

COMPACT ELECTROMAGNETIC FLOWMETER (COMPACT FLOW)

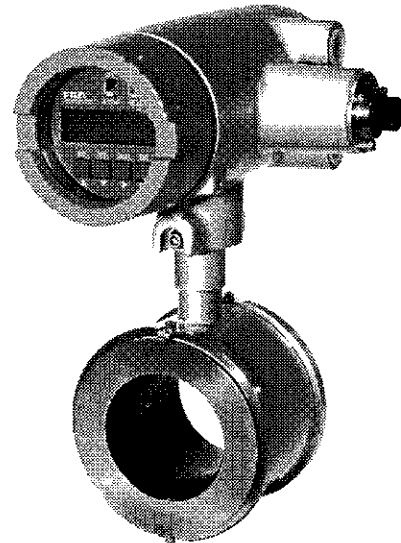
The electromagnetic flowmeter is an instrument to measure the volumetric flow rate of fluids simply by applying a magnetic field from the outside utilizing the fact that an electric conductor which crosses a magnetic field at a certain velocity causes a voltage to be induced in proportion to the velocity, which is known as Faraday's law.

This flowmeter has a converter equipped with a micro-computer for digital processing of signals to realize high accuracy and intelligent measurements.

The adoption of optical fiber cable in the signal transmission unit configures an optical field instrumentation system with an optical star coupler and master station.

FEATURES

1. **Compact wafer-type flowmeter in which detector and converter are combined.**
The compact and light-weight design allows the piping work to be accomplished with the ease of connecting an orifice and permits easy centering of pipe.
2. **Bidirectional transmission system**
One-fiber bidirectional transmission system is used to transmit measurement/diagnosis data to host equipment and to receive remote setting data from the same equipment.
3. **Simple adjustment**
Measuring ranges can easily be changed by manipulating key switches.
4. **Self-diagnosis function**
Various kinds of self-diagnoses can be achieved by the built-in micro-computer.
5. **High reliability**
The detector casing is fully welded and the electrode unit is double sealed. The transmitter and external terminals are sealed separately.
6. **Field indicator with digital display (option)**
7. **Explosion-proof**
Safety barrier is self-contained.
8. **Dual output signal**
A change-over switch is provided for 4 to 20mA single output.
In optical output mode, 4 to 20mA electrical output is given simultaneously to provide flexible application capability.
9. **The converter orientation is changeable.**



SPECIFICATIONS

Measured fluid: Industrial water, service water, drainage, sludge, chemical liquid, slurry and other liquids with more than $5\mu\text{S}/\text{cm}$ of conductivity.

Measuring range and accuracy:
Fluid velocity 0 to 1 ... 10m/s: $\pm 0.5\%$ FS
Fluid velocity 0 to 0.3 ... 1m/s or less: $\pm 1\%$ FS

Output: Optical digital output (4 to 20mA DC can also allowable load resistance: 0 to 600 Ω)

Meter size, measuring range, and materials of construction

Meter size	2.5A	6A	15A	25A	50A	80A	100A	150A	200A	
Measuring range	0 to 0.3 ... 10m/s									
Materials of wetted parts	Meter liner	Teflon (PFA mold)								
	Electrode	Platinum-iridium, 316L stainless steel								
	Ground ring	Tantalum, 316 stainless steel, Hastelloy C								
Converter housing	Aluminum casting									

Note : FS: Full scale

Operating pressure limits:

-0.1 to +2MPa{-1 to +20kgf/cm²}

Process fluid temperature limits:

Teflon liner... -10 to +120°C

See Fig. 1 and Fig. 2.

Enclosure: Meets JIS C0920 immersionproof

Explosion-proof: (excluding 2.5A, 200A)

JIS C 0903 ids 2G4

Functions (with field indicator and setting unit)

Field-ind ication:

LCD 6-digit display

Display of instantaneous flow rate (0 to 100%), symbols of setting items and setting value and symbols of self-diagnostic items

Setting item:

Direct setting with toggle switch and key switches, or remote setting from master station (Asterisked * item is not acceptable)

* Current output calibration (0%, 100%)
Fluid velocity full scale setting range: 0.3 to 10m/s

Damping constant: 0 to 51 sec

* Output low cut off function: 0 to 10%FS

* Flow noise cut off function: 0 to 10%FS
Interchangeability constants of detector and converter

Self-daignosis:

(Following items are displayed on the indicator and transmitted to master station).

