

# SPECIFICATION SHEET



ELECTROMAGNETIC INDUCTION TYPE ELECTRIC CONDUCTIVITY METER CONVERTER (4-WIRE TYPE)

**MBM-160**

ELECTROMAGNETIC INDUCTION DENSITOMETER CONVERTER (4-WIRE TYPE)

**MBM-162**

Robust aluminum die-cast 4-wire (AC-free power supply) on-site electromagnetic induction type electric conductivity meter/densitometer converter. It is equipped with a transmission output of 2 circuits (including water temperature) of DC 4 to 20mA and a 2-point adjustment (upper / lower limit alarm) output.

Since the detector is made of heat-resistant vinyl chloride (C-PVC) or fluororesin (PFA), it has excellent corrosion resistance and heat resistance to most chemical solutions. For details, please refer to the see the separate spec sheet for detector.



## Features

### ○Measurement of high electrical conductivity...MBM-160

It can accurately measure high electrical conductivity of 20 mS/cm or more, which cannot be measured by the two-electrode method. In addition, it can support a wide measurement range from a minimum of 0 to 0.5mS/cm to a maximum of 0 to 2000mS/cm and a wide temperature compensation range of -5 to 105°C.

### ○Transmission output range change...MBM-160

Within 7 types of hard ranges, 23.8% (5/21 width) or more of each range can be set arbitrarily.

### ○Measurement of strong corrosion solution concentration ...MBM-162

The concentration (%) of strong acid/strong alkaline solutions such as hydrochloric acid/sulfuric acid and caustic soda can be measured accurately over a wide range. The measurement range and temperature compensation range are adjusted according to the individual required specifications, and the concentration measurement value is output linearly (DC 4 to 20 mA).

### ○Temperature measurement display and output

The temperature of the sample water is measured and displayed, and the transmission output DC 4 to 20mA is output to any range.

### ○Measurement value correction

The measured value can be corrected to the electrical conductivity (concentration value) for operation management.

### ○Easy operation with the waterproof switch on the front

All operations can be performed with the 10 waterproof switches on the front without opening the door.

### ○Automatic return to measurement mode

After 2 hours have passed in the maintenance mode, the measurement mode is automatically restored.

### [Option]

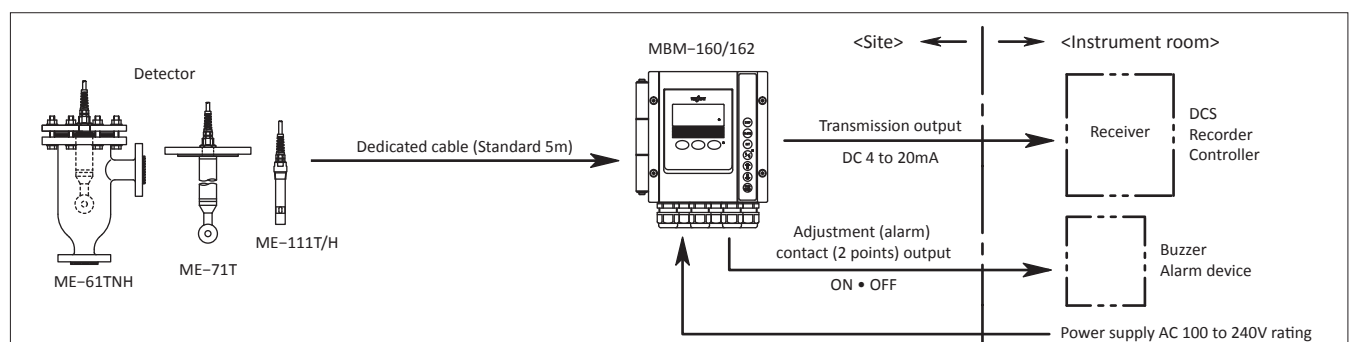
#### ○RS-232C output

Data can be transferred to a computer by connecting a dedicated communication cable to the RS-232C output.

#### ○Power off signal

Outputs a closed contact when the power supply is cut off.

