

Weir Diaphragm Valve MWD Series

INSTRUCTION MANUAL

SM-50787-A/3



- Read this Instruction Manual before using the product.
- Read the safety notes carefully.
- Keep this Instruction Manual in a safe and convenient place for future reference.

PREFACE

Thank you for purchasing CKD's **"MWD Series " Manual Weir Diaphragm Valve.**

This Instruction Manual contains basic matters such as installation and usage instructions in order to ensure optimal performance of the product. Please read this Instruction Manual thoroughly and use the product properly.

Keep this Instruction Manual in a safe place and be careful not to lose it.

Product specifications and appearances presented in this Instruction Manual are subject to change without notice.

- The product, which uses control valves such as solenoid valves, motor valves, and air operated valves, is intended for users who have basic knowledge about materials, fluids, piping, and electricity. CKD shall not be responsible for accidents caused by persons who selected or used the product without knowledge or sufficient training with respect to control valves.
- Since there are a wide variety of customer applications, it is impossible for CKD to be aware of all of them. Depending on the application or usage, the product may not be able to exercise its full performance or an accident may occur due to fluid, piping, or other conditions. It is the responsibility of the customer to check the product specifications and decide how the product shall be used in accordance with the application and usage.

SAFETY INFORMATION

When designing and manufacturing any device incorporating the product, the manufacturer has an obligation to ensure that the device is safe. To that end, make sure that the safety of the machine mechanism of the device, the pneumatic or water control circuit, and the electric system that controls such mechanism is ensured.

To ensure the safety of device design and control, observe organization standards, relevant laws and regulations, which include the following:

ISO 4414, JIS B 8370 (the latest edition of each standard)




In order to use our products safely, it is important to select, use, handle, and maintain the products properly.

Observe the warnings and precautions described in this Instruction Manual to ensure device safety.

Although various safety measures have been adopted in the product, customer's improper handling may lead to an accident. To avoid this:


**Thoroughly read and understand this Instruction Manual
before using the product.**

To explicitly indicate the severity and likelihood of a potential harm or damage, precautions are classified into three categories: "DANGER", "WARNING", and "CAUTION".

 DANGER	Indicates an imminent hazard. Improper handling will cause death or serious injury to people.
 WARNING	Indicates a potential hazard. Improper handling may cause death or serious injury to people.
 CAUTION	Indicates a potential hazard. Improper handling may cause injury to people or damage to property.

Precautions classified as "CAUTION" may still lead to serious results depending on the situation. All precautions are equally important and must be observed.

Other general precautions and tips on using the product are indicated by the following icon.

	Indicates general precautions and tips on using the product.
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Precautions on Product Use

WARNING

The product must be handled by a qualified person who has extensive knowledge and experience.

The product is designed and manufactured as a device or part for general industrial machinery.

Use the product within the specifications.

The product must not be used beyond its specifications. Also, the product must not be modified and additional work on the product must not be performed.

The product is intended for use in devices or parts for general industrial machinery. It is not intended for use outdoors or in the conditions or environment listed below.

- In applications for nuclear power, railroad system, aviation, ship, vehicle, medical equipment, and equipment that directly touches beverage or food.
- For special applications that require safety including amusement equipment, emergency shut-off circuit, press machine, brake circuit, and safety measures.
- For applications where life or properties may be adversely affected and special safety measures are required.

(Exception is made if the customer consults with CKD prior to use and understands the specifications of the product. However, even in that case, safety measures must be taken to avoid danger in case of a possible failure.)

Do not handle the product or remove pipes and devices until confirming safety.

- Inspect and service the machine and devices after confirming the safety of the entire system. Also, turn off the energy source (air supply or water supply) and power to the relevant facility. Release compressed air from the system and use extreme care to avoid water or electric leakage.
- Since there may be hot or live parts even after operation has stopped, use extreme care when handling the product or removing pipes and devices.
- When starting or restarting a machine or device that incorporates pneumatic components, make sure that a safety measure (such as a pop-out prevention mechanism) is in place and system safety is secured.

Precautions on Product Disposal

CAUTION

When disposing of the product, comply with laws pertaining to disposal and cleaning of wastes and have an industrial waste disposal company dispose of the product.

Precautions on Design and Selection

WARNING

If it is necessary to function as a safety valve such as an emergency shut off valve, take other measures to ensure safety.