Micro-computer abnormal (Note)

RAM backup battery abnormal

Current output D/A converter abnormal

Input overflow (120%FS or more)

Input underflow (-20%FS or less)

Note: Abnormal micro-computer is normalized by auto-reset.

(No display and transmission of abnormality)

Built in arrester (option):

For power source and current output

Exciting system: Low-frequency excitation

Mountins method:

Insert a meter body between adjacent pipe flanges

Cable and connection:

JIS G1/2 (Terminals: M4 screw)

Optical signal transmission unit; Fuji's specified cable and connector is required.

Power consumption:

Approx. 10VA

Power source: 100, 115, 220V (±10%) AC 50/60Hz (±2Hz)

Ambient temperature:

-20 to +60°C

Ambient humidity:

95%RH or less

Finish color: Silver (housing cover...blue)

Mass and external dimensions:

See outline diagram

Other optional specifications

(non-standard; contact Fuji for details.)

- Non-fluid detecting function
- 24V DC power supply (when using exclusive inverter)

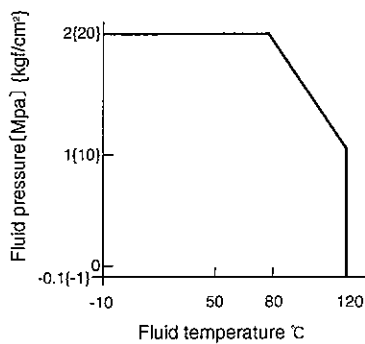


Fig. 1 Fluid temperature vs allowable fluid pressure

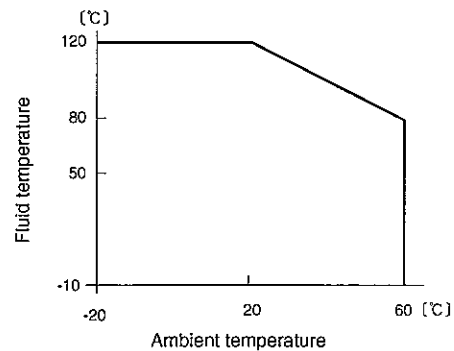


Fig. 2 Ambient temperature vs allowable fluid temperature

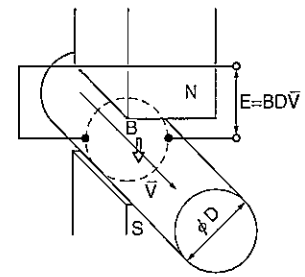
OPERATING PRINCIPLE

The flowmeter is designed utilizing Faraday's law that "when a electric conductor moves in a magnetic field, an electromotive force proportional to the velocity is generated in the electric conductor"

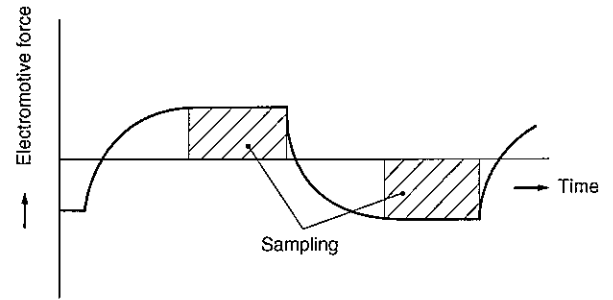
Suppose that there is a magnetic field with magnetic flux density "B" in a pipe of inside diameter "D" and a pair of electrodes are placed at right angles to the pipe, and that the mean fluid velocity is "V", then an electromotive force "E" is induced between the electrodes.

$$E = B \cdot D \cdot \bar{V}$$

This flowmeter uses a low-frequency rectangular wave exciting system to provide excellent zero point stability and minimum power consumption, thereby allowing an electromotive force to be detected under stabilized condition.