## Diagram



## Standard specifications

### [Common specification]

Display : LCD  
 Transmission output : Insulated type...DC 4 to 20mA (linear),  
 Load resistance 650Ω or less  
 Electrical conductivity (concentration)  
 and liquid temperature (common to  
 both circuits)  
 Control operation : Depending on micro computer  
 Ambient temperature : -20 to 55°C, 95%RH or less (No  
 / humidity condensation)  
 Power source : AC 90 to 264V 50/60Hz  
 Power consumption : Approx. 10 VA  
 Structure : Outdoor installation, dustproof and  
 jetproof type (equivalent to IP65)  
 External dimensions : 181(W)×180(H)×95(D)mm (Water  
 stopper not included)

Mounting method : 50A pipe mounting  
 (Option: Wall / rack mounting)  
 Material : Mainn unit...aluminum die cast  
 Window...Polyester resin  
 Coating color : Metallic silver  
 Wiring port : 6 locations of cable glands  
 (For OD φ6 to φ12 cable)  
 Cable gland can be removed and  
 conduit can be connected (G1/2×6)  
 Weight : Approx. 2 kg  
 Combined detectors : ME-100 series, ME-6/7 series  
 Cable length : Standard 5m  
 Production specification of up to 20m  
 available by consultation

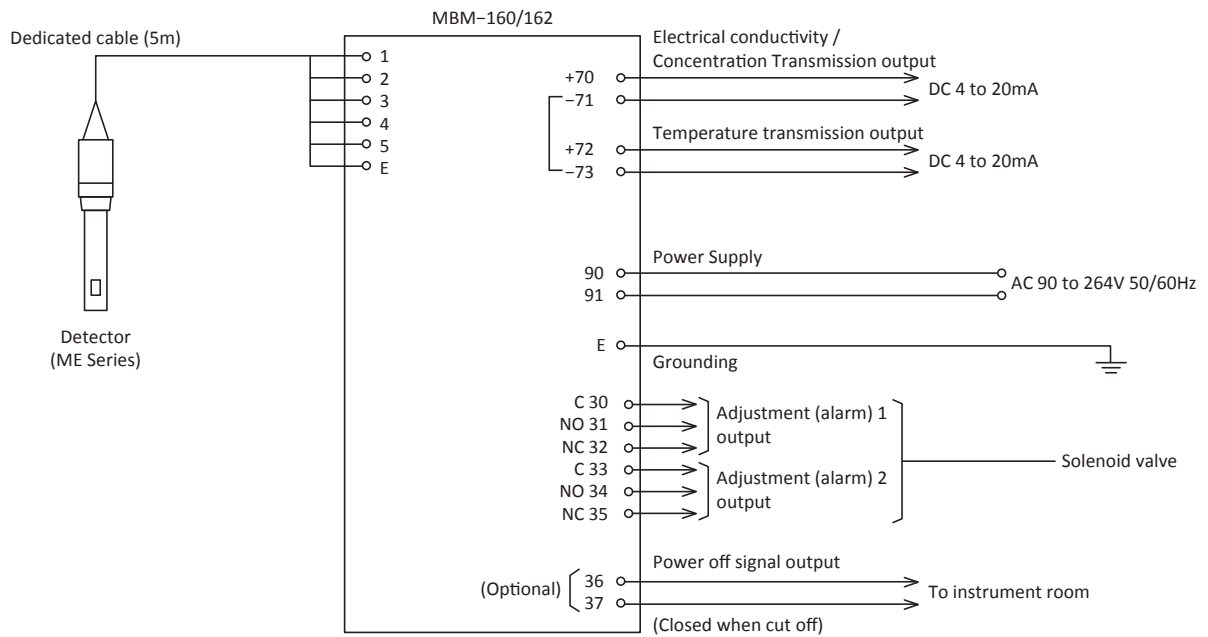
### [Electromagnetic induction type electric conductivity meter transmitter]

