# watanabe

Applications of Signal converters

Signal converters are used to isolate and convert sensor signal suitable for the connected device (Computer/PLC/DCS etc.), which are used in wide variety of plants and factories. Typical applications are as below.

## 1) Isolator : Prevents current ground loops

Current ground loop may occur when the 2 devices are wired in series, and also negative sides of both 2 devices are grounding. This makes incorrect signal flow to either of devices.
In this case, you can prevent current ground loop by signal isolation between the sensor and the device by using isolator.

Sensor

Current ground loop

Earth

Sensor

Isolator

WSPF-DS
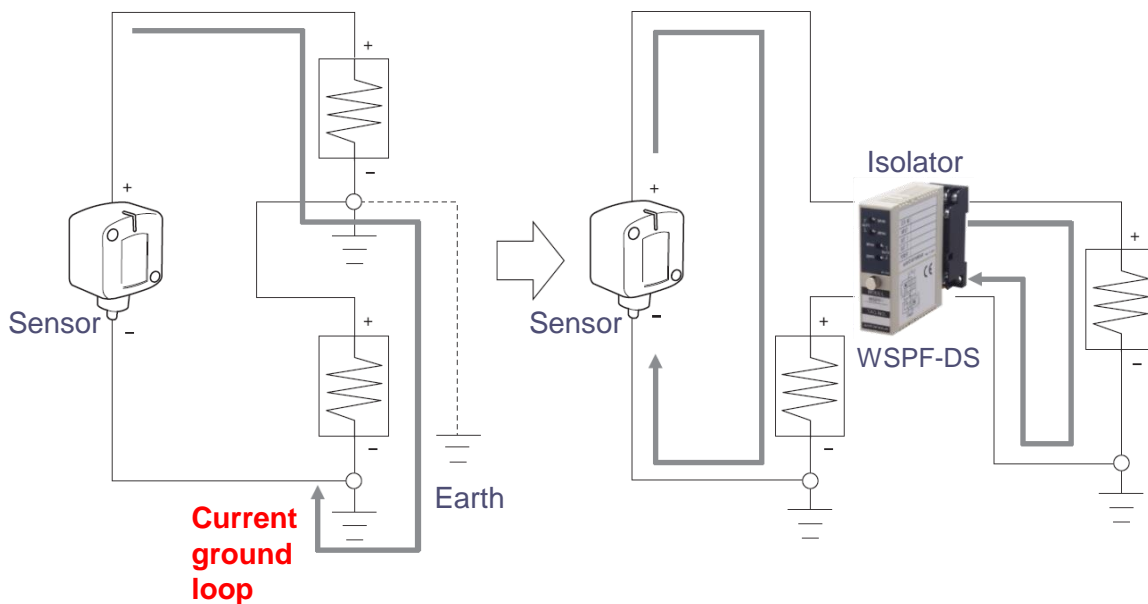
2) Isolator : Protection from external noise

When the sensor is not isolated and caused the failure, it may affects the connected devices such as Meter/PLC etc. It will make a big problem such as the factory line stop and lowering quality caused by the failure or malfunction.
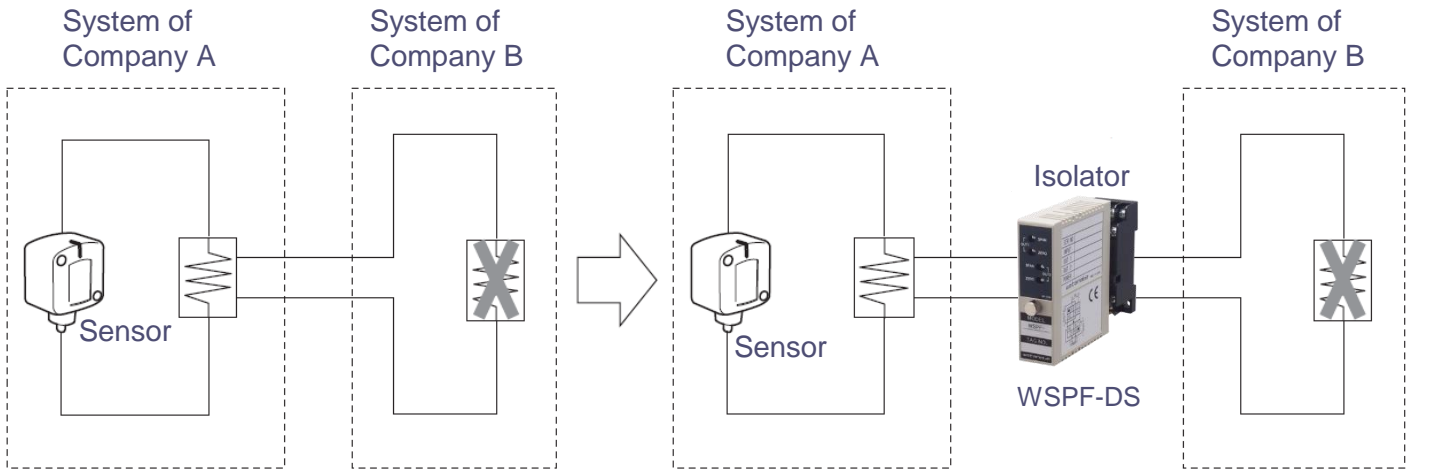To prevent the above problems, it is important to isolate using Isolator between the sensor and devices.

