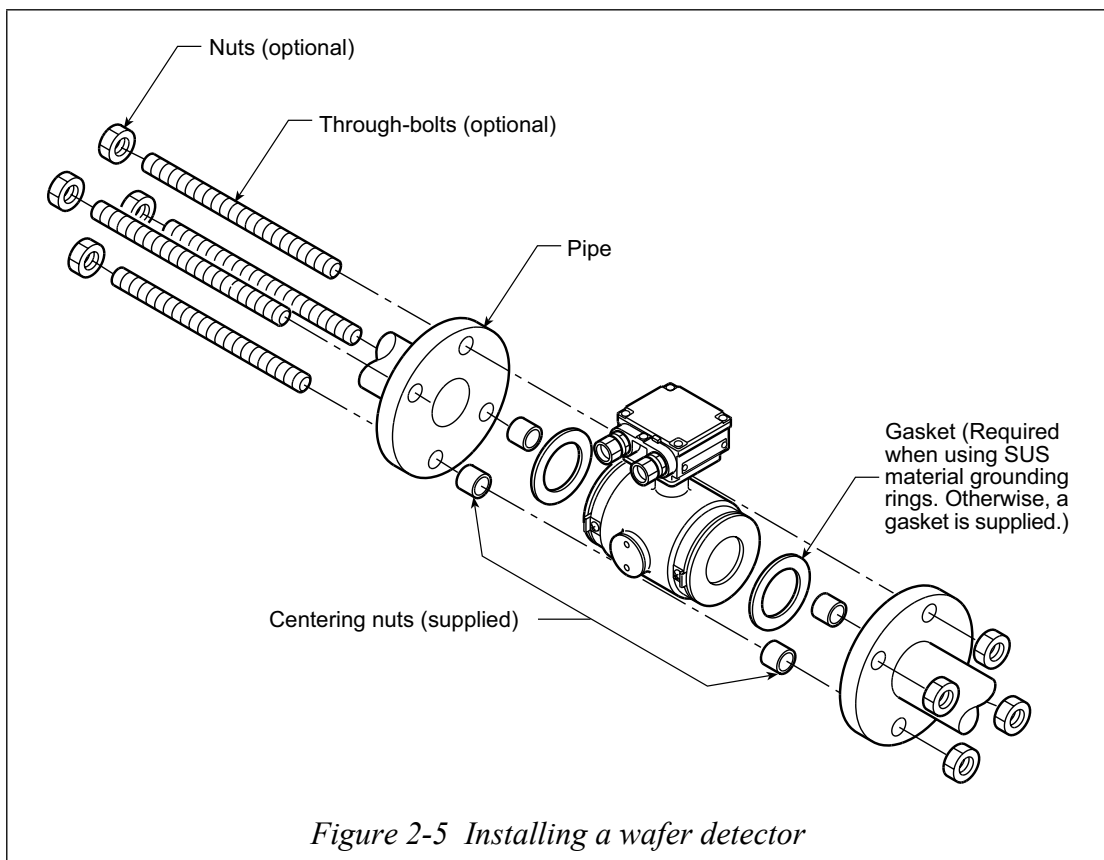
⚠ CAUTION

Before installing the detector, make sure any foreign matter is flushed from the interior passage of the detector. Residual foreign matter could cause output fluctuations.

Do not touch the electrodes or allow oil or fat to come into contact with them to avoid output fluctuations.

Align the direction mark on the detector in the direction of the liquid flow. Misalignment can result in a negative output.

The following figure shows the basic installation method for installing a wafer detector.



2.4.1: Determining the fastening torque

The following table shows the fastening torque for each pipe bore.


 CAUTION	
The correct fastening torque must be used to prevent leakage. To avoid damage to the detector, do not exceed the listed fastening torque.	

Table 2-1 Fastening torque for wafer detectors

Nominal detector bore diameter mm (inch)		Fastening torque N•m (ft•lb)
2.5 - 15	(0.1 - 3/8)	13 - 18 (9.6 - 13.3)
25	(1)	20 - 30 (14.8 - 22.1)
40 - 80	(1½ - 3.1)	30 - 50 (22.1 - 36.9)
100	(4)	50-70 (36.9 - 51.6)
125 - 150	(5 - 6)	80 -100 (59.0 - 73.8)
200	(4)	90 -100 (66.4 - 73.8)

2.4.2: Selecting the flange shape

The flanges used for installation should maximize the area of contact with the gasket.

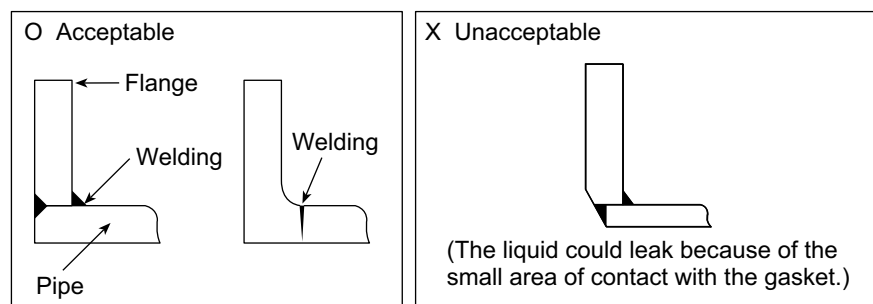



Figure 2-6 Flange Shapes

 CAUTION	
Before installing the detector, make sure that the pipe is exactly straight and centered. Any irregularity could cause leakage or other hazards.	

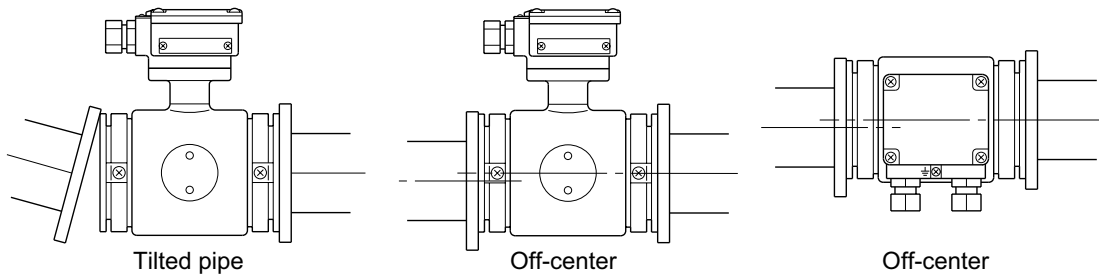


Figure 2-7 Unacceptable positioning

⚠ CAUTION

Never attempt to force the detector between two flanges if the space is too narrow. It can damage the detector.

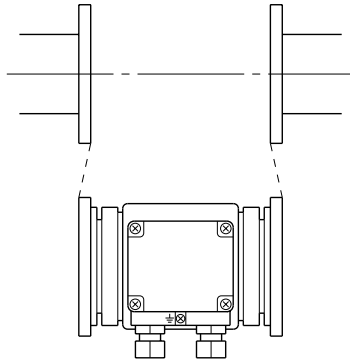


Figure 2-8 Unacceptable placement of detector between flanges

⚠ CAUTION

Make certain the bore diameters of the pipe and the detector are exactly the same and install the detector so that the gasket does not protrude into the inner bore of the pipe, as this could result in leakage or other hazards.

⚠ CAUTION

Tighten each bolt a little at a time and apply uniform pressure to all the bolts. If leakage continues after tightening the bolts, make sure that the pipe is not off center, then continue to tighten each bolt a little at a time.

2.4.3: Necessary parts

You will need the following parts to install a wafer detector:

- Centering nuts (four supplied)
- Connecting bolts and nuts (available separately)
- Gaskets: Required when using grounding rings made of SUS material. Not required when using grounding rings made of hastelloy, titanium, tantalum, or platinum.
- Protective Plate: Required when connecting the detector to polyvinyl chloride (PVC) piping.

Centering nuts

The centering nuts create the exact alignment of the pipe and detector. These nuts are positioned on through-bolts and the detector is set on top of the nuts to properly position it against the flanges.

The position of the centering nuts depends on the direction in which the detector is installed. For horizontal centering of the detector, position two centering nuts against each flange. For vertical centering of the detector, position the four centering nuts on the bottom flange. The following figures show horizontal and vertical centering nut positions.

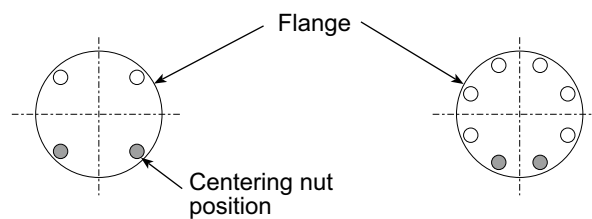


Figure 2-9 Centering nut positioning for horizontal centering

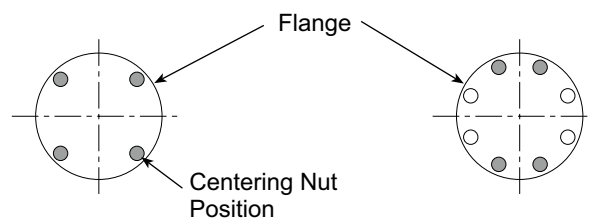


Figure 2-10 Centering nut positioning for vertical centering

Gaskets

Gaskets are supplied with the grounding ring, except when it is made of SUS material. If you are using SUS material, you must provide the gaskets. Azbil Corporation recommends compressed fiber sheet or polytetrafluoroethylene (PTFE) gasket material. For the inner (bore) diameters of the gaskets, see the following table. Rubber gaskets are not recommended.

CAUTION	
Using a gasket with too small a diameter can affect the flow velocity distribution, resulting in inaccurate measurement.	
Using a gasket with too large a diameter can cause leakage. Also, any solid substance in the fluid to be measured could accumulate between the gasket and the flange, resulting in inaccurate measurement.	

Table 2-2 Recommended inner diameters of gaskets

Nominal detector bore diameter	mm	2.5	5	10	15	25	40	50	65	80	100	125	150	200
	(inch)	0.1	0.2	3/8	1/2	1	1½	2	2½	3	4	5	6	8
Gasket inner diameter	mm	6	6	11	16	25	40	51	64	76	101	124	148	196
	±	1	1	1	1	1	1	1	1	1	1	1	1	1
	(inch)	0.24	0.24	0.43	0.63	0.98	1.57	2.01	2.52	2.99	3.98	4.88	5.83	7.72
	±	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04

If you install the detector at a lower torque level using rubber gaskets, you must use gaskets with the bore and outer diameters for the respective pipe bore shown in the following table. Depending on the grounding ring material, two gaskets of different thicknesses may be required. The following two tables provide the inner and outer diameters for the two different gasket thicknesses.

Table 2-3 Inner and outer diameters of rubber gaskets of thickness 0.5 to 1 mm (0.02 to 0.04 inches)

Nominal detector bore diameter	mm	2.5	5	10	15	25	40	50	65	80	100	125	150	200
	(inch)	0.1	0.2	3/8	1/2	1	1½	2	2½	3	4	5	6	8
Gasket inner diameter	mm	6	6	11	16	25	40	51	64	76	101	124	148	196
	±	1	1	1	1	1	1	1	1	1	1	1	1	1
	(inch)	0.24	0.24	0.43	0.63	0.98	1.57	2.01	2.52	2.99	3.98	4.88	5.83	7.72
	±	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Gasket outer diameter	mm	34	34	34	34	50	75	91	111	121	146	177	207	257
	±	1	1	1	1	1	1	1	1	1	1	1	1	1
	(inch)	1.34	1.34	1.34	1.34	1.97	2.95	3.58	4.37	4.76	5.75	6.97	8.15	10.12
	±	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04

Table 2-4 Inner and outer diameters of rubber gaskets of thickness 3 to 4 mm (0.12 to 0.16 inches)

Nominal detector bore diameter	mm	2.5	5	10	15	25	40	50	65	80	100	125	150	200
	(inch)	0.1	0.2	3/8	1/2	1	1½	2	2½	3	4	5	6	8
Gasket inner diameter	mm	6	6	11	16	25	39	51	64	76	101	124	148	196
	±	1	1	1	1	1	1	1	1	1	1	1	1	1
	(inch)	0.24	0.24	0.43	0.63	0.98	1.54	2.01	2.52	2.99	3.98	4.88	5.83	7.72
	±	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Gasket outer diameter	mm	34	34	34	34	50	68	84	104	114	139	166	190	240
	±	1	1	1	1	1	1	1	1	1	1	1	1	1
	(inch)	1.34	1.34	1.34	1.34	1.97	2.68	3.31	4.09	4.49	5.47	6.54	7.48	9.45
	±	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04

2.4.4: Selecting an installation method

To select an installation method you must determine the following:

- Horizontal or vertical placement of the detector
- Mounting pipe material
- Grounding ring material
- Need for a protective plate
- Use of rubber gaskets


 CAUTION	
<p>The necessary materials and the installation method vary according to the material of the ring and that of the pipe on which the detector is to be installed. Select the appropriate method of installation from the following table after confirming the specifications of the detector to be installed and the conditions of installation. Improper installation can result in leakage or damage to the pipe flanges.</p>	

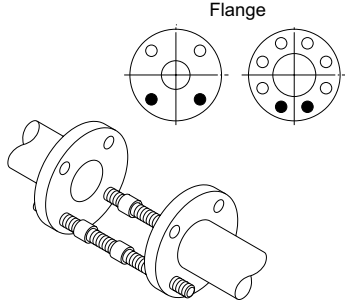
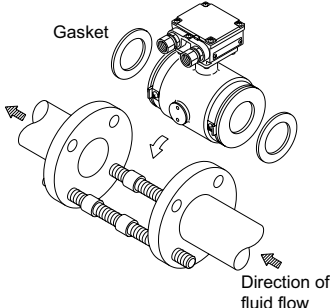
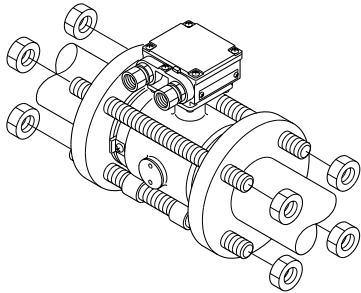
Table 2-5 Wafer detector installation methods

Pipe material	Grounding ring material	Installation Requirements	See Page
Metal	SUS material	With specified fastening torque	page 2-15
		With rubber gaskets and low fastening torque	page 2-17
	Non-SUS material	With specified fastening torque	page 2-16
		With rubber gaskets and low fastening torque	page 2-17
PVC	SUS material	With specified fastening torque	page 2-19
		With a protective plate	page 2-20
		With rubber gaskets and low fastening torque	page 2-21
	Non-SUS material	With specified fastening torque	page 2-22
		With a protective plate	page 2-23
		With rubber gaskets and low fastening torque	page 2-24

2.4.5: Installation on a horizontal pipe

To install a wafer detector on a horizontal pipe:

Follow this procedure to install the detector on a horizontal pipe.

Step	Action	Drawing
1	<ul style="list-style-type: none"> • Insert through-bolts in the flange holes shown by black dots in the drawing. Slip two centering nuts onto each through-bolt before inserting the bolts. 	
2	<ul style="list-style-type: none"> • Turn the detector so that the direction mark on the detector matches the direction of fluid flow. • Insert the detector and gaskets between the pipe flanges. • Position the detector so that it sits on top of the centering. 	
3	<ul style="list-style-type: none"> • Make sure that the detector remains properly centered. • Make sure that the gaskets do not protrude beyond the edges of the pipe flanges. • When you have checked these items, insert the remaining through-bolts into the flange holes and tighten the bolts evenly using the appropriate fastening torque given on page 2-7. 	

2.4.6: Installation on a vertical pipe

Follow this procedure to install the detector on a horizontal pipe.

Step	Action	Drawing
1	<ul style="list-style-type: none"> Of the flange holes shown by black dots in the drawing, insert through-bolts into the two holes at the back and fasten them lightly with nuts. Slip one centering nut onto each through bolt before inserting the bolts. 	
2	<ul style="list-style-type: none"> Turn the detector so that the direction mark on the detector matches the direction of fluid flow. Insert the detector and gaskets between the pipe flanges. 	
3	<ul style="list-style-type: none"> Insert through-bolts fitted with one centering nut each into the remaining two flange holes shown by black dots in steps 1 and 2. 	
4	<ul style="list-style-type: none"> Make sure that the detector remains properly centered. Make sure that the gaskets do not protrude beyond the edges of the pipe flanges. When you have checked these items, insert the remaining through-bolts into the flange holes and tighten the bolts evenly using the appropriate fastening torque given on page 2-7. 	

2.4.7: Installation on a metal pipe using SUS grounding ring material

The installation method described in this section is for installation on a metal pipe using SUS grounding ring material. For the installation method corresponding to any other combination of materials, refer to Table 2-5 on page 2-12.

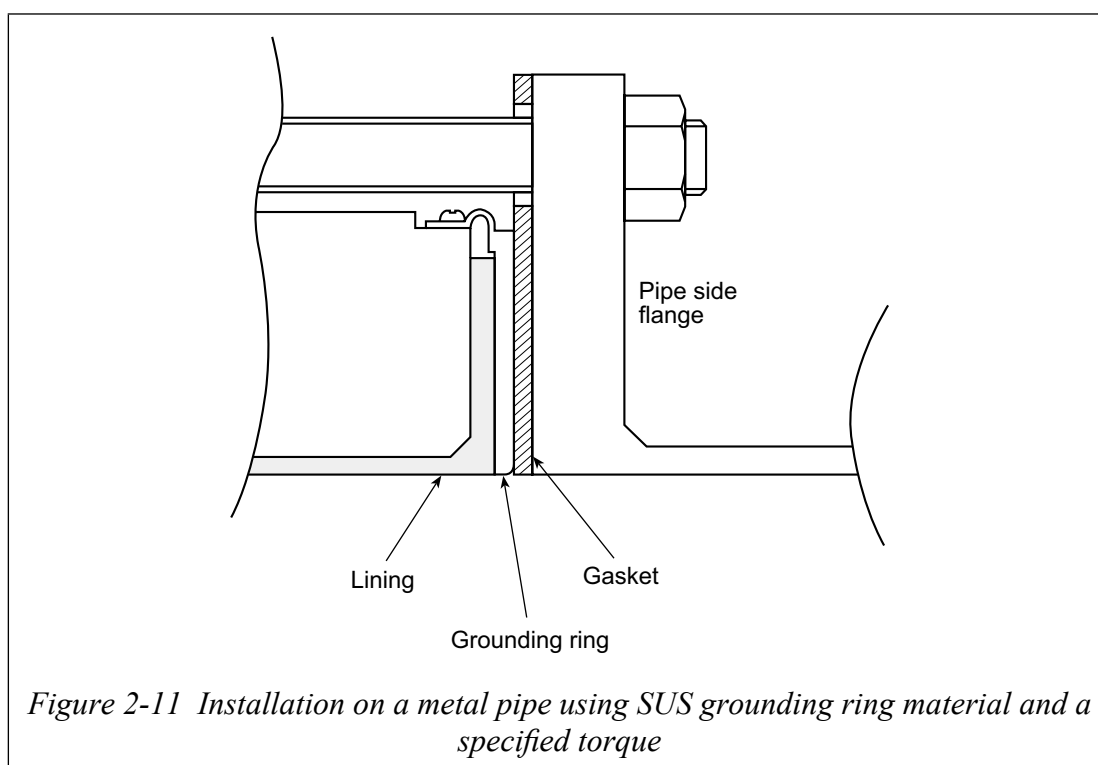
For installation using SUS grounding rings, Azbil Corporation recommends non-rubber gasket material such as compressed fiber sheet or PTFE. Although rubber gaskets can be used, it is not possible to reduce the fastening torque. See page 2-17 for installation using rubber gaskets.

