Watanabe Electric Presentation

Document No 1

Ver.2

Watanabe Electric Industry Co., Ltd.

2018 July

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1. Company Outline

1) Profile

Company Name	Watanabe Electric Industry Co.Ltd.
Trademark	watanabe
Headquarters Address	6-16-19 Jingumae, Shibuya-ku, Tokyo 150-0001
Representative	Hideki Watanabe, President
Founded	November 3, 1940
Capital Funds	45 million yen
Total Employees	190

Products

■ Component Products

1) Digital panel meter
2) Signal converter
3) Graphic multi meter
4) Temperature Sensors

■ System Products

1) Power multi-meter
2) Energy monitoring
3) Headlight tester

2) Business Bases

■ Headquarter & Tokyo Sales Office

6-6-19, Jingumae, Shibuya-ku, Tokyo 150-0001, Japan
TEL : +81-3-3400-6147
FAX : +81-3-3409-3156
E-mail : support@watanabe-electric.co.jp

■ Osaka Sales Office

TCS Bldg. 5F, 1-14-33 Esaka-cho, Suita-shi, Osaka 564-0063, Japan

■ Nagoya Sales Office

Fushimi IT Bldg. 5F, 1-4-25 Nishiki, Naka-ku, Nagoya-shi, Aichi 460-0003, Japan

Watanabe Electric Manufacturing Co.LTD.

■ Tokyo Factory

1-1-10 Nishi-Tsutsujigaoka, Chofu-shi, Tokyo 182-0006, Japan

■ Fukushima Factory

55 Kuwajimaichi, Kori-machi, Date-gun, Fukushima 969-1613, Japan

■ Komae Factory

3-11-7 Iwatokita,Komae-shi,Tokyo 201-0004 Japan

1. Company Outline

3) History

November, 1940	Ryuzo Watanabe founded the company in Tokyo
June, 1954	Release the "Non-contact Meter Relay"
March, 1962	Received the Excellent Factory Award from the Governor of Tokyo
April, 1971	Increased capital funds to 45 million yen
October, 1972	Established 2nd factory of the headquarters
April, 1974	Released the "Signal Converter"
January, 1975	Released the "Digital Panel Meter"
January, 1993	Hideki Watanabe became Representative Director & President
June, 1996	Released the Measurement & Monitoring Network "Rial Link"
March, 2005	Acquired ISO9001 Certification
April, 2007	Acquired ISO14001 Certification
June, 2007	Released the Free specification type compact signal converter "WSPA Series"
June, 2007	Started the Chofu Factory operation and relocated the Headlight Tester Division
June,2008	Released the 14 function modules of compact signal converter "WSP Series"
January, 2010	Acquired the Electronic Measuring Instruments Division of Asahi Keiki Co.,
February, 2010	Released the Web browser-based Energy Management System "EcoRiAL"
June, 2010	Released the Web browser-based Energy Monitoring Module
February, 2013	Released the high-performance digital panel meter "WPM Series"
October, 2014	Acquired “Good Design Award 2014” for digital panel meter "WPM Series"
Dec, 2014	Released the signal converter "WSPF Series"
May, 2016	Released the signal converter "WPMZ Series"

Digital panel meter

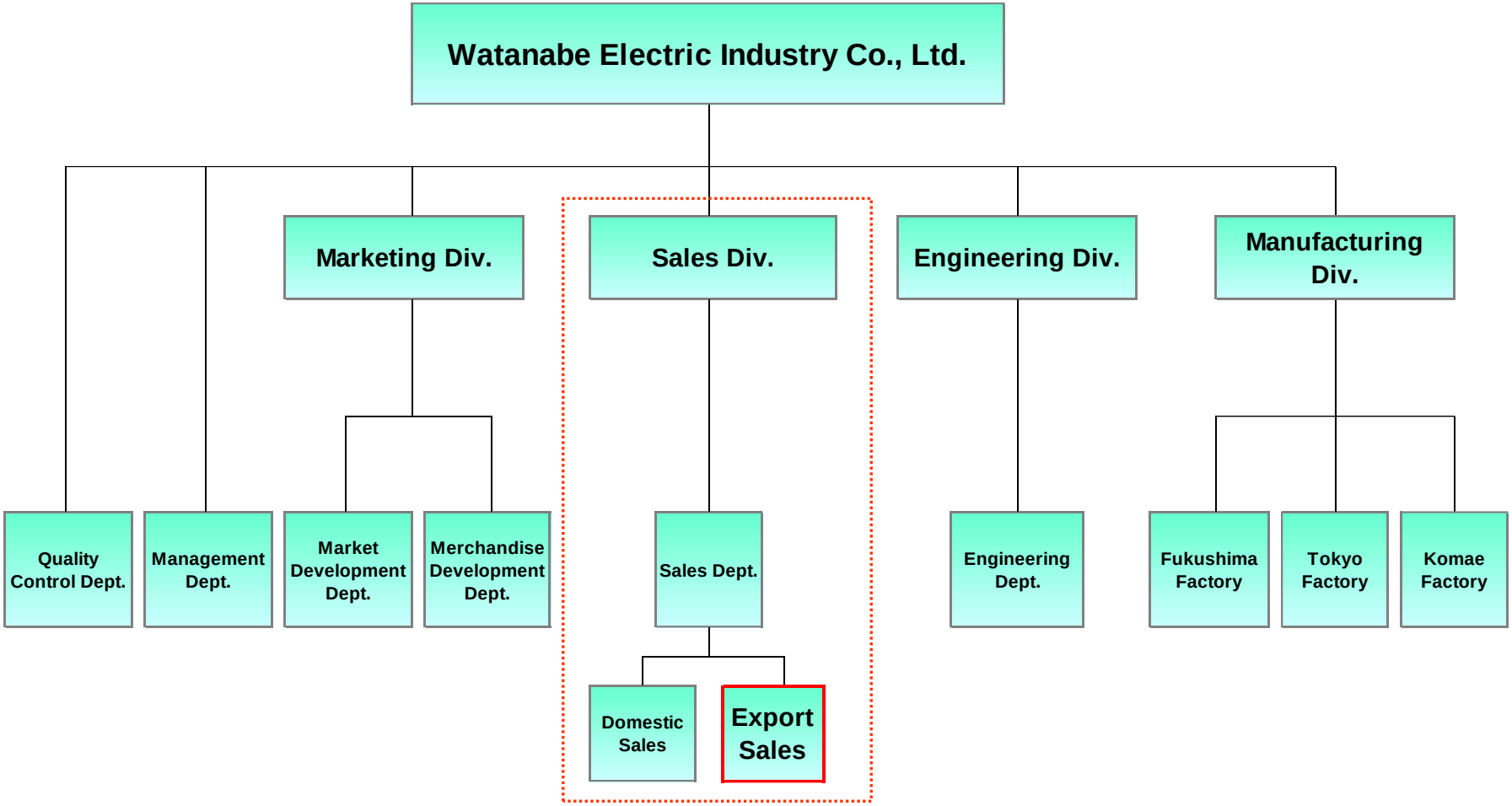
WPM series

WSPF series

WPMZ series

1. Company Outline

4) Organization

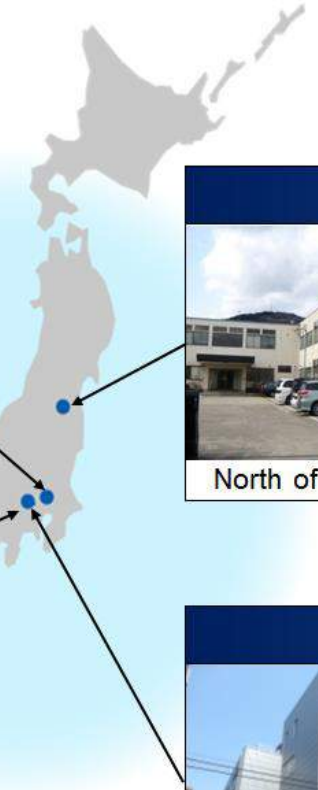


New organization started from April, 2018

1. Company Outline

5) Factory Location

Headquarter
(Tokyo, Harajuku)



Fukushima Factory

North of Tokyo about 300km

1. Number of Employees : 61
2. Site area : 3,733m2
3 Building area : 1,557m2
4. Main line of products :
Signal converter (TZ, TH, TW),
Digital panel meter,

Tokyo Factory

1. Number of Employees : 37
2. Site area : 1,152m2
3 Building area : 683m2
4. Main line of products :
Signal converter (WSPF / WSP / WVP series)

Komae Factory

1. Number of Employees : 8
2. Main line of products :
RTD & Thermocouple sensors

1. Company Outline

6) Export world market

1. Company Outline

7) Product Information

◆Digital Panel meter at **Fukushima factory**

WPMZ

A6000

AM-215B

WPM-1

A7000

A2000

◆Signal Converter at **Tokyo factory & Fukushima factory**

WSPF series

WSP series

TZ series

TW series

TH series

1. Company Outline

◆Temperature sensor at **Komae Factory**

Able to customize to various kinds. Below is the example of RTD and Thermocouple.

RTD

Using Pt100Ω platinum element. It can correspond to Connection head type, lead wire type or other standard/special shapes.