Sensor

Device Failure

Sensor

Isolator

WSPF-DS

Device Protection
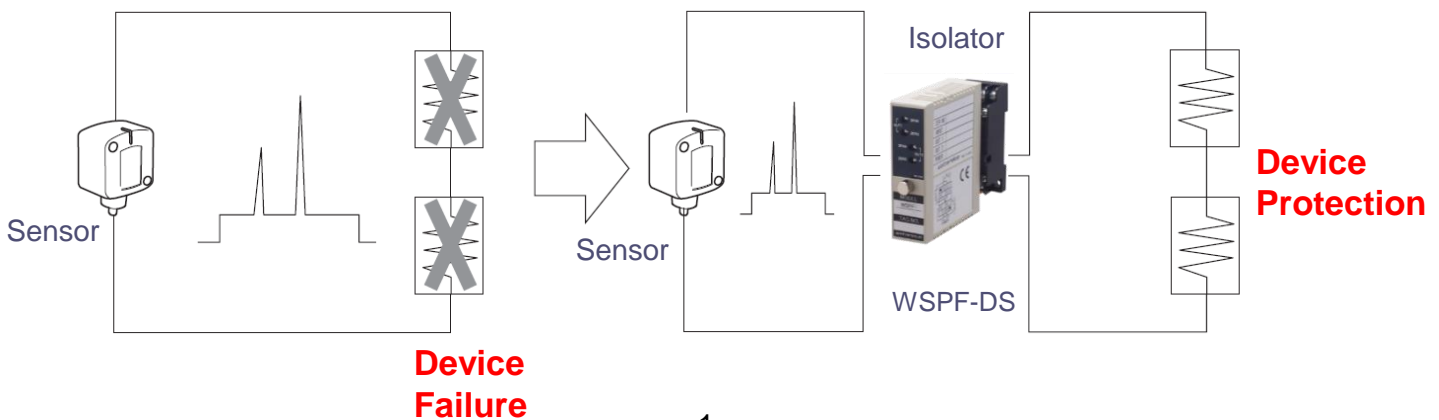
3) Isolator : Clarify the boundary of responsibility

Currently there are various sensors and devices, and those manufacturers are common to be several companies.
Isolator clarifies the boundary of responsibility by isolation between each devices
(between the companies) when the failure occurs. This makes easier to solve the problem.

System of Company A   System of Company B   System of Company A   System of Company B
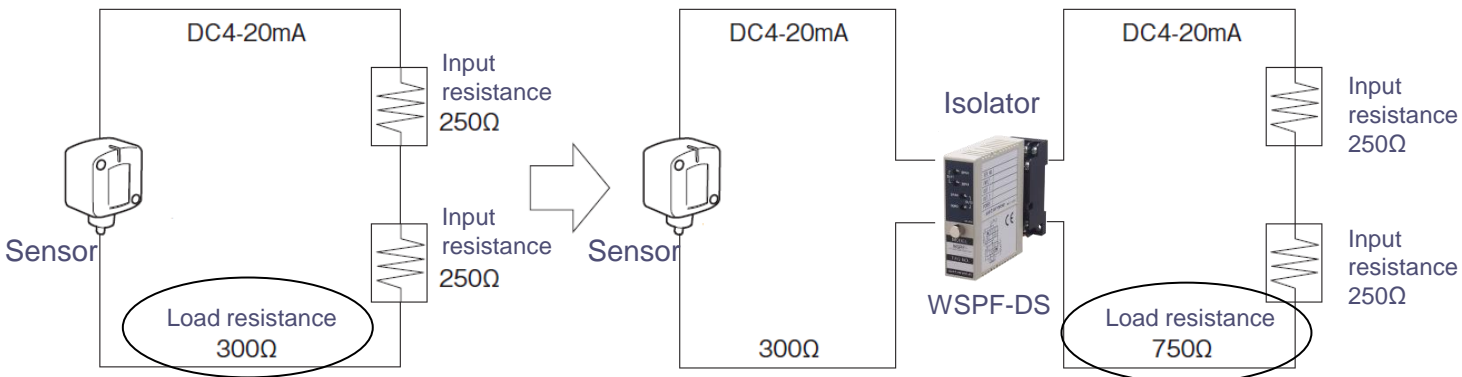

Isolator

WSPF-DS

What was the cause?
Caused by Abnormal signals from system A?

