

INSTRUCTION MANUAL

ANALOG INPUT COMMUNICATION UNIT

FCTT

(INPUT 8 CIRCUITS)



DAIICHI ELECTRONICS CO., LTD.

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Introduction

Thank you for purchase of DAIICHI product.
Please read this instruction manual carefully before use.
Keep this manual for future reference.
Please contact with us in case this manual is lost or damaged.

Safety precautions

■ Environment conditions

Please be sure to use this product in a place that meets the following conditions. In places that do not meet this condition, malfunctions and failures, and performance and product life may be reduced.


- ① Within the range of ambient temperature -10 to 55 °C, humidity 5 to 90 % RH.
- ② Place free of corrosive gas. (Corrosive gas : SO_2 / H_2S , etc.)
- ③ Place free of dust, salt and oily smoke.
- ④ Location that is not affected by vibration and shock.
- ⑤ Location that is not affected by external noise.
- ⑥ Altitude 2000m or less.

■ Outdoor use conditions.

- These products are not a dustproof, waterproof, and splash proof construction.
Please avoid the place with much dust. Please do not install in the place directly exposed to the rain and water droplets.
- Please do not install in the place directly exposed to the sun even through the glass.
Discoloration and degradation of a name plate, and deformation of the box by the surface temperature rise may cause. The case may be deformed if it is exposed to direct sunlight and the surface temperature exceeds $80^{\circ}C$.
- Product life may shorten when the daily average temperature exceeds 40 °C.

■ Mounting and wiring

Please refer to this instruction manual for installation and the wiring.

 CAUTION	<ul style="list-style-type: none"> ● Please refer to connection diagram for the wiring. An improper connection may cause generation of high voltage on the CT secondary side, and which may lead to device malfunction, burning or fire. ● Hot line work is prohibited. There is a risk of explosion by electric shock, device malfunction, burning, fire, or gas. ● Please use an electrical wire size suitable with the rated current. Use unsuitable size electric wire, which may lead to a fire. ● Strip the wire with an appropriate length. If it is peeled off too long, it may short-circuit with the adjacent wire. Also, if it is too short, the wires may not fit properly, resulting in poor contact. ● Be careful not to short-circuit the core wire with the adjacent pole due to the whiskers. ● Please check the tightening of the screw. If the screws are loose, it may cause a fire or malfunction.
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■ Preparation

This product must be set before use. Please read this manual and make the setting correctly.
If you make a mistake on the setting it does not operate correctly.

■ Maintenance and inspection

- Inspection during energization is dangerous.
- This product has no parts to replace during regular inspections.
- Please wipe off lightly with the dry soft cloth.
Please do not use the organic solvent, chemicals, cleaners, etc., such as an alcohol, for cleaning.

■ Storage

When storing this product for a long period, please keep it in a place that satisfies the following environmental conditions.

- Within the range of ambient temperature (-20 to 70 °C) and humidity (5 to 90 %RH).
- Place where average daily temperature does not exceed 40 °C.
- Locations with little dust, corrosive gases, salt and oil smoke.
- A place not subject to vibration or shock.

■ Countermeasures against troubles

If this product breaks down within the warranty period, it will be repaired by DAIICHI Electronics.

■ Disposal

Please dispose of this product as industrial waste (noncombustible).
Mercury parts and a nickel-cadmium battery are not used for this product.

■ Warranty period

The warranty period of the product is one year after the date of delivery.

■ Warranty scope

In the state of the normal use of product-specification within the range according to this instruction manual, the trouble within the warranty period performs exchange or repair gratuitously.
However, if it corresponds to the next, it does not warrant.

- ① If it breaks down when converted or repaired except our company.
- ② If it breaks down by use out of specification range.
- ③ If the cause of trouble is based on cause other than this product.
- ④ Transportation, movement, damage by falling, and trouble.
- ⑤ Other, natural disasters, disasters, etc. In the case where the supplier side (Company and agent) is not responsible.

This warranty is a guarantee for the delivered product. Cannot warrant the damage induced by trouble of this product.

■ Replacement cycle of the product

We recommend updating the product for 10 years as a rough standard.

■ Change of instruction manual written contents.

This instruction manual changes written contents without a notice by product improvement etc.

Model name configuration

Type Specification code
FCTT -

	①	
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②

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① Input	
8A8	DC1 to 5V (About 1MΩ) 8 circuits
8C7	DC4 to 20mA (About 100Ω) 8 circuits