For equipment selection and handling, it is the customer's responsibility to check the specifications of this product.

Incorrect equipment selection and handling can cause problems not only in this product, but also to your system.

Take measures to prevent physical harm or property damage in the event of failure of this product.

Follow the precautions below regarding the surrounding environment.

- Check the compatibility of product component materials and the atmosphere.
- Make sure that no fluid adheres to anything other than the flow path of the product.
- Use within the ambient temperature range described in the specifications.
- Do not use in places affected by vibration or shock, around heat sources, or outdoors.

If the liquid ring circuit, install a release valve.

When the valve opens and closes, the diaphragm moves up and down, which causes the flow path capacity to change inside the valve. For this reason, if the fluid is an incompressible fluid (liquid), extreme pressures will be created in the valve when operating under conditions that seal the fluid in the valve (liquid ring). In this case, install a release valve on the primary or secondary side of the valve, preventing a liquid ring circuit from forming.

Follow the precautions below depending on working fluids.

- Check the compatibility of product component materials and working fluids.
- Iron rust and debris in the fluid can cause operation faults or leaks and deteriorate product performance. Provide measures to remove foreign matter.
- When hot fluid flows during steam sterilization, the valve body becomes hot, so do not touch with your hand or body. There is a risk of burns if these are touched directly.
Also, be careful not to place anything that may deteriorate, melt, or ignite nearby.
- While the upper side of the diaphragm (actuator side) does not come into contact with the fluid, due to changes in fluid and fluid temperature, fluid may permeate and turn into fluid atmosphere.
- Fluids that contain particles, such as slurries and UV hardeners, or that may solidify or gel, can affect performance.

Use at the fluid temperature described in the specifications.

Use at the working pressure described in the specifications.

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1. PRODUCT OVERVIEW

1.1 Model Number Indication

MWD

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F

A: Model No.

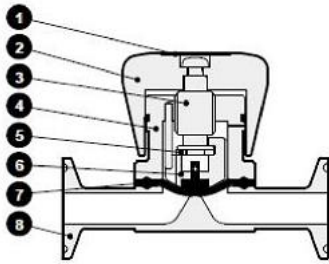
B: Series

C: Port size

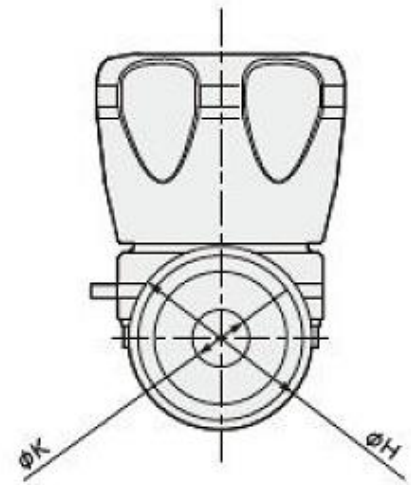
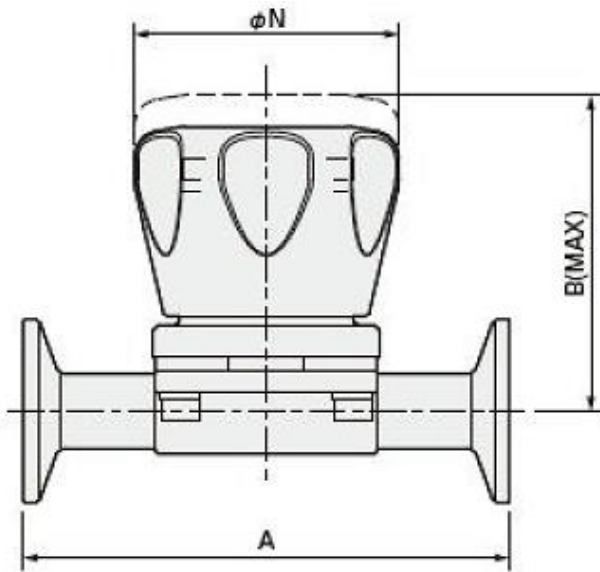
D: Actuator/
diaphragm/
body material combination