System A & B are isolated by isolator,
system failure in System B side is problem of System B.

4) Isolator : Signal boosting to increase load resistance

If the load resistance of sensor output (4 to 20mAdc) is small, connecting an isolator between the sensor and the device can be used to increase the load resistance to the value of isolator output.
This makes it possible to connect the output signals from the sensors to several devices.

DC4-20mA

Input resistance 250Ω

Input resistance 250Ω

Sensor

Load resistance 300Ω

DC4-20mA

Isolator

Sensor

300Ω

WSPF-DS

DC4-20mA

Input resistance 250Ω

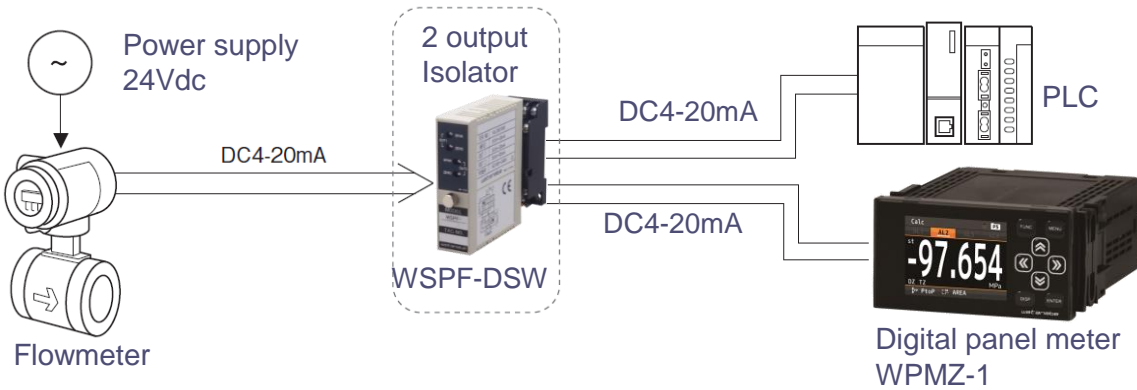Input resistance 250Ω

Load resistance 750Ω

Correct current does not flow when load resistance of sensor output is not enough.

When signal is isolated by Isolator,
load resistance will be increased to isolators value.
It will be able to connect 2 devices without problems.

5) Signal conversion to 2 different output signal

2 output Isolator WSPF-DSW provides 2 outputs from 1 input from sensor.
You can select each output range for 2 different devices.

Power supply 24Vdc

2 output Isolator

DC4-20mA

PLC

DC4-20mA

WSPF-DSW

Flowmeter

DC4-20mA

Digital panel meter WPMZ-1

6) Current loop supply to transmitter

Distributor (Current loop supply) is a signal converter which uses with 2-wire transmitter, and supplies power to the connected transmitter
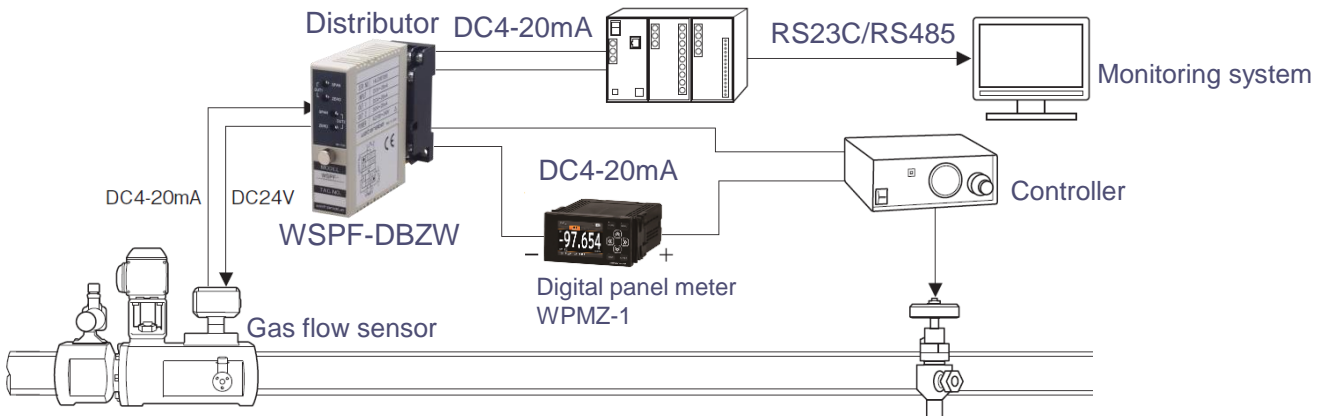Distributor provides power supply (24Vdc) of 2-wire transmitter and receive 4-20mAdc signal from the line. Then isolates and converts 4-20mAdc signal and output to other device.