② Output	
M	RS-485 Modbus RTU

③ Bit rate / Parity bit	
F	Various settings are possible

④ Auxiliary supply	
B	AC/DC80 to 264V
C	DC19 to 57V

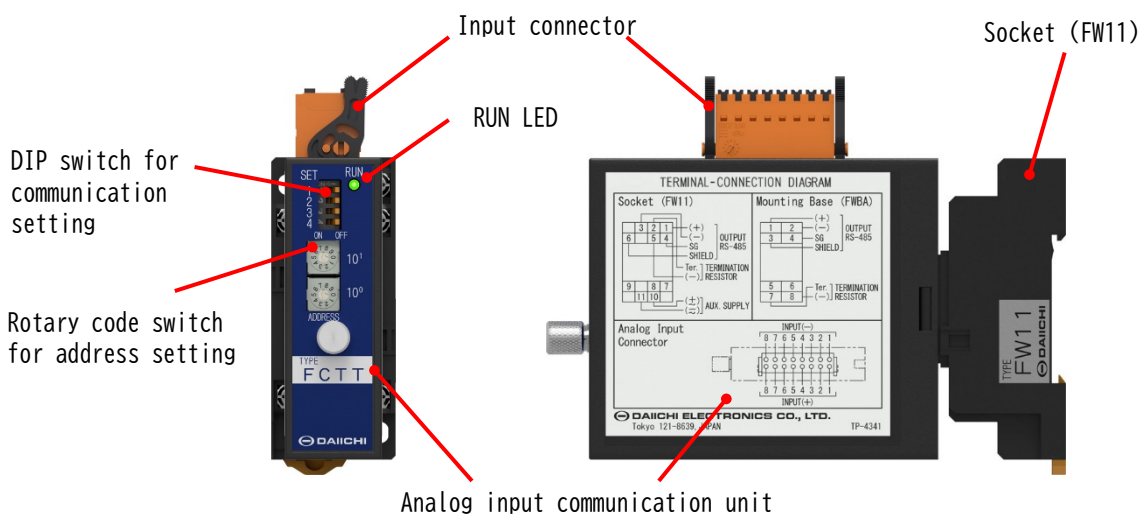
⑤ Power fuse	
1	Without fuse
2	Within fuse

1 Outline on the product

1.1 Features

- Remote monitoring of analog signals such as various sensors and instrumentation equipment is possible.
- Achieves high-precision conversion $\pm 0.1\%$.
- Multi-point input of up to 8 circuits.
- The push-in connector reduces wiring man-hours.
- "Auxiliary supply applied status" and "communication status" can be confirmed by LED (green).
- By supporting MODBUS communication on the open network, it can be combined with a general-purpose wireless unit.
- CE marking product.