Screw type with connection head

Wire anchor for thermal storage tank

Ring sensor for wiring surface

Wall-mount type for low temperatur

Flat thermo

White stick for chemicals

Thermocouple

Thermocouple type B, R, S, K, E, J, T available for wide range -200℃ to 1,700℃

Sheath screw type with connection head

Non-metallic protection tube type for high temperature

Coating thermocouple

Magnetic type

Surface thermocouple sheet

Signal Converter

2. Signal Converter

1) Main 4 functions of Signal converter

(1) Convert Signal

In case that the signal from sensor is not suitable for the device,
Covert it to suitable Signal for the device.

- DC V / A
- Frequency
- Resistance
- Thermocouple
- RTD
- AC V / A
- Load cell
- Pulse

Signal from Sensor

Convert into
Suitable signal
For device

Device

(2) Divide Signal

- DC V / A
- Frequency
- Resistance
- Thermocouple
- RTD
- AC V / A
- Load cell
- Pulse

Signal from Sensor

Input from 1
Channel

Divide to get
2 signal

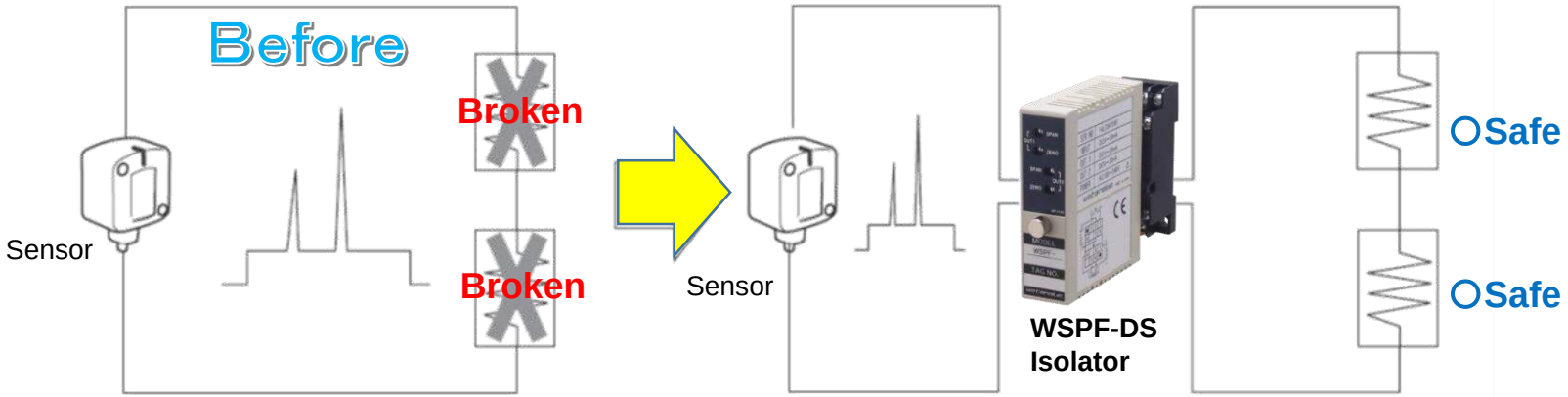
PLC etc.

Device

2. Signal Converter

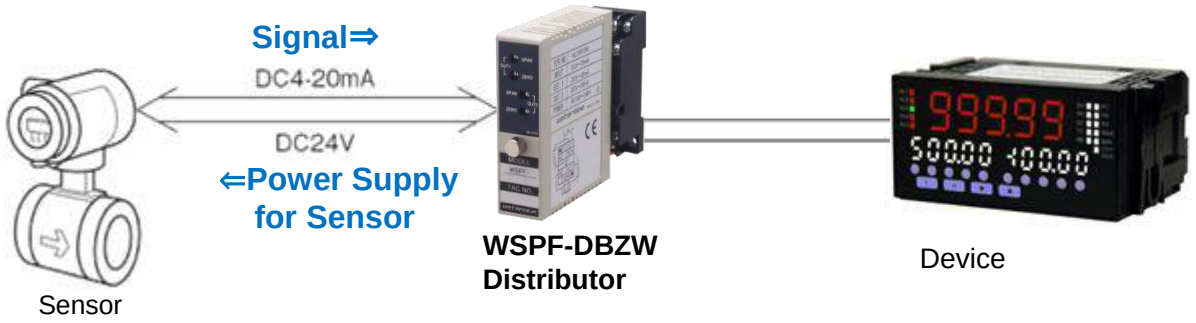
(3) Isolator

Electrically isolate sensor and device.
It protect device and equipment from abnormal signal at sensor malfunction.
(Also it can reduce noise)



(4) Distributor

Supply 24 VDC to the sensor via the Signal line. It is useful in case that the sensor is installed outside. (It is difficult to take power supply outside)



2. Signal Converter

2) Types of Input Signal

(1) Sensor example for Isolator (DC converter)

Sensor	Measurement	Signal converter (example)				
		Type	Model		Input	Output
Displacement sensor  **Differential transformer**  **Linear encoder** 	Displacement / Length	Isolator / DC converter	WSPF-IS WSPF-DS WSPF-DE (High speed)		DC Voltage / current	DC Voltage / Current
			WSPF-DSW WSPF-DEW (High speed)			DC Voltage / Current (2 output)
Pressure sensor 	Pressure	Isolator / DC converter	WSPF-IS WSPF-DS WSPF-DE (High speed)		DC Voltage / current	DC Voltage / Current
			WSPF-DSW WSPF-DEW (High speed)			DC Voltage / Current (2 output)
Speed sensor  **Acceleration sensor** 	Speed / Acceleration	Isolator / DC converter	WSPF-IS WSPF-DS WSPF-DE (High speed)		DC Voltage / current	DC Voltage / Current
			WSPF-DSW WSPF-DEW (High speed)			DC Voltage / Current (2 output)

2. Signal Converter

(2) Sensor example for AC converter

Sensor	Measurement	Signal converter (example)				
		Type	Model		Input	Output
CT 	AC Voltage / current	AC converter	WSP-AZ / EZ WSP-CTA / CTE		AC Voltage / current	DC Voltage / Current
PT 			WSP-ACW / EFW WSP-CTAW / CTEW			DC Voltage / Current (2 output)

(3) Sensor example for Temperature converter

Sensor	Measurement	Signal converter (example)				
		Type	Model		Input	Output
Thermocouple 	Temperature	Thermocouple converter	WSPF-THS		Thermocouple signal	DC Voltage / Current
			WSPF-THW			DC Voltage / Current (2 output)
RTD 		RTD converter	WSPF-RTS		RTD Signal	DC Voltage / Current
			WSPF-RTW			DC Voltage / Current (2 output)

(4) Sensor example for Load cell converter

Sensor	Measurement	Signal converter (example)				
		Type	Model		Input	Output
Load cell (Strain gauge) 	Weight	Load cell converter	TW-3S		Load cell signal (mV/V)	DC Voltage / Current

*WSP/SWPF series don't have load cell converter

(5) Sensor example for Potentiometer converter

Sensor	Measurement	Signal converter (example)				
		Type	Model		Input	Output
Potenstiometer 	Resistance / Angle	Potentiometer converter	WSPF-MS		Resistance	DC Voltage / Current
			WSPF-MSW			DC Voltage / Current (2 output)