Code		Content				
B: Series						
1	Size1	●				
2	Size2		●			
3	Size3			●		
4	Size4				●	
5	Size5					●
C: Port size						
8	Clamp fitting 8A	●				
10	Clamp fitting 10A	●				
15	Clamp fitting 15A		●			
25	Clamp fitting 25A(1S)			●		
40	Clamp fitting 40A(1.5S)				●	
50	Clamp fitting 50A(2S)					●
D: Actuator/diaphragm/body material combination						
	Actuator	Diaphragm	Body			
F	A5056	PTFE/EPDM	SUS316L	●	●	●

1.2 Internal Structure, Dimensions



No.	Part name	Material	
1	Indicator	PET	Polyethylene terephthalate
2	Handle	A5056	Aluminum
3	Rod	SUS304	Stainless steel
4	Bonnet	A5056	Aluminum
5	Bearing	-	-
6	Compressor	SCS13	Stainless steel
7	Diaphragm	PTFE, EPDM, SUS303, SUS304	Fluoro resin, ethylene propylene rubber, stainless steel
8	Body	SUS316L	Stainless steel



Model No.	A	B	H	K	N	Weight [kg]
MWD10-8-F	90	58.5	34	10.5	49	0.4
MWD10-10-F	90	60.7	34	14	49	0.4
MWD20-15-F	108	71.5	34	17.5	59	0.6
MWD30-25-F	127	88.7	50.5	23	69	1.2
MWD40-40-F	159	107.6	50.5	35.7	89	2.4
MWD50-50-F	190	164.5	64	47.8	89	4.6

1.3 Product Specifications

Item		MWD10-8	MWD10-10	MWD20-15	MWD30-25	MWD40-40	MWD50-50
Working fluid		Water, pure water, chemical liquids (fluids that do not corrode wetted part materials)					
Working pressure	MPa	0 to 0.6					
Proof pressure (at water pressure)	MPa	2.0					
Fluid temperature	°C	5 to 90(during steam sterilization 130)					
Ambient temperature	°C	0 to 0.6					
Valve seat leakage	cm ³ /min	0 (at water pressure)					
Mounting orientation	CAUTION 1	Unrestricted					
Operating torque	N•m	0.7 to 1.1	0.7 to 1.1	1.0 to 1.5	1.7 to 2.7	3.0 to 4.0	5.0 to 5.0
Cv		2.3	2.6	4.5	13	27	50
Material	Diaphragm	PTFE/EPDM					
	Body	SUS316L (buff polishing #400 or equiv.,electrolytic polishing)					
	Actuator	A5056 (fluoro resin coating)					

CAUTION 1 : For horizontal piping, piping at the angles shown in Table 1 on page 6 minimizes valve fluid pooling.

2. INSTALLATION

2.1 Before Installation

CAUTION

Do not remove the piping port protector and do not take the product out of the plastic bag until just before piping.

If the piping port protector is removed or the product is taken out of the plastic bag before ready to begin piping, foreign matters may enter from the piping ports and cause a failure or malfunction.

Do not disassemble the valve before installation.

Even within the warranty period, disassembly for purposes other than maintenance and inspection may not be covered by the warranty.

In addition, there is a risk of causing problems due to foreign matter being mixed in.

- Check that the product model number you ordered and the model number displayed on the product are the same.
- Check that there are not abnormalities in the product such as damage to the outside of the product or loose bolts.
- When storing, store it in a box so that foreign matter does not get inside the valve, and remove it from the box when piping.

2.2 Environment

WARNING

Consult CKD about the specifications before using the product outside the designated specifications or for special applications.

Do not use this product in the presence of corrosive gas or solvents.

Do not use this product in an environment where corrosive gases such as sulfur dioxide gas or solvents are present.

Do not use this product in a humid environment.

Condensation may occur due to a change in the temperature.

Do not use this product near a heat generating source or in a location where it may be exposed to radiant heat.

Use this product within the specified ambient temperature range.



- When using this product in a cold climate, take the necessary measures to prevent freezing.
- This product cannot be used outdoors. Protect the product by installing it inside a cover or a case.
- Do not use this product in an environment where vibration or inertia is applied.

2.3 Mounting

WARNING

Mounting and piping should be done after thoroughly reading this Instruction Manual by a person who has a thorough understanding of safety precautions such as the system, fluid characteristics, and compatibility of fluids with related components.