⚠ CAUTION

The use of rubber gaskets is not recommended and can cause leakage.

To install a wafer detector on a metal pipe using SUS grounding ring material and a specified torque:

- Install the detector as shown in the following illustration. The torque level for tightening the bolts is not related to the gasket material. See Table 2-1 on page 2-7 for the appropriate torque. See Table 2-2 on page 2-10 for the inner diameter of the gasket.



2.4.8: Installation on a metal pipe using non-SUS grounding ring material

The installation methods described in this section are for installation on a metal pipe using non-SUS grounding ring material. For the installation method corresponding to any other combination of materials, refer to Table 2-5 on page 2-12.

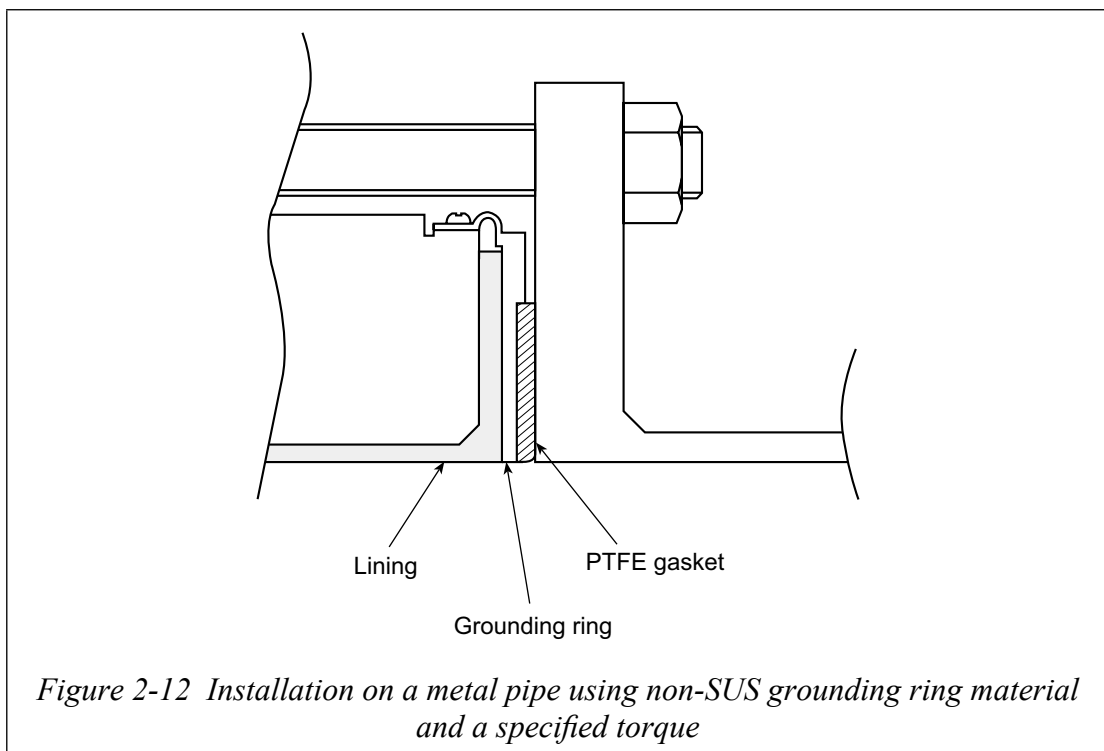
PTFE gaskets are provided for this type of installation. Although rubber gaskets can be used, it is not possible to reduce the fastening torque. See page 2-17 for installation using rubber gaskets.

⚠ CAUTION

The use of anything other than the PTFE gaskets provided can result in leakage. The use of rubber gaskets is not recommended and can cause leakage.

To install a wafer detector on a metal pipe using non-SUS grounding ring material and a specified torque:

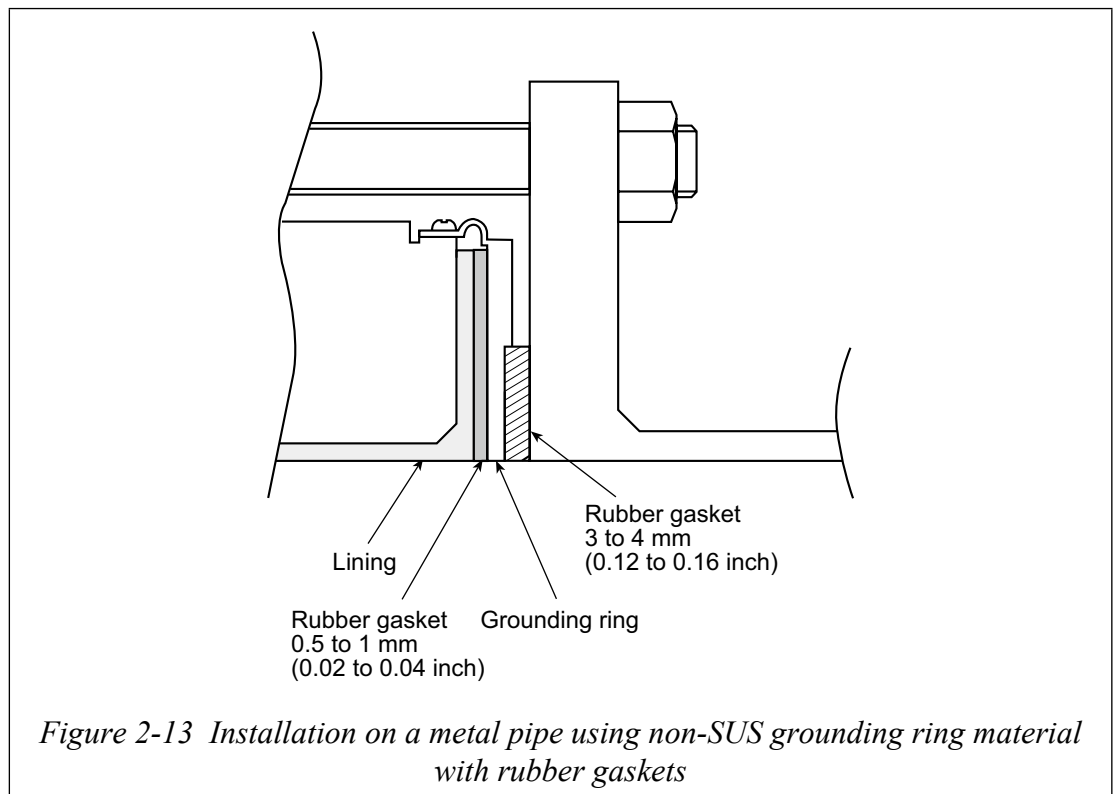
- Install the detector as shown in the following illustration. The torque level for tightening the bolts is not related to the gasket material. See Table 2-1 on page 2-7 for the appropriate torque. See Table 2-2 on page 2-10 for the inner diameter of the gasket.



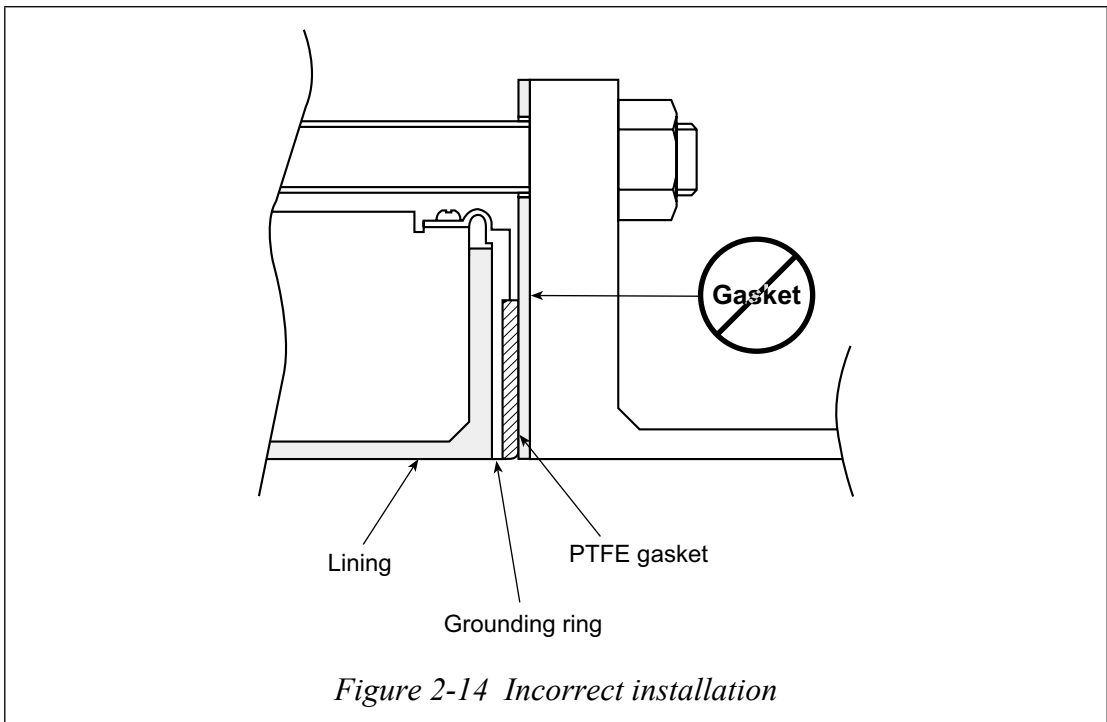
To install a wafer detector on a metal pipe using non-SUS grounding ring material with rubber gaskets:**CAUTION**

The use of anything other than the PTFE gaskets provided can result in leakage.
The use of rubber gaskets is not recommended and can cause leakage.

- (1) Remove the grounding ring from the detector and insert a rubber gasket 0.5 to 1.0 mm (0.02 to 0.04 inch) thick between the lining and the grounding ring.
- (2) Reinsert the grounding ring on top of the rubber gasket.
- (3) Remove the PTFE gasket and insert a rubber gasket 3.0 to 4.0 mm (0.12 to 0.16 inch) to replace it.
- (4) With the rubber gaskets in the position shown in the following figure, attach the detector to the pipe. Both rubber gaskets should be made of the same material.
See Table 2-3 on page 2-11 and Table 2-4 on page 2-11 for the rubber gasket dimensions.



- (5) Fasten the bolts with a torque that provides a leakproof joint.



2.4.9: Installation on a PVC pipe using SUS grounding ring material

The installation methods described in this section are for installation on a PVC pipe using SUS grounding ring material. For the installation method corresponding to any other combination of materials, refer to Table 2-5 on page 2-12.

PTFE gaskets are provided for this type of installation. If you supply the gaskets, Azbil Corporation recommends non-rubber gaskets made of material such as compressed fiber sheet or PTFE. Although rubber gaskets can be used, they are not recommended. See page 2-21 for installation using rubber gaskets.

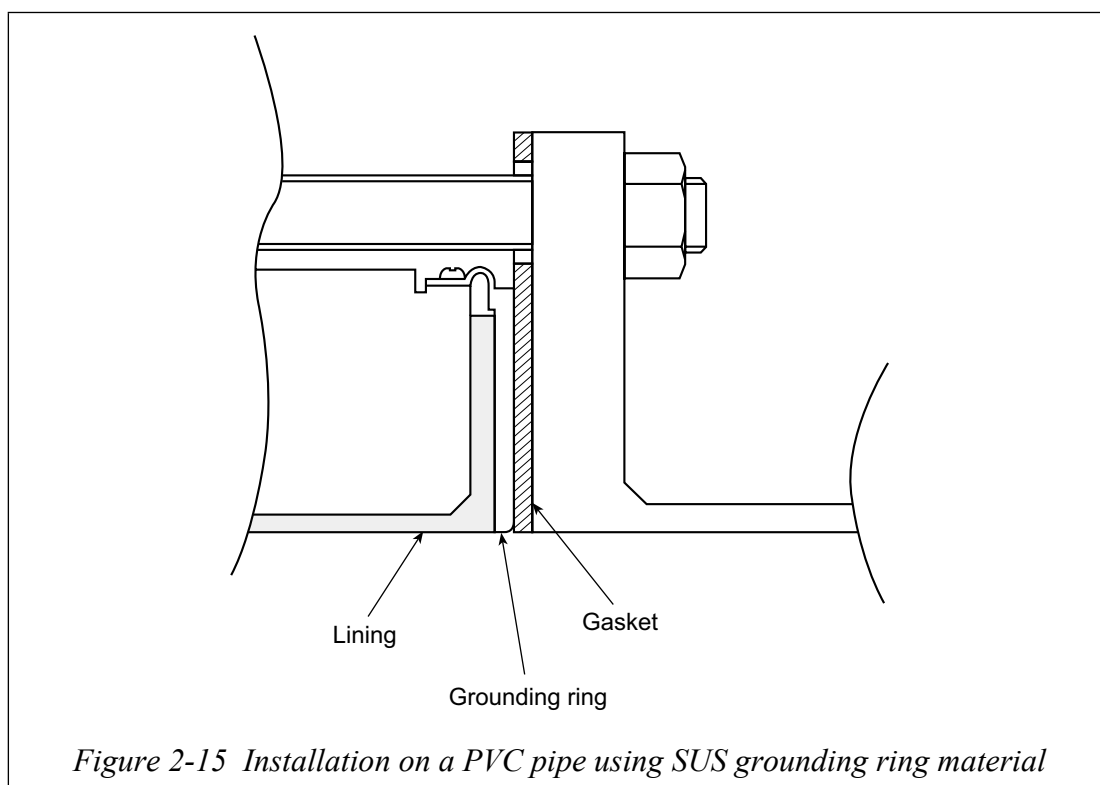
CAUTION

The use of rubber gaskets and a lower fastening torque is not recommended and can cause insufficient surface pressure between the lining and the grounding ring, resulting in leakage.

If tightening the bolts at the specified torque threatens to warp or damage the PVC pipes, you will need to use a protective plate. See page 2-20 for installation of the protective plate.

To install a wafer detector on a PVC pipe using SUS grounding ring material with a specified fastening torque:

- Install the detector as shown in the following illustration. The torque level for tightening the bolts is not related to the gasket material.
See Table 2-1 on page 2-7 for the appropriate torque.
See Table 2-2 on page 2-10 for the inner diameter of the gasket.



To install a wafer detector on a PVC pipe using SUS grounding ring material and a protective plate:

Use this method to install the detector using a protective plate to prevent the PVC pipe from being deformed or damaged when the bolts are tightened with the specified torque.

- Install the protective plate between the outer side of the PVC flange and the detector, as shown in the figure below. The protective plate protects the PVC pipe. The torque level for tightening the bolts is not related to the gasket material. See Table 2-1 on page 2-7 for the appropriate torque.
See Table 2-2 on page 2-10 for the inner diameter of the gasket.

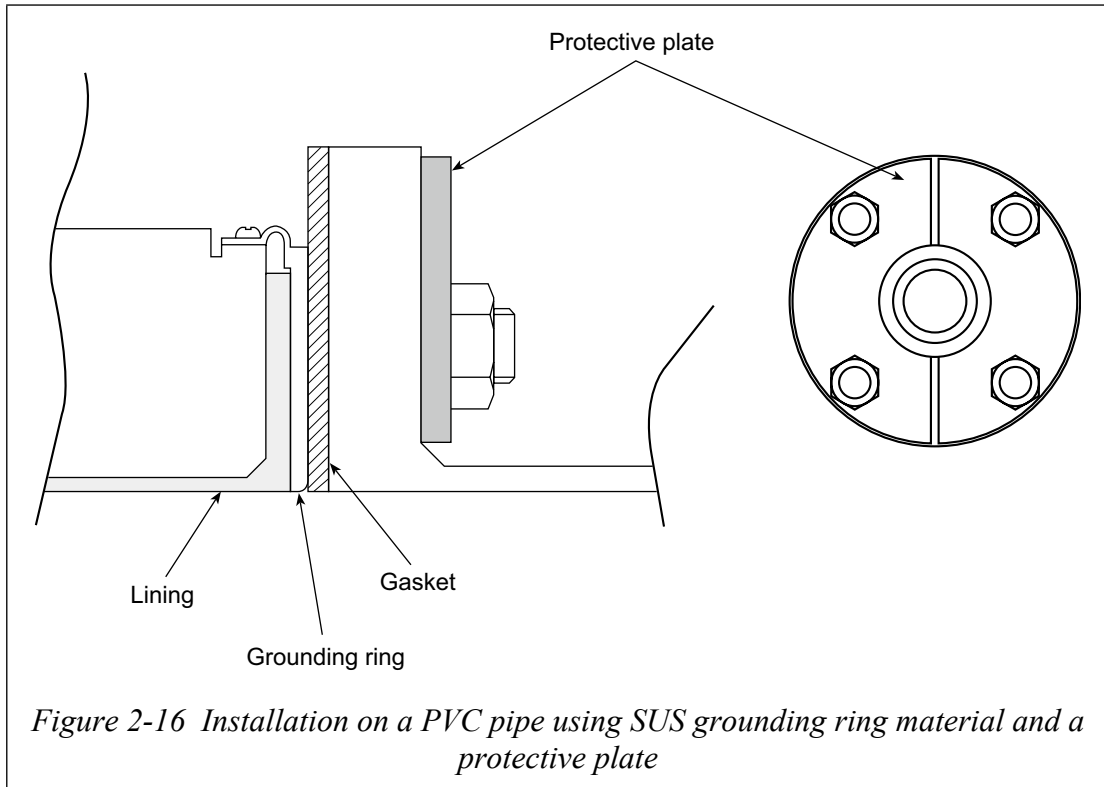


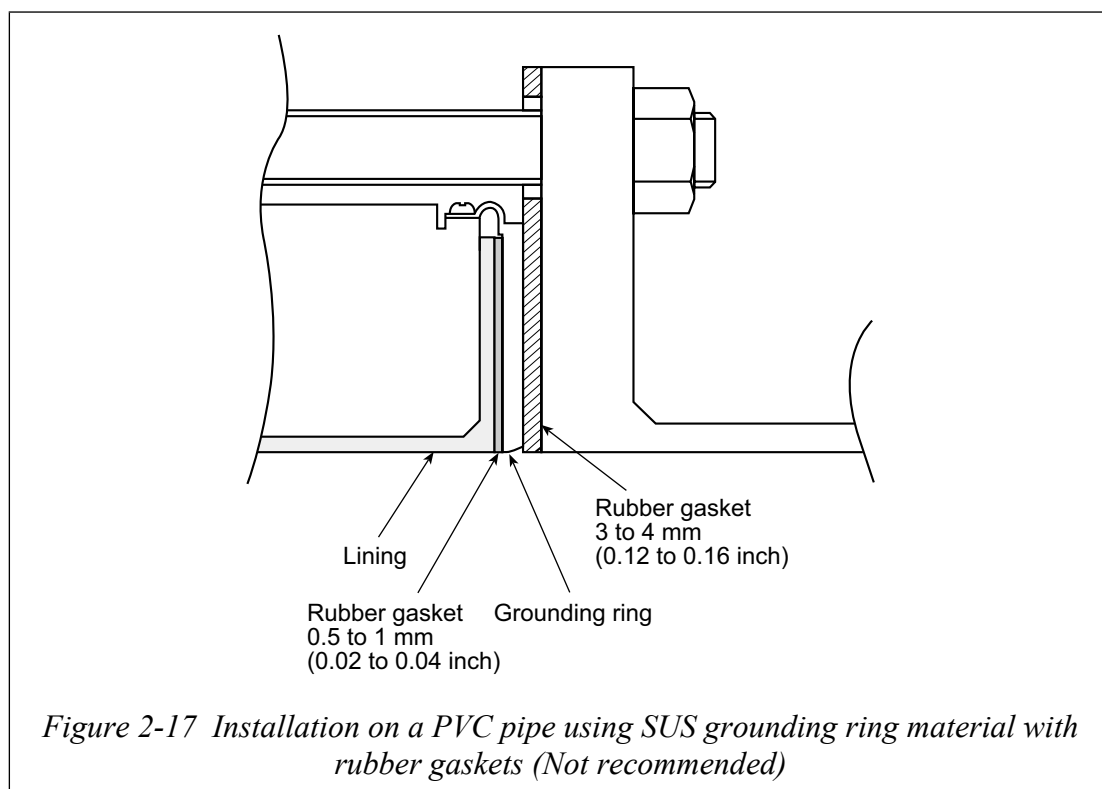
Figure 2-16 Installation on a PVC pipe using SUS grounding ring material and a protective plate

To install a wafer detector on a PVC pipe using SUS grounding ring material with rubber gaskets and a low fastening torque:

CAUTION

The use of rubber gaskets and a lower fastening torque is not recommended and can cause insufficient surface pressure between the lining and the grounding ring, resulting in leakage.