Product name : Electromagnetic induction type electric  
 conductivity meter transmitt  
 Model : MBM-160  
 Measurement range : Electric conductivity (Unit: mS/cm)  
 Select for 7 ranges below  
 0.000 to 2.100  
 0.00 to 7.00  
 0.00 to 21.00  
 0.0 t 70.0  
 0.0 to 210.0  
 0 to 700  
 0 to2100  
 Temperature...-5 to 120°C (Resolution 0.1°C)  
 (Due to the heat resistance of the detector)  
 Solution temperature : -5 to 105°C(Depends on the detector  
 compensation material)  
 Transmission output : Electric conductivity...23.8% or more  
 range measurement range (Range can be set  
 arbitrarily)  
 Temperature...10°C width or more in  
 1°C increments (Can be set arbitrarily  
 in the range of -5 to 120°C)  
 Performance : Straightnes...Within ±0.5%FS±1digit  
 (With equivalent resistance)  
 However, in 0.000 to 2.100mS/cm range  
 Repeatability...Within ±0.2%FS  
 Temperature compensation...Within  
 ±1.5%FS  
 Adjustment (alarm) : Object...Electric conductivity  
 output Adjustment (alarm) point...2 points  
 cContact  
 Contact capacity...AC 250V 3A  
 (Resistance load)  
 DC 30V 3A or less (Resistance load)  
 Set range...Can be set arbitrarily (2  
 points), 0 to FS  
 Power off signal : Outputs a closed contact signal when  
 output (optional) the power is turned off  
 Contact capacity...AC 250V 3A or less  
 (Resistance load)

### [Electromagnetic induction densitometer transmitter]

Product name : Electromagnetic induction  
 densitometer transmitter  
 Model : MBM-162  
 Measurement : Sodium chloride (NaCl)  
 object and range Sodium hydroxide (NaOH)  
 Hydrochloric acid (HCl)  
 Sulfuric acid (H<sub>2</sub>SO<sub>4</sub>)  
 Nitric acid (HNO<sub>3</sub>)  
 Please refer to the product code and  
 attached table on pages 6 to 7 for  
 details on the measurement target and  
 measurement range.  
 Temperature...-5 to 120°C (Resolution 0.1°C)  
 (Due to the heat resistance of the detector)  
 Temperature : Standard 20°C width  
 compensation range (Depends on the type of measured  
 concentration)  
 Transmission output : Concentration...Linear output  
 range corresponding to solution concentration  
 Temperature...10°C width or more in  
 1°C increments (Can be set arbitrarily  
 within the range of -5 to 120°C)  
 Adjustment (alarm) : Subject...Concentration  
 output Adjustment (alarm) points ... 2 points c  
 contacts  
 Contact capacity...AC 250V 3A or less  
 (Resistance load)  
 DC 30V 3A or less(Resistance load)  
 Power off signal : Outputs a closed contact signal when  
 output (optional) the power is turned off  
 Contact capacity...AC 250V 3A or  
 less(Resistance load)