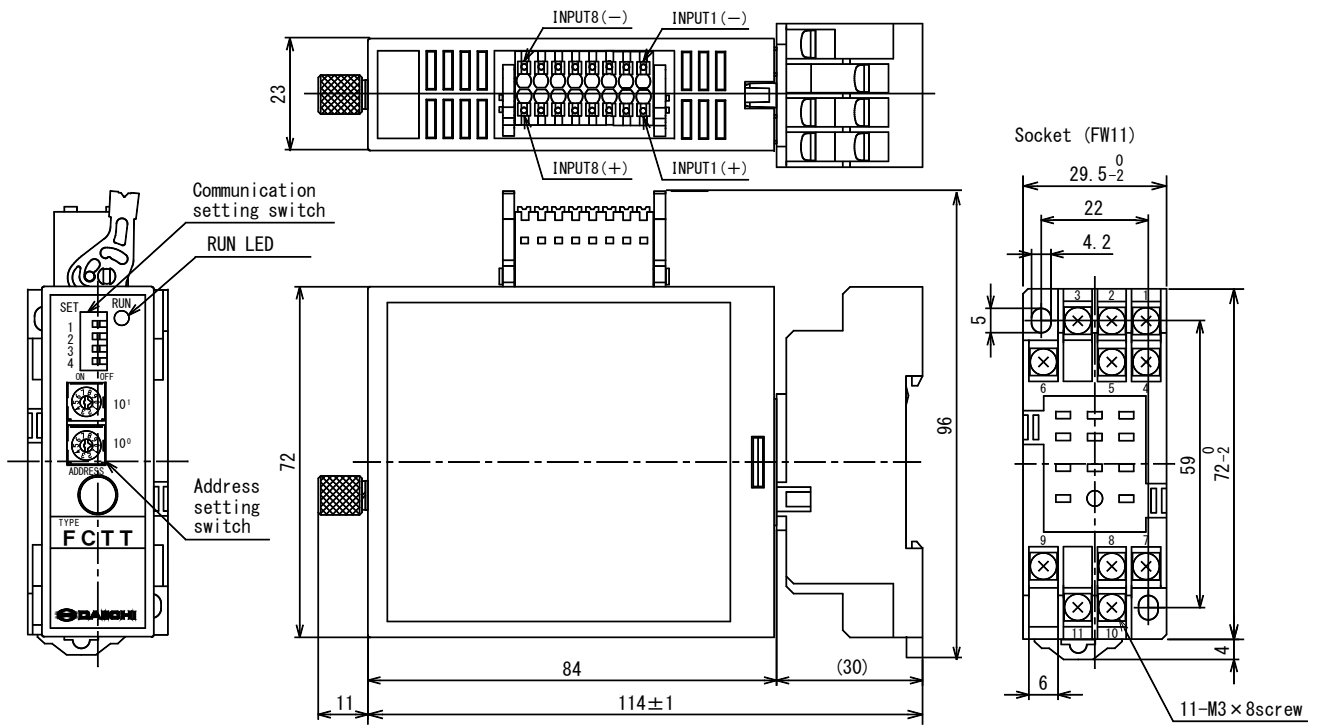
1.2 Name of each part



1.3 Bundled items

- ① Input connector 1
- ② FW11 socket 1

2 Outline dimensions



3 Installation

3.1 Connection method

Input connector connection method

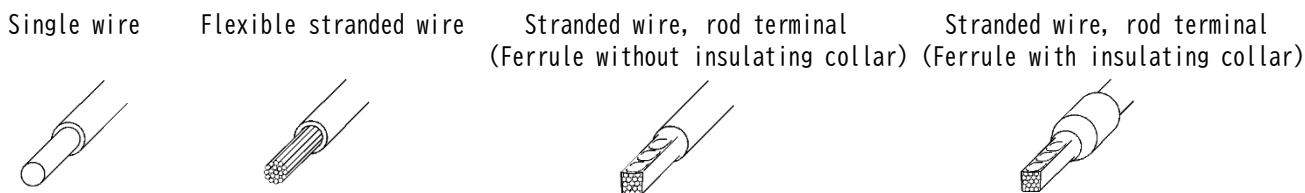
(1) Applicable wire

The connector is a push-in connection connector. The applicable wire sizes are shown in the table below.

	Single wire	Flexible stranded wire	Stranded wire, rod terminal (Ferrule without insulating collar)	Stranded wire, rod terminal (Ferrule with insulating collar)
Cross-sectional area	0.14 to 1.5mm ²			0.14 to 1mm ²
AWG	26 to 16			26 to 17

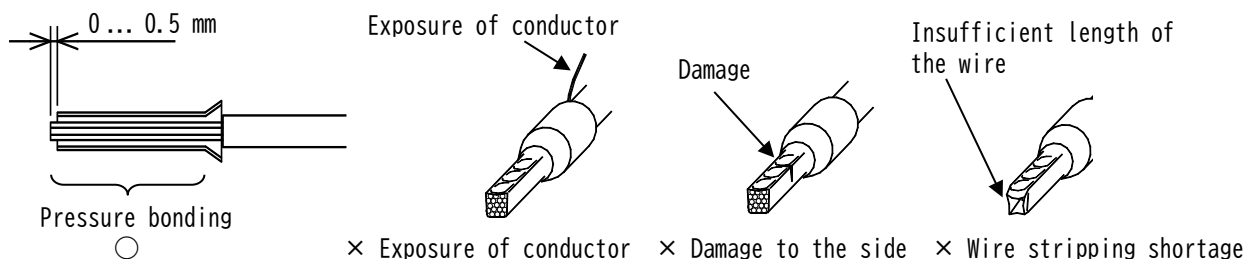
(2) Electric wire stripping length

Electric wire			Electric wire stripping length
Single wire			10mm
Flexible stranded wire			
Stranded wire, rod terminal (Ferrule without insulating collar)	0.5 mm ²	Ferrule without insulating collar (Weidmuller, H0.5/10)	
	0.75 mm ²	Ferrule without insulating collar (Weidmuller, H0.75/10)	
	1.0 mm ²	Ferrule without insulating collar (Weidmuller, H1.0/10)	
	1.5 mm ²	Ferrule without insulating collar (Weidmuller, H1.5/10)	
Stranded wire, rod terminal (Ferrule with insulating collar)	0.5 mm ²	Ferrule with insulating collar (Weidmuller, H0.5/160R)	12mm
	0.75 mm ²	Ferrule with insulating collar (Weidmuller, H0.75/18W)	14mm
	1.0 mm ²	Ferrule with insulating collar (Weidmuller, H1.0/18DR)	15mm



In case of flexible stranded wire, please be careful not to loosen the wire. There is a rod terminal as a preventive measure. Rod terminal of recommendation, please refer to the "(2) Electric wire stripping length". Also, please use a dedicated crimping tool to rod terminal.

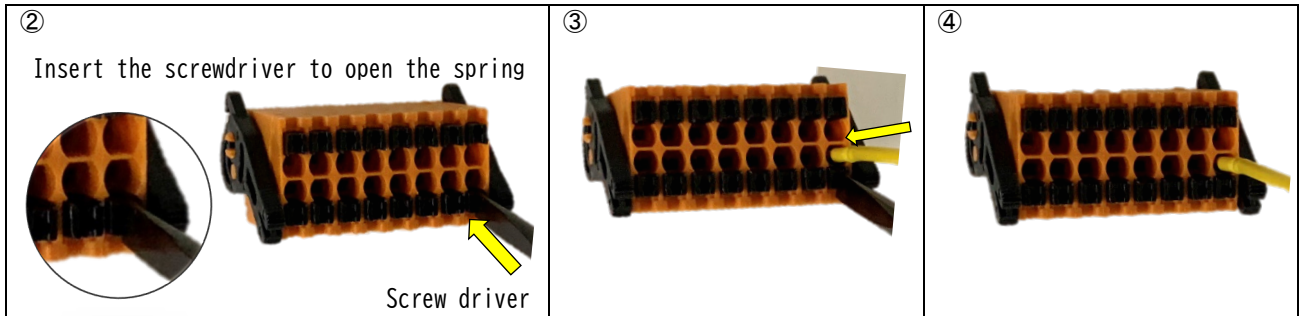
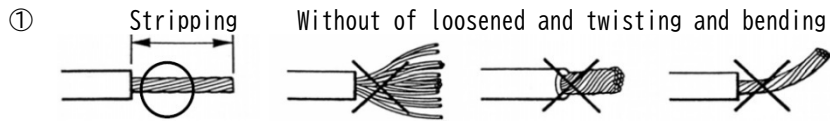
- Crimping tool : Weidmuller, Ferrule crimping tool, PZ series
- Use a rod terminal that matches the wire size.
- The tip of the wire, please cut the length of the rod terminal (or about 0.5 mm long).
- After the rod terminal crimping, please check the appearance.