- (1) Remove the grounding ring from the detector and insert a rubber gasket 0.5 to 1.0 mm (0.02 to 0.04 inch) thick between the lining and the grounding ring.
- (2) Reinsert the grounding ring on top of the rubber gasket.
- (3) With the rubber gasket in the position shown in the following figure, attach the detector to the pipe. In the example shown, both rubber gaskets are made of the same material.



- (4) Fasten the bolts with a torque that provides a leakproof joint.

2.4.10: Installation on a PVC pipe using non-SUS grounding ring material

The installation methods described in this section are for installation on a PVC pipe using non-SUS grounding ring material. For the installation method corresponding to any other combination of materials, refer to Table 2-5 on page 2-12.

PTFE gaskets are provided for this type of installation. If you supply the gaskets, Azbil Corporation recommends non-rubber gaskets made of material such as compressed fiber sheet or PTFE. Although rubber gaskets can be used, they are not recommended. See page 2-24 for installation using rubber gaskets.

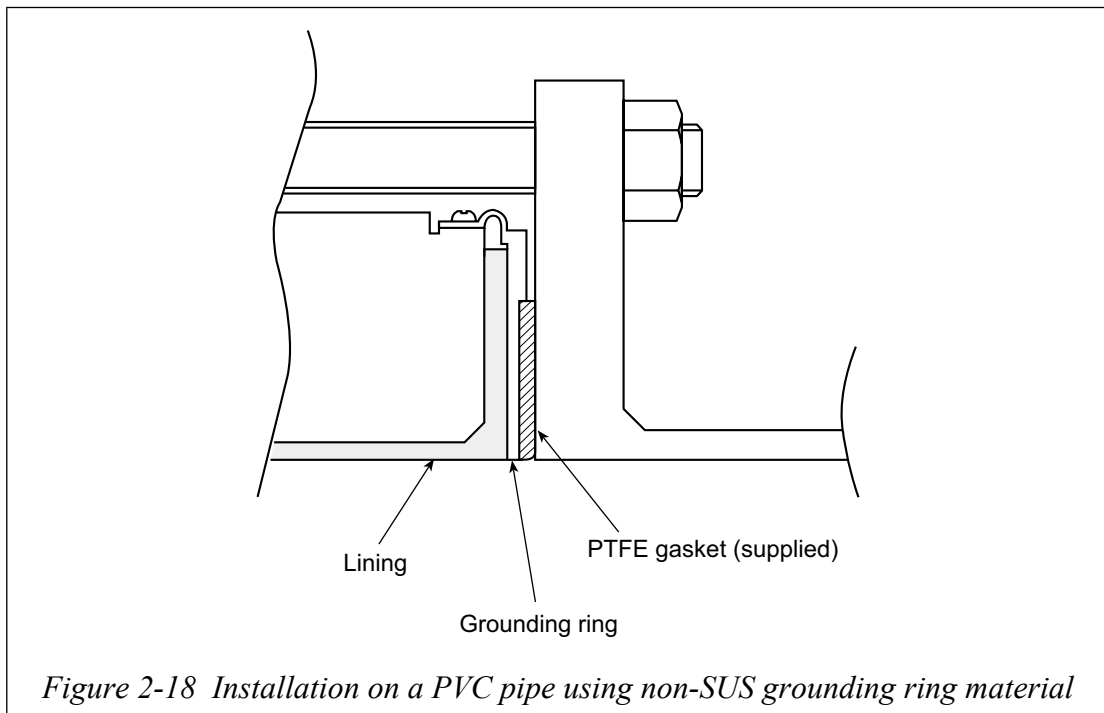
⚠ CAUTION

The use of rubber gaskets and a lower fastening torque is not recommended and can cause insufficient surface pressure between the lining and the grounding ring, resulting in leakage.

If tightening the bolts at the specified torque threatens to warp or damage the PVC pipes, you will need to use a protective plate. See page 2-23 for installation of the protective plate.

To install a wafer detector on a PVC pipe using non-SUS grounding ring material with a specified fastening torque:

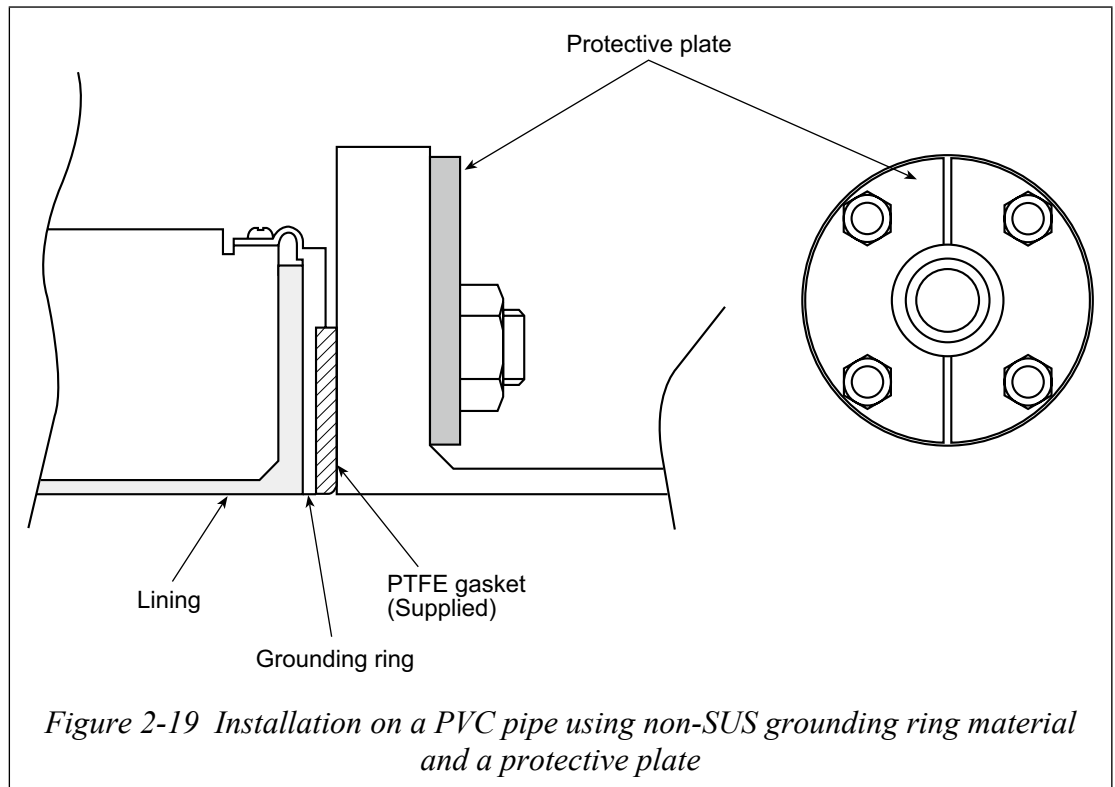
- Install the detector as shown in the following illustration. The torque level for tightening the bolts is not related to the gasket material.
See Table 2-1 on page 2-7 for the appropriate torque.
See Table 2-2 on page 2-10 for the inner diameter of the gasket.



To install a wafer detector on a PVC pipe using non-SUS grounding ring material and a protective plate:

Use this method to install the detector using a protective plate to prevent the PVC pipe from being deformed or damaged when the bolts are tightened with the specified torque.

- Install the protective plate between the outer side of the PVC flange and the detector, as shown in the figure below. The protective plate protects the PVC pipe. The torque level for tightening the bolts is not related to the gasket material. See Table 2-1 on page 2-7 for the appropriate torque. See Table 2-2 on page 2-10 for the inner diameter of the gasket.

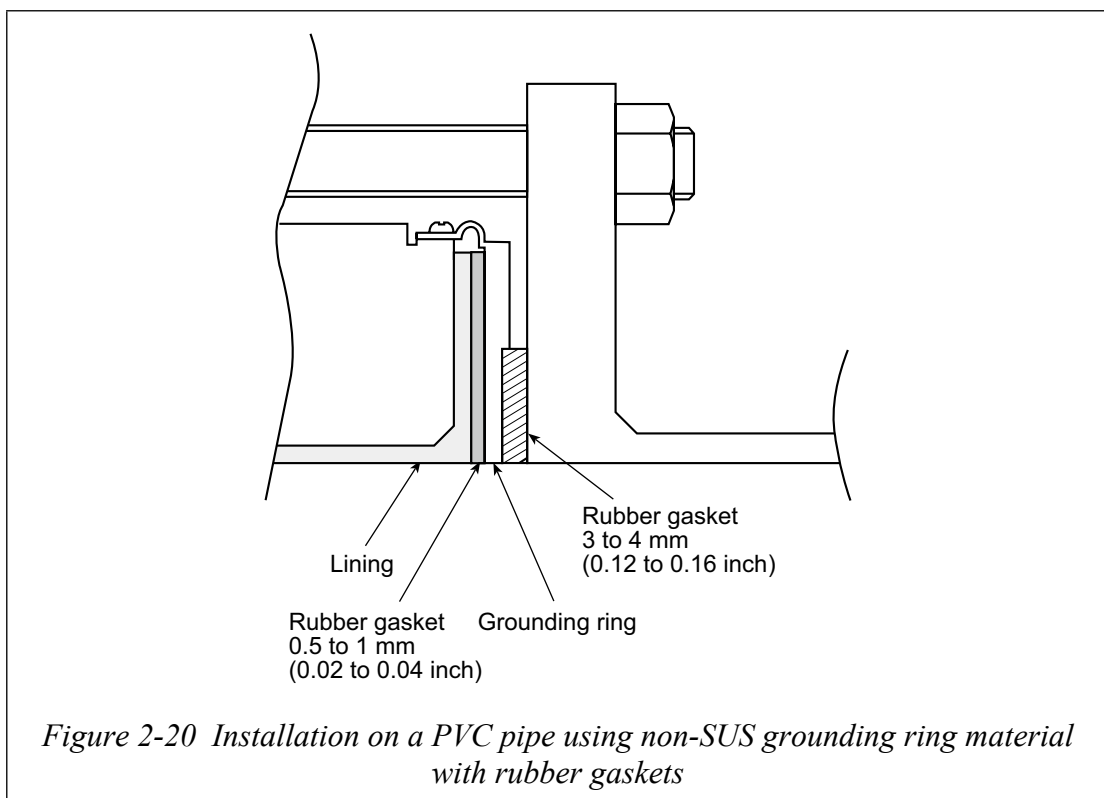


To install a wafer detector on a PVC pipe using non-SUS grounding ring material with rubber gaskets and a low fastening torque:

⚠ CAUTION

The use of rubber gaskets and a lower fastening torque is not recommended and can cause insufficient surface pressure between the lining and the grounding ring, resulting in leakage.

- (1) Remove the grounding ring from the detector and insert a rubber gasket 0.5 to 1.0 mm (0.02 to 0.04 inch) thick between the lining and the grounding ring.
- (2) Reinsert the grounding ring on top of the rubber gasket.
- (3) Remove the PTFE gasket and insert a rubber gasket 3.0 to 4.0 mm (0.12 to 0.16 inch) to replace it.
- (4) With the rubber gaskets in the position shown in the following figure, attach the detector to the pipe. Both rubber gaskets should be made of the same material. See Table 2-3 on page 2-11 and Table 2-4 on page 2-11 for the appropriate dimensions.



- (5) Fasten the bolts with a torque that provides a leakproof joint.

2.5 : Installing a flanged detector

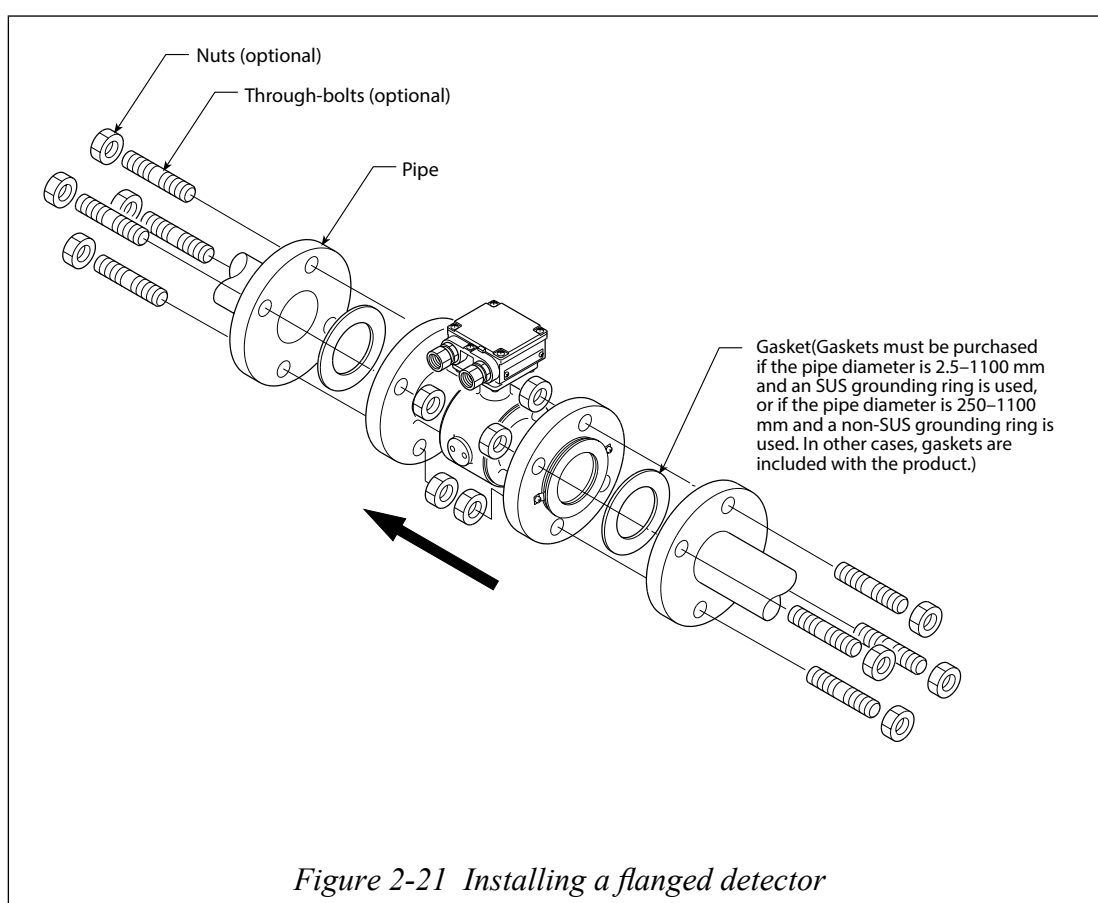
⚠ CAUTION

Before installing the detector, make sure any foreign matter is flushed from the interior passage of the detector. Residual foreign matter could cause output fluctuations.

Do not touch the electrodes or allow oil or fat to come into contact with them to avoid output fluctuations.

Align the direction mark on the detector in the direction of the liquid flow. Misalignment can result in a negative output.

The following figure shows the basic installation method for installing a flanged detector.



2.5.1: Determining the fastening torque

The following table shows the fastening torque for each pipe bore.

 CAUTION	
The correct fastening torque must be used to prevent leakage. To avoid damage to the detector, do not exceed the listed fastening torque.	

