WH7DC isolated DC transducers

AF99-353

WH7DC

■ Description

The WH7DC isolated DC transducer is designed to convert a DC voltage or current values into a DC signal. Input and output circuits are electrically isolated from each other. These transducers are ideal for the amplifying and isolating minute signals that are output from a variety of sensors.

■ Features

- Power supply of 24V DC. I/O circuits isolated from the power supply.

■ Applications

- Signal exchange between electrically isolated systems
- Prevention of control signal sneak currents
- Remote transmission of output signals

■ Standards

UL recognized and CSA File No. E206961

■ Specifications

Type		WH7DC
Insulation method		Photocoupler
Accuracy		±0.1% (Pulse output: ±0.2%)
Temperature characteristics		±0.015% /˚C
Response time		0.5s max. (0 to 90%)
Insulation resistance		100MΩ or more (500V DC megger)
Dielectric strength		2000V AC, 1 min. between input-output-power supply and ground 1000V AC, 1 min. between output 1 and output 2
Auxiliary power supply		24V DC ±10%
Power consumption		Approx. 120mA at 24V DC
Ambient temperature and humidity		–5 to 55°C, 90% RH or less (no condensation)
Input signal (Input impedance)	Voltage	0 to 1V DC (1MΩ min.), 0 to 5V DC (1MΩ min.), 0 to 10V DC (1MΩ min.), 1 to 5V DC (1MΩ min.)
	Current	0 to 20mA DC (250Ω), 4 to 20mA DC (250Ω)
Output 1 (Load resistance)	Voltage	0 to 5V DC (1kΩ min.), 0 to 10V DC (2kΩ min.), 1 to 5V DC (1kΩ min.)
	Current	0 to 20mA DC (750Ω max.), 4 to 20mA DC (750Ω max.)
Output 2 (Load resistance)	Voltage	1 to 5V DC (1kΩ min.)
	Current	4 to 20mA DC (350Ω max.)
	Pulse output	Open collector signal: 0 to 0.01Hz min. and 1kHz max. with 100mA max. at 30V Shutdown frequency: 2% of full scale
Zero adjustment range: Approx. -5% to +5% Span adjustment range: Approx. 95% to 105%		• Only output 1 is adjustable with the WH7AJ adjuster.

■ Type number nomenclature

WH7DC - □ □ □ 3 1

Input signal
13: 0 to 5VDC
14: 0 to 10V DC
15: 1 to 5V DC
16: 4 to 20mA DC
22: 0 to 20mA DC

Output 1
A: 1 to 5V DC
B: 0 to 5V DC
C: 0 to 10V DC
H: 4 to 20mA DC
P: 0 to 20mA DC

Output 2
A : 1 to 5V DC
H : 4 to 20mA DC
W: Pulse
Y : None

Power supply
3: 24V DC ± 10%

■ Ordering information

Specify the following:
1. Type number

■ Dimensions and wiring diagrams

See page 09/49.

WH7TC thermocouple temperature transducers

WH7TC

■ Description

The WH7TC transducer converts a thermocouple input into a DC voltage or current signal output with reference point compensation of thermal-electromotive force. Input and output circuits are electrically isolated from each other.

■ Features

- Power supply of 24V DC. I/O circuits isolated from the power supply.
- Reference point compensation function, linearizer function, and upper limit burnout function