Incorrect mounting and piping may cause not only troubles of this product but also system troubles of the customer, and may lead to death or serious injury of the user.

CAUTION

Thoroughly read and understand this Instruction Manual before mounting the product.

Hold the body firmly when handling and mounting the product.

After mounting, check for leaks in the piping and check the valve is mounted correctly.

This product may be heavy depending on the port size.

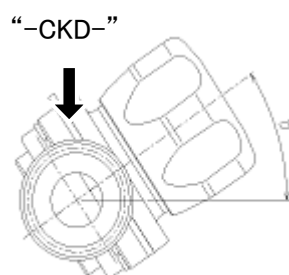
When mounting, piping, and removing, handle with care, such as taking measures to prevent injury due to dropping.



- For horizontal piping, liquid accumulation in the valve can be minimized (see Table 1, Fig. 1) by tilting the valve and piping. Pipe so that the “-CKD-” mark stamped on the body piping section is directly above.
- Secure enough space in consideration of safety work during maintenance and troubleshooting.

Table 1. Port size and valve tilt angle

Model No.	Port size	Valve tilt angle (°)
MWD10-8-F	8A	23
MWD10-10-F	10A	11
MWD20-15-F	15A	14
MWD30-25-F	25A(1S)	25
MWD40-40-F	40A(1.5S)	24
MWD50-50-F	50A(2S)	23



(Fig. 1) Valve tilt angle

2.4 Piping

CAUTION

Secure the product when tightening or piping again.

When installing piping, avoid any application of stress on the valve body, such as bending, tension, or compression.

Secure and support the pipes to prevent the valve from being subjected to pipe loads and vibrations directly.

Install a bypass circuit to facilitate maintenance and repair work.

Do not apply high pressure suddenly when supplying fluid for the first time after connecting the pipes.

If the pipes are not secured properly, it may lead to accidents such as a pipe disconnection or a fluid leakage.

Pipe cleaning

- Before piping the product, be sure to flush it to remove foreign matter such as debris, metal chips, rust, and sealing tape.

Removal of foreign matters

- Debris or foreign matter in the fluid may prevent the valve from functioning correctly. When there is contamination, install a filter on the primary side of the valve according to the circuit used.

Piping of body

- The ferrule part dimensions are ISO compliant. Assemble using gaskets and clamps of appropriate size.

3. USAGE

CAUTION

Pay attention to rapid changes in fluid temperature.

Rapid changes in fluid temperature may cause internal leakage.

If the product has been out of use for one month or more, perform a test run before starting actual operation.

If the product has been out of use for one month or more, completely remove any water left in the product.

Water residue will cause rusting and may lead to malfunction or leaks.

If the residual water cannot be removed, operate the valve several times a day and pass water through to ensure ideal use.

Make sure that no fluid adheres to anything other than the flow path of the product.

Pay attention to the fluid pressure and piping conditions.

Water hammer and vibration may occur in certain fluid pressure and piping conditions.

Review the fluid pressure and piping conditions.

The handle may rotate when the valve is opened due to vibration, causing flow rate fluctuation.

Do not use valves as footing or place any heavy objects on top of the valves.

3.1 Checks to Make Before Use (Checks Made After Mounting)

WARNING

Close the main cock and discharge the fluid in the valve before performing an appearance check.

Appearance check

- Check that the valve is securely fixed to the piping by pressing it by hand.
- Check that the piping is secure.
- Check that the threaded parts are not loose.

Operation check

- Before pressurizing the working fluid, pressurize the operating air and make sure the valve works.

Leakage check

- Pressurize the fluid to check for leakage from the piping connections.

3.2 Safety Instructions

- (1) The valve opens and closes by rotating the handle.
- (2) The operating torque differ depending on the model number of the product. See Table 2.
- (3) The state where the red indicator label is hidden by the handle is a guide when the valve is closed.

Table 2. Operating torque for each port size

Model No.	Operating torque (N · m)
MWD10-8-F	0.7 to 1.1
MWD10-10-F	0.7 to 1.1
MWD20-15-F	1.0 to 1.5
MWD30-25-F	1.7 to 2.7
MWD40-40-F	3.0 to 4.0
MWD50-50-F	5.0 to 5.5

4. MAINTENANCE AND INSPECTION

DANGER

Thoroughly read and understand this Instruction Manual before maintenance and inspection.