When flowmeter is outside and difficult to supply power, you can reduce man-hour by using distributor which can provide power with transmission line.

Distributor

DC4-20mA

PLC

DC4-20mA

DC24V

DC4-20mA

WSPF-DBZW

Flowmeter

Digital panel meter WPMZ-1
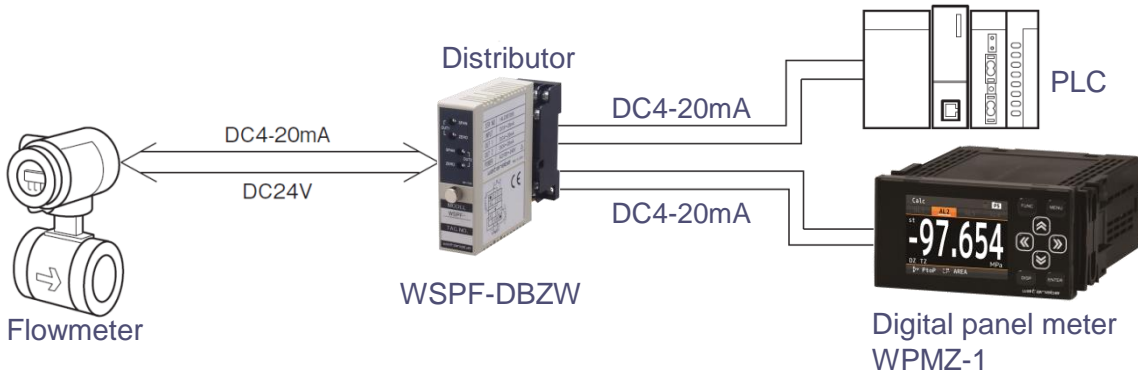
(2 output distributor)
2 output distributor (WSPF-DBZW) is possible to split the sensor signal into two.

Distributor DC4-20mA

RS23C/RS485

Monitoring system

DC4-20mA

Controller

DC4-20mA DC24V

WSPF-DBZW

Digital panel meter WPMZ-1

Gas flow sensor

7) Pulse isolator : Distribution of the pulse

2 output pulse isolator can divide the pulse into 2 devices.
But, in case of the line driver signal, it is possible to transmit a signal to a multiple devices by connecting in a multi-drop(daisy-chain).

Pulse isolator
(2 output)

Open collector → PLC

Pulse output sensor
(Open collector)

I/O module

WSP-FZP

Line driver → PLC

Pulse output sensor
(Line driver)