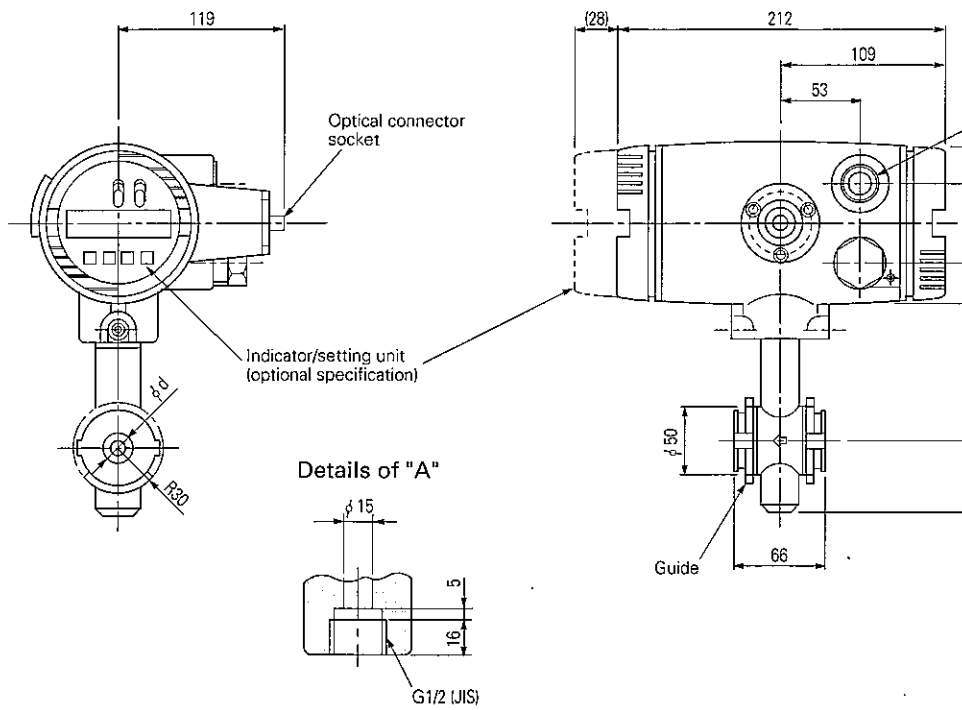
Operating principle



CODE SYMBOLS

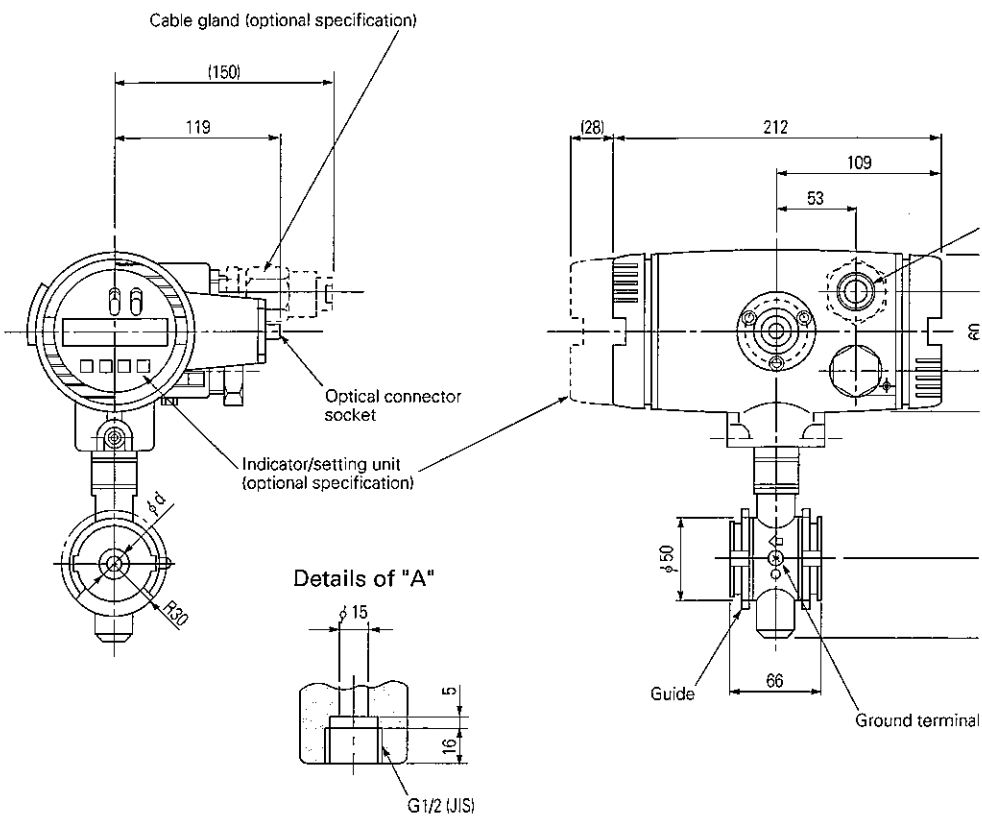
1 2 3 4 5 6 7 8 9 10 11 12 13													Description	
F	M	K	0										0	Flange Non (flange insert)
S														Meter size 2.5A
A														6A
C														15A
D														25A
E														50A
F														80A
G														100A
H														150A
J														200A
P														Meter liner Teflon (PFA mold)
T														Ground ring Tantalum
H														Hastelloy C
W														316 stainless steel
													1	Guide For JIS 10K flanges
													2	For JIS 20K flanges
													7	For JIS 75M flanges (unusable with "S", "A", "C", "D", and "E" in 5th digit)
P														Material of electrode Platinum-Iridium
W														316L stainless steel
D														Output signal and field indicator/setting unit Optical signal (FFI) Without field indicator/setting unit
E														Optical signal (FFI) With field indicator/setting unit
F														Optical signal (FFI) Without field indicator/setting unit
G														Optical signal (FFI) With field indicator/setting unit
														} With flame-proof construction
A														
B														100V AC 60Hz Without arrester
C														100V AC 50Hz With arrester
D														100V AC 60Hz With arrester
E														115V AC 50Hz Without arrester
F														115V AC 60Hz Without arrester
G														115V AC 50Hz With arrester
H														115V AC 60Hz With arrester
J														220V AC 50Hz Without arrester
K														220V AC 60Hz Without arrester
L														220V AC 50Hz With arrester
M														220V AC 60Hz With arrester
														Structure
													1	Non-explosion-proof, immersion-proof
													3	Flame-proof (conduit screw coupled type lead in system)
													4	Flame-proof (flame-proof packing type connection)
														} Unusable with "S" and "J" in 5th digit