Table 2-6 Fastening torque for flanged detectors

Nominal detector bore diameter mm (inch)	Flange ratings	Fastening torque	
		N•m (ft•lb)	kgf•cm
2.5 - 15 mm (0.1 - 3/8 inch)	JIS 10K	6 - 9 (4.4 - 6.6)	61 - 92
	JIS 20K	6 - 9 (4.4 - 6.6)	61 - 92
	JIS 30K	18 - 31 (13.3 - 22.9)	184 - 316
	JPI 150		
	JPI 300		
	ANSI 150	6 - 9 (4.4 - 6.6)	61 - 92
	ANSI 300	6 - 9 (4.4 - 6.6)	61 - 92
	DIN PN10/16 DIN PN25/40	6 - 9 (4.4 - 6.6) 9 - 14 (6.6 - 10.3)	61 - 92 92 - 143
25 mm (1 inch)	JIS 10K	21 - 31 (15.5 - 22.9)	214 - 316
	JIS 20K	21 - 32 (15.5 - 23.6)	214 - 326
	JIS 30K	23 - 36 (17.0 - 26.6)	235 - 367
	JPI 150		
	JPI 300		
	ANSI 150	11 - 17 (8.1 - 12.5)	112 - 173
	ANSI 300	22 - 34 (16.2 - 25.1)	224 - 347
	DIN PN10/16 DIN PN25/40	10 - 14 (7.4 - 10.3) 12 - 18 (8.9 - 13.3)	102 - 143 122 - 184
40 mm (1½ inches)	JIS 10K	22 - 32 (16.2 - 23.6)	224 - 326
	JIS 20K	22 - 34 (16.2 - 25.1)	224 - 347
	JIS 30K	41 - 65 (30.2 - 47.9)	418 - 663
	JPI 150		
	JPI 300		
	ANSI 150	13 - 18 (9.6 - 13.3)	133 - 184
	ANSI 300	36 - 57 (26.6 - 42.0)	367 - 581
	DIN PN10/16 DIN PN25/40	22 - 32 (16.2 - 23.6) 25 - 38 (18.4 - 28.0)	224 - 326 255 - 387

Table 2-6 Fastening torque for flanged detectors

Nominal detector bore diameter mm (inch)	Flange ratings	Fastening torque	
		N•m (ft•lb)	kgf•cm
50 / 65 mm (2 / 2½ inches)	JIS 10K	24 - 34 (17.7 - 25.1)	245 - 347
	JIS 20K	19 - 31 (14.0 - 22.9)	194 - 316
	JIS 30K	22 - 34 (16.2 - 25.1)	224 - 347
	JPI 150		
	JPI 300		
	ANSI 150	23 - 32 (17.0 - 23.6)	235 - 326
	ANSI 300	20 - 32 (14.8 - 23.6)	204 - 326
	DIN PN10/16 DIN PN25/40	24 - 34 (17.7 - 25.1) 28 - 42 (20.7 - 31.0)	245 - 347 286 - 428
80 mm (3 inches)	JIS 10K	20 - 31 (14.8 - 22.9)	204 - 316
	JIS 20K	37 - 61 (27.3 - 45.0)	377 - 622
	JIS 30K	42 - 66 (31.0 - 48.7)	428 - 673
	JIS G3443 F12	18 - 37 (13.3 - 27.3)	184 - 377
	JPI 150		
	JPI 300		
	ANSI 150	26 - 35 (19.2 - 25.8)	265 - 357
	ANSI 300	37 - 57 (27.3 - 42.0)	377 - 581
DIN PN10/16 DIN PN25/40	20 - 31 (14.8 - 22.9) 25 - 39 (18.4 - 28.8)	204 - 316 255 - 398	
100 mm (4 inches)	JIS 10K	22 - 33 (16.2 - 24.3)	224 - 337
	JIS 20K	41 - 66 (30.2 - 48.7)	418 - 673
	JIS 30K	61 - 95 (45.0 - 70.1)	622 - 969
	JIS G3443 F12	21 - 41 (15.5 - 30.2)	214 - 418
	JPI 150		
	JPI 300		
	ANSI 150	21 - 31 (15.5 - 22.9)	214 - 316
	ANSI 300	43 - 66 (31.0 - 48.7)	438 - 673
DIN PN10/16 DIN PN25/40	22 - 33 (16.2 - 24.3) 48 - 74 (35.4 - 54.6)	224 - 337 489 - 755	
125 / 150 mm (5 / 6 inches)	JIS 10K	47 - 67 (34.7 - 49.4)	479 - 683
	JIS 20K	58 - 91 (42.8 - 67.1)	591 - 928
	JIS 30K	80 - 123 (59.0 - 90.7)	816 - 1254
	JIS G3443 F12	23 - 45 (17.0 - 33.2)	235 - 459
	JPI 150		
	JPI 300		
	ANSI 150	42 - 60 (31.0 - 44.3)	428 - 612
	ANSI 300	50 - 74 (36.9 - 54.6)	510 - 755
DIN PN10/16 DIN PN25/40	47 - 67 (34.7 - 49.4) 97 - 97 (71.5 - 71.5)	479 - 683 989 - 989	

Table 2-6 Fastening torque for flanged detectors

Nominal detector bore diameter mm (inch)	Flange ratings	Fastening torque	
		N•m (ft•lb)	kgf•cm
200 mm (8 inches)	JIS 10K	44 - 65 (32.5 - 47.9)	449 - 663
	JIS 20K	66 - 102 (48.7 - 75.2)	673 - 1040
	JIS 30K	94 - 142 (69.3 - 104.7)	959 - 1448
	JIS G3443 F12	24 - 44 (17.7 - 32.5)	245 - 449
	JPI 150		
	JPI 300		
	ANSI 150	42 - 59 (31.0 - 43.5)	428 - 602
	ANSI 300	81 - 120 (59.7 - 88.5)	826 - 1224
	DIN PN10/16 DIN PN25/40	47 - 68 (34.7 - 50.2) 123 - 189 (90.7 - 139.4)	479 - 693 1254 - 1927
250 mm (10 inches)	JIS 10K	51 - 63 (37.6 - 46.5)	520 - 642
	JIS 20K	81 - 99 (59.7 - 73.0)	826 - 1010
	JIS G3443 F12	73 - 89 (53.8 - 65.6)	744 - 908
	JPI 150		
	JPI 300		
	ANSI 150	69 - 85 (50.9 - 62.7)	704 - 867
	ANSI 300	82 - 97 (60.5 - 71.5)	836 - 989
	DIN PN10/16 DIN PN25	57 - 69 (42.0 - 50.9) 108 - 127 (79.7 - 93.7)	581 - 704 1101 - 1295
	300 mm (12 inches)	JIS 10K	50 - 62 (36.9 - 45.7)
JIS 20K		79 - 97 (58.3 - 71.5)	806 - 989
JIS G3443 F12		49 - 59 (36.1 - 43.5)	500 - 602
JPI 150			
JPI 300			
ANSI 150		56 - 68 (41.3 - 50.2)	571 - 693
ANSI 300		116 - 136 (85.6 - 100.3)	1183 - 1387
DIN PN10/16 DIN PN25		45 - 55 (33.2 - 40.6) 105 - 122 (77.4 - 90.0)	459 - 561 1071 - 1244
350 mm (14 inches)		JIS 10K	54 - 66 (39.8 - 48.7)
	JIS 20K	143 - 167 (105.5 - 123.2)	1458 - 1703
	JIS G3443 F12	66 - 80 (48.7 - 59.0)	673 - 816
	JPI 150		
	JPI 300		
	ANSI 150	80 - 98 (59.0 - 72.3)	816 - 999
	ANSI 300	116 - 136 (85.6 - 100.3)	1183 - 1387
	DIN PN10/16 DIN PN25	42 - 52 (31.0 - 38.4) 160 - 189 (118.0 - 139.4)	428 - 530 1632 - 1927
	400 mm (16 inches)	JIS 10K	72 - 88 (53.1 - 64.9)
JIS 20K		160 - 189 (118.0 - 139.4)	1632 - 1927
JIS G3443 F12		69 - 85 (50.9 - 62.7)	704 - 867
JPI 150			
JPI 300			

Table 2-6 Fastening torque for flanged detectors

Nominal detector bore diameter mm (inch)	Flange ratings	Fastening torque	
		N•m (ft•lb)	kgf•cm
400 mm (16 inches)	ANSI 150	80 - 98 (59.0 - 72.3)	816 - 999
	ANSI 300	166 - 195 (122.4 - 143.8)	1693 - 1988
	DIN PN10/16	72 - 88 (53.1 - 64.9)	734 - 897
	DIN PN25	199 - 234 (146.8 - 172.6)	2029 - 2386
450mm (18 inches)	JIS 10K	72-88 (53.1-64.9)	734 - 897
	JIS 20K	160-189 (118.0-139.4)	1632 - 1927
	JIS G3443 F12	122-147 (90.0-108.4)	1244 - 1499
	JPI 150		
	JPI 300		
	ANSI 150	155 - 189 (114.3 - 139.4)	1581 - 1927
	DIN PN10/16	72-88 (53.1 - 64.9)	734 - 897
DIN PN25	199-234 (146.8 - 172.6)	2029 - 2386	
500 mm (20 inches)	JIS 10K	114 - 133 (84.1 - 98.1)	1162 - 1356
	JIS 20K	173 - 204 (127.6 - 150.5)	1764 - 2080
	JIS G3443 F12	133 - 161 (98.1 - 118.7)	1356 - 1642
	JPI 150		
	JPI 300		
	ANSI 150	155 - 189 (114.3 - 139.4)	1581 - 1927
	DIN PN10/16	106 - 129 (78.2 - 95.1)	1081 - 1315
DIN PN25	214 - 251 (157.8 - 185.1)	2182 - 2559	
600 mm (24 inches)	JIS 10K	184 - 216 (135.7 - 159.3)	1876 - 2203
	JIS 20K	267 - 315 (196.9 - 232.3)	2723 - 3212
	JIS G3443 F12	127 - 154 (93.7 - 113.6)	1295 - 1570
	JPI 150		
	JPI 300		
	ANSI 150	214 - 262 (157.8 - 193.2)	2182 - 2672
	DIN PN10/16	153 - 185 (112.8 - 136.4)	1560 - 1886
DIN PN25	292 - 343 (215.4 - 253.0)	2978 - 3498	
700 mm (28 inches)	JIS 10K	134 - 163 (98.9 - 120.3)	1367 - 1663
JIS G3443 F12			
800 mm (32 inches)	JIS 10K	187- 228 (138.0 - 168.3)	1908 - 2327
	JIS G3443 F12		
900 mm (40 inches)	JIS 10K	193 -235 (142.4- 173.4)	1969 - 2398
	JIS G3443 F12		
1000 mm (36 inches)	JIS 10K	262 - 320 (193.4- 236.2)	2673 - 3265
	JIS G3443 F12		
1100 mm (44 inches)	JIS 10K	300 - 360 (221.4 - 265.7)	3061 - 3673
	JIS G3443 F12		

Flange shape selection

The flanges used for installation should maximize the area of contact with the gasket.

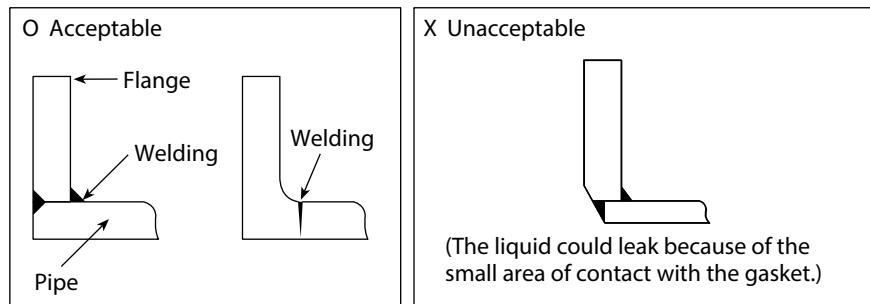


Figure 2-22 Flange Shapes

⚠ CAUTION

Never attempt to force the detector between two flanges if the space is too narrow. It can damage the detector.

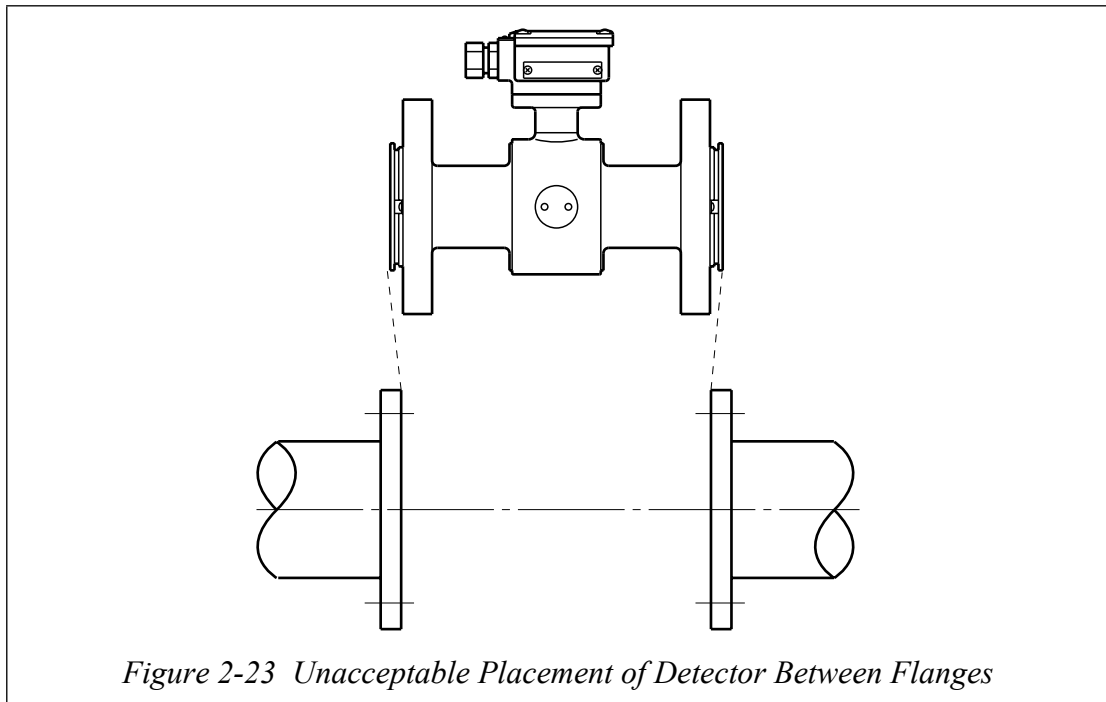


Figure 2-23 Unacceptable Placement of Detector Between Flanges

⚠ CAUTION

Make certain the bore diameters of the pipe and the detector are exactly the same and install the detector so that the gasket does not protrude into the inner bore of the pipe, as this could result in leakage or other hazards.

⚠ CAUTION

Tighten each bolt a little at a time and apply uniform pressure to all the bolts. If leakage continues after tightening the bolts, make sure that the pipe is not off center, then continue to tighten each bolt a little at a time.

2.5.2: Necessary parts

You will need the following parts to install the detector:

- Connecting bolts and nuts (available separately)
- Gaskets: Gaskets must be purchased if the pipe diameter is 2.5–1100 mm and an SUS grounding ring is used, or if the pipe diameter is 250–1100 mm and a non-SUS grounding ring is used. For 2.5–200 mm dia. pipe with a non-SUS grounding ring, gaskets are included with the product.
- Protective Plate: Required when connecting the detector to polyvinyl chloride (PVC) piping.

Gaskets

Gaskets are included with the product if the pipe diameter is 2.5–200 mm and a non-SUS grounding ring is used. Gaskets must be purchased if the pipe diameter is 2.5–1100 mm and an SUS grounding ring is used, or if the pipe diameter is 250–1100 mm and a non-SUS grounding ring is used. Azbil Corporation recommends compressed fiber sheet or polytetrafluoroethylene (PTFE) gasket material. For the inner diameters of the gaskets, see the following table. Rubber gaskets are not recommended.


 CAUTION	
Using a gasket with too small a diameter can affect the flow velocity distribution, resulting in inaccurate measurement.	
Using a gasket with too large a diameter can cause leakage. Also, any solid substance in the fluid to be measured could accumulate between the gasket and the flange, resulting in inaccurate measurement.	

Table 2-7 Recommended inner diameters of gaskets

Bore diameter	mm (inch)	Inner diameter	mm (inch)
2.5	(0.1)	11±1	(0.43±0.04)
5	(0.2)	11±1	(0.43±0.04)
10	(3/8)	11±1	(0.43±0.04)
15	(1/2)	16±1	(0.63±0.04)
25	(1)	25±1	(0.98±0.04)
40	(1½)	40±1	(1.57±0.04)
50	(2)	51±1	(2.01±0.04)
65	(2½)	64±1	(2.52±0.04)
80	(3)	76±1	(2.99±0.04)
100	(4)	101±1	(3.98±0.04)
125	(5)	124±1	(4.88±0.04)
150	(6)	148±1	(5.33±0.04)
200	(8)	196±1	(7.72±0.04)
250	(10)	246±1	(9.69±0.04)
300	(12)	296±1	(11.65±0.04)
350	(14)	346±1	(13.62±0.04)
400	(16)	396±1	(15.59±0.04)
500	(20)	496±1	(19.53±0.04)
600	(24)	596±1	(23.46±0.04)
700	(28)	701±2	(27.60±0.08)

Table 2-7 Recommended inner diameters of gaskets

Bore diameter	mm (inch)	Inner diameter	mm (inch)
800	(32)	801±2	(31.54±0.08)
900	(36)	901±2	(35.47±0.08)
1000	(40)	1001±2	(39.41±0.08)
1100	(44)	1101±2	(43.35±0.08)

2.5.3: Selecting an installation method

To select an installation method you must determine the following:

- Mounting pipe material (metal or PVC)
- Grounding ring material (SUS or non-SUS) and diameter
- Need for a protective plate
- Use of rubber gaskets


 CAUTION
<p>The necessary materials and the installation method vary according to the material of the ring and that of the pipe on which the detector is to be installed. Select the appropriate method of installation from the following table after confirming the specifications of the detector to be installed and the conditions of installation. Improper installation can result in leakage or damage to the pipe flanges.</p>

Table 2-8 Flange detector installation methods

Pipe material	Grounding ring material	Installation requirements	See Page
Metal	SUS & pipe dia. 2.5–1100 mm, or non-SUS & pipe dia. 250–1100 mm	With specified fastening torque	page 2-33
	Non-SUS & pipe dia. 2.5–200 mm	With specified fastening torque	page 2-34
PVC	SUS & pipe dia. 2.5–1100 mm, or non-SUS & pipe dia. 250–1100 mm	With specified fastening torque	page 2-36
		With a protective plate	page 2-37
		With rubber gaskets and low fastening torque	page 2-38
	Non-SUS & pipe dia. 2.5–200 mm	With specified fastening torque	page 2-40
		With a protective plate	page 2-41
		With rubber gaskets and low fastening torque	page 2-42

2.5.4: Installation on a metal pipe using an SUS grounding ring (pipe dia. 2.5–1100 mm) or non-SUS ring (250–1100 mm)

This section describes installation on a metal pipe using an SUS grounding ring (pipe diameter: 2.5–1100 mm) or a non-SUS grounding ring (pipe diameter: 250–1100 mm). For installation with other combinations of material, see Table 2-8 on page 2-32.

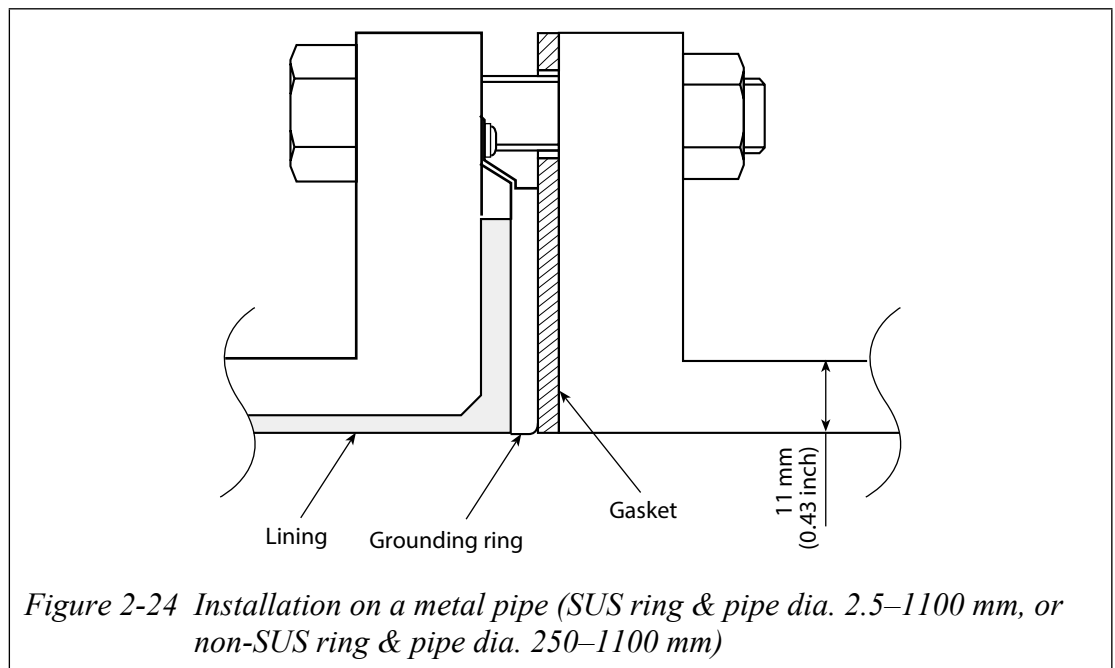
For this type of installation, the use of non-rubber (for example, compressed fiber sheet or PTFE) gaskets is recommended. See Table 2-7 on page 2-31 for recommended inner (bore) diameters.

To install a flanged detector on a metal pipe using an SUS grounding ring (pipe dia. 2.5–1100 mm) or a non-SUS ring (250–1100 mm) with the specified torque:

- Install the detector as shown in the following illustration. The torque level for tightening the bolts is not related to the gasket material.