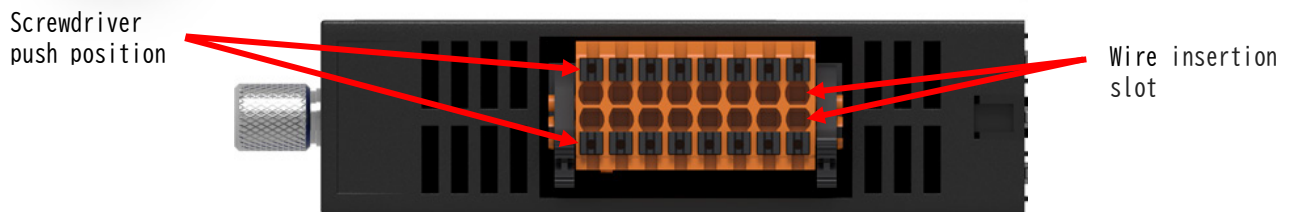
(3) Connection method

- ① Stripping off the tip of the wire. Or, crimping the rod terminal.
- ② Insert the screwdriver to screwdriver insertion slot, open the spring.
- ③ To insert the wire to the wire insertion slot.
- ④ Pull out the screwdriver, close the spring.

<Caution> When connecting, disconnect the connector from the main unit (connector alone).



【Screwdriver and wire insertion slot】

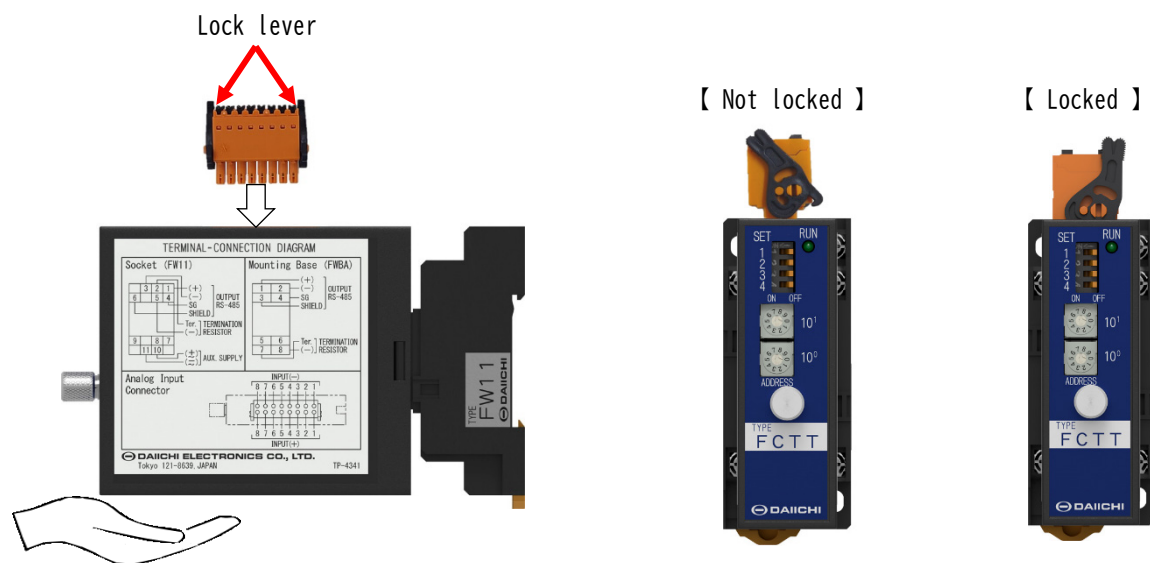


3.2 Installing and removing the input connector

<Caution> Cut off the input signal when removing or installing the connector from the main unit.

(1) How to install the connector.

Insert the connector into the main unit and push it in until the lock lever of the connector locks.



<Caution> Install the connector while supporting the main body.

(2) How to remove the connector

Operate the lock levers on both ends of the connector in the direction of the arrow at the same time to remove them from the main unit.