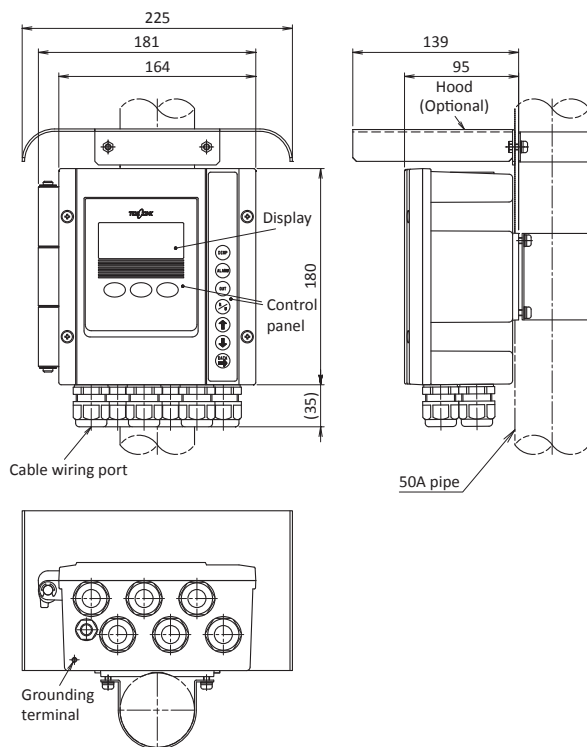
## Connection



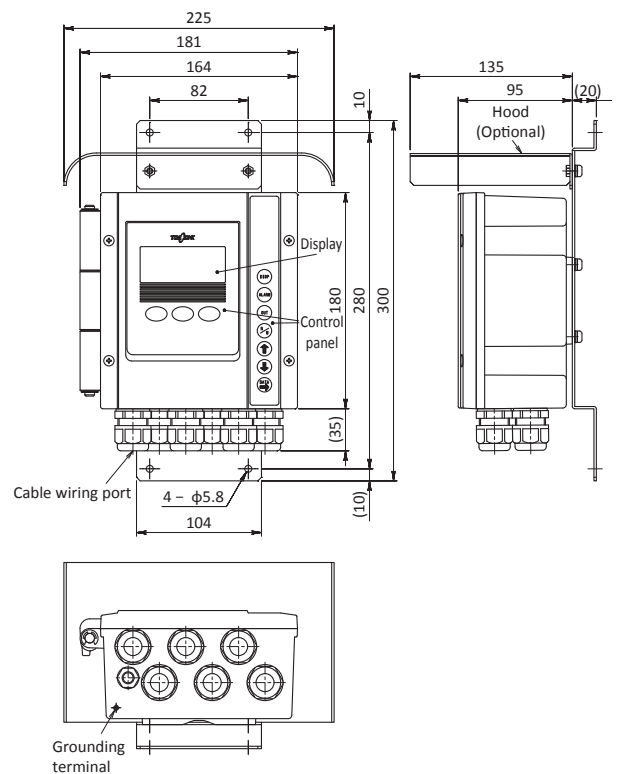
## Dimensions

Unit : mm

### ● Pole mounting



### ● Wall or rack mounting



**Product code**

MBM160A-3-□□□□□□□□□□□□□□□□ mS/cm unit system  
 MBM160B-3-□□□□□□□□□□□□□□□□ S/m unit system

1	.....	Power pressure
	.....	AC 90 to 264V 50/60Hz
A	.....	Transmission output
	.....	DC 4 to 20mA
B	.....	DC 4 to 20mA and with RS-232C interface
	.....	Combined detector cell constant
1	.....	9.0/cm (900/m) (ME-100 series)
2	.....	2.6/cm (260/m) (ME-11T · ME-6/7 series)
	.....	Electrical conductivity transmission output range
A	.....	<Specify one from A to T in the separate table>
to	.....	
Y	.....	Others specified *1
	.....	Temperature compensation coefficient
1	.....	NaCl
2	.....	%/°C Please specify the value
8	.....	INPUT (Max. 6 points) Please specify the value
	.....	Temperature compensation conversion temperature
0	.....	at 25°C
8	.....	Others 5°C (unit at 5 to 95°C) Please specify the value
	.....	Sample water temperature transmission output range
A	.....	0 to 50°C
Y	.....	Others specified *2
	.....	Adjustment (alarm) contact output
A	.....	2contact alarm (2circuit c contact)
B	.....	2contact alarm (2circuit c contact) + Power off signal (a contact)
	.....	Mounting bracket
1	.....	For mounting 50 A pipe
2	.....	For wall / rack mounting
	.....	Power / transmission / signal cable wiring port *3
A	.....	For φ6 to φ12 cable gland (Standard)
B	.....	When the cable gland is removed, the conduit connection screw G1/2
C	.....	NPT1/2 (Attach 5 adapters)
	.....	Surface finish (coating) *4
A	.....	Standard coating
B	.....	Heavy-duty anticorrosion coating
	.....	Arrester built-in *5
0	.....	None
1	.....	Present
	.....	Hood (sun shade)
0	.....	None
1	.....	Included (50A pipe mounting) (Code No.7049930K)
2	.....	Included (Wall mounting) (Code No.69304500)
	.....	Description form
0	.....	Japanese (standard)
1	.....	English
	.....	Combined detector
A	.....	None *6
B	.....	Simultaneous production

Custom spec. code;  
 Numeric digit: 9  
 Alphabet: Z

\*1. Other transmission output ranges can be arbitrarily specified with a width of 5/21 (23.8%) or more for each of the 7 measurement (display) ranges.

Example: 0.500 to 1.000mS/cm, 20 to 500mS/cm, 2.0 to 7.00S/m

\*2. The measurement range of the sample water temperature is -5 to 120°C, but the transmission output range can be specified in 1°C increments with a width of 10°C or more.

Example: 50 to 60°C, 0 to 100°C

\*3. There are 6 wiring ports with φ6 to φ12 cable glands, and a wire pipe screw G1/2 appears when the cable gland is removed.