See Table 2-6 on page 2-26 for the appropriate torque.

See Table 2-7 on page 2-31 for the inner diameter of the gasket.



2.5.5: Installation on a metal pipe (dia. 2.5–200 mm) using a non-SUS grounding ring

This section describes installation on a metal pipe (diameter: 2.5-200 mm) using a non-SUS grounding ring. For installation with other combinations of material, see Table 2-8 on page 2-32.

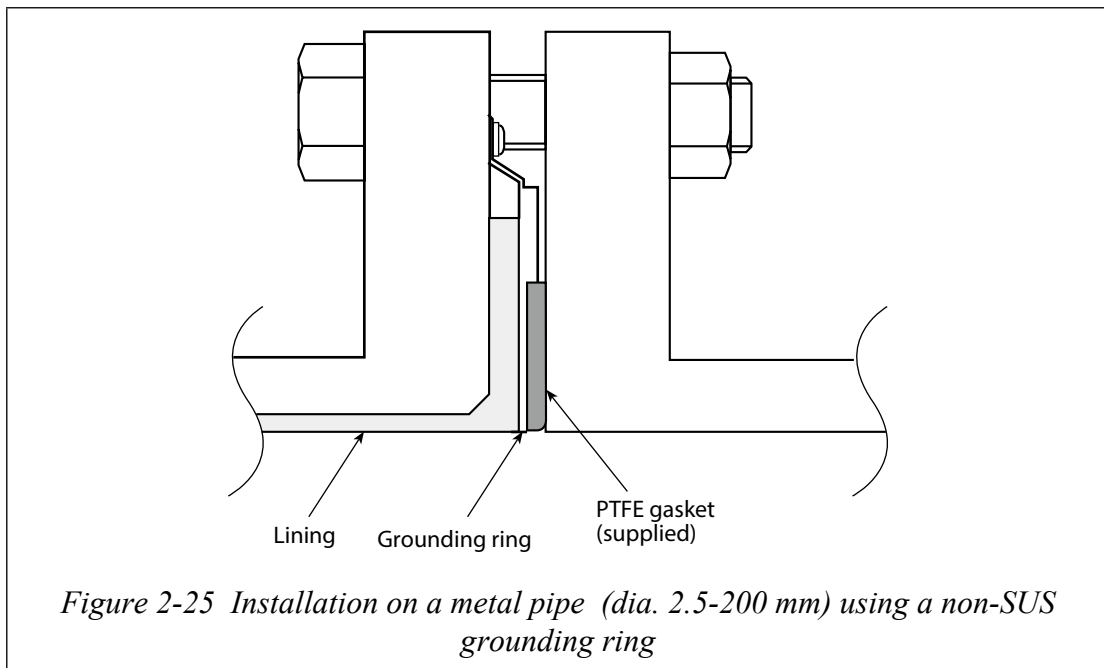
PTFE gaskets are provided for this type of installation. If you supply the gaskets, Azbil Corporation recommends non-rubber gaskets made of material such as compressed fiber sheet or PTFE.

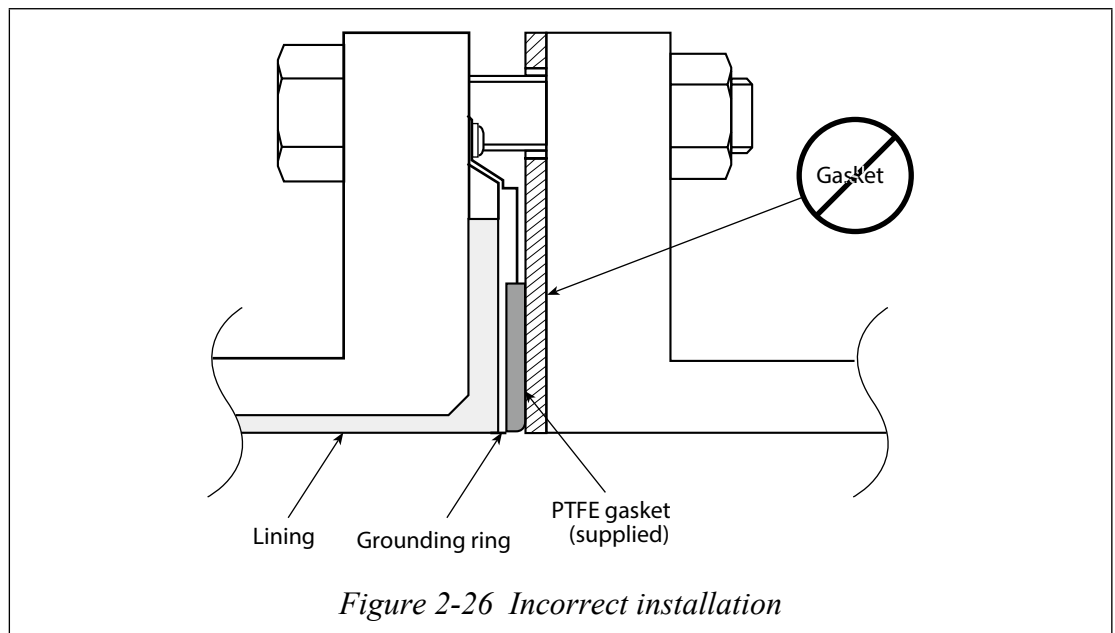
To install a flanged detector on a metal (dia. 2.5-200 mm) using a non-SUS grounding ring with the specified torque:

- Install the detector as shown in the following illustration. The torque level for tightening the bolts is not related to the gasket material.

See Table 2-6 on page 2-26 for the appropriate torque.

See Table 2-7 on page 2-31 for the inner diameter of the gasket.





2.5.6: Installation on a PVC pipe using an SUS grounding ring (pipe dia. 2.5–1100 mm) or non-SUS ring (250–1100 mm)

This section describes installation on a PVC pipe using an SUS grounding ring (pipe diameter: 2.5–1100 mm) or a non-SUS grounding ring (pipe diameter: 250–1100 mm). For installation with other combinations of material, see Table 2-8 on page 2-32.

For this type of installation, the use of non-rubber (for example, compressed fiber sheet or PTFE) gaskets is recommended. Although rubber gaskets can be used, they are not recommended. See page 2-38 for installation using rubber gaskets.

⚠ CAUTION

The use of rubber gaskets and a lower fastening torque is not recommended and can cause insufficient surface pressure between the lining and the grounding ring, resulting in leakage.

If tightening the bolts at the specified torque threatens to warp or damage the PVC pipes, you will need to use a protective plate. See page 2-37 for installation of the protective plate.

To install a flanged detector on a PVC pipe using an SUS grounding ring (pipe dia. 2.5–1100 mm) or a non-SUS ring (250–1100 mm) with the specified fastening torque:

- Install the detector as shown in the following illustration. The torque level for tightening the bolts is not related to the gasket material.
See Table 2-6 on page 2-26 for the appropriate torque.
See Table 2-7 on page 2-31 for the inner diameter of the gasket.

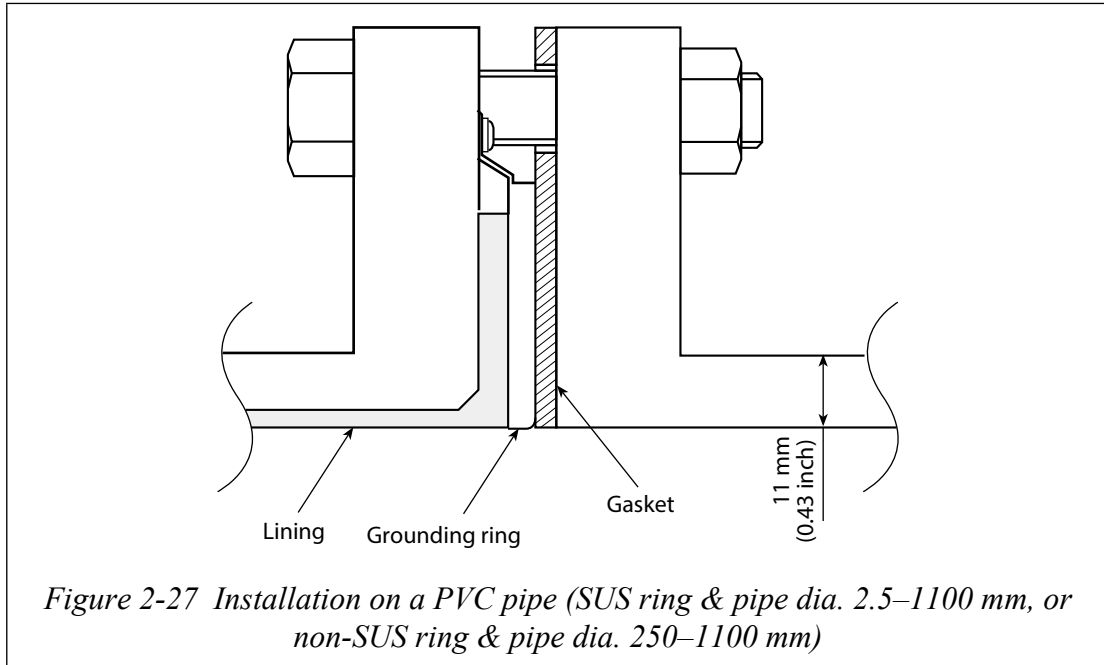
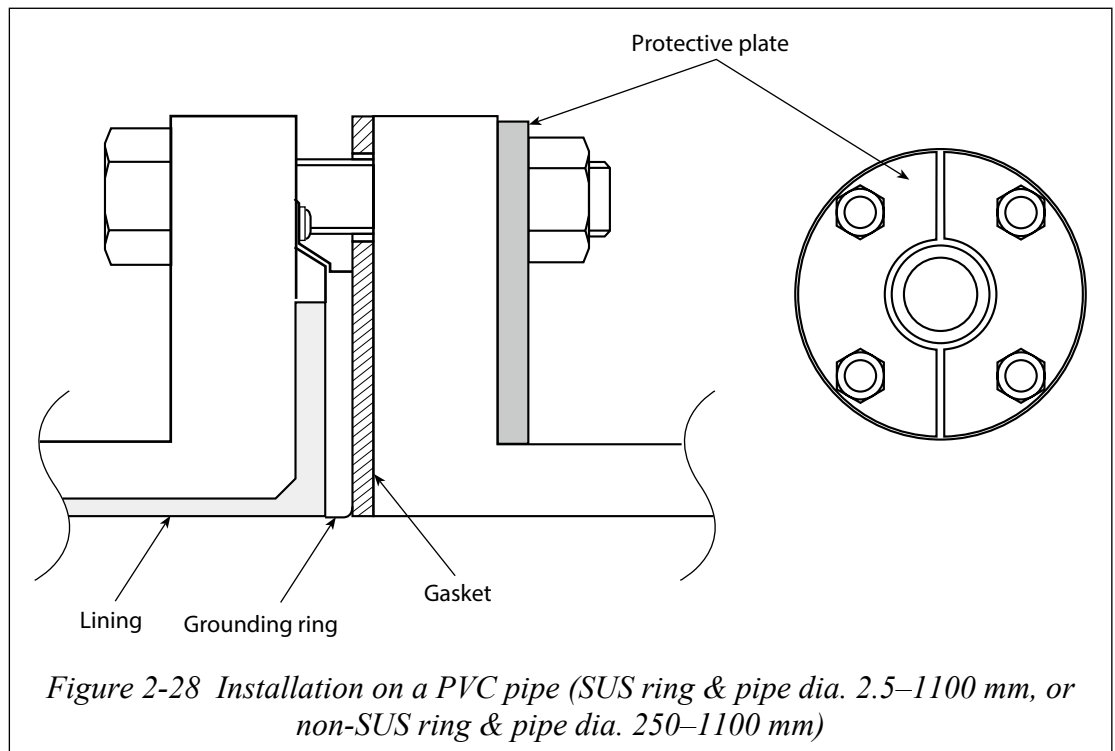


Figure 2-27 Installation on a PVC pipe (SUS ring & pipe dia. 2.5–1100 mm, or non-SUS ring & pipe dia. 250–1100 mm)

To install a flanged detector on a PVC pipe using an SUS grounding ring (pipe dia. 2.5–1100 mm) or a non-SUS ring (250–1100 mm) and a protective plate:

Use this method to install the detector using a protective plate to prevent the PVC pipe from being deformed or damaged when the bolts are tightened with the specified torque.

- Install the protective plate between the outer side of the PVC flange and the detector, as shown in the figure below. The protective plate protects the PVC pipe. The torque level for tightening the bolts is not related to the gasket material. See Table 2-6 on page 2-26 for the appropriate torque. See Table 2-7 on page 2-31 for the inner diameter of the gasket.

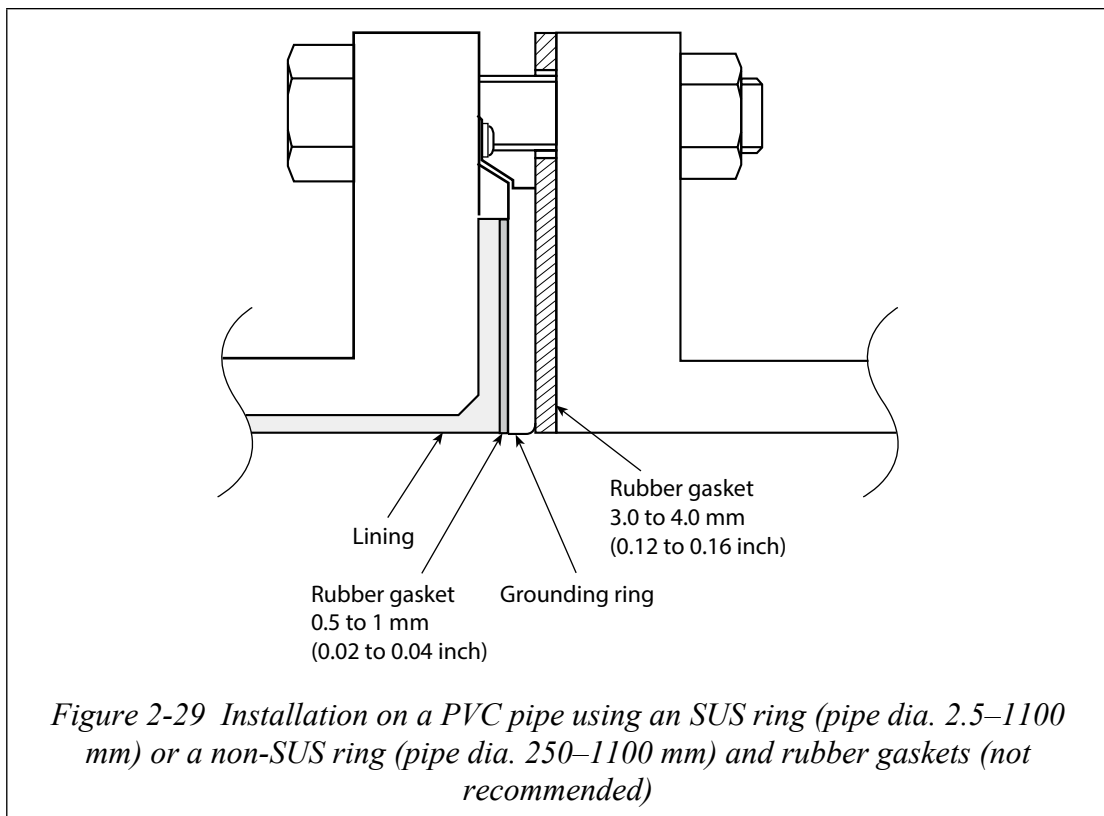


To install a flanged detector on a PVC pipe using an SUS grounding ring (pipe dia. 2.5–1100 mm) or a non-SUS ring (250–1100 mm) and rubber gaskets with a low fastening torque:

⚠ CAUTION

The use of rubber gaskets and a lower fastening torque is not recommended and can cause insufficient surface pressure between the lining and the grounding ring, resulting in leakage.

- (1) Remove the grounding ring from the detector and insert a rubber gasket 0.5 to 1.0 mm (0.02 to 0.04 inch) thick between the lining and the grounding ring.
- (2) Reinsert the grounding ring on top of the rubber gasket.
- (3) Remove the PTFE gasket and insert a rubber gasket 3.0 to 4.0 mm (0.12 to 0.16 inch) to replace it.
- (4) With the rubber gaskets in the position shown in the following figure, attach the detector to the pipe. Both rubber gaskets should be made of the same material.



- (5) Fasten the bolts with a torque that provides a leakproof joint.

2.5.7: Installation on a PVC pipe (dia. 2.5–200 mm) using a non-SUS grounding ring

This section describes installation on a PVC pipe (diameter: 2.5–200 mm) using a non-SUS grounding ring. For installation with other combinations of material, see Table 2-5 on page 2-12.

PTFE gaskets are provided for this type of installation. If you supply the gaskets, Azbil Corporation recommends non-rubber gaskets made of material such as compressed fiber sheet or PTFE. When using rubber gaskets, gaskets of the same material with two different thicknesses (0.5 to 1.0 mm (0.02 to 0.04 inch) and 3.0 to 4.0 mm (0.12 to 0.16 inch)) are required. See Table 2-3 on page 2-11 and Table 2-4 on page 2-11 for the appropriate dimensions. See page 2-42 for installation using rubber gaskets.

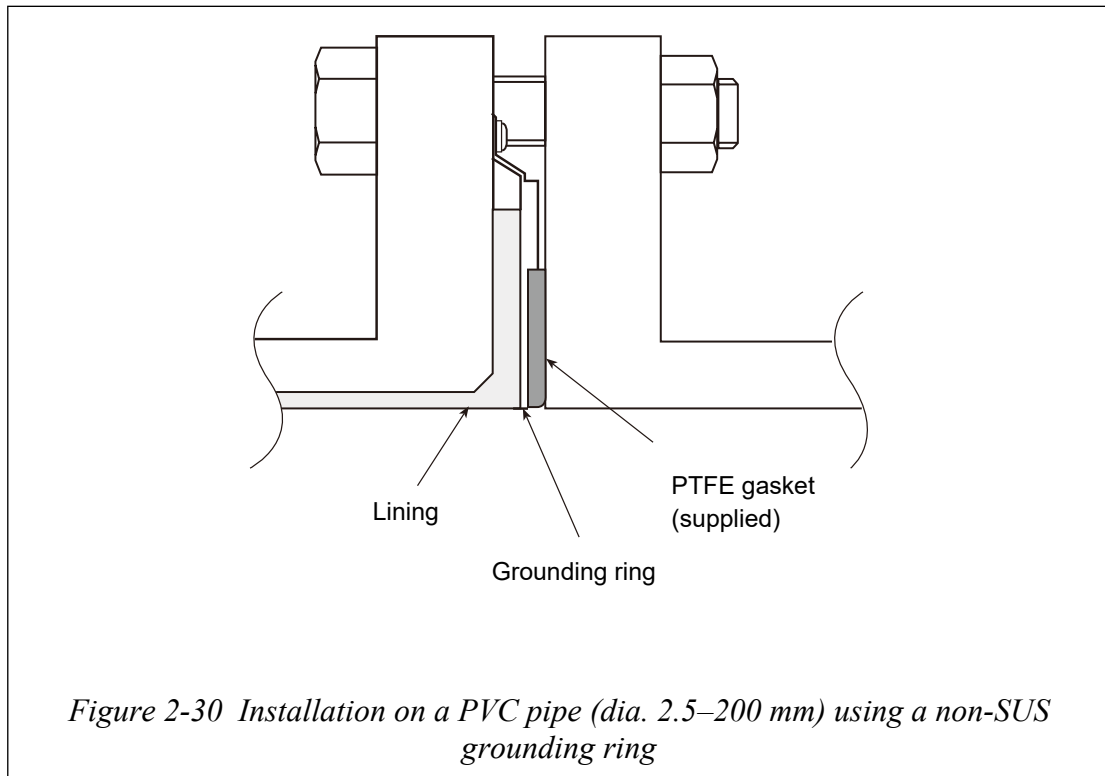
CAUTION

The use of rubber gaskets and a lower fastening torque is not recommended and can cause insufficient surface pressure between the lining and the grounding ring, resulting in leakage.