Valve performance may not be maintained if disassembled and reassembled.

Release fluid pressure before maintenance and inspection.

When replacing the valve, wash it with pure water or air before starting work.

Make sure that the remaining chemicals do not affect surrounding equipment or people. Also, when touching the valve, please read the Material Safety Data Sheet (SDS) and wear the necessary protective equipment.

Surely follow the "4.2 Disassembling and Assembling" replacement procedure.

Absolutely perform a test run after reassembling.

CAUTION

When replacing the product, be sure to use the product with the same model number.

Specifications may differ even if they have the same appearance.

Do not store in direct sunlight or places with high temperatures.

When handling the product, do not subject it to shocks or scratches due to throwing, dropping, hooking, etc.

If the product has been out of use for one month or more, perform a test run before starting actual operation.



- (1) Perform daily and regular inspections to use this product in the optimum condition.
- (2) Daily check
 - Please refer to "3.1 Checks to Make Before Use (Checks Made After Mounting)" for the inspection contents.
- (3) Periodic inspection
 - Normally, disassemble the valve once every six months and inspect the seal. Although it depends on the conditions of use, we recommend that you replace the diaphragm once a year. If there is no abnormality in the diaphragm during regular inspection, it can be reused, but be careful not to change the combination of diaphragm and body.
 - Since the durability of the diaphragm varies greatly depending on the type of fluid, pressure, temperature, and operating frequency, the frequency of periodic inspections should be performed in consideration of the customer's usage conditions.
 - The durability of the actuator varies depending on the fluid temperature quality, so perform regular maintenance.

4.1 Maintenance Parts

CAUTION

Disassembled or replaced products and parts, and defects caused by work are excluded from the scope of warranty.



- (1) Diaphragm
 - Replace if any abnormality such as leakage, malfunction or delay is found during use.

4.2 Disassembling and Assembling

WARNING

Before disassembling and assembling, release the liquid pressure to discharge the fluid in the product.

■ Before diaphragm replacement



- (1) Before disassembling, be sure to release the fluid pressure and check that no pressure is applied inside the valve.
- (2) When replacing the diaphragm, replace it with pure water so that the remaining fluid does not affect surrounding equipment and people, and purge it with dry air or an inert gas before starting work. Also, when touching the fluid passage of the valve, read the Material Safety Data Sheet (SDS) and wear the necessary protective equipment.
- (3) The diaphragm can be replaced with the body piped, but it is recommended to replace the diaphragm with it removed from the plumbing.
- (4) Be sure to use the specified diaphragm.

■ Diaphragm replacement procedure (See page 12)



- ① After confirming that there is no fluid or pressure, open the valve.
- ② Remove the hexagon socket head cap screws and spring washers and remove the actuator and diaphragm from the body.
- ③ Turn the handle to keep the valve closed.
- ④ Rotate the diaphragm 90 degrees and remove it from the compressor.
- ⑤ Check the compressor is clean and install a new diaphragm.
After inserting the diaphragm as far as it will go, rotate it 90 degrees in the same way as when disassembling. After rotation, make sure that the diaphragm and the actuator mounting holes are aligned.
- ⑥ Check that the sealing surface of the body (both internal and external seals) is free of dirt, scratches, and foreign matter. ※These will cause leakage.
- ⑦ In the same way as (1), supply the open the valve.
- ⑧ Set the handle part on the body and align the convex part of the diaphragm with the concave part of the body.
- ⑨ Tighten the hexagon socket head cap screws evenly. See Table 3 for tightening torque.
Tighten the screws diagonally gradually to avoid one-sided tightening. Excessive tightening will put an excessive load on the diaphragm and shorten its life, so tighten it while checking the torque with a torque wrench or the like.
- ⑩ Open and close the valve and check that it operates smoothly. Pipe and pressurize the fluid to make sure there are no leaks from the pipe.
- ⑪ Check each time to see if the torque can be maintained even after operation.

<4.2 ①~②>

① Turn the handle to open the valve.

Handle part

Diaphragm

Internal seal surface

External seal surface

Body

Spring washer

Hexagon socket head cap screw

② Remove the hexagon socket head cap screws and spring washers.

<4.2 ③~⑥>

③ Turn the handle to close the valve.