2. Signal Converter

(6) Sensor example for Tachogenerator converter

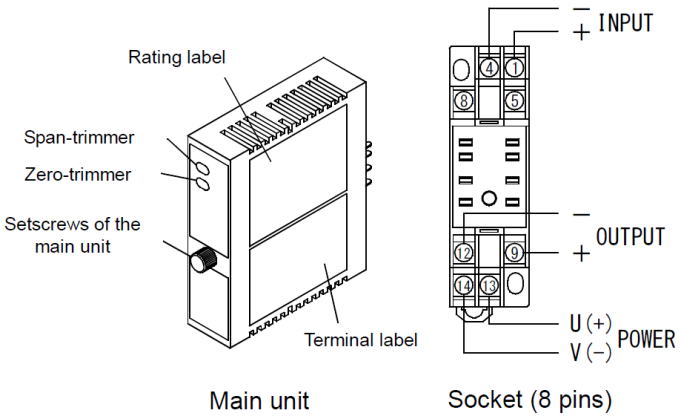
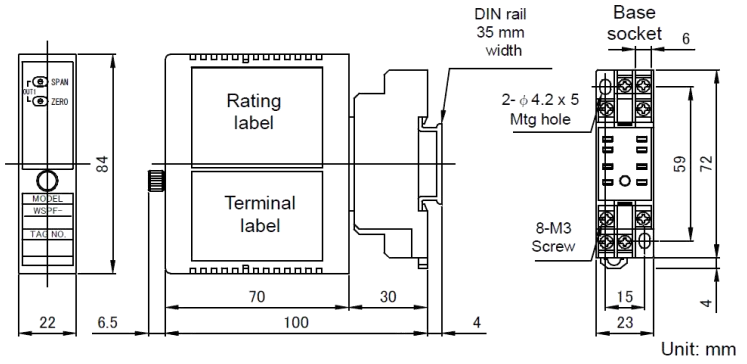
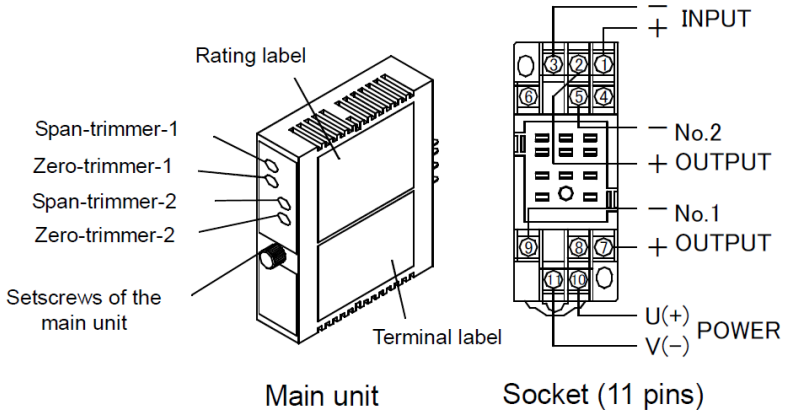
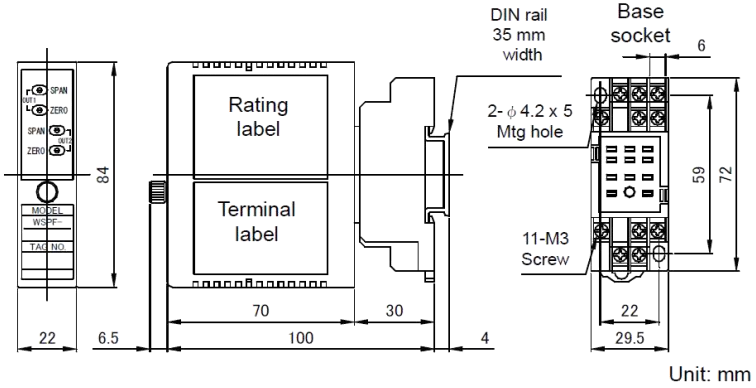
Sensor	Measurement	Signal converter (example)				
		Type	Model		Input	Output
Tachogenerators 	Rotation Speed	Tachogenerator converter	WSP-TGS		AC pulse	DC Voltage / Current
			WSP-TGW			DC Voltage / Current (2 output)

(7) Sensor example for Pulse converter

Sensor	Measurement	Signal converter (example)				
		Type	Model		Input	Output
Rotary encoder  **Magnetic Speed Sensor**  **Photoelectronic sensor**  **Flow meter** 	Rotation / Speed / Count / Shape / Flow	Pulse to DC converter	WSP-FV		1) Open collector (NPN/PNP) 2) Voltage pulse	DC Voltage / Current
			WSP-FVW			DC Voltage / Current (2 output)
		Pulse isolator	WSP-FZ WSP-FZP			Pulse

2. Signal Converter

3) Names of each parts & dimensions

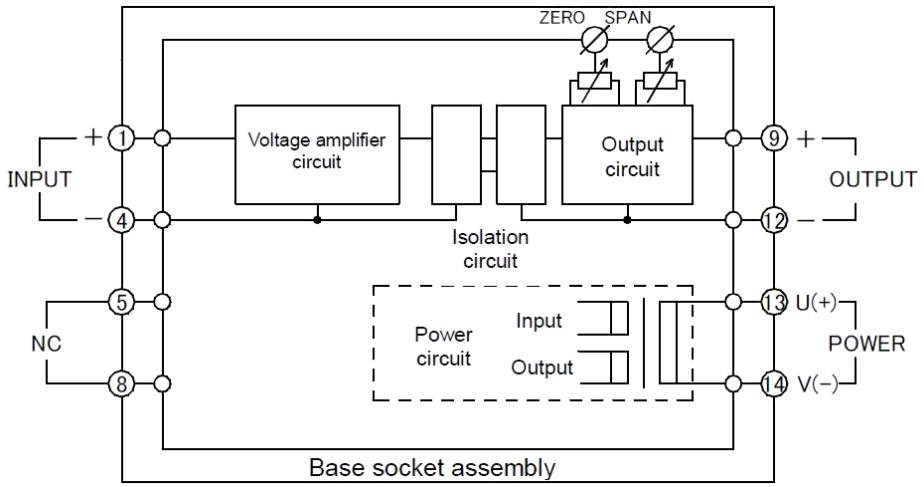
	Name of Each Parts	Dimensions
Example 1) **WSPF-DS** **1 output Isolator**		
Example 2) **WSPF-DSW** **2 output Isolator**		

Depends on the models. Please check manual for details

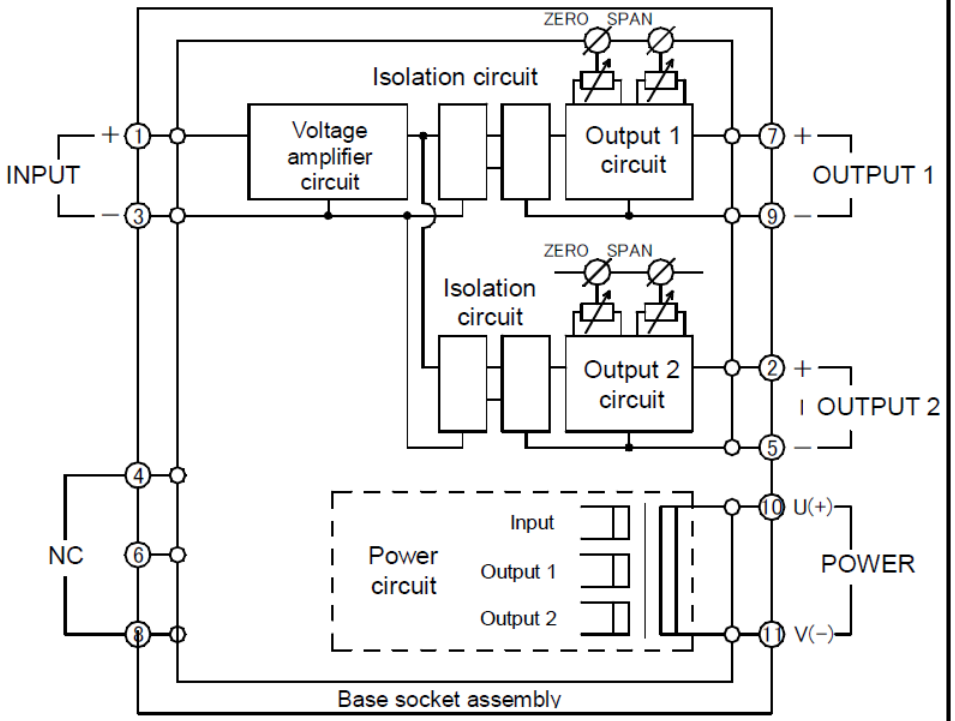
2. Signal Converter

4) Block diagram

Example 1) WSPF-DS
1 output Isolator



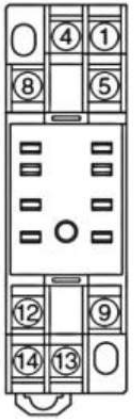
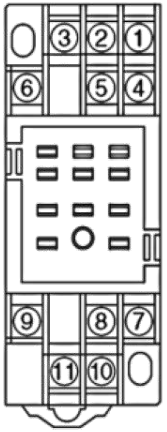
Example 2) WSPF-DSW
2 output Isolator



3-port Isolation!!
(Input, Output, Power)

2. Signal Converter

5) Terminal connections

	Terminal connections
Example 1) **WSPF-DS** **1 output Isolator**	
Example 2) **WSPF-DSW** **2 output Isolator**	

No	Symbol		Description
1	INPUT	+	Input
4		-	
5	NC		No connection
8	NC		No connection
9	OUTPUT	+	Output
12		-	
13	POWER	U(+)	Power Supply
14		V(-)	

No	Symbol		Description
1	INPUT	+	Input
2	No.2 OUTPUT	+	No.2 Output
3	INPUT	-	Input
4	NC		No connection
5	No.2 OUTPUT	-	No.2 Output
6	NC		No connection
7	No.1 OUTPUT	+	No.1 Output
8	NC		No connection
9	No.1 OUTPUT	-	No.1 Output
10	POWER	U(+)	Power Supply
11		V(-)	

Depends on the models. Please check manual for details

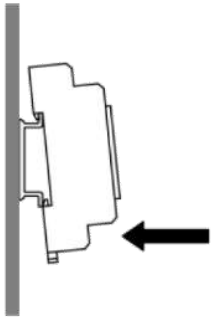
2. Signal Converter

6) Mounting and removing to from the DIN rail

Example : WSPF series

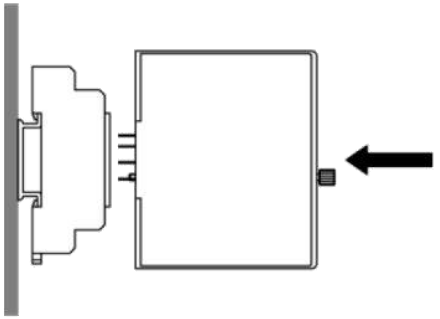
1) How to fix the socket

Hold the product with the slider at the bottom of the socket facing downward, engage the tab at the top of the rear surface of the socket with the rail, and then push in the bottom of the socket in the direction of the arrow to fix the product in place.