If tightening the bolts at the specified torque threatens to warp or damage the PVC pipes, you will need to use a protective plate. See page 2-41 for installation of the protective plate.

To install a flanged detector on a PVC pipe (dia. 2.5–200 mm) using a non-SUS grounding ring with the specified fastening torque:

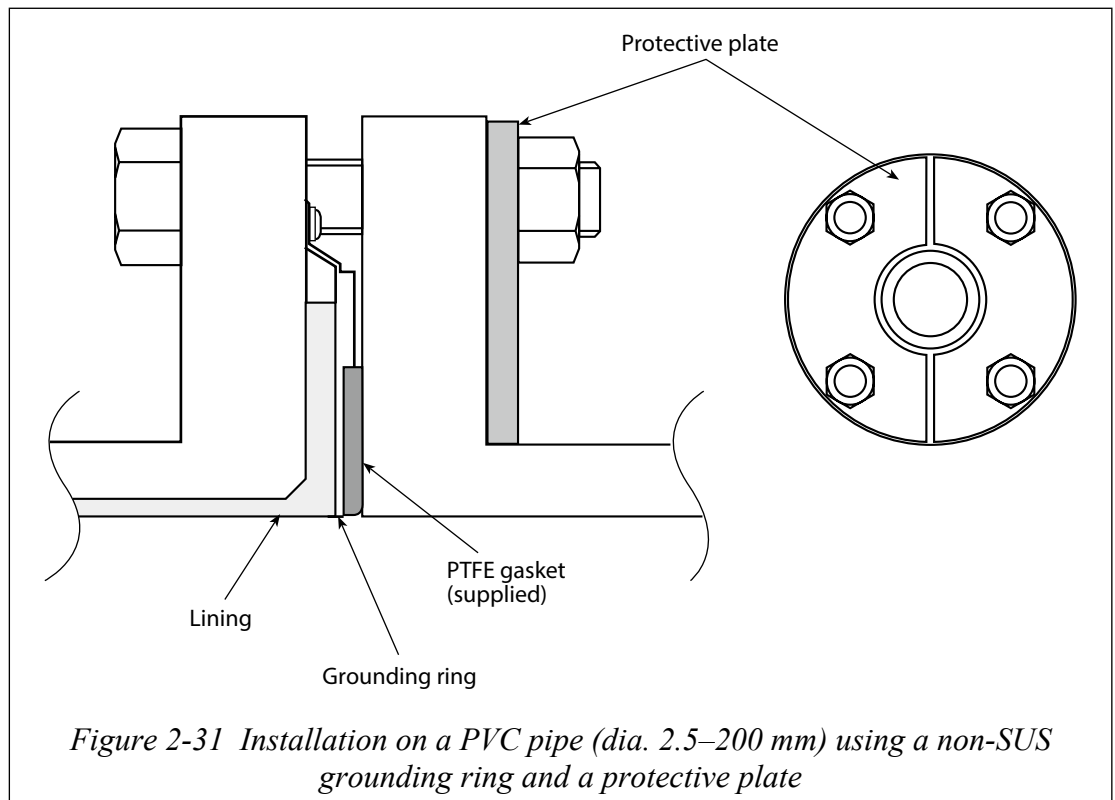
- Install the detector as shown in the following illustration. The torque level for tightening the bolts is not related to the gasket material.
See Table 2-6 on page 2-26 for the appropriate torque.
See Table 2-7 on page 2-31 for the inner diameter of the gasket.



To install a flanged detector on a PVC pipe (dia. 2.5–200 mm) using a non-SUS grounding ring and a protective plate:

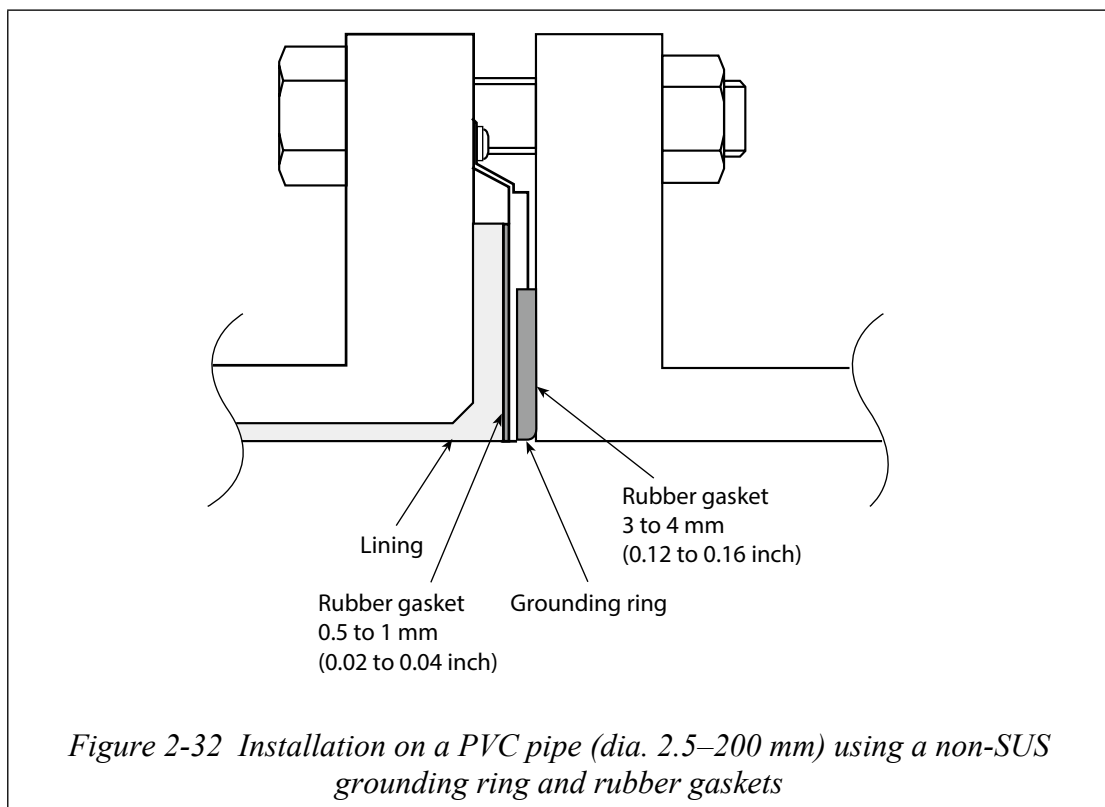
Use this method to install the detector using a protective plate to prevent the PVC pipe from being deformed or damaged when the bolts are tightened with the specified torque.

- Install the protective plate between the external side of the PVC flange and the detector, as shown in the figure below. The protective plate protects the PVC pipe. The torque level for tightening the bolts is not related to the gasket material. See Table 2-6 on page 2-26 for the appropriate torque. See Table 2-7 on page 2-31 for the inner diameter of the gasket.



To install a flanged detector on a PVC pipe (dia. 2.5–200 mm) using a non-SUS grounding ring and rubber gaskets with a low fastening torque:

- (1) Remove the grounding ring from the detector and insert a rubber gasket 0.5 to 1.0 mm (0.02 to 0.04 inch) thick.
- (2) Reinsert the grounding ring on top of the rubber gasket.
- (3) Remove the PTFE gasket and insert a rubber gasket 3.0 to 4.0 mm (0.12 to 0.16 inch) to replace it.
- (4) With the rubber gaskets in the position shown in the following figure, attach the detector to the pipe. Both rubber gaskets should be made of the same material. See Table 2-3 on page 2-11 and Table 2-4 on page 2-11 for the appropriate dimensions.



- (5) Fasten the bolts with a torque that provides a leakproof joint.

2.6 : Installing a Union / Hose / Clamp Detector

2.6.1: Installation of Union and Hose assemblies basic installation method

Direction of installation

Match the flow direction of the fluid to be measured to that of the flow direction mark on the electromagnetic flowmeter. If they cannot be matched, the direction can be changed on the terminal box or the converter. Refer to the section “Direction of terminal box / converter”.

Position of the detector

Position the detector so that the center of the pipe aligns with that of the measuring pipe of the electromagnetic flowmeter. Be sure to fasten the electromagnetic flowmeter on a stand.

Pipe connection

For union assembly, mount the union joint nuts (supplied by the customer) on the process pipe. Connect the pipe by screwing it into the connection hole of the electromagnetic flowmeter using the union joint nuts. For hose assembly, screw in the hose, and fasten it with a fastening band, etc. (supplied by the customer).

Nut tightening (union assembly)

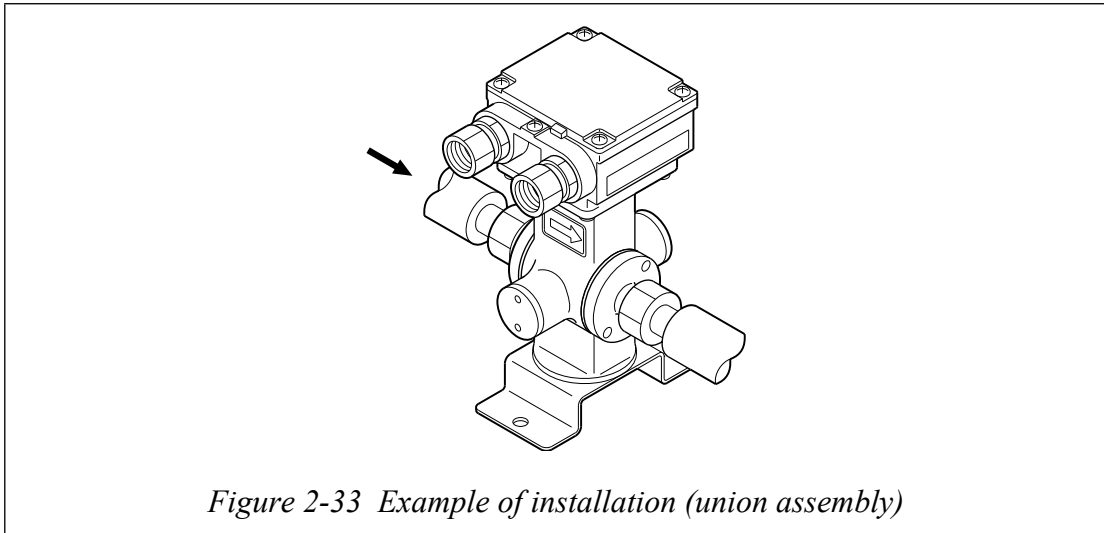
Use a torque wrench to tighten the union joint nuts. Do not tighten them fully to the specified fastening torque one at a time. Instead, tighten the upstream and downstream joint nuts alternately little by little over three or four turns. For the fastening torque, see Table 2-9.

CAUTION

Fasten the detector using the specified fastening torque to prevent leakage.

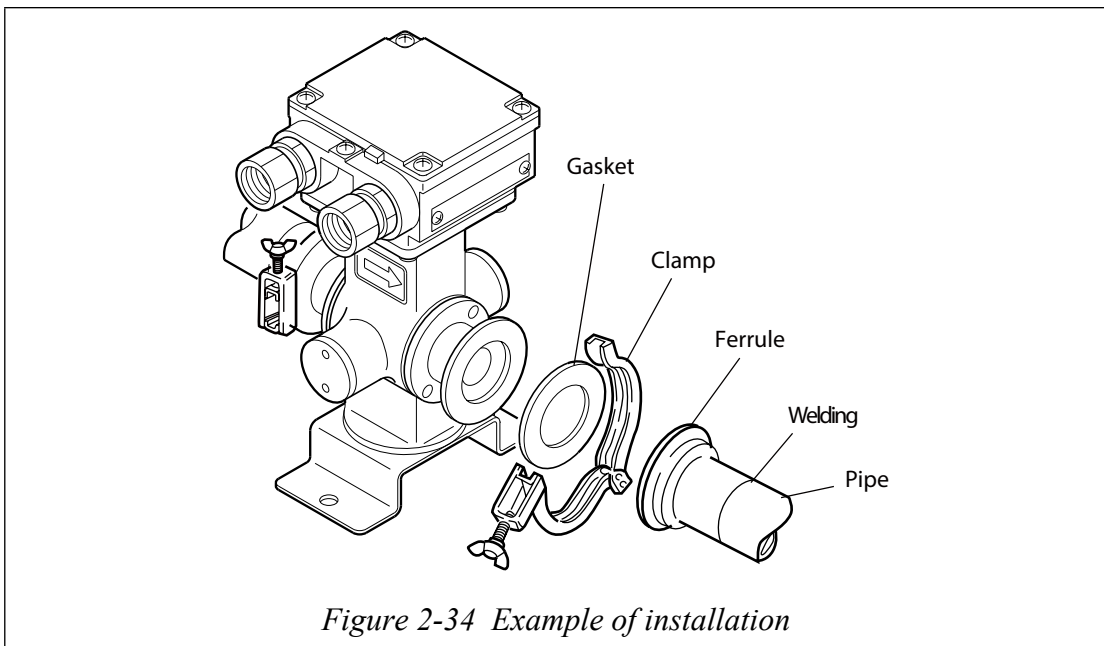
Table 2-9 Fastening torque

Nominal detector bore mm (inch)	Fastening torque N•m (ft•lb)
2.5 (0.1)	Max. 12 (8.9)
5 (0.2)	Max. 12 (8.9)
10 (3/8)	Max. 18 (13.3)
15 (1/2)	Max. 18 (13.3)



2.6.2: Installation of ISO-clamp/ Tri-clamp assemblies basic installation method

Example of clamp assembly



Welding a ferrule to the pipe

Weld the supplied ferrule onto the pipe. In the welding process, pay special attention to the taper processing, butting stages, welding current, etc. When welding ensure that there is no residual fluid in the meter and that the clamp section does not become distorted.

Mounting of the special gasket

Mount the supplied special clamp gasket so that it fits into the groove of the gasket.

WARNING

Mount it carefully into the groove so that there is no misalignment of the gasket. Misalignment can cause leakage or other hazards. Gaskets and clamps are attached to sanitary model MGS18U.

Direction of installation

Match the flow direction of the measured fluid to that of the flow direction mark of the detector, and insert the detector between the ferrules.

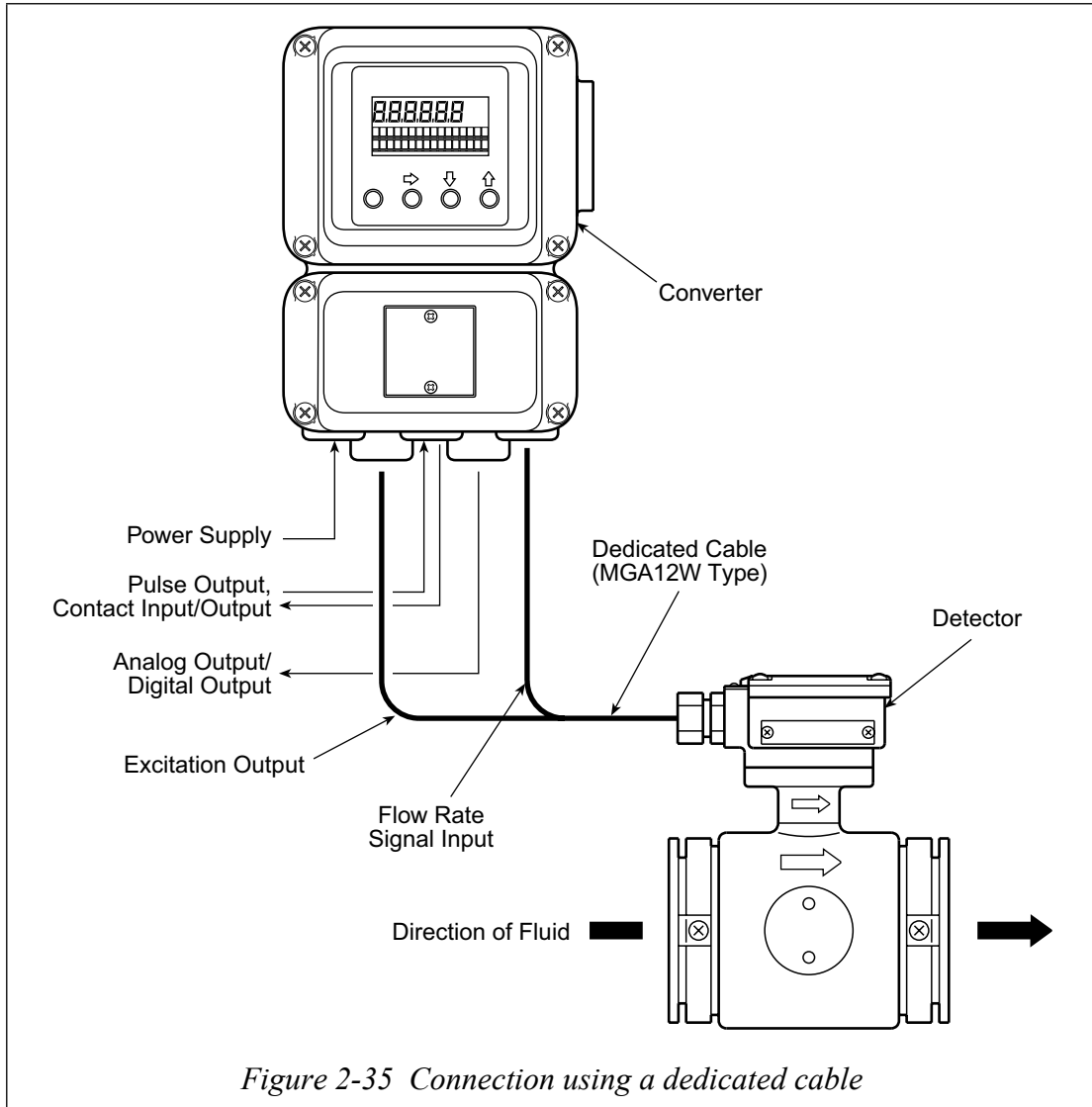
IDF-clamp / Tri-clamp tightening

Mount the clamp so that it will cover the detector and the tapered section of the ferrule, and screw it tightly.

2.7 : Wiring the detector

2.7.1: Connecting the detector and converter (Remote models)

The use of a dedicated cable (model MGA12W) is recommended for the connection between the detector and the converter. For detailed wiring information (including the dedicated cable) see the manual for the converter that you are using.



~Note Although the dedicated cable is shielded, install it away from any possible sources of noise, such as a large capacity transformer, motors, or motor power supplies.