Compressor

④ Rotate the diaphragm 90 ° and remove it from the compressor.

Diaphragm

⑤ Check the compressor is clean and install a new diaphragm.

⑥ Check the valve body is clean.

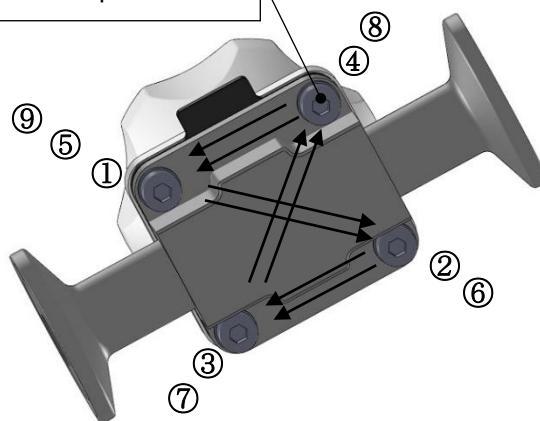
<4.2 ⑦~⑧>

⑦ Turn the handle to open the valve.

⑧ Align the convex part of the diaphragm with the concave part of the body.

<4.2 ⑨>

⑨ Tighten the hexagon socket head cap screws.



Hexagon socket head cap screw tightening order

Table 3. Recommended tightening torque for hexagon socket head cap screws

Series size	Nominal diameter of screw	Tightening torque (N · m)
MWD10	M4	1.8 to 2.2
MWD20	M5	2.7 to 3.3
MWD30	M8	9.0 to 11.0
MWD40	M8	12.6 to 15.4
MWD50	M10	25.2 to 30.8

5. TROUBLESHOOTING

5.1 Problems, Causes, and Solutions

If the product does not operate as intended, check the table below for a possible solution.

Problem	Cause	Solution
Valve does not close, or fluid is leaking.	Fluid pressure is too high.	Use within the specified range.
	Not tightened to the proper torque. (Excessive torque, tightening below the appropriate torque)	Check the proper torque.
Valve does not open, or flow rate is insufficient.	Fluid is not supplied.	Check the circuit and supply the fluid.
There is leakage to the outside.	There are scratches on the external seal point of the valve body.	Replace the product.
	There are scratches on the external seal surface of the diaphragm.	Replace the diaphragm.
	Hexagon socket head cap screws are loose.	Tighten the hexagon socket head cap screws.
There is internal leakage.	There are abrasions and scratches on the internal seal point of the valve body.	Replace the product.
	There are abrasions and scratches on the internal seal surface of the diaphragm.	Replace the diaphragm.
	Foreign matters are stuck.	Disassemble the valve body and clean flow path.

※If you have any other questions or concerns, contact your nearest CKD sales office or distributor.

6. WARRANTY PROVISIONS

6.1 Warranty Conditions

■Warranty coverage

If the product specified herein fails for reasons attributable to CKD within the warranty period specified below, CKD will promptly provide a replacement for the faulty product or a part thereof or repair the faulty product at one of CKD's facilities free of charge.

However, following failures are excluded from this warranty:

- Failure caused by handling or use of the product under conditions and in environments not conforming to those stated in the catalog, the Specifications, or this Instruction Manual.
- Failure caused by incorrect use such as careless handling or improper management.
- Failure not caused by the product.
- Failure caused by use not intended for the product.
- Failure caused by modifications/alterations or repairs not carried out by CKD.
- Failure that could have been avoided if the customer's machinery or device, into which the product is incorporated, had functions and structures generally provided in the industry.
- Failure caused by reasons unforeseen at the level of technology available at the time of delivery.
- Failure caused by acts of nature and disasters beyond control of CKD.

The warranty stated herein covers only the delivered product itself. Any loss or damage induced by failure of the delivered product is excluded from this warranty.

■Confirmation of product compatibility

It is the responsibility of the customer to confirm compatibility of the product with any system, machinery, or device used by the customer.

■Others

The terms and conditions of this warranty stipulate basic matters.

When the terms and conditions of the warranty described in individual specification drawings or the Specifications are different from those of this warranty, the specification drawings or the Specifications shall have a higher priority.

6.2 Warranty Period

The product is warranted for one (1) year from the date of delivery to the location specified by the customer.