Five SUS316 adapters are attached to the NPT1/2 request, so remove the cable gland and attach the required number to the wiring port. In addition, the cable gland of the wiring port without conduit piping is used as a plug (hole plugging) with it attached.

\*4. The standard coating is melamine resin undercoat / topcoat, with an average film thickness of 30 μm or more.

Heavy-duty anticorrosion coating is epoxy resin undercoat / intermediate coating, polyurethane resin topcoat, and average film thickness of 100 μm or more.

\*5. Install a ceramic surge arrester (simple) on the power and transmission lines.

\*6. If it is not manufactured at the same time as the detector, you are required to contact the data (serial number, etc.) of the combination detector.

Note that it is not compatible with detectors in use combined with MB-32 type converters

**Electrical conductivity transmission output range <Appendix table>**

Pilk	MBM160A-3- Unit mS/cm	MBM160B-3- Unit S/m	Range
A	0.000 to 0.500	.0000 to .0500	1
B	0.000 to 1.000	.0000 to .1000	
C	0.000 to 2.000	.0000 to .2000	
D	0.00 to 3.00	0.000 to 0.300	2
E	0.00 to 4.00	0.000 to 0.400	
F	0.00 to 5.00	0.000 to 0.500	
G	0.00 to 10.00	0.000 to 1.000	3
H	0.00 to 20.00	0.000 to 2.000	
J	0.0 to 30.0	0.00 to 3.00	
K	0.0 to 40.0	0.00 to 4.00	4
L	0.0 to 50.0	0.00 to 5.00	5
M	0.0 to 100.0	0.00 to 10.00	
N	0.0 to 200.0	0.00 to 20.00	
P	0 to 300	0.0 to 30.0	6
Q	0 to 400	0.0 to 40.0	
R	0 to 500	0.0 to 50.0	
S	0 to 1000	0.0 to 100.0	7
T	0 to 2000	0.0 to 200.0	

Note 1. As shown in the table below, there are 7 measurement (display) ranges (hard ranges) for each of the mS/cm and S/m units.

Hard range	Unit mS/cm at25°C	Unit S/m at25°C
1	0.000 to 2.100	.0000 to .2100
2	0.00 to 7.00	0.000 to 0.700
3	0.00 to 21.00	0.000 to 2.100
4	0.0 to 70.0	0.00 to 7.00
5	0.0 to 210.0	0.00 to 21.00
6	0 to 700	0.0 to 70.0
7	0 to 2100	0.0 to 210.0

Note 2. The transmission output (DC 4 to 20mA) is equipped as standard with two circuits (common) of electrical conductivity and sample water temperature.

Note 3. The temperature compensation range is -5 to 105°C (If the detector is made of PVC, -5 to 60°C)

**Product code**

MBM162A-2-□□□□□□□□□□□□□□□□	(Salt densitometer)
B-2-□□□□□□□□□□□□□□□□	(Hydrochloric acid densitometer)
C-2-□□□□□□□□□□□□□□□□	(Nitric acid densitometer)
D-2-□□□□□□□□□□□□□□□□	(Sodium hydroxide densitometer)
E-2-□□□□□□□□□□□□□□□□	(Sulfuric acid densitometer)
F-2-□□□□□□□□□□□□□□□□	(Other densitometer)

1	Power
	AC 90 to 264V 50/60Hz
A	Transmission output
	DC 4 to 20mA (linear)
B	DC 4 to 20mA or RS-232C with interface
	Combined detector cell constant
1	2.6cm <sup>-1</sup> (ME-11T series ME-6□, 7□)
2	9.0cm <sup>-1</sup> (ME-***H/T series)
	Densitometer measurement range
A	Attached table1
Y	
	Temperature compensation range
A	Attached table2
Y	
	Liquid temperature output range (-5 to 120°C)
A	0.0 to 50°C
Y	Others specified (10°C width or more in 1°C units)
	Adjustment (alarm) contact output
0	2 contact alarm (2circuit c Contact)
1	2 contact alarm (2circuit c Contact) + Power off signal (a Contact)
	Mounting bracket
1	For mounting 50 A pipe
2	For mounting wall / rack
	Power supply / transmission / signal cable wiring port *1
0	For φ6 to φ12 cable gland (Standard)
1	Conduit connection screw G1/2 appears when cable gland is removed
2	NPT1/2 (5 adapters attached)
	Surface finish (coating) *2
A	Standard coating
B	Heavy-duty anticorrosion coating
	Arrester built-in *3
0	None
1	Present
	Hood (sun shade)
0	None
1	Present (50A pipe mounting) (Code No.7049930K)
2	Present (Wall mounting) (Code No.69304500)
	Description form
0	Japanese (standard)
1	English
	Combined detector
A	None *4
B	Simultaneous production