■ Applications

- Temperature input control of electric, gas, or heavy oil furnaces

■ Standards

UL recognized and CSA File No. E206961

■ Specifications

Type (Ordering code)		**WH7TC**
Insulation method		Photocoupler
Accuracy		±0.3% (±0.5% for low-range)
Temperature characteristics		±0.02%/˚C (±0.04% /˚C for low-range)
Response time		1s max. (0% to 90%)
Reference point compensation accuracy		±1˚C max.
Burnout time		10s max.
Permissible external resistance		10Ω max.
Input thermocouple (Input impedance)		J, K, E, T, B, R, S, N (1MΩ min.)
Output 1	Voltage	0 to 5V DC (1kΩ min.), 0 to 10V DC (2kΩ min.), 1 to 5V DC (1kΩ min.)
(Load resistance)	Current	0 to 20mA DC (750Ω max.), 4 to 20mA DC (750Ω max.)
Output 2	Voltage	1 to 5V DC (1kΩ min.)
(Load resistance)	Current	4 to 20mA DC (350Ω max.)
Zero adjustment range: Approx. -5% to +5%		Only output 1 is adjustable with the WH7AJ adjuster.
Insulation resistance		100MΩ or more (500V DC megger)
Dielectric strength		2000V AC, 1 min. between input-output-power supply and ground 1000V AC, 1 min. between output 1 and output 2
Auxiliary power supply		24V DC ±10%
Power consumption		Approx. 120mA at 24V DC
Ambient temperature and humidity		–5 to 55°C, 90% RH or less (no condensation)

■ Input thermocouple range

Thermocouple code	Available temperature	Min. measurable temperature range	Thermocouple code	Available temperature	Min. measurable temperature range	Thermocouple code	Available temperature	Min. measurable temperature range
J	-100 to 1000˚C	100˚C	T	-150 to 400˚C	100˚C	S	0 to 1760˚C	500˚C
K	-100 to 1200˚C	100˚C	B	0 to 1820˚C	900˚C	N	-100 to 1200˚C	150˚C
E	0 to 700˚C	100˚C	R	0 to 1760˚C	500˚C			

■ Type number nomenclature

WH7TC - □ □ □ □ 3 1

Input thermocouple
J, K, E, T, B, R, S, N
(see table left)

Measurement temperature range

	J	K	E	T	B	R	S	N
08: 0 to 100˚C	●	●	●	●				
09: 0 to 150˚C	●	●	●	●				●
10: 0 to 200˚C	○	●	○	●				●
11: 0 to 250˚C	○	○	○	○				○
12: 0 to 300˚C	○	○	○	○				○
13: 0 to 350˚C	○	○	○					○
14: 0 to 400˚C	○	○	○					○
15: 0 to 500˚C	○	○	○					○
16: 0 to 600˚C	○	○	○					○
17: 0 to 800˚C		○						○
18: 0 to 1000˚C		○			○	○	○	○
19: 0 to 1200˚C		○			○	○	○	○
20: 0 to 1400˚C					○	○	○	
21: 0 to 1800˚C					○			

Power supply
3: 24V DC ± 10%

Output 2
A: 1 to 5V DC
H: 4 to 20mA DC
Y: None

Output 1
A: 1 to 5V DC
B: 0 to 5V DC
C: 0 to 10V DC
H: 4 to 20mA DC
P: 0 to 20mA DC

Note: • Black circles ● indicate low-range types.
• White circles ○ indicate standard-range types that can be manufactured (the guaranteed accuracy ranges of thermocouples R and B are over 400˚C and 800˚C respectively).
• Compensation wires are used to compensate the difference in temperature between thermocouples and transducer terminals. Types of compensation wires are classified by color. Select the right one according to the thermocouple at site.
• Each transducer is shipped in combination with an RJC temperature resistance thermometer block. Use them in pairs.
• A transducer with a lower limit burnout function is available on request.
• When the lower limit burnout function is triggered, the output of the transducer will scale out for a moment, then it will be set to the minimum value.

■ Ordering information

Specify the following:
1. Type number

■ Dimensions and wiring diagrams

See page 09/49.

WH7PT resistance transducers

WH7PT

■ Descriptions
The WH7PT transducer converts resistance changes in a temperature resistance thermometer into a DC voltage or current signal. Input and output circuits are electrically isolated.

■ Features
- Power supply of 24V DC. I/O circuits isolated from the power supply.
- Linearizer function and upper limit burnout function

■ Applications
- Temperature input control from electric, gas, or heavy oil furnaces.
- Temperature input control of cold-storage warehouse.