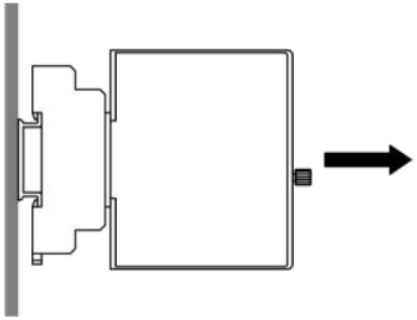
2) How to fix the main body to the socket

Hold the main unit in the direction such that the text on the label can be read correctly, insert it perfectly straight, and then tighten the screws on the front of the main unit. Be careful not to tighten the screws too hard.



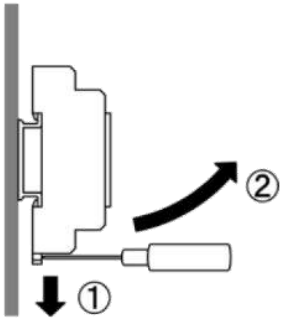
3) How to remove the main body from the socket

Slacken the screws on the front of the main unit, and withdraw the main unit perfectly straight.



4) How to remove the socket

Insert a screwdriver in the slider groove of the socket. While pulling the screwdriver in the direction of the arrow as shown in Figure ①, draw the lower part of the socket forward ② until it is removed.



2. Signal Converter

7) Zero and span adjustment

Example : WSPF series

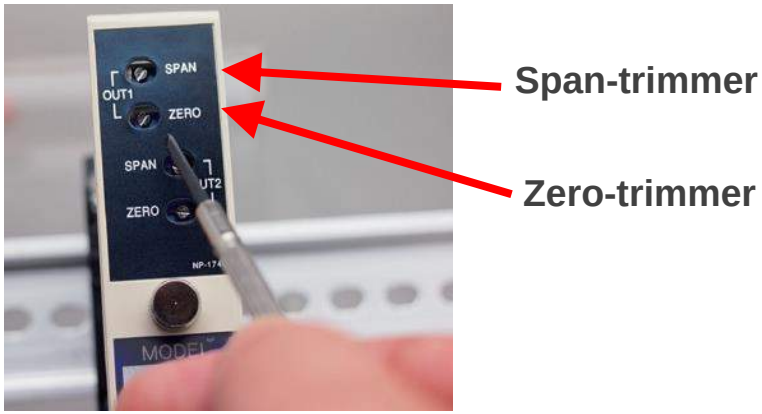
If matching with connected equipment or calibration is required, WSPF-DS (Isolator) can adjust Span & Zero point within the range of ±10% full scale by 15-turn trimmer. (Please refer manual for detail procedure).

1) ZERO adjustment :

Input a min. value of the input range and then adjust by zero-trimmer until output signal reaches the min. value of the output range.

2) SPAN adjustment :

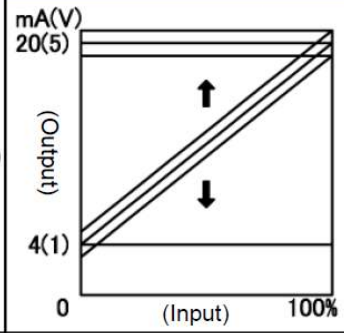
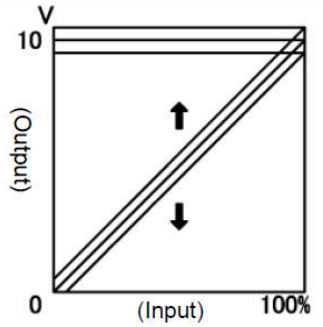
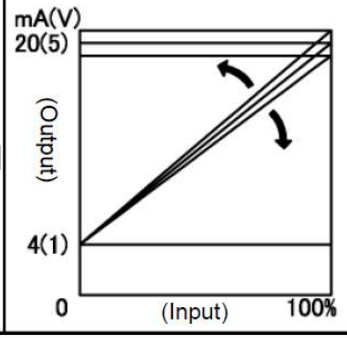
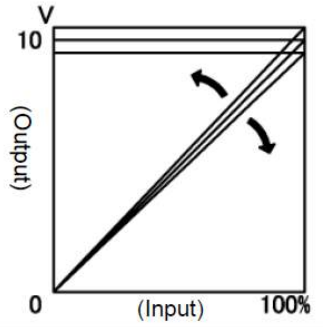
Input a max. value of the input range and then adjust by span-trimmer until output signal reaches the max. value of the output range.



Span-trimmer

Zero-trimmer

Explanation of ZERO & SPAN adjustment

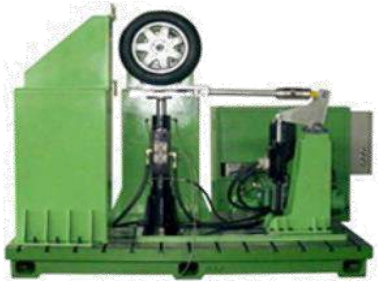
		In case of 4 to 20 (1 to 5 V) mA output	In case of 0 to 10 V output.
Zero adjustment	Shifts the zero upwards. ZERO Shifts the zero downwards.		
Span adjustment	Widens the span. SPAN Narrows the span.		

2. Signal Converter

8) Applications

(1) Automotive

Tire Test System



PC etc.

Rotary encoder

Pulse

Input

WSP-FV

4-20mA

Output

PLC etc.

Thermocouple

Thermocouple signal

Input

WSPF-THS

4-20mA

Output

2. Signal Converter

(2) Machine for Production -1

Press machine

Molding machine

Load cell

Input

1~4mV/V
etc.

Load cell
Signal converter
TW-3S series

Output (DC)

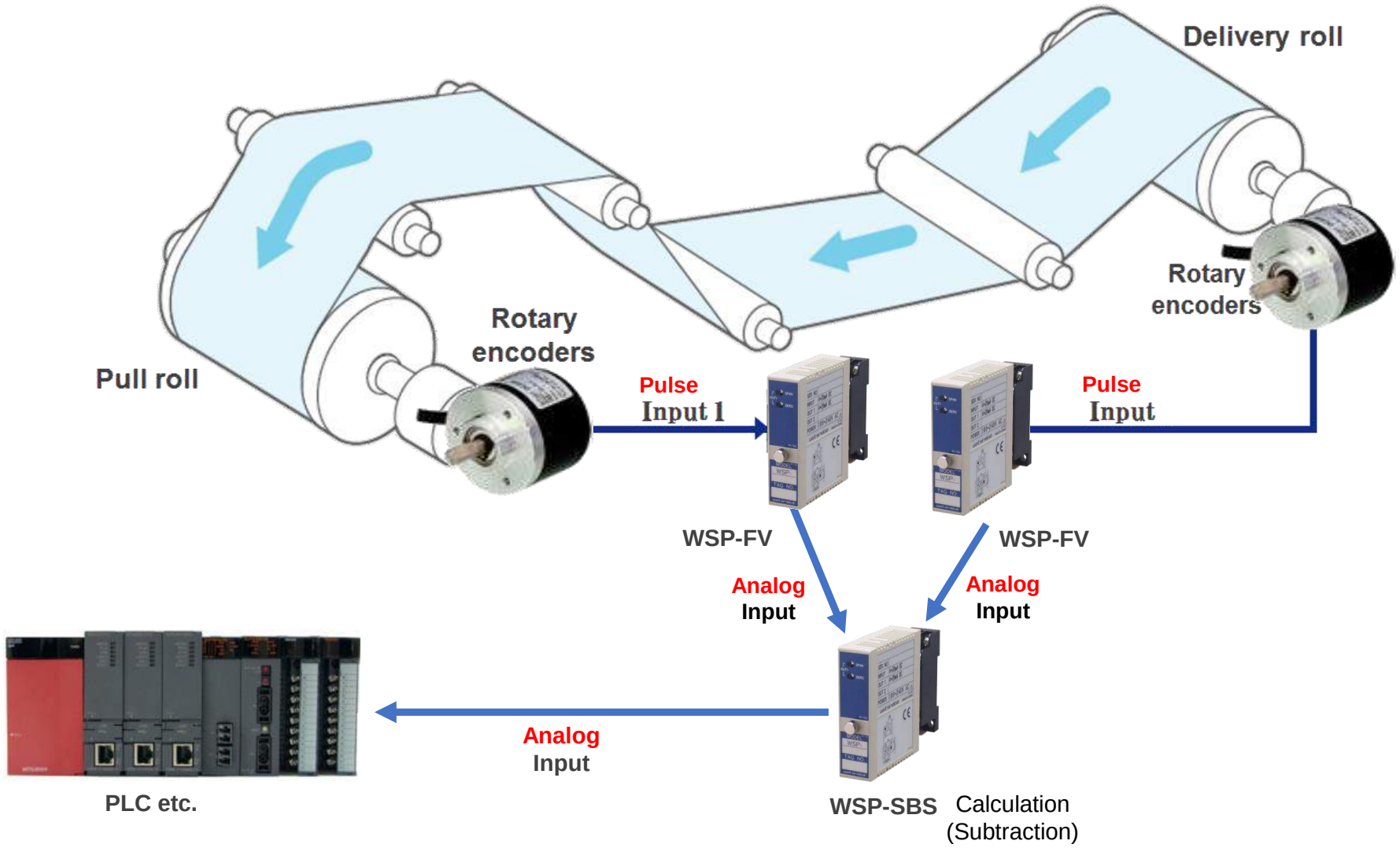
0~5V
1~5V
0~10V

4~20mA
0~20mA

PLC
etc.