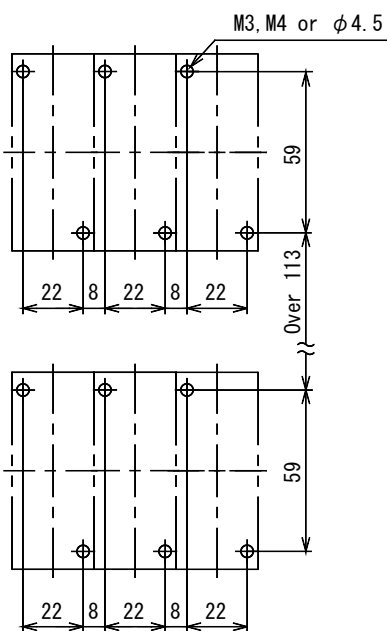


3.3 Cautions on mounting

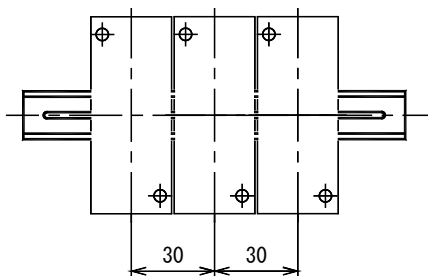
- ① Please install indoors in a place with low mechanical vibration, dust, and corrosive gas.
- ② There is no restriction on mounting position.
- ③ Mounting can be done on 35mm width DIN rail mounting or screw mounting.
- ④ For screw mounting, please install with M3 screw or M4 screw. However, the screw is not attached.
- ⑤ The tightening torque of a screw, M3 : 0.45 to 0.60N·m, M4 : 1.00 to 1.30N·m
- ⑥ The interval between FW11 does not have designation.
- ⑦ Considering heat dissipation and wiring space, please leave more than 100mm space between the top and bottom. (Reference at section 3.4 Example of combination mounting)
- ⑧ Please leave space between terminal and metal panel for 10mm or more.

3.4 Example of combination mounting

■ Screw installation (Unit mm)



■ Rail installation (Unit mm)



Please use rail of IEC, DIN technical standard 35mm width rail (strong type).

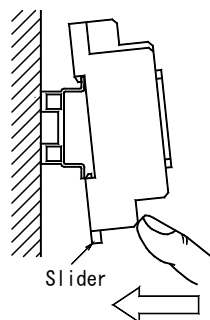
《 Recommendation product 》 Fuji Electric Co.,Ltd. TH35-15AL

3.5 The mount to DIN rail, and the method of detachment

<Caution> Shut down the auxiliary supply when removing or installing the main unit from the socket.

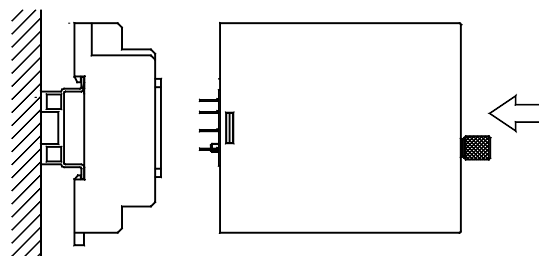
(1) How to fix a socket.

Set the base socket so that its slider is at the bottom. Position the upper hook at the rear side of base socket on the DIN rail and push in the lower.



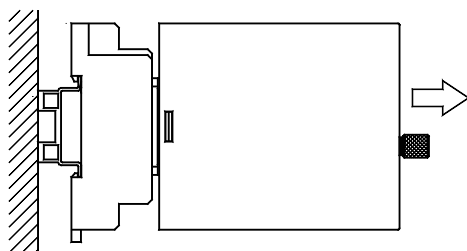
(2) How to fix a body to a socket.

Do in the direction which can read a label character correctly, and insert a body straightly. Press with the screw of a body. (Please do not tighten a screw too much.)



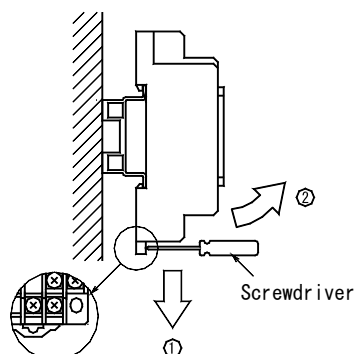
(3) How to remove a body from a socket.

Loosens the screw of a body. Please pull a body to straight near side.



(4) How to remove a socket.

Push down the slider utilizing a minus screwdriver and pull.

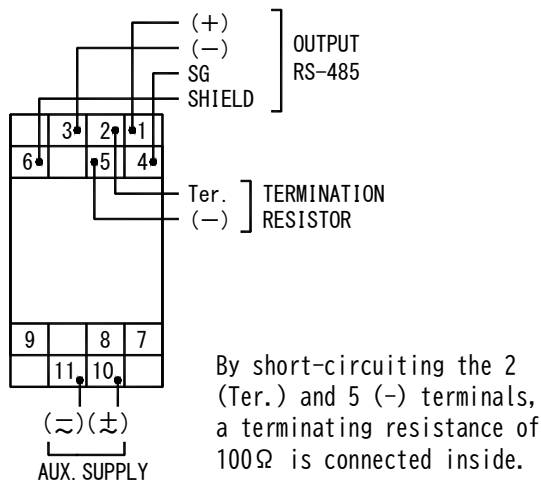


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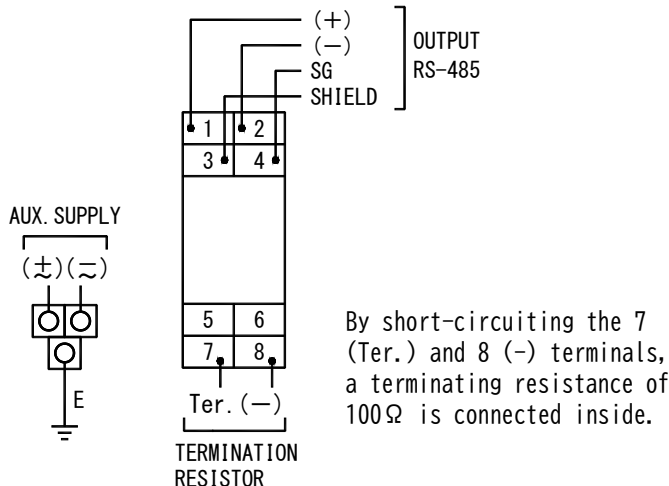
If a body is taken out and inserted aslant, the terminal of a body will bend and a loose connection etc. will occur.