OUTLINE DIAGRAM (Unit:mm)



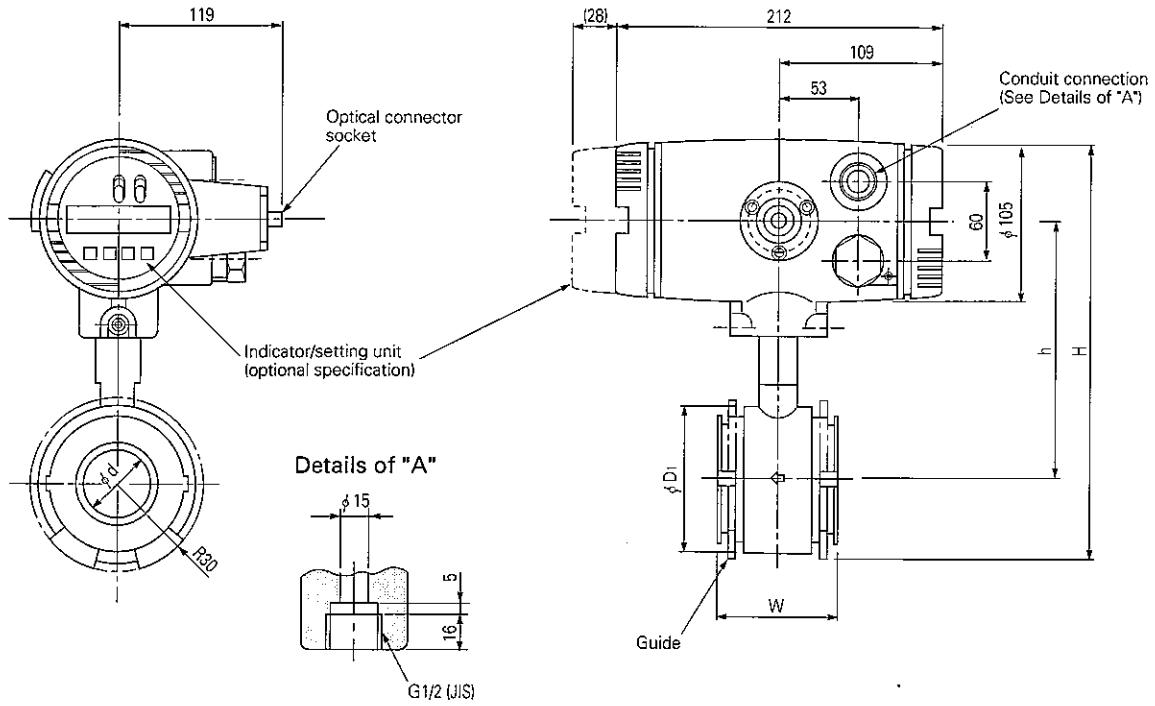
Meter size	ϕ d	Mass (weight) [kg]
2.5A	2.5	4
6A	6	4.5
15A	12	4.5