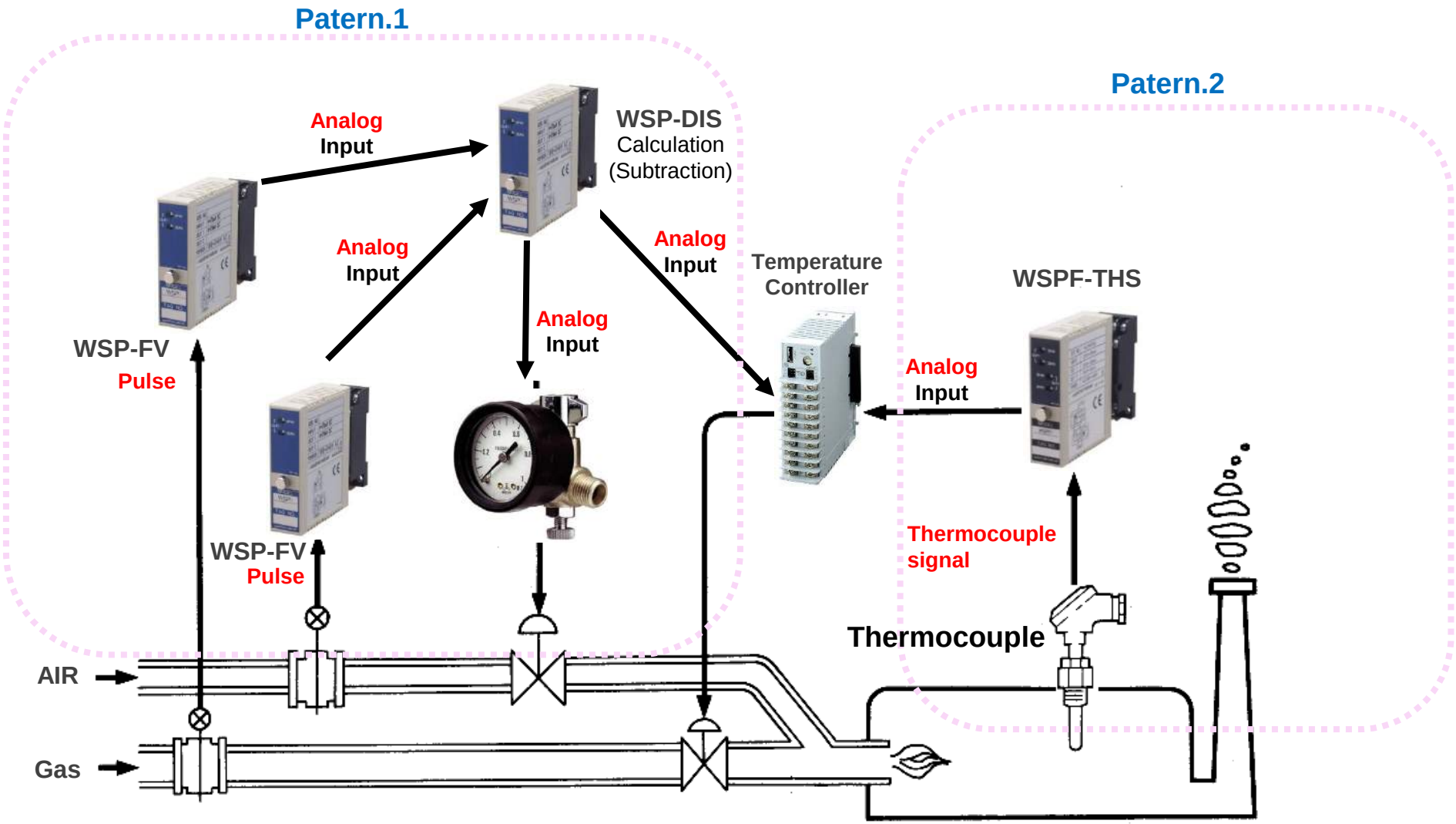
2. Signal Converter

(3) Machine for Production -2



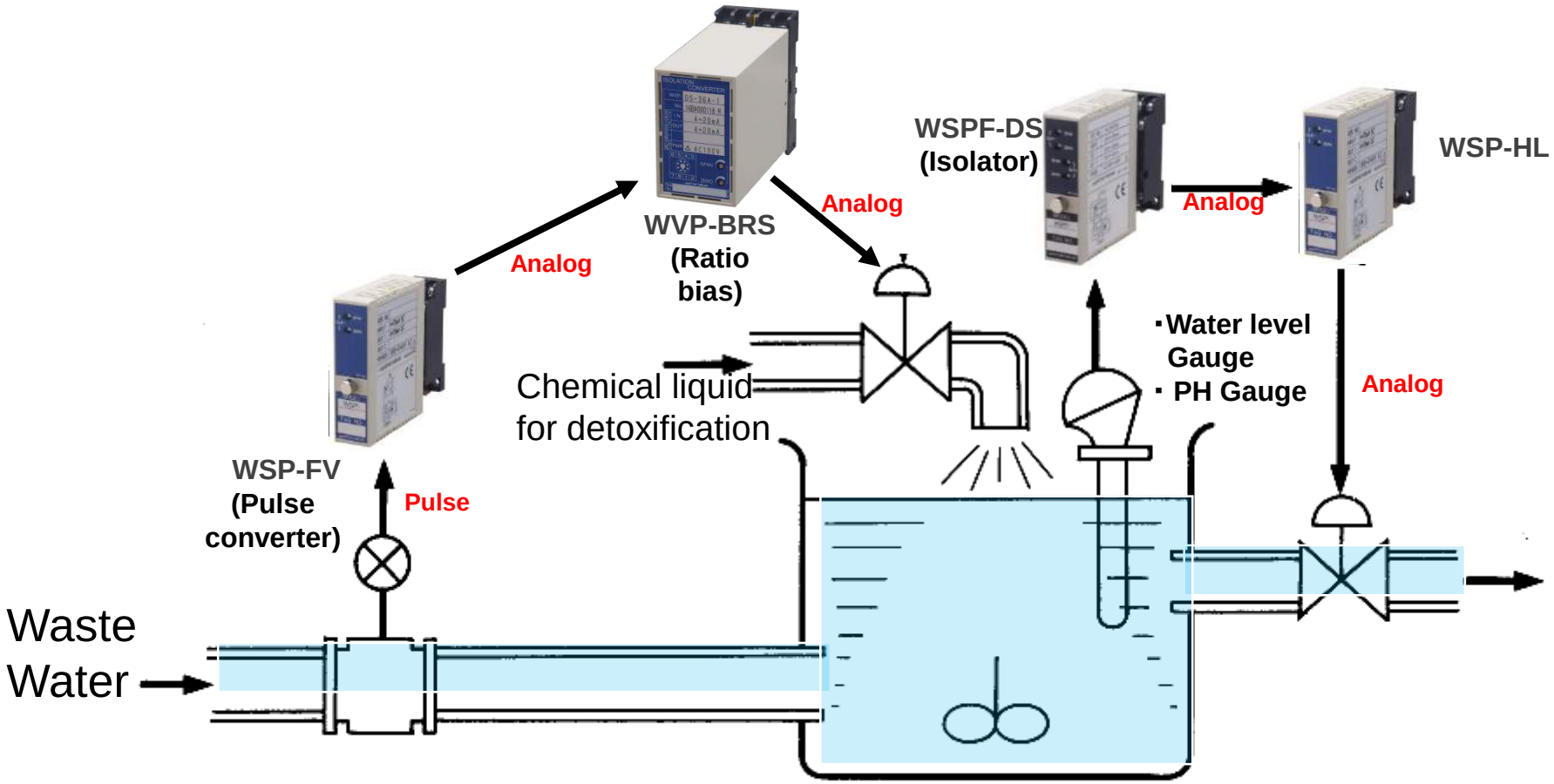
2. Signal Converter

(4) Fuel and Utility



2. Signal Converter

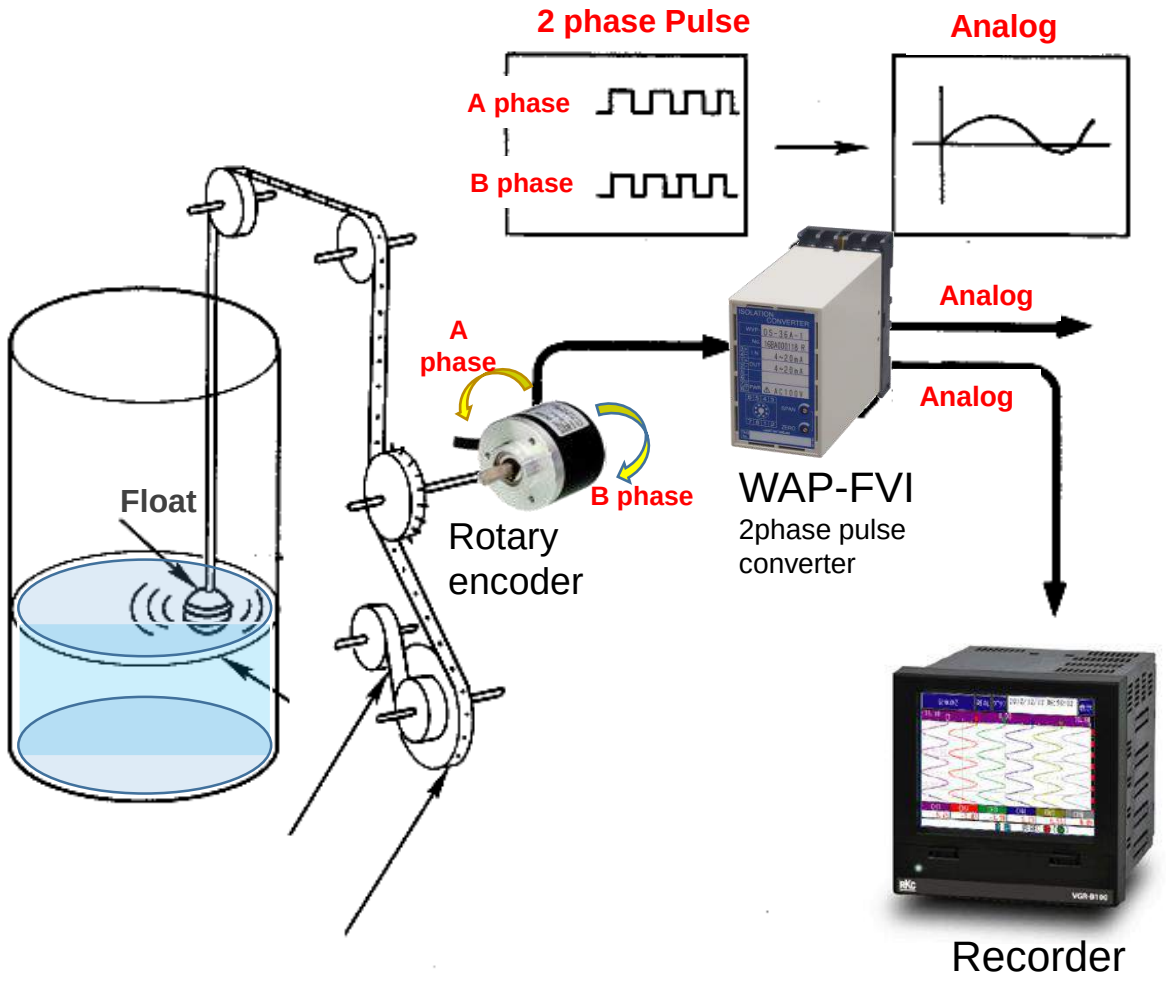