■ Standards
UL recognized and CSA File No. E206961

■ Specifications

Type (Ordering code)		**WH7PT**
Insulation method		Photocoupler
Accuracy		±0.2% (±0.4% for low-range, span 100˚C max.)
Temperature characteristics		±0.02% /˚C (±0.04% low-range)
Response time		1s max. (0% to 90%)
Burnout time		10s max.
Permissible external resistance		20Ω max. per wire (Use three wires with the same resistance.)
Input resistance thermometer		Pt100Ω
Output 1	Voltage	0 to 5V DC (1kΩ min.), 0 to 10V DC (2kΩ min.), 1 to 5V DC (1kΩ min.)
(Load resistance)	Current	0 to 20mA DC (750Ω max.), 4 to 20mA DC (750Ω max.)
Output 2	Voltage	1 to 5V DC (1kΩ min.)
(Load resistance)	Current	4 to 20mA DC (350Ω max.)
Zero adjustment range: Approx. -5% to +5%		Only output 1 is adjustable with the WH7AJ adjuster.
Insulation resistance		100MΩ or more (500V DC megger)
Dielectric strength		2000V AC, 1 min. between input-output-power supply and ground 1000V AC, 1 min. between output 1 and output 2
Auxiliary power supply		24V DC ±10%
Power consumption		Approx. 120mA at 24V DC
Ambient temperature and humidity		–5 to 55°C, 90% RH or less (no condensation)

■ Type number nomenclature

WH7PT - 2 □ □ □ 3 1

Input temperature resistance thermometer
2: Pt100Ω

Measurement temperature range
10: 0 to 50˚C/For low-range
11: 0 to 100˚C/For low-range
12: 0 to 150˚C
13: 0 to 200˚C
14: 0 to 250˚C
15: 0 to 300˚C
16: 0 to 350˚C
17: 0 to 400˚C
18: 0 to 500˚C
19: 0 to 600˚C
20: -20 to +80˚C/For low-range
21: -40 to +60˚C/For low-range
22: -50 to +50˚C/For low-range
23: -50 to +100˚C
24: -50 to +150˚C
25: -100 to +100˚C

Power supply
3: 24V DC ± 10%

Output 2
A: 1 to 5V DC
H: 4 to 20mA DC
Y: None

Output 1
A: 1 to 5V DC
B: 0 to 5V DC
C: 0 to 10V DC
H: 4 to 20mA DC
P: 0 to 20mA DC

Note: When the lower limit burnout function is triggered, the output of the transducer will scale out for a moment, then it will be set to the minimum value.

■ Ordering information

Specify the following:
1. Type number

■ Dimensions and wiring diagrams

See page 09/49.

WH7PM potentiometer transducers

WH7PM AF99-356

■ Description
The WH7PM transducer converts resistance changes in potentiometers into a DC voltage or current signal.

■ Features
- Power supply of 24V DC
  I/O circuits isolated from the power supply

■ Applications
- Float water gages
- Solenoid valve, gate, and damper valve opening meters
- Plunger pump and jack stroke detectors

■ Standards
UL recognized and CSA File No. E206961

■ Specifications

Type		WH7PM
Insulation method		Photocoupler
Accuracy		±0.1%
Temperature characteristics		±0.015% /˚C
Response time		0.5s max. (0% to 90%)
Input signal		Entire resistance range of potentiometer 100Ω to 10kΩ
Input span		50% min. of entire resistance range of potentiometer
Output 1	Voltage	0 to 5V DC (1kΩ min.), 0 to 10V DC (2kΩ min.), 1 to 5V DC (1kΩ min.)
(Load resistance)	Current	0 to 20mA DC (750Ω max.), 4 to 20mA DC (750Ω max.)
Output 2	Voltage	1 to 5V DC (1kΩ min.)
(Load resistance)	Current	4 to 20mA DC (350Ω max.)
Zero adjustment range: Approx. -5% to +5%		Only output 1 is adjustable with the WH7AJ adjuster.
Insulation resistance		100MΩ or more (500V DC megger)
Dielectric strength		2000V AC, 1 min. between input-output-power supply and ground 1000V AC, 1 min. between output 1 and output 2
Auxiliary power supply		24V DC ±10%
Power consumption		Approx. 120mA at 24V DC
Ambient temperature and humidity		–5 to 55°C, 90% RH or less (no condensation)

■ Type number nomenclature

WH7PM - 0 1 □ □ 3 1

Input signal
01: 0Ω to 100Ω min.
0Ω to 10kΩ max.