Non-explosion-proof type



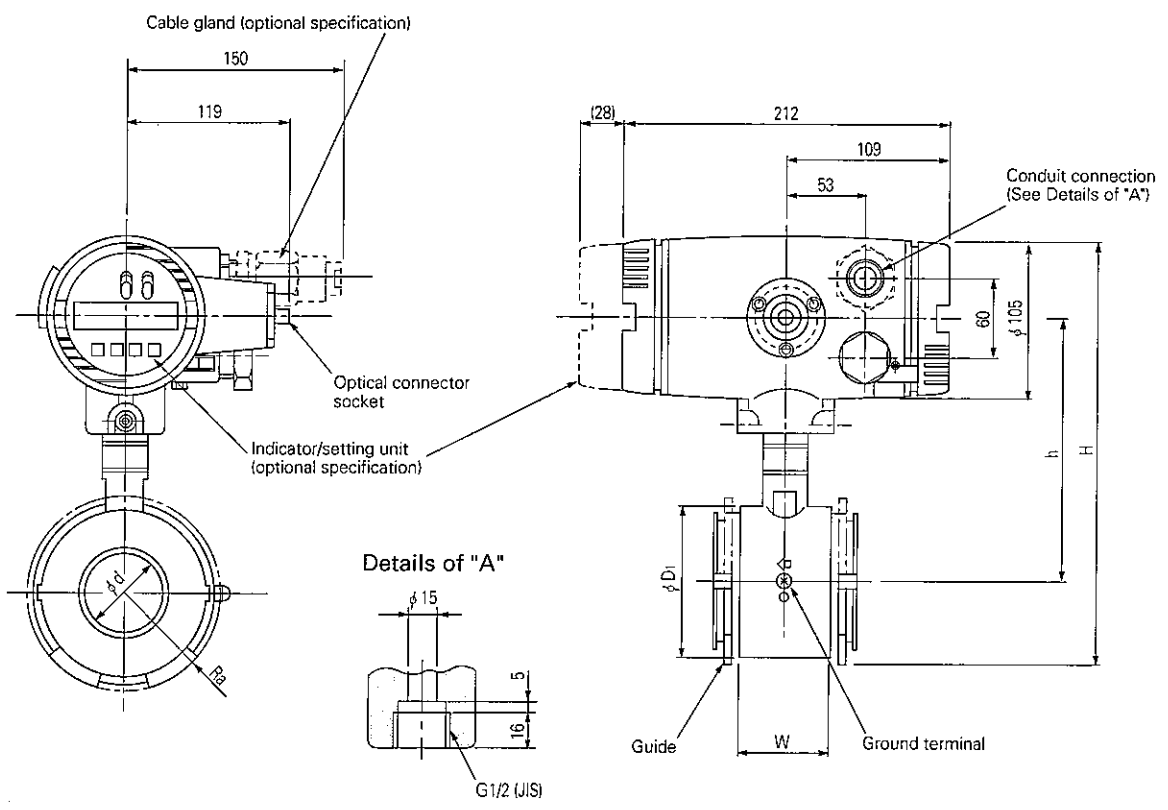
Meter size	ϕ d	Mass (weight) [kg]
6A	6	4.5
15A	12	4.5

Explosion-proof type



Meter size	W	φ d	φ D1	h	H	Guide Ra			Mass weight (kg)
						JIS 10K	JIS 20K	JIS 75M	
25A	65	21	70	169	257	38	38		4.5
50A	80	48	96	182	283	53	53		5.5
80A	100	76	128	198	315	68	71	77	6
100A	120	100	156	212	343	81	84	91	8.5
150A	165	150	206	237	393	111	120	117	12
200A	200	200	265	267	451	136	142	142	20