(5) Water Treatment -1



2. Signal Converter

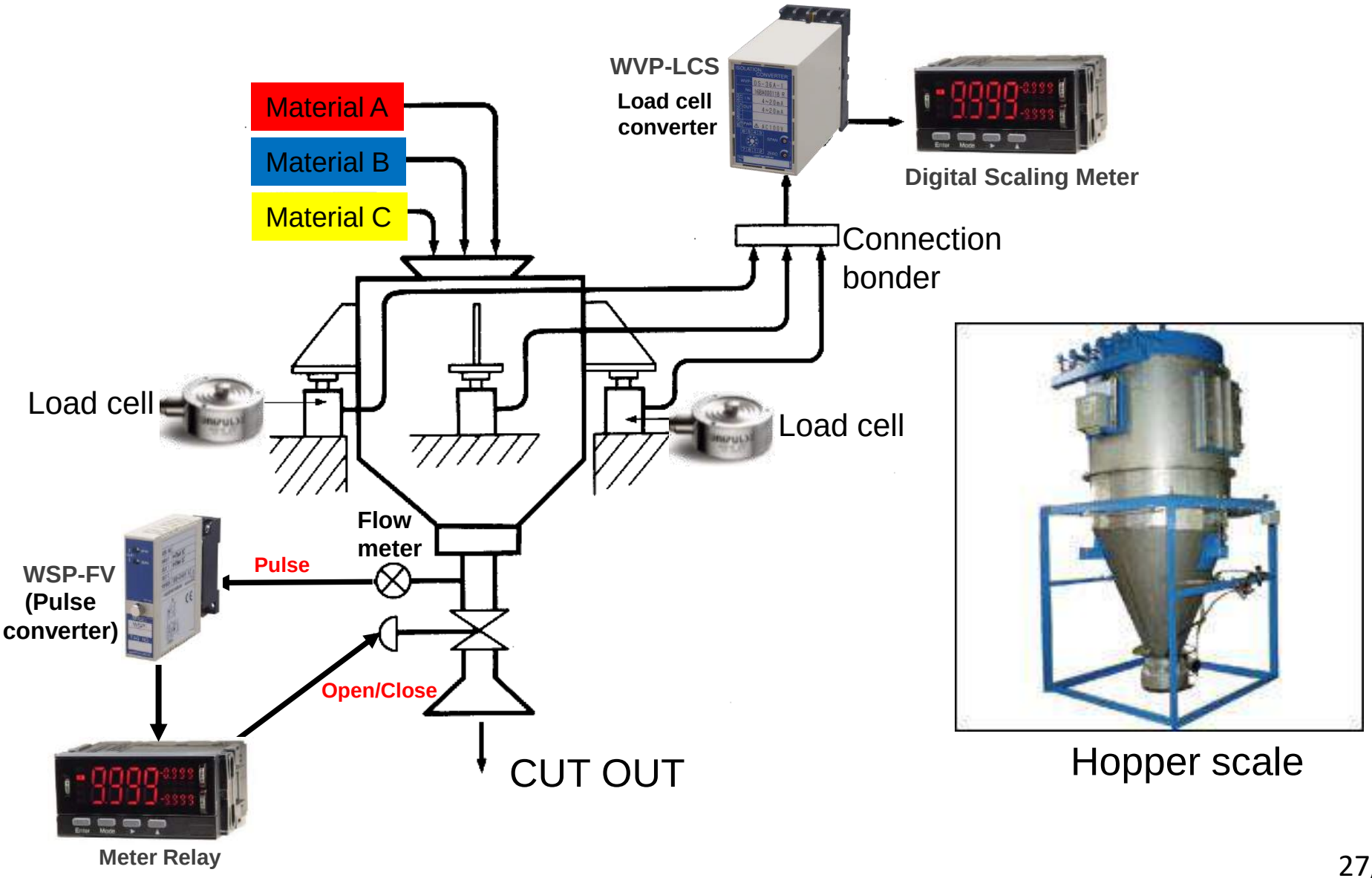
(6) Water Treatment -2

For deps measurement of tank pool, and also dam,
2 phase pulse can tell us the water level as like this.