Output 1
A: 1 to 5V DC
B: 0 to 5V DC
C: 0 to 10V DC
H: 4 to 20mA DC
P: 0 to 20mA DC

Power supply
3: 24V DC ± 10%

Output 2
A: 1 to 5V DC
H: 4 to 20mA DC
Y: None

■ Ordering information
Specify the following:
1. Type number
2. Input signal range (Potentiometer resistance range)

■ Dimensions and wiring diagrams
See page 09/49.

WH7RV reverse transducers

■ Description
The WH7RV reverse transducer inversely converts an input signal into an output signal. Input and output circuits are electrically isolated from power supply.

■ Features
- Power supply of 24V DC.
  I/O circuits isolated from the power supply.

■ Applications
- Reversing control operation from input
- Fail-safe circuits and output subtraction circuits

■ Standards
UL recognized and CSA File No. E206961

■ Specifications

Type		WH7RV
Insulation method		Photocoupler
Accuracy		±0.1%
Temperature characteristics		±0.015%/˚C
Response time		0.5s max. (0% to 90%)
Input signal	Voltage	0 to 5V DC (1MΩ min.), 0 to 10V DC (1MΩ min.), 1 to 5V DC (1MΩ min.)
(Input impedance)	Current	0 to 20mA DC (250Ω), 4 to 20mA DC (250Ω)
Output 1	Voltage	5 to 0V DC (1kΩ min.), 10 to 0V DC (2kΩ min.), 5 to 1V DC (1kΩ min.)
(Load resistance)	Current	20 to 0mA DC (750Ω max.), 20 to 4mA DC (750Ω max.)
Output 2	Voltage	5 to 1V DC (1kΩ min.)
(Load resistance)	Current	20 to 4mA DC (350Ω max.)
Zero adjustment range: Approx. -5% to +5%		Only output 1 is adjustable with the WH7AJ adjuster.
Insulation resistance		100MΩ or more (500V DC megger)
Dielectric strength		2000V AC, 1 min. between input-output-power supply and ground 1000V AC, 1 min. between output 1 and output 2
Auxiliary power supply		24V DC ±10%
Power consumption		Approx. 120mA at 24V DC
Ambient temperature and humidity		–5 to 55°C, 90% RH or less (no condensation)

■ Type number nomenclature

WH7RV - □ □ □ 3 1

Input signal
13: 0 to 5VDC
14: 0 to 10V DC
15: 1 to 5V DC
16: 4 to 20mA DC
22: 0 to 20mA DC

Output 1
A: 5 to 1V DC
B: 5 to 0V DC
C: 10 to 0V DC
H: 20 to 4mA DC
P: 20 to 0mA DC

Power supply
3: 24V DC ± 10%

Output 2
A: 5 to 1V DC
H: 20 to 4mA DC
Y: None

■ Ordering information
Specify the following:
1. Type number

■ Dimensions and wiring diagrams
See page 09/49.

WH7SP slow pulse transducers

■ Description

The WH7SP slow pulse transducers are designed to convert ON-OFF pulse and voltage pulse signals into a DC voltage or current signal, isolating input and output circuits.

■ Features

- Power supply of 24V DC, with dielectric strength 2000V AC for 1min and 4 ports isolated. (1000V AC for 1 min between output 1 and output 2)

■ Applications

- Flow rate control combined with various types of flow meters
- Monitoring automated machines and wind force combined with rotary encoder
- Speed control of rotating machines combined with pulse transmitter and controller

WH7SP AF99-355

■ Standards

- UL recognized and CSA File No. E206961 (24V DC power supply models only)