I/O module
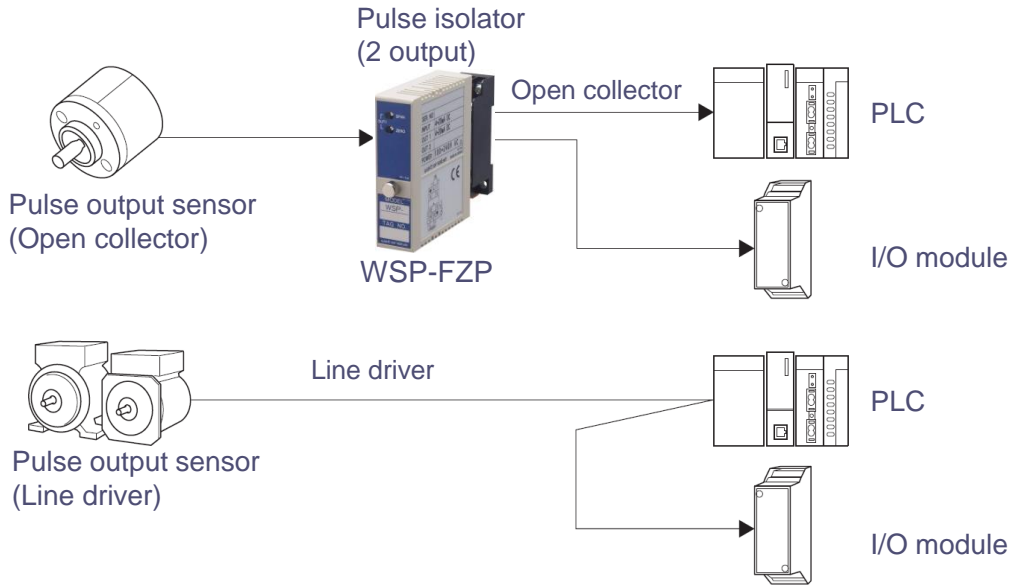
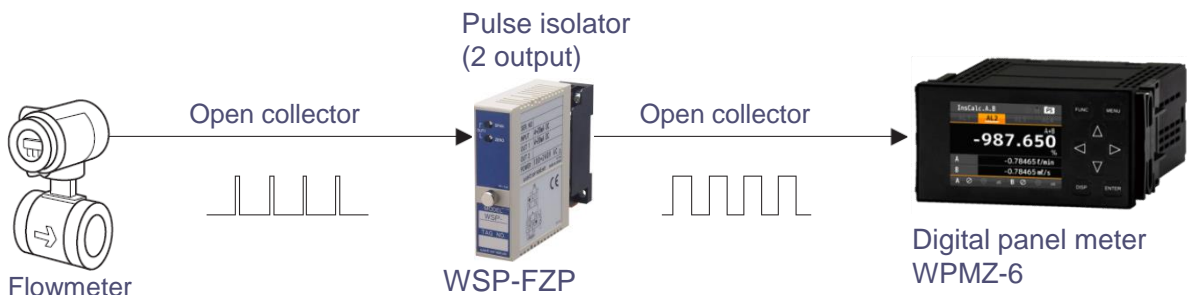# 8) Pulse isolator : Conversion of the pulse signal

Pulse isolator is used to convert and distribute the pulse signal.
If the input and output specifications of the connected device is different, you can convert the signal to the specifications to suit the connected device by the pulse isolator.
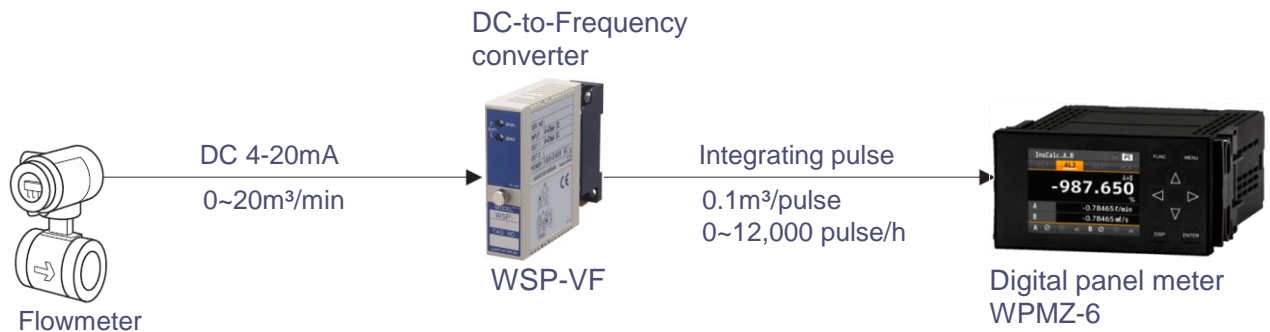
Pulse isolator
(2 output)

Open collector   Voltage pulse

Flowmeter

WSP-FZP

Digital panel meter
WPMZ-6
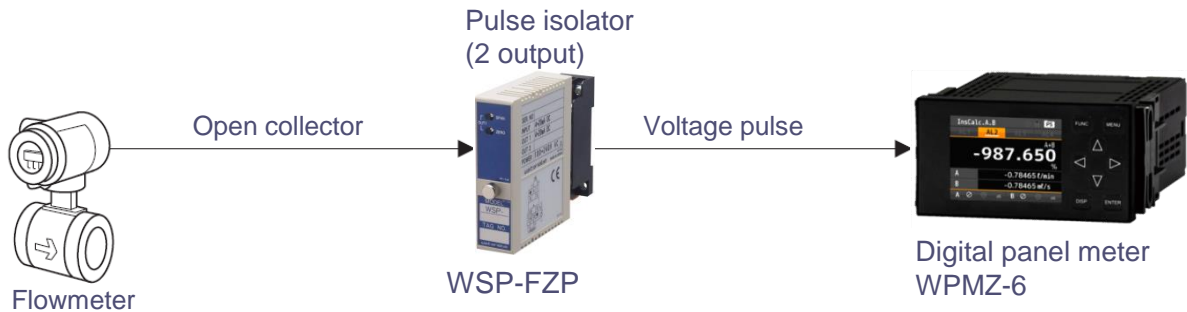
9) Pulse isolator : Conversion of the pulse width

There is a case that can not detect pulse depending on the ON width, although the pulse type is correct. In this case, pulse isolator can widen the ON width of pulse signal to detect correctly.