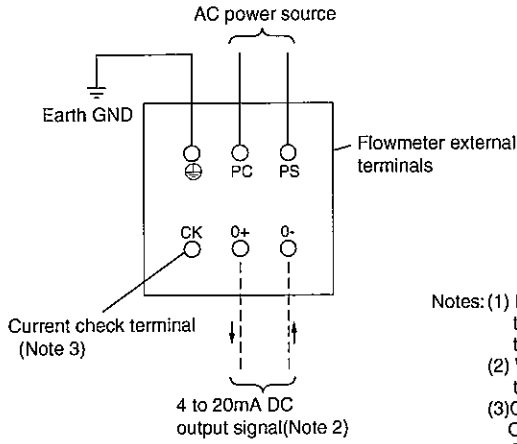
Non-explosion-proof type



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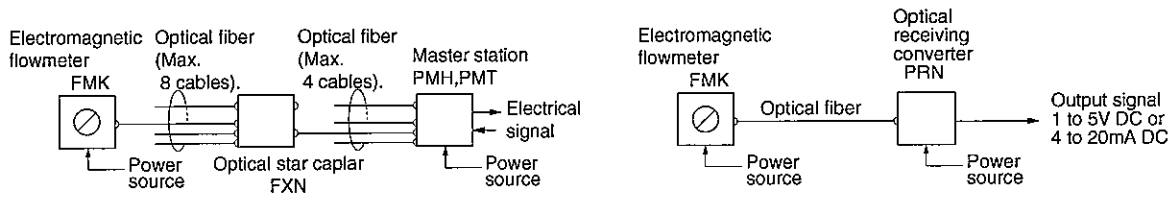
Explosion-proof type

CONNECTION DIAGRAM

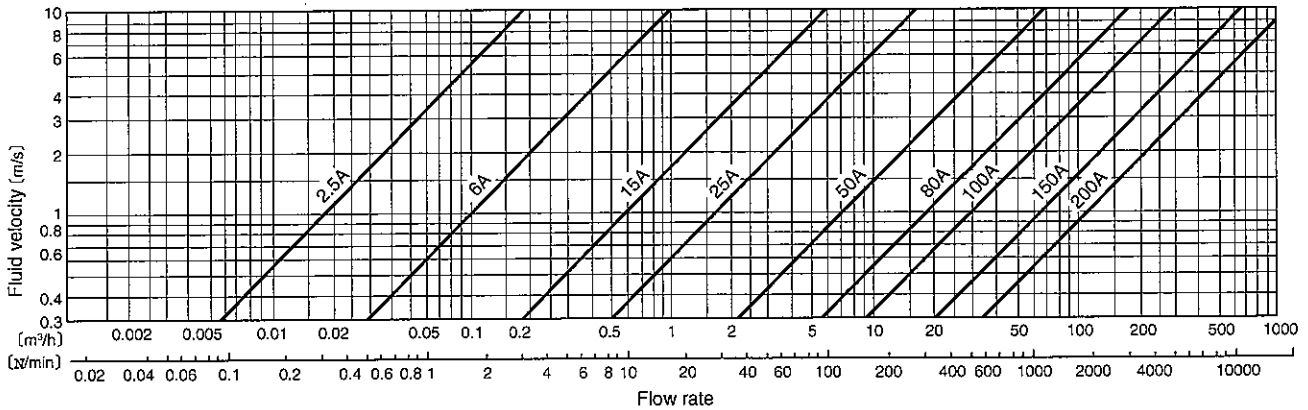


- Notes: (1) For explosion-proof type flowmeter, individual ground terminals should be connected to the detector and the transmitter.
 (2) When transmitting current output, connect lead wires to "0+" and "0-".
 (3) Current output being transmitted can be checked at the CK (check) terminal and "0+" terminal. Connect the "+" side of the check current ammeter (internal resistance; less than 10Ω) to CK and the "-" side to "0+".

SYSTEM BLOCK DIAGRAM



FLOW RATE vs. FLUID VELOCITY CONVERSION DIAGRAM



SCOPE OF DELIVERY

Flowmeter (Without mounting bolts and gaskets)

RELATED DEVICES

- Master station (Data sheet No. EDS11-86)
- Optical receiving converter (Data sheet No. EDS9-43)
- Optical star coupler
- Optical connector
- Optical connector assembling tool
- Optical fiber cable

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