4 Terminal connections

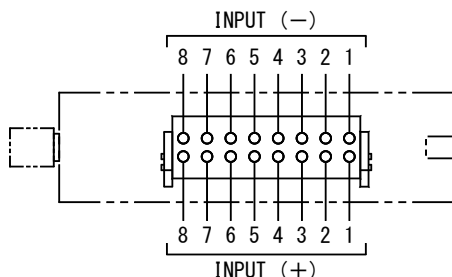
Socket (FW11)



Mounting base (FWBA)



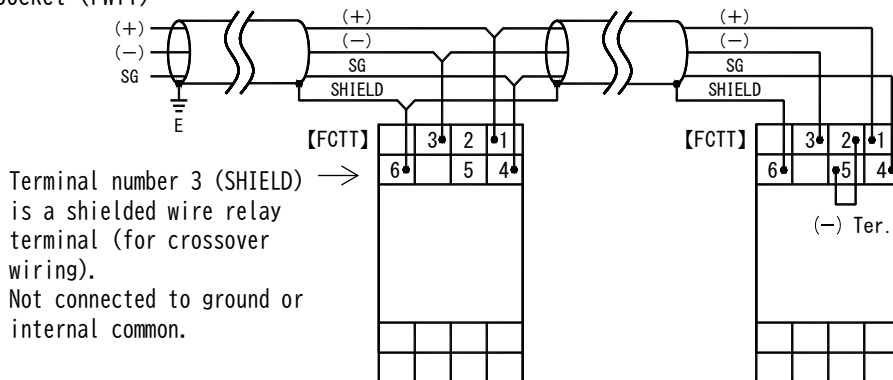
Input connector (plug)



<Note>
If guidance induced lightning surge may occur on the input side / output side or auxiliary power supply side, install line surge protector and arrester etc. between the line and ground to protect this product.

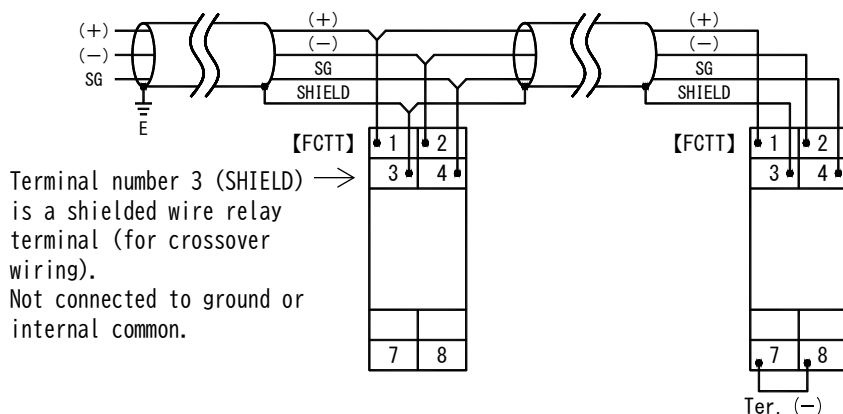
【 About communication output wiring 】

Socket (FW11)



<Note>
For device that has been terminated by connection, short-circuit the 2 (Ter.) terminal and 5 (-) terminal, and connect a 100Ω terminating resistor.

Mounting base (FWBA)



<Note>
For device that has been terminated by connection, short-circuit the 7 (Ter.) terminal and 8 (-) terminal, and connect a 100Ω terminating resistor.

<Note> Use a shielded twisted pair cable for the transmission line. Also, use the same cable, including inside the panel. Also, if there is a lot of inductive noise, ground only one of the most effective points.

5 Operation and settings

(1) Switch and display

Item		Specification		
Rotary code switch for address setting		Communication address setting, 2 digits (10 ¹ , 10 ⁰) Address setting range : 01 to 99 (10 digits or 1 digit, set individually) Factory setting is 00 (communication not used)		
DIP switch for communication settings	Bit rate setting	DIP switch setting	SET1	SET2
		4800 bps	OFF	ON
		9600 bps	OFF	OFF
		19200 bps	ON	OFF
	Parity bit (Stop bit)	38400 bps	ON	ON
		DIP switch setting	SET3	SET4
		Odd number (1 bit)	OFF	ON
	Even number (1 bit)	OFF	OFF	
	None (2 bit)	ON	OFF	
RUN LED	Always on	Normal operation, non-communication		
	Blinking at 1 second cycle (0.5 seconds on, 0.5 seconds off)	Time out, Communication error, CRC error		
	Blinking at 2 second cycle (1 second on, 1 second off)	Setting error (Change communication setting while applying power)		