■ Specifications

Type			**WH7SP**
Insulation method			Photocoupler
Accuracy			±0.1%
Temperature characteristics			±0.015%/˚C
Response time			0.5s + twice of input cycle (0% to 90%)
Shut down frequency			Approx. 5% of input frequency
Input signal	ON/OFF pulse	Relay	0.01 to 50Hz (pulse width: 10ms or more)
		Open collector (NPN)	0.01 to 10kHz (12V at OFF, approx. 3mA at ON)
	DC voltage pulse		0.01 to 10kHz (Duty ratio 20-80% with pulse width 50μs or more, $2V^{P-P}$ to $50V^{P-P}$)
			AC voltage 50 to 10kHz ($2V^{P-P}$ to $50V^{P-P}$)
Output 1 (Load resistance)	Voltage		0 to 5V DC (1kΩ min.), 0 to 10V DC (2kΩ min.), 1 to 5V DC (1kΩ min.)
	Current		0 to 20mA DC (750MΩ max.)
			4 to 20mA DC (750MΩ max.)
Output 2 (Load resistance)	Voltage		1 to 5V DC (1kΩ min.)
	Current		4 to 20mA DC (350MΩ max.)
Zero adjustment range: Approx. -5% to +5%			Only the output 1 is adjustable with the WH7AJ adjuster.
Insulation resistance			100MΩ or more (500V DC megger)
Dielectric strength			2000V AC, 1 min. between input-output-power supply and ground
			1000V AC, 1 min. between output 1 and output 2
Auxiliary power supply			24V DC ±10%
Power consumption			Approx. 120mA at 24V DC
Ambient temperature and humidity			–5 to 55°C, 90% RH or less (no condensation)

■ Type number nomenclature

WH7SP - □ □ □ □1

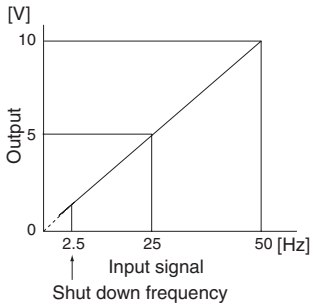
Input signal
10: Relay (Specify 0.01-50Hz)
20: Open collector (Specify 0.01-10kHz)
30: DC voltage pulse (Specify 0.01-10kHz)
40: AC voltage (Specify 50-10kHz)

Output 1
A: 1-5V DC
B: 0-5V DC
C: 0-10V DC
H: 4-20mA DC
P: 0-20mA DC

Power supply
3: 24V DC ±10%

Output 2
A: 1-5V DC
H: 4-20mA DC
Y: None

• Shut down frequency
When the input frequency becomes too low against the full scale. the output ripple cannot be removed. Hence, when the input frequency becomes 5% lower than the full scale, the output is forcibly zero.



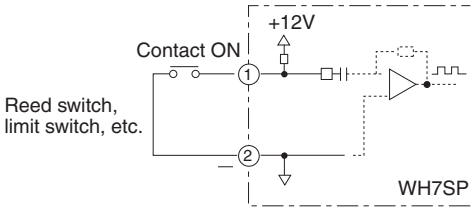
■ Ordering information

Specify the following:
1. Type number
2. Input frequency

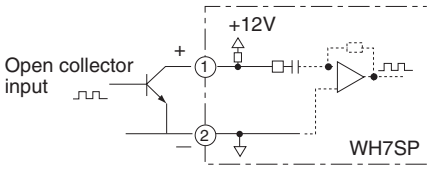
■ Input circuit diagram

● ON-OFF pulse input circuit

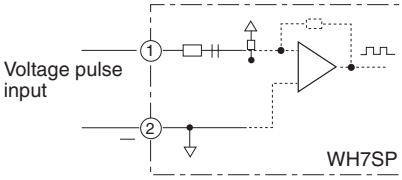
Relay input pulse

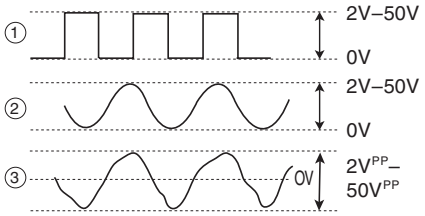


Open collector pulse



● Voltage pulse input circuit





P-P: peak to peak

■ Dimensions and wiring diagrams

See page 09/49.

09

WH7DY isolation type transducers

■ Description

The WH7DY transducers (isolation type distributor) are designed to use by combining 2-wire type transmitter. The WH7DY supplies DC power to the transmitters on site through signal line and converts 4 to 20mA DC signal generated by the transmitters into input signals suitable for monitoring and control equipment, isolating input and output circuits from each other. Pulse output signal can be output as the output 2.