Pulse isolator
(2 output)

Open collector   Open collector

Flowmeter

**WSP-FZP**

Digital panel meter
WPMZ-6

4

10) DC to Pulse converter : Flow rate integration by using analog output flowmeter

DC to pulse converter converts analog signal to pulse signal for flow rate management.

DC-to-Frequency converter

DC 4-20mA
0~20m³/min

Integrating pulse
0.1m³/pulse
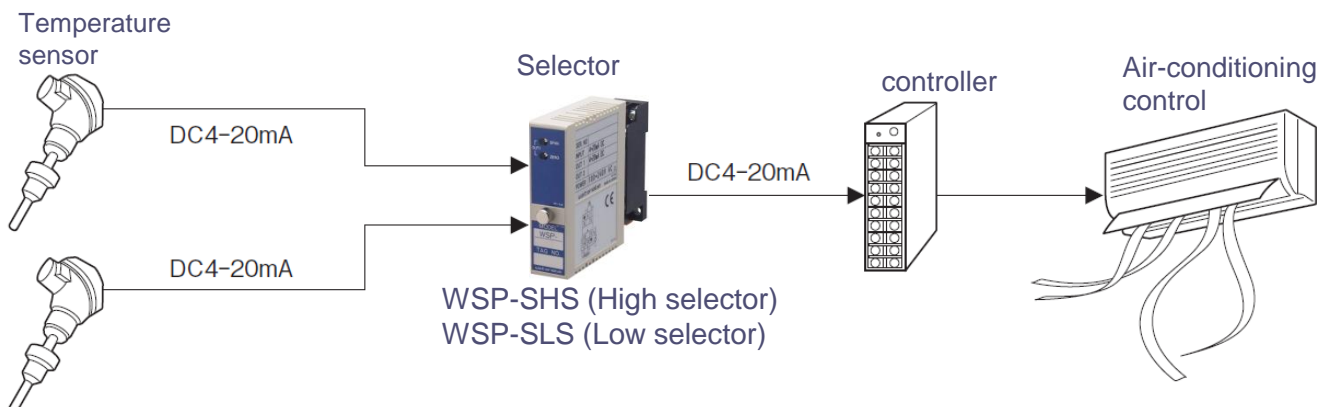0~12,000 pulse/h

WSP-VF

Flowmeter

Digital panel meter
WPMZ-6

11) Subtractor

Subtractor is used to display difference of water level by inputting two water levels in the tank.
By using the digital panel meter which ha the alarm output, you can set to output alarm when the water level difference exceeds.

Subtractor

Displays difference of water level

WSP-SBS

Digital panel meter
WPMZ-1

Tank A   Tank B
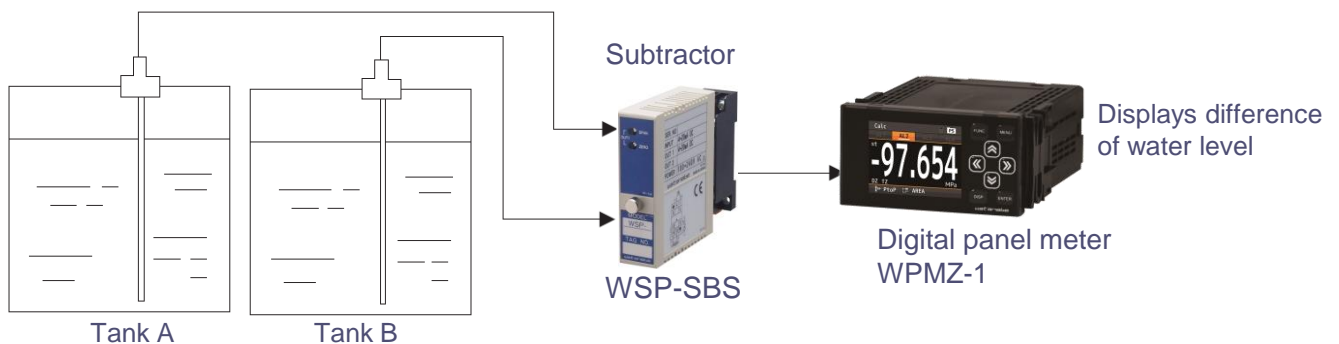
12) Selector

When you control the floor temperature of the buildings, you can send the higher or lower temperature data of the 2 points to the temperature controller.