6 Specifications

(1) Rating

Item		Specification	
Input (Input resistance)		DC1 to 5V (1M Ω)	
		DC4 to 20mA (100 Ω)	
Communication output		Modbus RTU (RS-485)	
Auxiliary supply	Auxiliary supply range	(1) AC80 to 264V (Rated voltage AC100/110V, AC200/220V) 50/60Hz DC80 to 264V (Rated voltage DC100/110V, DC200/220V) AC-DC dual-use	
		(2) DC19 to 57V (Rated voltage DC24V, DC48V)	
	Consumption VA Power consumption	(1) 2.0VA (AC100/110V) , 2.5VA (AC200/220V) , 2.0W(DC100/110V, DC200/220V)	
		(2) 2.0W (DC24V, DC48V)	
	Inrush current (Time constant)	(1) AC110V : 2.2A or less, AC220V : 4.4A or less (About 1ms) DC110V : 1.6A or less, DC220V : 3.1A or less (About 1ms)	
		(2) DC 24V : 2.7A or less, DC 48V : 5.4A or less (About 1ms)	
	Fuse	Rated current 280mA (At designation with fuse)	

(2) Performance

Item	Specification		
Conversion accuracy	$\pm 0.1\%$ (% of span)		
Influence of self-heating	$\pm 0.2\%$ (% of span)	The difference of the output value of immediately after operation (after 1 to 3 minutes) and after 30 to 35 minutes.	
Influence of temperature	$\pm 0.2\%$ (% of span)	The difference of the output value when changing $23\pm 10^{\circ}\text{C}$.	
Influence of auxiliary supply	$\pm 0.1\%$ (% of span)	The difference of the output value when making supply voltage into the upper limit and lower limit of the variation range, and the output value in rated voltage.	
Response time	1 second or less		
Measurement range and limiter	Input	Communication data	Limiter
	DC4 to 20mA	0H to 2710H	Upper limiter : 125% of span
	DC1 to 5V	(0 to 10000)	Lower limiter : -25% of span

(3) Communication specifications

Item	Specification	Factory setting
Output points	1	—
Communication system	RS-485 Half-double 2-wire system Synchronous system	—
Protocol	Modbus RTU mode (For details of the protocol, refer to the separate volume "Communication Specifications")	—
Bit rate	4800bps / 9600bps / 19200bps / 38400bps	9600bps
Transmission code	NRZ	—
Start bit	1 bit	—
Data bit	8 bit	—
Parity bit	None / Even number / Odd number	Even number
Stop bit	1 bit: Parity / 2 bits: Non parity	1 bit
Transmission code	Binary	—
Cable length	1000m (Max.)	—
Communication address	01 to 99, 00 (Communication unused)	00 (Communication unused)
Number of connection	Max. 32	—
Error detection	CRC-16 ($X^{16}+X^{15}+X^2+1$)	—
Termination resistor	By short-circuiting the (-) terminal and the (Ter.) terminal, a terminating resistance of 100Ω is connected inside.	—

(4) Electrical strength, Mechanical strength

Item	Specification	
Insulation resistance	Between electric circuit and case.	DC500V More than 50MΩ
	Between input and communication output and auxiliary supply.	
	Non-insulated between inputs	
Voltage test (Commercial frequency withstand voltage)	Between electric circuit and case.	AC2210V(50/60Hz) 5 srconds
	Between input and communication output and auxiliary supply.	AC2000V(50/60Hz) 1 minute
	Non-insulated between inputs	
Impulse voltage test	Between input and communication output and auxiliary supply.	5kV 1.2/50μs
Overload capacity	Input	2 times 10 seconds, 1.2 times continuation of rated input.
	Auxiliary supply	1.5 times 10 seconds, 1.2 times continuation of rated voltage. (AC100/110V, AC200/220V, DC24/48V, DC200/220V)
		1.5 times 10 seconds, 1.3 times continuation of rated voltage. (DC100/110V)
Vibration	IEC 60068-2-6:2007 Frequency range: 10 to 55Hz, Single amplitude: 0.15mm, Sweep cycle: 5 times Vibration direction: front and back, left and right, up and down.	
Impact	IEC 60068-2-27:2008 Peak acceleration: 300m/s ² 3 times in each of forward and reverse in the X, Y and Z directions.	

(5) Noise immunity

Item	Specification
Damped oscillatory wave immunity test IEC 61000-4-12	Peak voltage: 2.5kV, Frequency: 1MHz ±10%, Add 3 times for 30 seconds. There should be no error within ± 10%, and communication error and communication stoppage. · Auxiliary supply circuit (Normal/Common)
Square impulse immunity test JEA B-402	Add noise (1μs, 100ns width) repeatedly for 5 minutes. There should be no error within ±10%, and communication error and communication stoppage. · Auxiliary supply circuit (normal / Common) Over 1500V · Input circuit (Induction) Over 1000V · Communication output (Induction) Over 1000V
Radio wave immunity test	① Transceiver rated output 5W (150MHz, 400MHz). There should be no error within ±10%, and communication error and communication stoppage. ② No malfunction occurs when a mobile phone (800MHz, 1.8GHz) and wireless LAN (2.4GHz, 5GHz) are brought into contact with each other for intermittent irradiation. And, communication should communicate normally after a noise applying stop.