■ Features

- Power supply of 24V DC, with dielectric strength 2000V AC for 1min and 4-port isolated. (1000V AC 1 min, between output 1 and output 2)
- Short-circuit protection

■ Standards

- UL recognized and CSA File No. E206961 (24V DC power supply models only)

■ Specifications

Type		**WH7DY**
Power supply fro transmitter	Voltage	24 to 28V DC at no load
	Current	Max. 22mA DC (short-circuit current: approx. 30mA)
	Ripple	$0.1V^{P-P}$ or less
	Allowable short-circuit time	No limitation
	Tolerance against load fluctuation	2% or less at 0 to 100% load
Insulation method		Photocoupler
Accuracy		±0.1%
Temperature characteristic		±0.02%/˚C
Response time		0.5s or less (0% to 90%)
Input signal (input impedance)		4 to 20mA DC (250Ω)
Input signal (with square root operation)		$Y = \sqrt{\frac{X = (\text{Input 0\% value})}{\text{Input span}}} \times \text{Output span} + (\text{Output 0\% value})$ Where: X = Input value, Y = Output value E.g. If input = 4-20mA, output range = 4-20mA; $\text{Output } Y = \sqrt{\frac{20-4}{16}} \times 16 + 4 = 20\text{mA}$
Output 1 (Load resistance)	Voltage	0 to 5V DC (1kΩ min.), 0 to 10V DC (2kΩ min.), 1 to 5V DC (1kΩ min.)
	Current	0 to 20mA DC (500MΩ max.), 4 to 20mA DC (500MΩ max.)
Output 2 (Load resistance)	Voltage	1 to 5V DC (1kΩ min.)
	Current	4 to 20mA DC (350MΩ max.)
Zero adjustment range: Approx. -5% to +5%		Only the output 1 is adjustable with the WH7AJ adjuster.
Insulation resistance		100MΩ or more (500V DC megger)
Dielectric strength		2000V AC, 1 min. between input-output-power supply and ground 1000V AC, 1 min. between output 1 and output 2
Auxiliary power supply		24V DC ±10%
Power consumption		Approx. 120mA at 24V DC
Ambient temperature and humidity		–5 to 55°C, 90% RH or less (no condensation)

Note: *1 The addressing of RS-485 can be set by the WH7PD PC loader.
• When ordering, specify the output frequency. The frequency can also be changed by the WH7PD PC loader.

■ Type number nomenclature

WH7DY - □ □ □ □1

Power supply for transmitter
01: 24-28V DC
02: 24-28V DC with square root operation

Output 1
A: 1-5V DC
B: 0-5V DC
C: 0-10V DC
H: 4-20mA DC
P: 0-20mA DC

Power supply
3: 24V DC ±10%

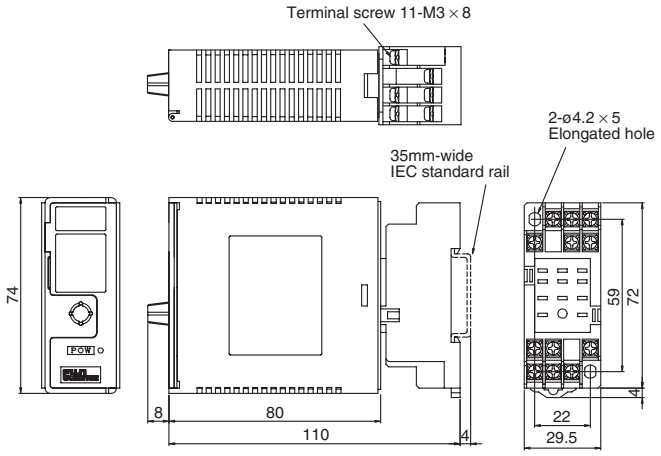
Output 2
A: 1-5V DC
H: 4-20mA DC
W: Pulse
Y: None

■ Ordering information

Specify the following:
1. Type number

■ Dimensions, mm

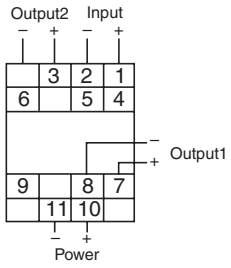
WH7DC, WH7PT, WH7PM, WH7RV, WH7SP, WH7DY