2. Signal Converter

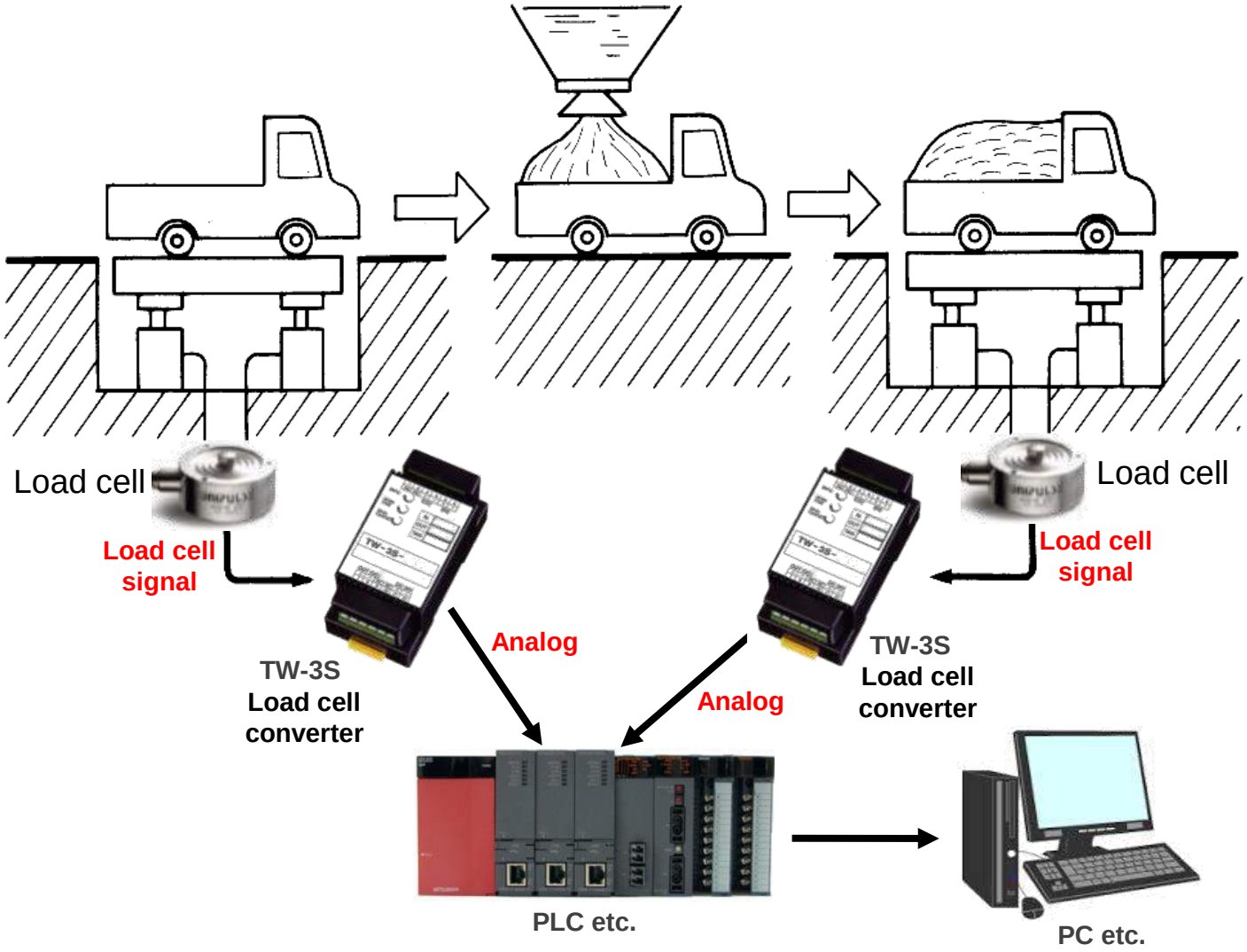
(7) Cement /Asphalt -1



Hopper scale

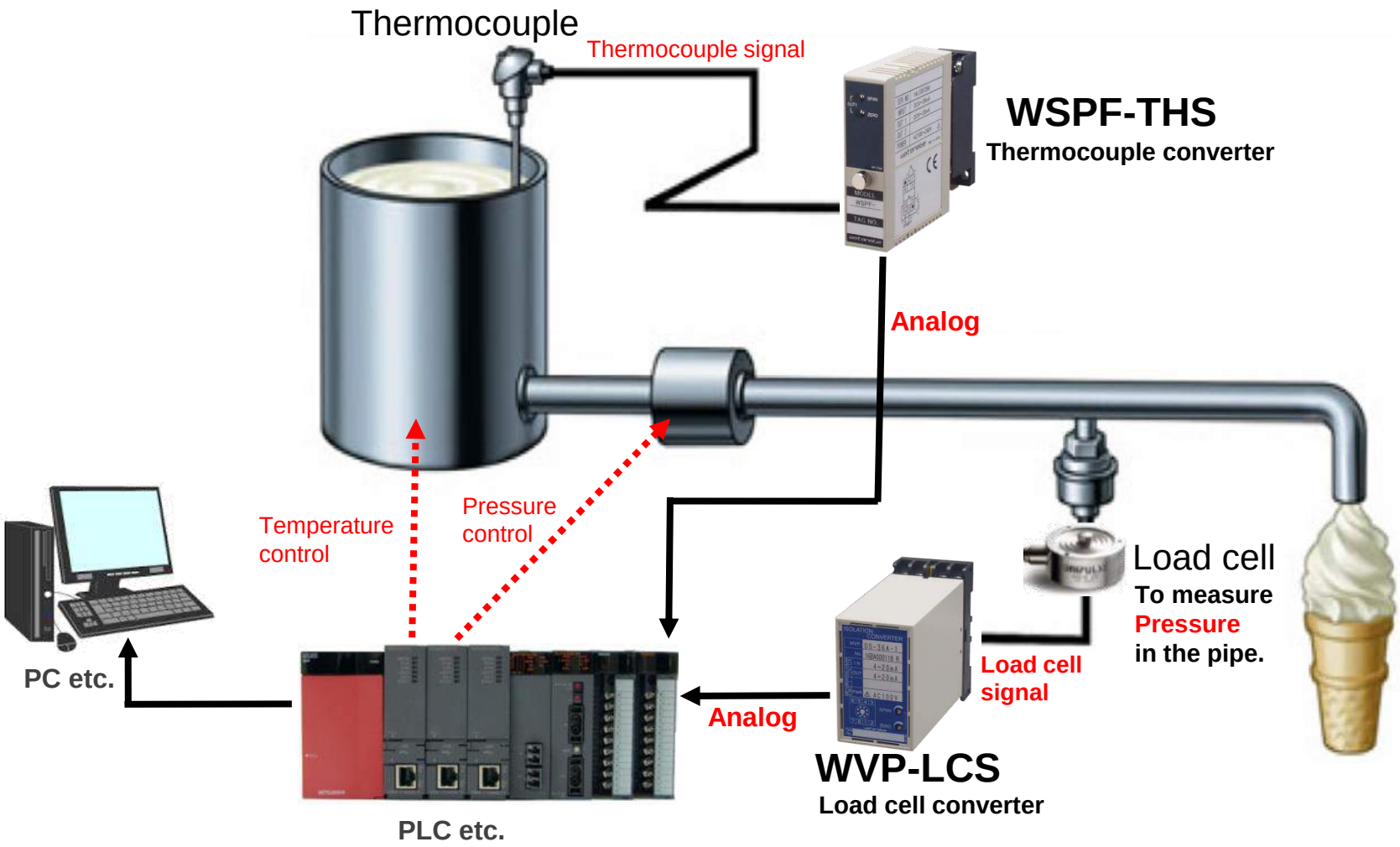
2. Signal Converter

(8) Cement /Asphalt -2



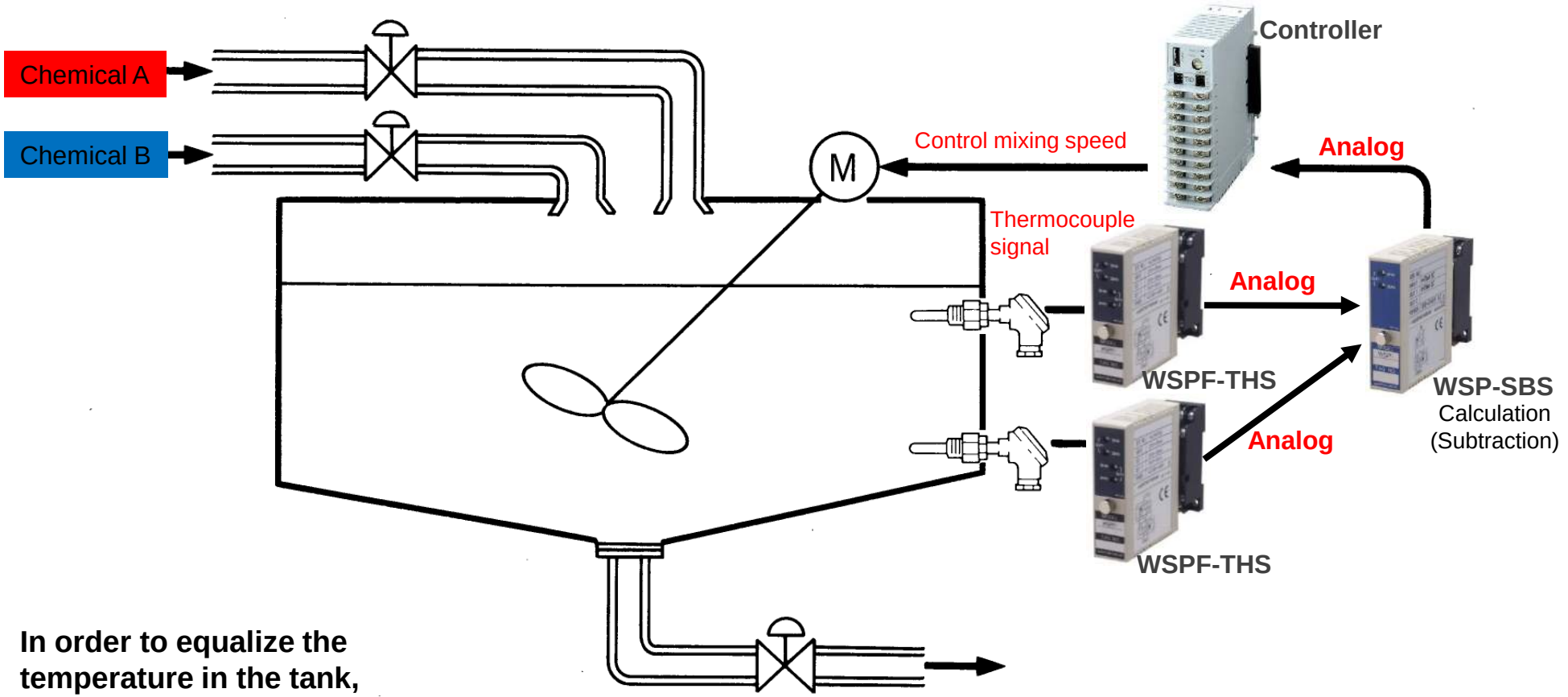
2. Signal Converter

(9) Food and Drink



2. Signal Converter

(10) Chemical



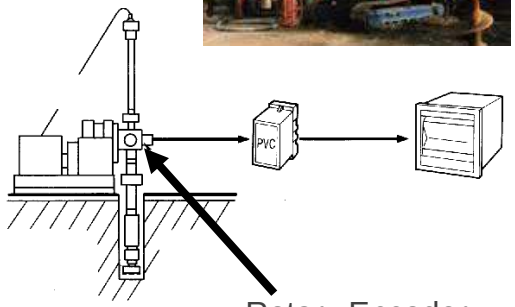
In order to equalize the temperature in the tank,
calculate to get the balance of 2 Thermocouple signal.