Custom spec. code;  
 Numeric digit: 9  
 Alphabet: Z

\*1. There are 6 wiring ports with φ6 to φ12 cable glands, but if you remove this cable gland, a wire pipe screw G1/2 appears.  
 Five SUS316 adapters are attached to the NPT1/2 request, so remove the cable gland and attach the required number to the wiring port. In addition, the cable gland of the wiring port without conduit piping is used as a plug (hole plugging) with it attached.

\*2. The standard coating is melamine resin undercoat / topcoat, and the average film thickness is 30μm or more.  
 Heavy-duty anticorrosion coating is epoxy resin undercoat / intermediate coating, polyurethane resin topcoat, and average film thickness of 100μm or more.

\*3. Install a ceramic surge arrester (simple) on the power and transmission lines.

\*4. If it is not manufactured at the same time as the detector, it is necessary to contact the data (serial number, etc.) of the combination detector.

It cannot be used with the detector combined with the MB-32 type converter.

Note 1. Please refer to attached table 2 for the temperature compensation range.  
 In addition, there are restrictions depending on the material of the detector.

Note 2. The temperature display and transmission output are -5 to 120°C, but please use below the specified temperature in consideration of the measurement target, detector material, and temperature compensation range.

Note 3. Since the transmission output (DC 4 to 20mA) is a linear output (linear) corresponding to the solution concentration, it is necessary to change the scale of the receiver when updating from MB-32 type (non-linear).

<Table 1>

Object digits		Salt densitometer	Hydrochloric acid densitometer	Nitric acid densitometer	Sodium hydroxide densitometer	Sulfuric acid densitometer	Other densitometer	
Densitometer measurement range	04 digit	A	0 to 5 % NaCl	0 to 5 % HCl	0 to 5 % HNO <sub>3</sub>	0 to 5 % NaOH	0 to 5 % H <sub>2</sub> SO <sub>4</sub>	
		B	0 to 10 % NaCl	0 to 10 % HCl	0 to 10 % HNO <sub>3</sub>	0 to 10 % NaOH	0 to 10 % H <sub>2</sub> SO <sub>4</sub>	Oleum
		C	0 to 20 % NaCl	0 to 15 % HCl	0 to 20 % HNO <sub>3</sub>	0 to 15 % NaOH *5	0 to 20 % H <sub>2</sub> SO <sub>4</sub>	Hydrofluoric acid
		D	0 to 25 % NaCl	25 to 35 % HCl	0 to 25 % HNO <sub>3</sub>	20 to 40 % NaOH *5	0 to 30 % H <sub>2</sub> SO <sub>4</sub> *5	Potassium hydroxide
		E		25 to 40 % HCl	40 to 80 % HNO <sub>3</sub>		40 to 80 % H <sub>2</sub> SO <sub>4</sub>	Phosphoric acid
		F		30 to 40 % HCl	60 to 70 % HNO <sub>3</sub>		60 to 80 % H <sub>2</sub> SO <sub>4</sub>	Calcium chloride
		G			60 to 80 % HNO <sub>3</sub>		93 to 99.5 % H <sub>2</sub> SO <sub>4</sub> *5	
		H					94 to 99.5 % H <sub>2</sub> SO <sub>4</sub> *5	
		Y	Other NaCl	Other HCl	Other HNO <sub>3</sub>	Other NaOH	Other H <sub>2</sub> SO <sub>4</sub>	Specified *6
		Z	Special	Special	Special	Special	Special	Special

\*5. Please note that the temperature compensation range is limited. (See Table 2 below)

\*6. Specify the measurement target, measurement range, and unit.

\*7. We have other denitometers including fuming sulfuric acid, hydrofluoric acid, potassium hydroxide, phosphoric acid, calcium chloride (antifreeze), etc.