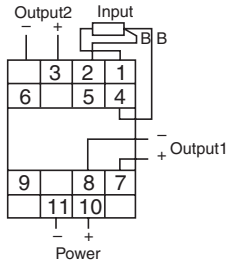
Mass: 150g

■ Wiring diagrams

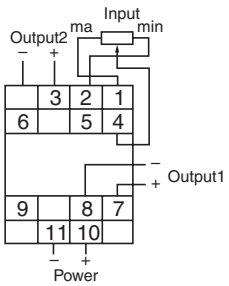
WH7DC, WH7RV, WH7DY



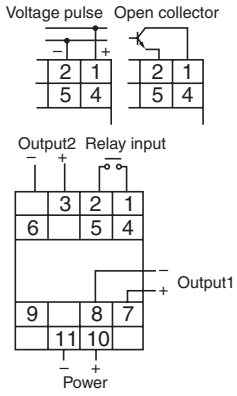
WH7PT



WH7PM

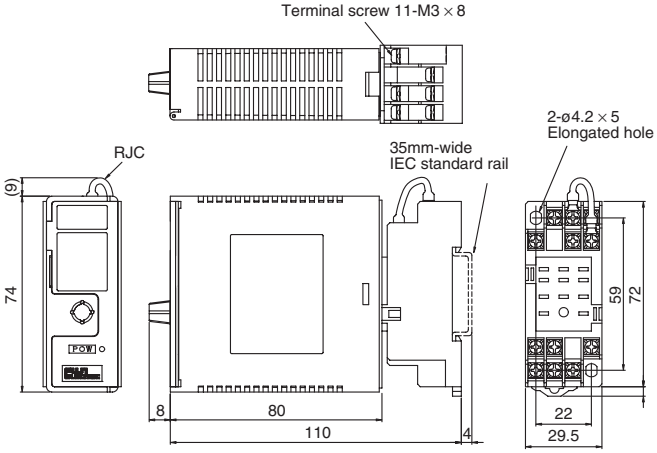


WH7SP



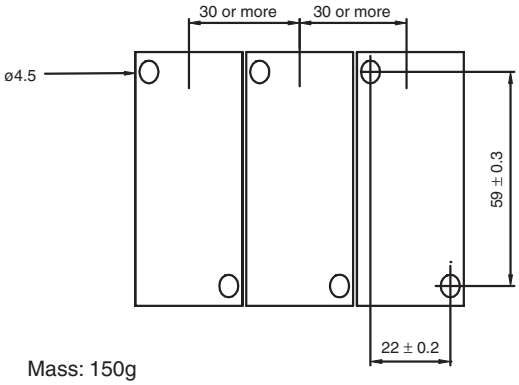
09

■ Dimensions, mm
WH7TC



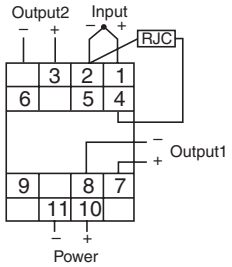
Mass: 150g

Panel drilling



Mass: 150g

■ Wiring diagrams
WH7TC



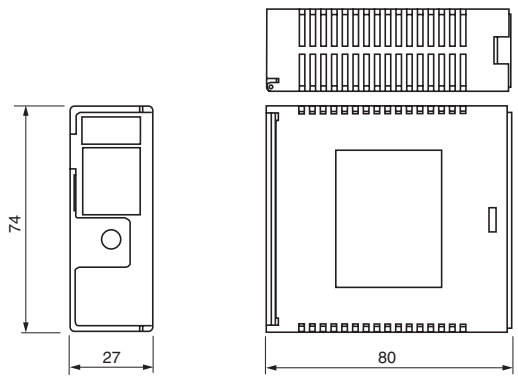
Optional accessories

Simplified adjuster WH7AJ, cable WH7CB

■ Description
- The adjuster WH7AJ is connected to a WH7 series transducer to do zero point adjustment or span adjustment.
- Use a dedicated cable WH7CB (separately sold) to connect the adjuster WH7AJ to a WH7 series transducer.

■ Ordering information
Specify the following:
1. Type number

■ Dimensions, mm
● Simplified adjuster WH7AJ



● Cable WH7CB