(6) EMC

Item	Specification			
Electrostatic discharge immunity test	Contact discharge ±4kV (Charge voltage) Air discharge ±8kV (Charge voltage)	Performance standard : B	After test : Within inherent error	EN61000-6-2:2005 EN61000-4-2:2009
Radiated, radio-frequency, electromagnetic field immunity test	Frequency : ① 80 to 1000MHz ② 1.4 to 2.0GHz ③ 2.0 to 2.7GHz Field strength : ① 10V/m ② 3V/m ③ 1V/m Amplitude modulation : 80%AM (1kHz)	Performance standard : A	During testing : within ±20% error After test : Output is within inherent error	EN61000-6-2:2005 EN61000-4-3:2006 +A2:2010
Electrical fast transient / burst immunity test	Power port (DC)	±2.0kV	Performance standard : B	After test : Within inherent error
	Power port (AC)	±2.0kV		
	Signal port	±1.0kV		
	Communication port	±1.0kV		
Surge immunity test	Power port (DC)	Line to earth ±0.5kV Line to line ±0.5kV	Performance standard : B	After test : Within inherent error
	Power port (AC)	Line to earth ±2.0kV Line to line ±1.0kV		
	Signal port	Line to earth ±1.0kV		
Immunity to conducted disturbances, induced by radio-frequency fields	Frequency : 0.15 to 80MHz Voltage level : 10V, 80%AM (1kHz)	Performance standard : A	During testing : within ±20% error After test : Output is within inherent error	EN61000-6-2:2005 EN61000-4-6:2014
Power frequency magnetic field immunity test	Frequency : 50/60Hz Field strength : 30A/m	Performance standard : A	During testing : within ±20% error After test : Output is within inherent error	EN61000-6-2:2005 EN61000-4-8:2010
Voltage dips, short interruptions and voltage variations immunity tests (AC power supply port)	Residual voltage : 0%, 1 cycle	Performance standard : B	After test : Within inherent error	EN61000-6-2:2005 EN61000-4-11:2004
	Residual voltage : 40%, 10/12 cycle	Performance standard : C	After test : Within inherent error	
	Residual voltage : 70%, 25/30 cycle			
	Residual voltage : 0%, 250/300 cycle			
Electromagnetic radiation disturbance	Frequency band 30 to 230MHz 3m distance : 50dB(μV/m) or less, 10m distance : 40dB(μV/m) or less Frequency band 230 to 1000MHz 3m distance : 57dB(μV/m) or less, 10m distance : 47dB(μV/m) or less			
Terminal noise	Power port (AC) Frequency band 0.15 to 0.5MHz, Quasi-peak : 79dB or less, Average : 66dB or less Frequency band 0.5 to 30MHz, Quasi-peak : 73dB or less, Average : 60dB or less			EN61000-6-4:2007 +A1:2011 EN55011:2009 +A1:2010 classA, Group1
	Communication port Frequency band 0.15 to 0.5MHz, Quasi-peak : 97dB to 87dB, Average : 84dB to 74dB Frequency band 0.5 to 30MHz, Quasi-peak : 84dB or less, Average : 74dB or less			
Performance standard A : During and after the test the equipment shall be able to continue operation as specified.				
Performance standard B : The equipment shall be able to continue operation as specified after the test. However, performance degradation during testing is allowed.				
Performance standard C : Temporary loss of function is allowed, but the function can be self-healing or can be recovered by operation of the control device.				

(7) Structural and environmental conditions

Item	Specification
External dimensions	29.5×96×125mm (W×H×D) Including socket / input connector
Mass	Main body : Approx. 130g , Socket : Approx. 50g
Material	FCTT : ABS(V-0) FW11 socket : Flame retardant PPO resin (V-1)
Color	Black (Munsell N1.5)
Input connector	Push-in connector
Socket terminal screw	M3×8 washer screw (FW11 socket)
Protection rating	IP30
Operating temperature and humidity limits	-10 to +55°C , 5 to 90% RH (Non condensing)
Storage temperature limits	-20 to +70°C

(8) Standard

Item	Specification
CE marking	Low Voltage Directive 2014/35/EU EN61010-1
	EMC Directive 2014/30/EU EN61000-6-2, EN61000-4-2, -3, -4, -5, -6, -8, -11 EN61000-6-4, EN55011 classA, Group1
	RoHS Directive 2011/65/EU EN50581
Safety	IEC 61010-1 : 2010 Measurement Category III, Maximum use voltage : 300V (line to neutral), Pollution degree 2
Communication	TIA-485-A (2003)

7 Troubleshooting

Trouble	Probable cause	Handling
RUN LED is not lights	Auxiliary supply is not applied. (Wiring mistake, Auxiliary supply is low voltage)	Please by applying an auxiliary supply.
	Failure of equipment	Replacement of equipment
RUN LED is blinking (2 second cycle : 1 second on, 1 second off)	Changed the communication settings while supplying auxiliary power. (Address, Bit rate, Parity / Stop bit)	Auxiliary power off, Apply auxiliary power again.
RUN LED is blinking (1 second cycle : 0.5 seconds on, 0.5 seconds off)	Time out, Communication error or CRC error occurs	<ul style="list-style-type: none"> • Please check the CRC • Please refer to the "communication error occurs"
Communication error occurs	Communication cable is disconnected or not properly connected. (Polarity etc.)	Please check the communication cable
	Communication settings are incorrect (Address, Bit rate, Parity / Stop bit)	Please check the communication setting

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Revision B, DATE : January 24, 2025