<Table 2>

Object digits		Salt densitometer	Hydrochloric acid densitometer	Nitric acid densitometer	Sodium hydroxide densitometer	Sulfuric acid densitometer	Other densitometer	
Temperature compensation range	05 digit	A	0 to 20°C	0 to 20°C	0 to 20°C	0 to 20°C ]*8	0 to 20°C ]*10	
		B	10 to 30°C	10 to 30°C	10 to 30°C	10 to 30°C ]	10 to 30°C ]	
		C	20 to 40°C	20 to 40°C	20 to 40°C	20 to 40°C	20 to 40°C	
		D	30 to 50°C	30 to 50°C	30 to 50°C	30 to 50°C	30 to 50°C	
		E	40 to 60°C	40 to 60°C	40 to 60°C	40 to 60°C ]*9	40 to 60°C	
		F	50 to 70°C	50 to 70°C	50 to 70°C	50 to 70°C ]	50 to 70°C	
		G	60 to 80°C	60 to 80°C	60 to 80°C	60 to 80°C ]	60 to 80°C	
		H	70 to 90°C	70 to 90°C	70 to 90°C	70 to 90°C ]	70 to 90°C	
		J	80 to 100°C	80 to 100°C	80 to 100°C	80 to 100°C ]	80 to 100°C	
		Y	Specified	Specified *11	Specified *11	Specified	Specified	Specified
Z	Special	Special *11	Special *11	Special	Special	Special		

\*8. It is not possible to manufacture the measurement range of 0 to 15%.


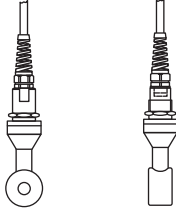
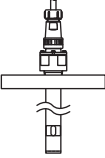
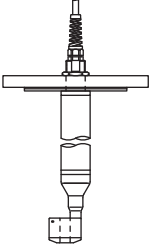
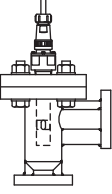
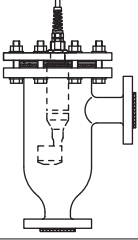


\*9. It is not possible to manufacture the measurement range of 20 to 40%.

\*10. The measurement range of 0 to 30% cannot be manufactured.

\*11. If the intermediate temperature exceeds 70°C please contact us in advance.

**List of combined detectors**

There are two types of detectors for MBM-160/162 type, the compact and lightweight ME-100 series (cell constant: 9.0/cm) and the high-sensitivity ME-6/7 series (cell constant: 2.6/cm). For details, refer to the separate "Process Instrument System Guide" or "Detector Spec Sheet".

Type	Small ME-100 series (Cable used: EC-11 waterproof connector connection)		High-sensitivity type ME-6/7 series (Cable integrated type)	
	Shape	Specification	Shape	Specification
Piping insertion type (Screw-in installation)		Model : ME-112□ Wetted part material : C-PVC, PVDF and PFA Connection screw : R3/4 Insertion length : 123mm		Model : ME-11T Wet contact material : PFA Connection screw : G3/4 Insertion length : 103mm Cable length : 5m
Sealed tank insertion immersion type (Flange mounting)		Model : ME-122□ Wetted part material : C-PVC, PVDF and PFA Connection flange standard : 50A JIS10K FF Flange lower length : 96 to 2000mm		Model : ME-72T Wet contact material : PFA Connection flange standard : 100A JIS10K RF Flange bottom length : 500 to 2000mm Cable length : 5m
Flow-type / with case (Flange connection)		Model : ME-142H Wetted part material : C-PVC Case flange standard : 15A JIS10K FF		Model : ME-62T Wetted part material : PFA Case flange standard : 25A JIS10K RF Cable length : 5m
Throw-in type		Model : ME-111H Cable direct connection type wetted material : C-PVC Outer diameter : φ30 Cable length : 5 to 10m		Model : ME-11T Wet contact material : PFA, PVC Mass : Approximately 1kg Outer diameter : φ60 Cable length : 5 to 20m



**DKK-TOA CORPORATION**



Please read the operation manual carefully before using products.

Overseas Sales Division:  
DKK-TOA Corporation  
29-10, 1-Chome, Takadanobaba, Shinjuku-ku,  
Tokyo 169-8648 Japan  
Tel : +81-3-3202-0225 Fax : +81-3-3202-5685  
E-mail : intsales@dkktoa.com