Temperature sensor

Selector

controller

Air-conditioning control

DC4-20mA

DC4-20mA

DC4-20mA

WSP-SHS (High selector)
WSP-SLS (Low selector)

13) Load cell converter

The load cell is the sensor to measure the weight.
When using more than one load cell sensors like track scale, signal will go through the addition junction box, and then input to the load cell converter
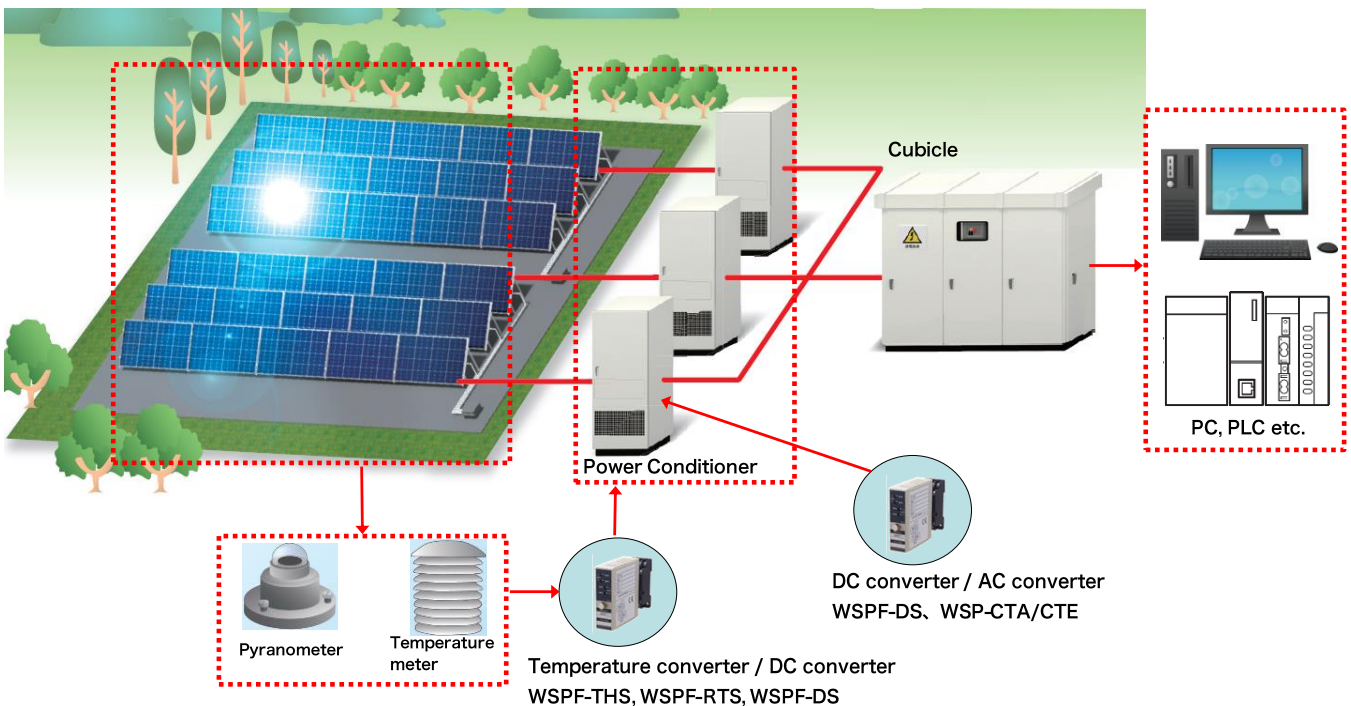
Since the signal from the load cell sensor is very small, you need signal conversion if connected device don't have special input specification.