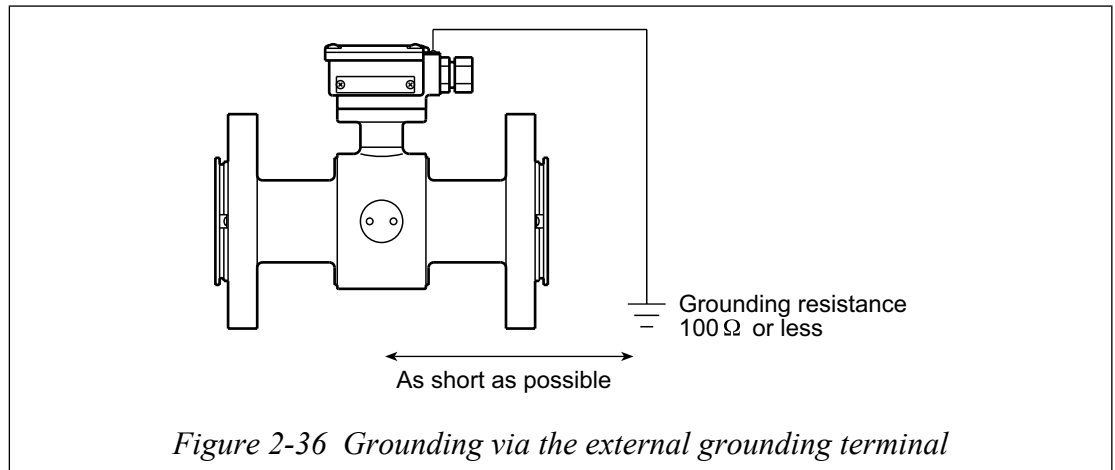
2.7.2: Grounding the detector (Remote models)

The detector is grounded via the external grounding terminal.

⚠ CAUTION

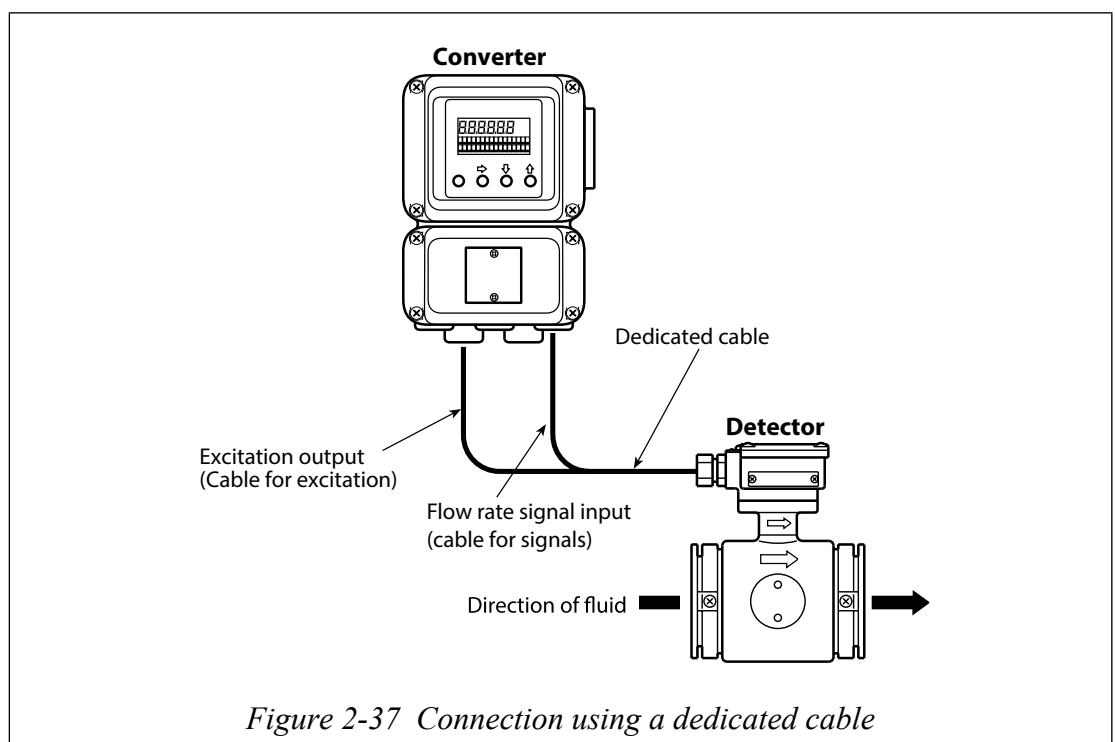
Insufficient grounding can cause output fluctuations, instability of the zero point, or output drift. Secure single point grounding with a grounding resistance of 100 Ω or less is recommended.

To avoid damaging the detector, do not ground a welder to the detector.



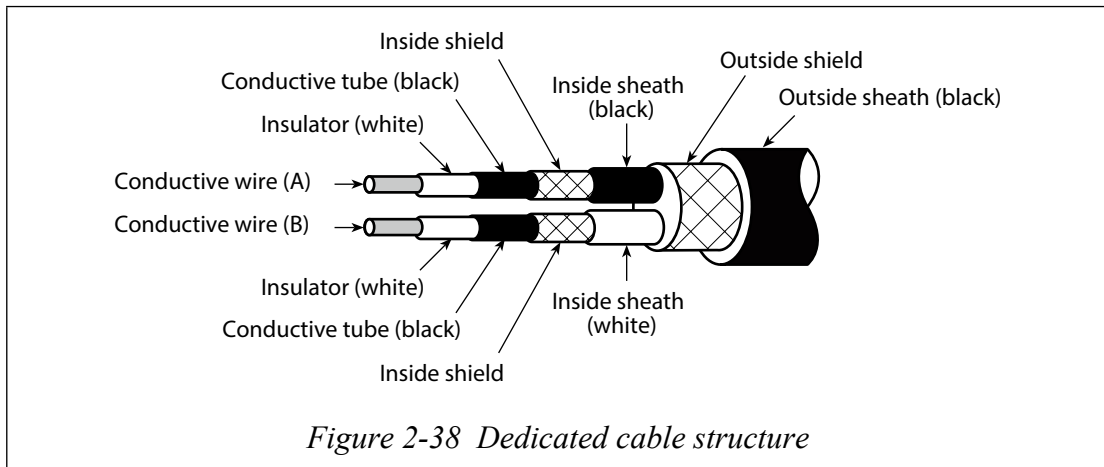
2.7.3: Installing the dedicated cable

The dedicated cable is used to connect the detector to the remote converter. It transmits either the flow rate signal input or the excitation output.



Dedicated cable structure

The structure of the dedicated cable is shown in the following figure. The cable must be properly dressed to insure proper connection.



~Note *The conductive tubing (black) for conductive wires (A) and (B) is to be removed up to the end of the inside shield.*

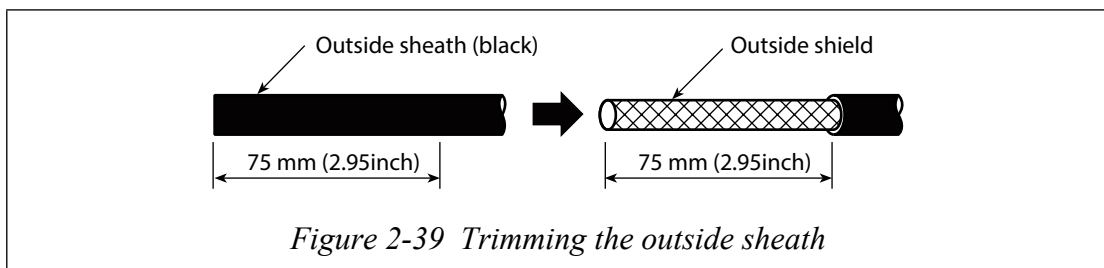
Dressing the dedicated cable : Converter side

To dress the dedicated cable:

- (1) Scribe (cut) a line in the outside sheath (black) as shown in the following figure and remove the sheathing. The length is 75mm (2.95 inch).

CAUTION

Do not cut into the outside shield.



~Note *If the terminal of the converter is designed not to use a shield drive, remove the outside shield and skip to Step 4.*

- (2) Wind the lead wire once around the outside shield.
- (3) Solder the lead wire (C-wire) to the middle of the 5 mm (0.2 inch) length. Make the length of the lead wire slightly longer than necessary and trim it to the specified length in Step 10.

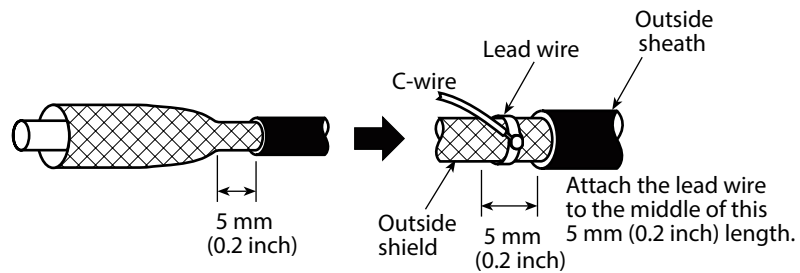


Figure 2-40 Attaching the C-wire

CAUTION

Be sure to use adequate solder so that contact failure will not occur between the C-wire and the outside shield. If the soldering connection is insecure, noise is generated due to contact resistance.

~Note *If the outside shield is not allowed to bend during soldering, in some cases, the conductive tube cannot be peeled off due to the heat of the solder.*

- (4) Cut the outside shield off at a point 5 mm (0.2 inch) from the outside sheath, leaving the specified length from the end of the outside shield.

CAUTION

Do not cut into the inside sheath.

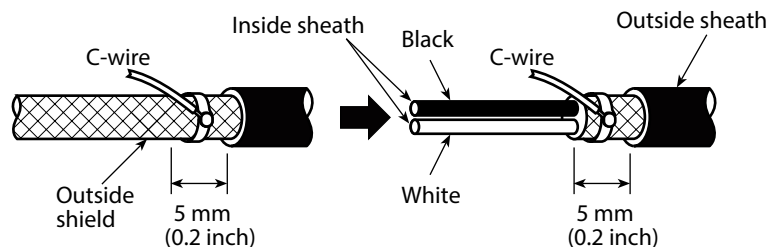


Figure 2-41 Trimming the outside shield

- (5) Peel off the inside sheath so that a 15 mm (0.59 inch) section remains.

CAUTION

Do not cut into the inside shield.

~Note *Check the operating manual for the product you are using to determine whether the lead wires (SA and SB) are necessary. If not, skip to Step 8.*

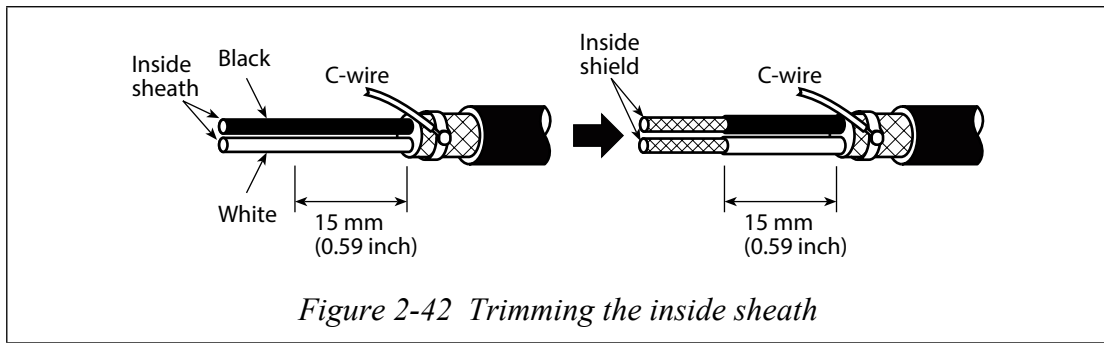


Figure 2-42 Trimming the inside sheath

- (6) Wind each lead wire (SA and SB) around the inside shield once.
- (7) Solder the lead wired (SA and SB) to the middle of this 5 mm (0.2 inch) length. Be sure to keep the two inside shields separate from each other to prevent them from being bonded together by mistake during soldering. The length of the lead wires should be measured from this point. Make the length of the lead wires slightly longer than necessary (see the operating manuals for the products) and trim to the specified length in Step 10.

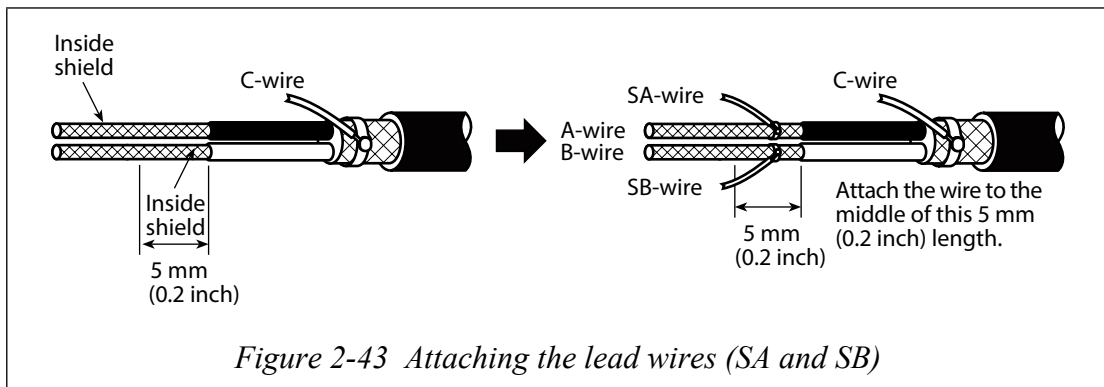


Figure 2-43 Attaching the lead wires (SA and SB)

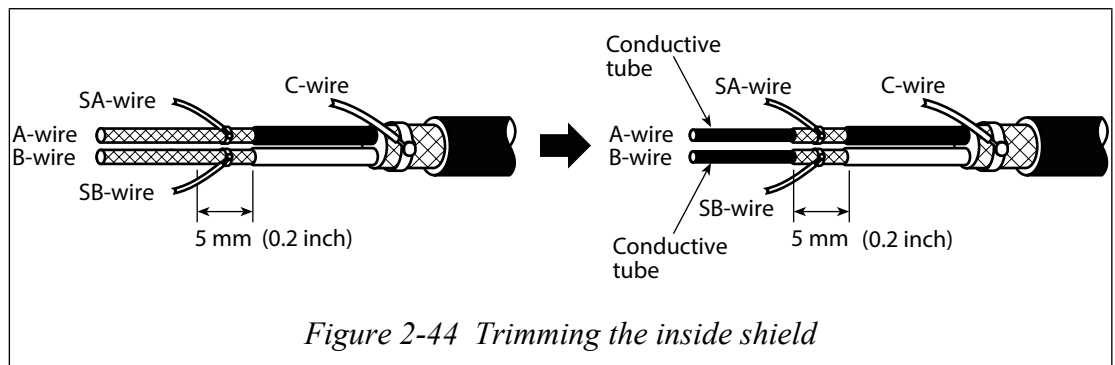
⚠ CAUTION

Be sure to use adequate solder so that contact failure will not occur between the C -wire and the outside shield. If the soldering connection is insecure, noise is generated due to contact resistance.

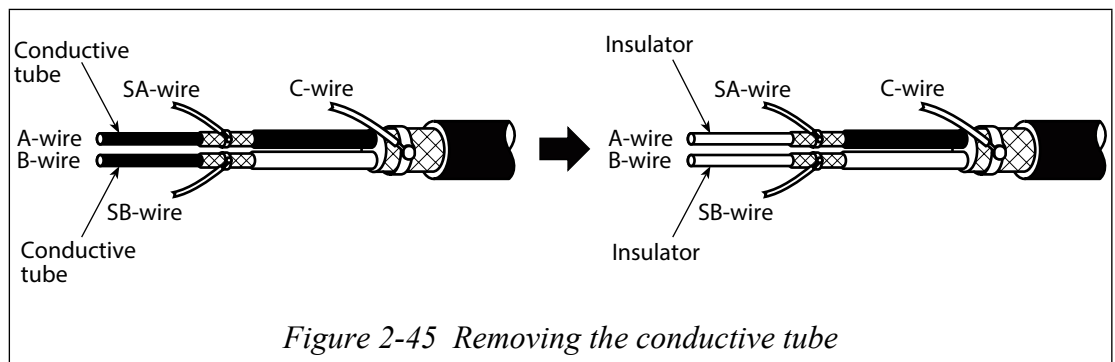
- (8) Cut the inside shield off at a point 5 mm (0.2 inch) from the inside sheath.

⚠ CAUTION

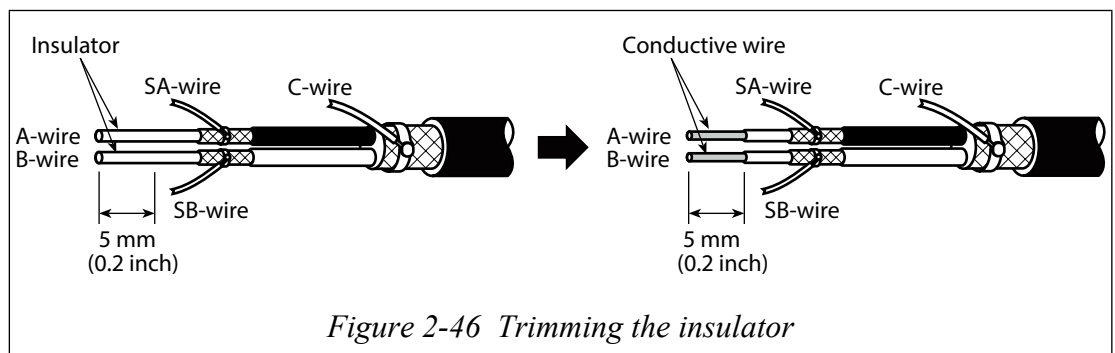
Do not cut into the conductive tube.



(9) Peel off the conductive tube (black) completely up to the inside shield.



(10) Trim the insulator to within 5 mm (0.2 inch) from its end. Trim the other lead wires (soldered to the shield sections) to the specified lengths so that each conductive wire is exposed by 5 mm (0.2 inch).



(11) Wind insulating tape around each inside shield and then around each outside shield.

(12) Attach markers to the lead wires.

(13) Crimp the terminals onto each lead wire. Test each terminal by pulling on it to make sure the terminal will not come off.

~Note *In some cases, the C-wire must be crimped together with either the SA or SB lead wire. For further information, refer to the appropriate operation manuals.*

Testing continuity

Test the continuity between the following terminals of the trimmed cables.

Table 2-10 Cable continuity

Terminals	Resistance
A - A	0 Ω
B - B	
C - C	

Testing the insulation

Test the insulation between the following terminals using an insulation resistance tester.

Table 2-11 Cable continuity

Terminals	Resistance
A - B	> 100 MΩ, 500 V DC
A - C	
A - SA	
A - SB	
B - C	
B - SA	
B - SB	
C - SA	
C - SB	

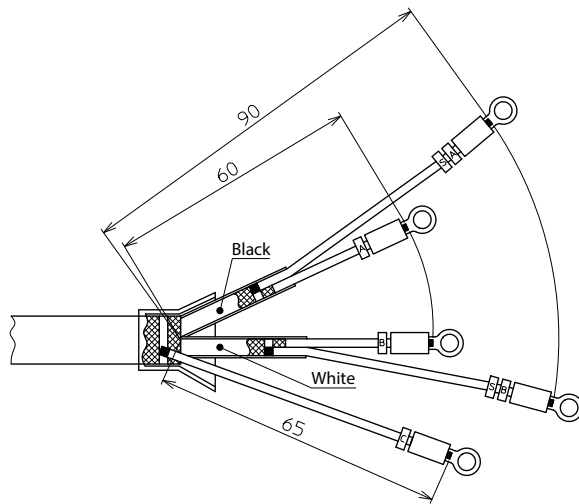


Figure 2-47 Terminal connections

Dressing the dedicated cable : Detector side

To dress the dedicated cable:

- (1) Scribe (cut) a line in the outside sheath (black) as shown in the following figure and remove the sheathing. The length is 75 mm (2.95 inch).

CAUTION

Do not cut into the outside shield.

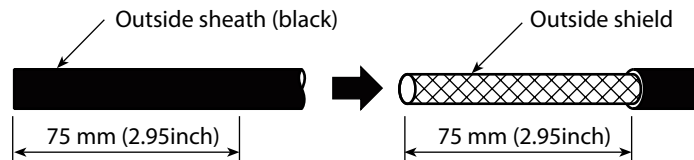


Figure 2-48 Trimming the outside sheath

~Note *If the terminal of the converter is designed not to use a shield drive, remove the outside shield and skip to Step 4.*

- (2) Wind the lead wire once around the outside shield.
- (3) Solder the lead wire (C-wire) to the middle of the 5 mm (0.2 inch) length. Make the length of the lead wire slightly longer than necessary and trim it to the specified length in Step 10.

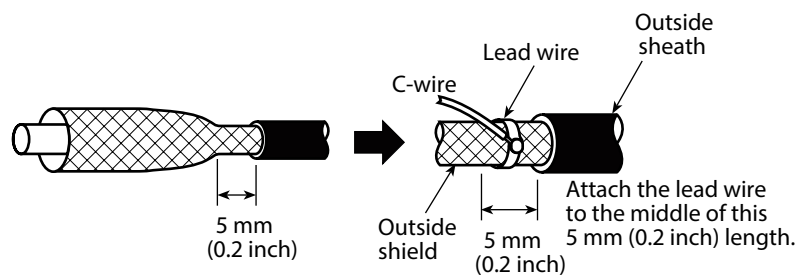


Figure 2-49 Attaching the C-wire

CAUTION

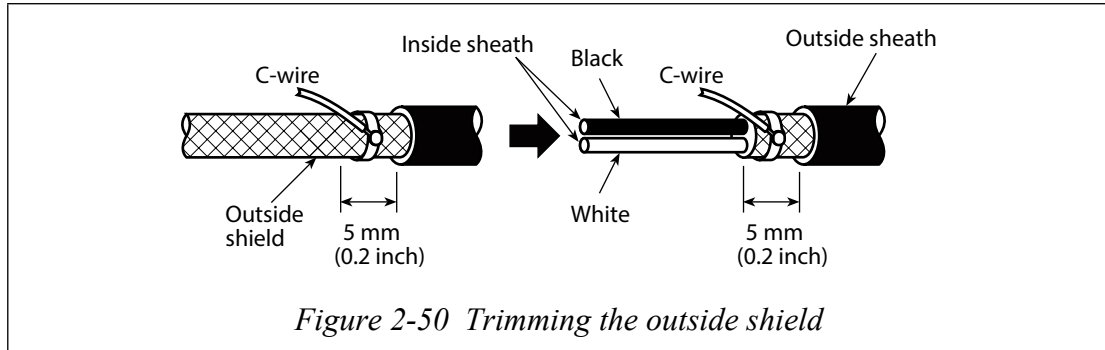
Be sure to use adequate solder so that contact failure will not occur between the C-wire and the outside shield. If the soldering connection is insecure, noise is generated due to contact resistance.

~Note *If the outside shield is not allowed to bend during soldering, in some cases, the conductive tube cannot be peeled off due to the heat of the solder.*

- (4) Cut the outside shield off at a point 5 mm (0.2 inch) from the outside sheath, leaving the specified length from the end of the outside shield.

⚠ CAUTION

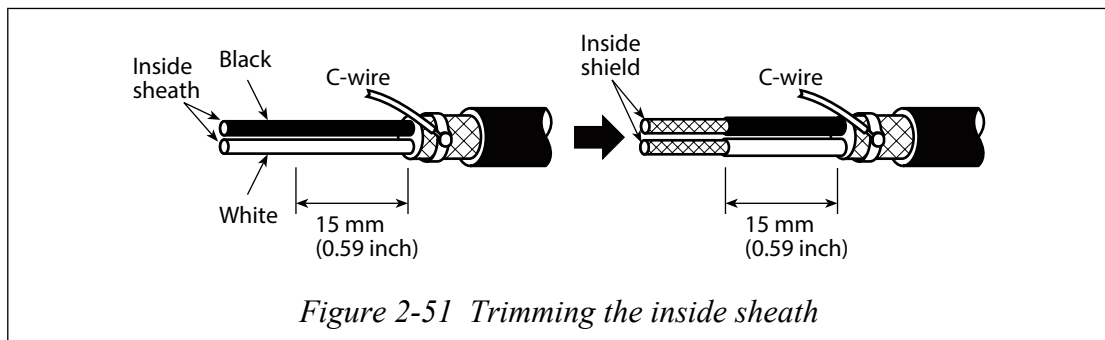
Do not cut into the inside sheath.



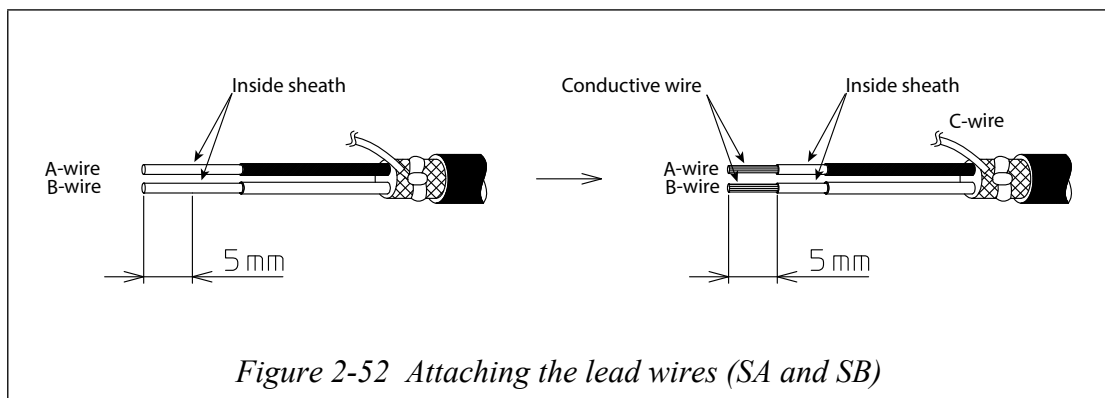
- (5) Peel off the inside sheath so that a 15 mm (0.59 inch) section remains.

⚠ CAUTION

Do not cut into the inside shield.



- (6) Cut the inside shield off at a point 5 mm (0.2 inch) from the edge.



⚠ CAUTION

Be sure to use adequate solder so that contact failure will not occur between the C-wire and the outside shield. If the soldering connection is insecure, noise is generated due to contact resistance.

⚠ CAUTION

Do not cut into the conductive tube.

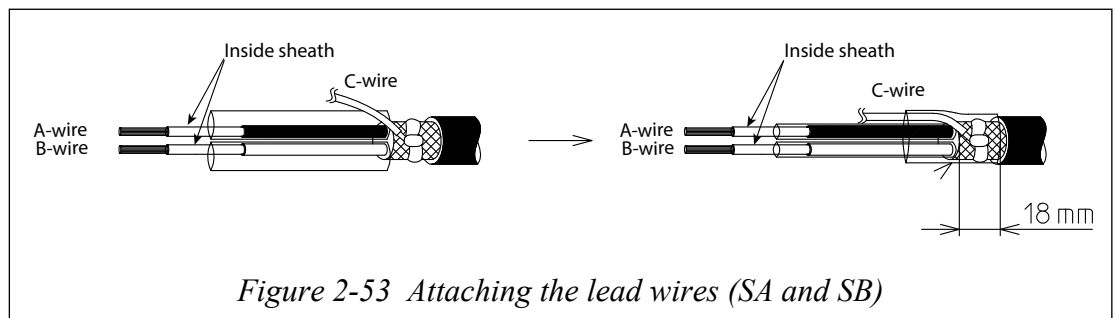


Figure 2-53 Attaching the lead wires (SA and SB)

- (7) Wind insulating tape around each inside shield and then around each outside shield.
- (8) Attach markers to the lead wires.
- (9) Crimp the terminals onto each lead wire. Test each terminal by pulling on it to make sure the terminal will not come off.

Testing continuity

Test the continuity between the following terminals of the trimmed cables.

Table 2-12 Cable continuity

Terminals	Resistance
A - A	0 Ω
B - B	
C - C	

Testing the insulation

Test the insulation between the following terminals using an insulation resistance tester.

Table 2-13 Cable continuity

Terminals	Resistance
A - B	> 100 MΩ, 500 V DC
A - C	
B - C	

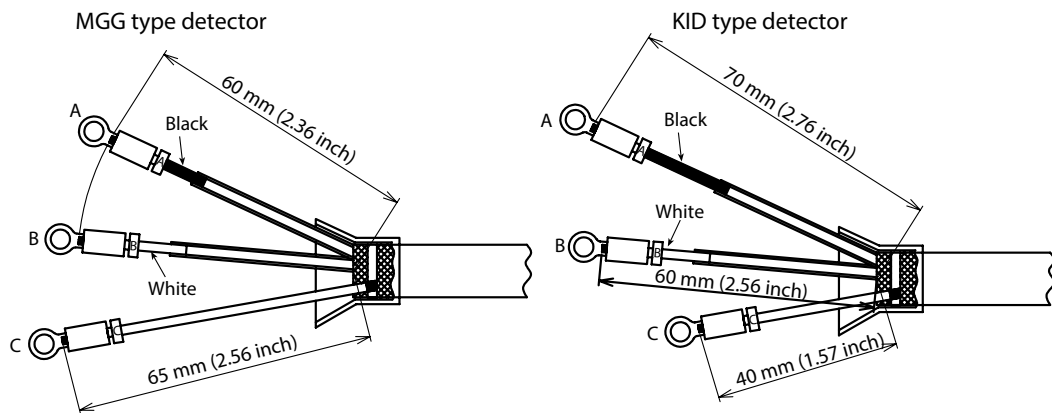


Figure 2-54 Terminal connections

2.8 : Troubleshooting and maintenance

MagneW FLEX+/PLUS+ detector is maintenance free.

For device loop diagrams for troubleshooting, operation, and maintenance, refer to the MagneW FLEX+/PLUS+ Electromagnetic Flowmeter Model MGG10C/14C User's Manual (CM2-MGG310-2001).

Terms and Conditions

We would like to express our appreciation for your purchase and use of Azbil Corporation's products.

You are required to acknowledge and agree upon the following terms and conditions for your purchase of Azbil Corporation's products (system products, field instruments, control valves, and control products), unless otherwise stated in any separate document, including, without limitation, estimation sheets, written agreements, catalogs, specifications and instruction manuals.

1. Warranty period and warranty scope

1.1 Warranty period

Azbil Corporation's products shall be warranted for one (1) year from the date of your purchase of the said products or the delivery of the said products to a place designated by you.

1.2 Warranty scope

In the event that Azbil Corporation's product has any failure attributable to azbil during the aforementioned warranty period, Azbil Corporation shall, without charge, deliver a replacement for the said product to the place where you purchased, or repair the said product and deliver it to the aforementioned place. Notwithstanding the foregoing, any failure falling under one of the following shall not be covered under this warranty:

- (1) Failure caused by your improper use of azbil product (noncompliance with conditions, environment of use, precautions, etc. set forth in catalogs, specifications, instruction manuals, etc.);
- (2) Failure caused for other reasons than Azbil Corporation's product;
- (3) Failure caused by any modification or repair made by any person other than Azbil Corporation or Azbil Corporation's subcontractors;
- (4) Failure caused by your use of Azbil Corporation's product in a manner not conforming to the intended usage of that product;
- (5) Failure that the state-of-the-art at the time of Azbil Corporation's shipment did not allow Azbil Corporation to predict; or
- (6) Failure that arose from any reason not attributable to Azbil Corporation, including, without limitation, acts of God, disasters, and actions taken by a third party.

Please note that the term "warranty" as used herein refers to equipment-only-warranty, and Azbil Corporation shall not be liable for any damages, including direct, indirect, special, incidental or consequential damages in connection with or arising out of Azbil Corporation's products.

2. Ascertainment of suitability

You are required to ascertain the suitability of Azbil Corporation's product in case of your use of the same with your machinery, equipment, etc. (hereinafter referred to as "Equipment") on your own responsibility, taking the following matters into consideration:

- (1) Regulations and standards or laws that your Equipment is to comply with.
- (2) Examples of application described in any documents provided by Azbil Corporation are for your reference purpose only, and you are required to check the functions and safety of your Equipment prior to your use.
- (3) Measures to be taken to secure the required level of the reliability and safety of your Equipment in your use

Although azbil is constantly making efforts to improve the quality and reliability of Azbil Corporation's products, there exists a possibility that parts and machinery may break down. You are required to provide your Equipment with safety design such as fool-proof design,*1 and fail-safe design*2 (anti-flame propagation design, etc.), whereby preventing any occurrence of physical injuries, fires, significant damage, and so forth. Furthermore, fault avoidance,*3 fault tolerance,*4 or the like should be incorporated so that the said Equipment can satisfy the level of reliability and safety required for your use.

*1. A design that is safe even if the user makes an error.

*2. A design that is safe even if the device fails.

*3. Avoidance of device failure by using highly reliable components, etc.

*4. The use of redundancy.

3. Precautions and restrictions on application

3.1 Restrictions on application

Please follow the table below for use in nuclear power or radiation-related equipment.

	Nuclear power quality*5 required	Nuclear power quality*5 not required
Within a radiation controlled area*6	Cannot be used (except for limit switches for nuclear power*7)	Cannot be used (except for limit switches for nuclear power*7)
Outside a radiation controlled area*6	Cannot be used (except for limit switches for nuclear power*7)	Can be used

*5. Nuclear power quality: compliance with JEAG 4121 required

*6. Radiation controlled area: an area governed by the requirements of article 3 of "Rules on the Prevention of Harm from Ionizing Radiation," article 2 2 4 of "Regulations on Installation and Operation of Nuclear Reactors for Practical Power Generation," article 4 of "Determining the Quantity, etc., of Radiation-Emitting Isotopes," etc.

*7. Limit switch for nuclear power: a limit switch designed, manufactured and sold according to IEEE 382 and JEAG 4121.

Any Azbil Corporation's products shall not be used for/with medical equipment.

The products are for industrial use. Do not allow general consumers to install or use any Azbil Corporation's product. However, azbil products can be incorporated into products used by general consumers. If you intend to use a product for that purpose, please contact one of our sales representatives.

3.2 Precautions on application

you are required to conduct a consultation with our sales representative and understand detail specifications, cautions for operation, and so forth by reference to catalogs, specifications, instruction manual, etc. in case that you intend to use azbil product for any purposes specified in (1) through (6) below. Moreover, you are required to provide your Equipment with fool-proof design, fail-safe design, anti-flame propagation design, fault avoidance, fault tolerance, and other kinds of protection/safety circuit design on your own responsibility to ensure reliability and safety, whereby preventing problems caused by failure or nonconformity.

- (1) For use under such conditions or in such environments as not stated in technical documents, including catalogs, specification, and instruction manuals
- (2) For use of specific purposes, such as:
 - * Nuclear energy/radiation related facilities
[When used outside a radiation controlled area and where nuclear power quality is not required]
[When the limit switch for nuclear power is used]
 - * Machinery or equipment for space/sea bottom
 - * Transportation equipment
[Railway, aircraft, vessels, vehicle equipment, etc.]
 - * Antidisaster/crime-prevention equipment
 - * Burning appliances
 - * Electrothermal equipment
 - * Amusement facilities
 - * Facilities/applications associated directly with billing
- (3) Supply systems such as electricity/gas/water supply systems, large-scale communication systems, and traffic/air traffic control systems requiring high reliability
- (4) Facilities that are to comply with regulations of governmental/public agencies or specific industries
- (5) Machinery or equipment that may affect human lives, human bodies or properties
- (6) Other machinery or equipment equivalent to those set forth in items (1) to (5) above which require high reliability and safety

4. Precautions against long-term use

Use of Azbil Corporation's products, including switches, which contain electronic components, over a prolonged period may degrade insulation or increase contact-resistance and may result in heat generation or any other similar problem causing such product or switch to develop safety hazards such as smoking, ignition, and electrification. Although acceleration of the above situation varies depending on the conditions or environment of use of the products, you are required not to use any Azbil Corporation's products for a period exceeding ten (10) years unless otherwise stated in specifications or instruction manuals.

5. Recommendation for renewal

Mechanical components, such as relays and switches, used for Azbil Corporation's products will reach the end of their life due to wear by repetitious open/close operations.

In addition, electronic components such as electrolytic capacitors will reach the end of their life due to aged deterioration based on the conditions or environment in which such electronic components are used. Although acceleration of the above situation varies depending on the conditions or environment of use, the number of open/close operations of relays, etc. as prescribed in specifications or instruction manuals, or depending on the design margin of your machine or equipment, you are required to renew any Azbil Corporation's products every 5 to 10 years unless otherwise specified in specifications or instruction manuals. System products, field instruments (sensors such as pressure/flow/level sensors, regulating valves, etc.) will reach the end of their life due to aged deterioration of parts. For those parts that will reach the end of their life due to aged deterioration, recommended replacement cycles are prescribed. You are required to replace parts based on such recommended replacement cycles.

6. Other precautions

Prior to your use of Azbil Corporation's products, you are required to understand and comply with specifications (e.g., conditions and environment of use), precautions, warnings/cautions/notices as set forth in the technical documents prepared for individual Azbil Corporation's products, such as catalogs, specifications, and instruction manuals to ensure the quality, reliability, and safety of those products.

7. Changes to specifications

Please note that the descriptions contained in any documents provided by azbil are subject to change without notice for improvement or for any other reason. For inquires or information on specifications as you may need to check, please contact our branch offices or sales offices, or your local sales agents.

8. Discontinuance of the supply of products/parts

Please note that the production of any Azbil Corporation's product may be discontinued without notice. After manufacturing is discontinued, we may not be able to provide replacement products even within the warranty period.

For repairable products, we will, in principle, undertake repairs for five (5) years after the discontinuance of those products. In some cases, however, we cannot undertake such repairs for reasons, such as the absence of repair parts. For system products, field instruments, we may not be able to undertake parts replacement for similar reasons.

9. Scope of services

Prices of Azbil Corporation's products do not include any charges for services such as engineer dispatch service. Accordingly, a separate fee will be charged in any of the following cases:

- (1) Installation, adjustment, guidance, and attendance at a test run
- (2) Maintenance, inspection, adjustment, and repair
- (3) Technical guidance and technical education
- (4) Special test or special inspection of a product under the conditions specified by you

Please note that we cannot provide any services as set forth above in a nuclear energy controlled area (radiation controlled area) or at a place where the level of exposure to radiation is equivalent to that in a nuclear energy controlled area.

Document Number:	CM2-MGG200-2001
Document Name:	MagneW FLEX+/PLUS+ Electromagnetic Flowmeter Detector Model MGG11/18/MGG12/19/MGF11MGS11U/28U User's Manual
Date:	1st edition: Dec. 1997 10th edition: Feb. 2023
Issued/Edited by:	Azbil Corporation

Azbil Corporation