Load cell converter

Analog signal

WVP-LCS

Digital panel meter
WPMZ-1

Addition junction box
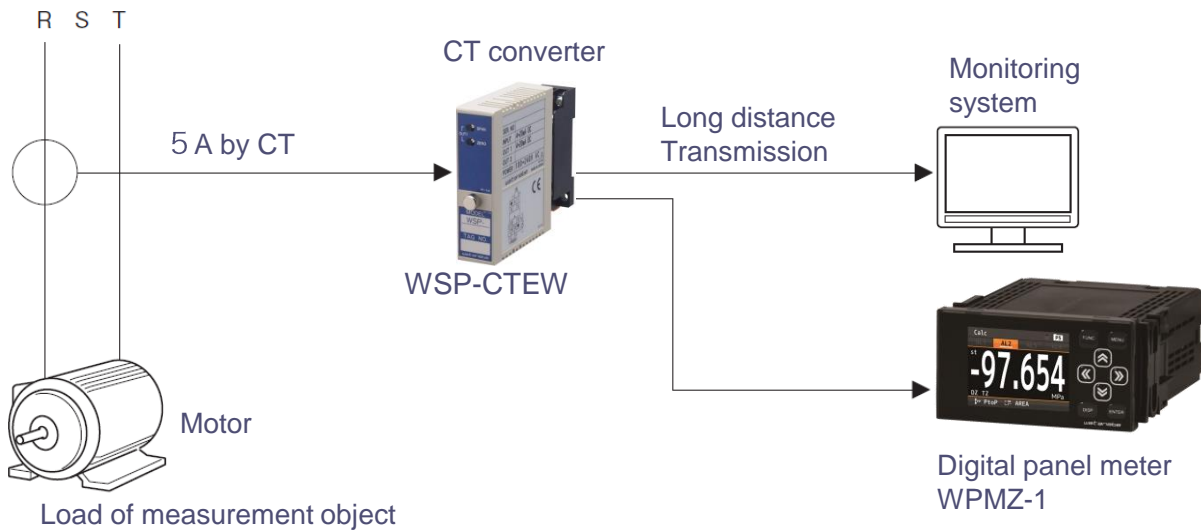
Load cell
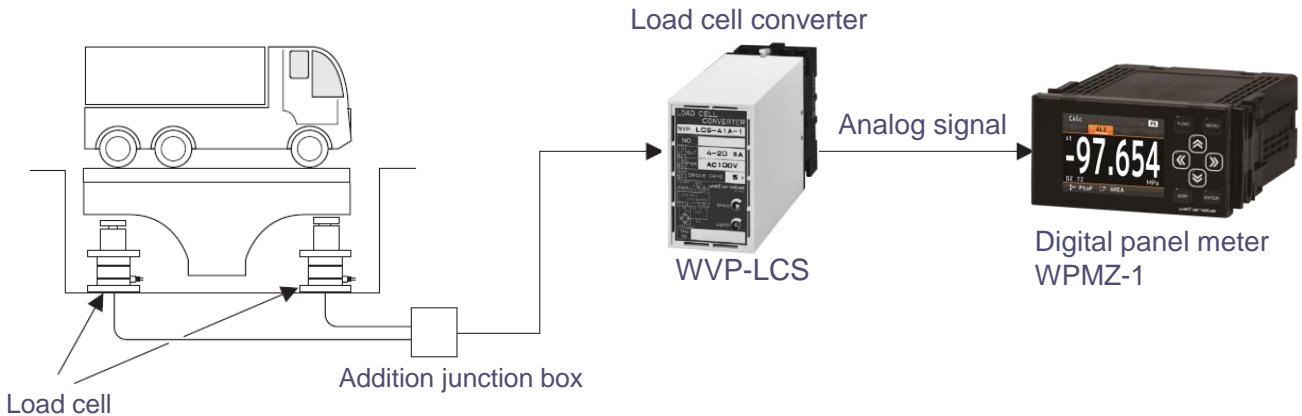
14) Converter in the Solar power system

In the solar power system, converters are used in the following applications.
1) Temperature converters and DC converters are used to convert signal from the pyranometer / temperature meter, then output to the power conditioner.
2) DC converters and AC converters are used inside the power conditioners to converts signal from the solar panels.

Cubicle

PC, PLC etc.

Power Conditioner

DC converter / AC converter
WSPF-DS、WSP-CTA/CTE

Pyranometer

Temperature meter

Temperature converter / DC converter
WSPF-THS, WSPF-RTS, WSPF-DS

15) CT converter : Current load measurement in the rolling process of steel works

CT converters are used in current monitoring of the rolling process.
CT converter measures a load of the motor etc. used in the rolling, and then transmit to the monitoring system or the panel meter as process signal.

R S T

5 A by CT

CT converter

WSP-CTEW

Long distance Transmission

Monitoring system

Motor

Load of measurement object

Digital panel meter WPMZ-1

-97.654

16) Tacho generator converter : Speed monitoring of conveyor belt

Tacho generator converter receives an AC voltage signal (Revolutions of the motor) from the tacho generator mounted on the motor, and then convert and output DC signal which can be used in digital panel meters and control devices.

Motor

Tacho generator

Tacho generator converter

WSP-TGW

DC4-20mA

Digital panel meter WPMZ-1

-97.654

DC4-20mA

Monitoring system