2. Signal Converter

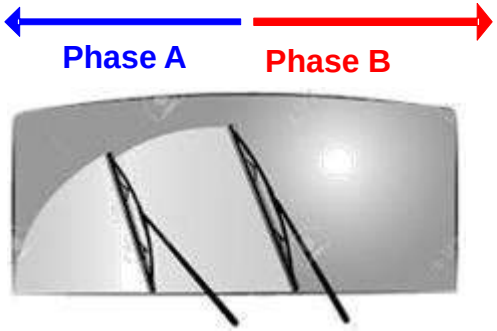
(11) Construction

Position measurement by 2-phase pulse input.
(Clockwise / Counter-clockwise rotation)

Tunneling / Mining equipment



Wiper



Rotary Encoder

2-phase pulse

Phase A

Phase B

WAP-FVI
2-phase pulse converter

Voltage / current

PLC etc.

Digital Panel Meter

3. Digital Panel Meter

1) Difference between Digital meter and Analog meter

1.What are digital panel meters?

This is a generic terms for meters which are mounted on panels and display various parameters in digital form.

2.What is digital?

The measurement and representation of the performance, value or behavior of phenomena in the form of numbers.
For example, digital numbers are digital, since they increase or decrease in steps of multiple integer numbers of 1 in the least significant digit.

3.What is Analog?

The representation and measurement of the performance or behavior of a system or phenomena such as time, temperature, atmospheric pressure and brightness by continuously variable means.

3. Digital Panel Meter

		Digital Meters	Analog Meters
1	Accuracy	High accuracy ±0.1% to ±0.03%	Lower accuracy ±2.5% to ±-0.5%
2	Reading	There is no ndividual difference between readings	There is individual difference between readings
3	Measurement type	Electronic type	Mechanical type
4	Cost	More expensive than analog meters	Cheaper than digital meters
5	Power supply	Need power supply for drive	No need power supply for drive
6	Application	Wide range of applications	Narrower rnage of applications

Digital Meters

Analog Meters

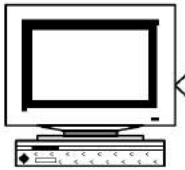
3. Digital Panel Meter

2) Data collection through RS485 communications

Modular connectors RJ14

if you connector 2 or more, need Splitter
RJ14 splitter

Computer

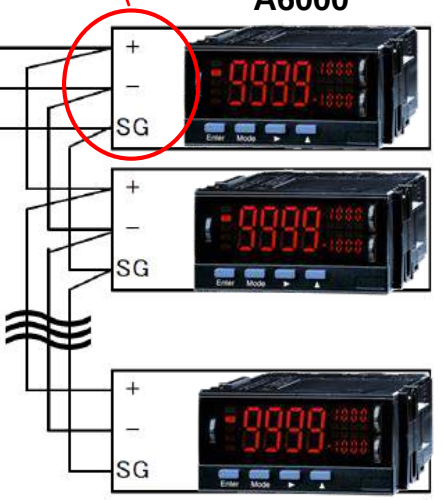


RS-232C

SG

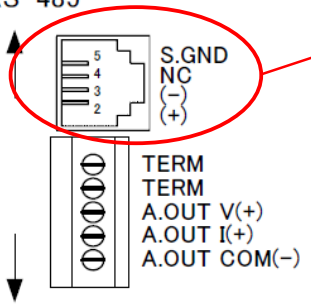
RS-232C/RS-485
converter
LINEEYE CO.,LTD.
SI-30

A6000



Input signal
DC V, A
AC A,V
RTD
TC
Frequency
Loadcell
Process

● RS-485



Name	Comment
S.GND	Common terminal of communication function
NC	No connection
(-)	inverting output
(+)	non-inverting output

Registered jack types
Modular connectors RJ14
For two telephone lines (6P4C)

3. Digital Panel Meter

3) Main sales series

Model	Display digits		Input	Power supply	option		Size
					Compare output	Output	
WPM-1	5 digits	99999	DC A, V Process	AC or DC	2 or 4 set points	Analog	96 X 48mm
A6000	4 digits	9999	DC A, V AC A,V RTD TC Frequency Loadcell Process	AC or DC	2 outputs	Analog BCD RS-232C RS-485	96 X 48mm
A1000	3 2/1digits	1999	DC A,V AC A,V RTD TC Process	AC or DC	none	none	96 X 48mm
A2100	3 2/1digits	1999	DC A,V	DC	none	none	48 X 24 mm
A2200	4 1/2digits	19999	DC V	DC	none	none	48 X 24 mm
WPMZ-5,6	6 digits	999999	Pulse	AC or DC	4 set points	Analog BCD RS-232C RS-485	96 X 48mm

WPM-1

A6000

A1000

A2000

WPMZ

3. Digital Panel Meter

4) 3 Functions of Digital Panel Meter

(1) Show Actual Value

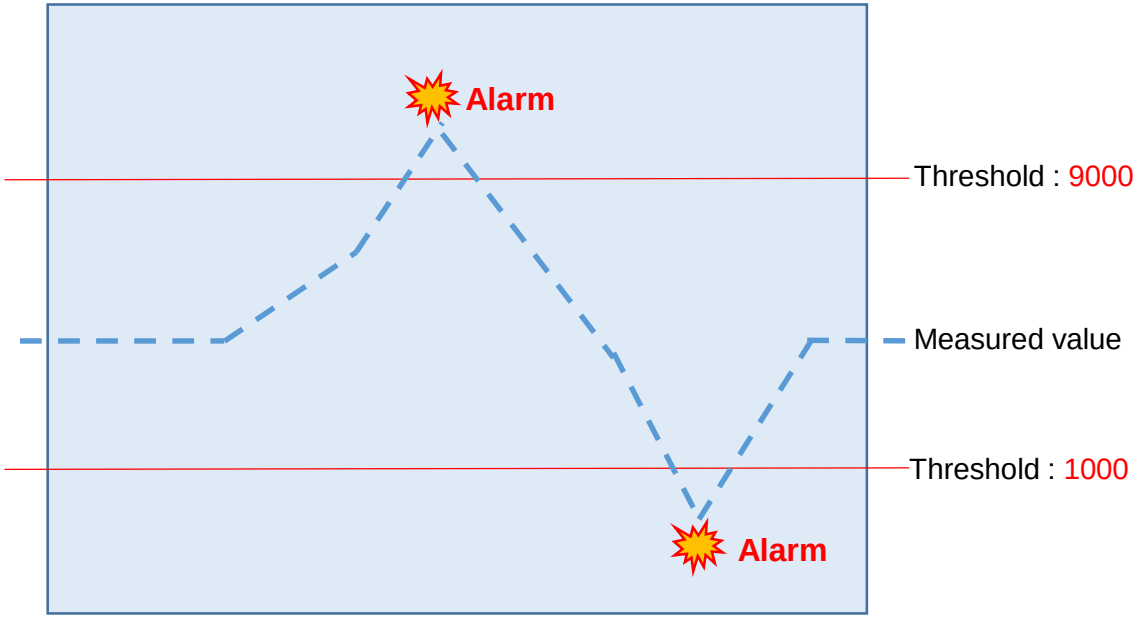
Current Value

Setting point HI/ LO
(Alarm signal if it over)

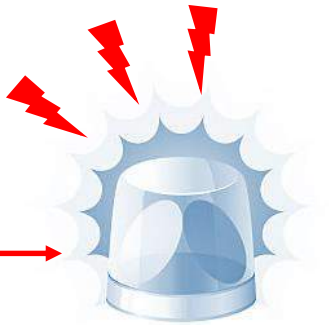
Calculation Result of 2ch A/B

Current value
(2 channel A / B)

(2) Alarm Output



Alarm output
1) Relay
2) Opencollector



Alarm,
Buzzer
Etc.

3. Digital Panel Meter

(3) Various Options

A6000 series

Input signal
1. DC V, A
2. AC V,A
3. Frequency
4. Thermocouple
5. RTD
6. Load cell
7. Resistance
8. Pulse




Output signal (Option)
1. Analog output (4~20mA, 0~10VDC etc.)
2. BCD output
3. RS232C output
4. RS485 output
5. HI and LO setpoint
   (by relay / photocoupler output)

3. Digital Panel Meter

5) 5 keywords of Digital Panel Meter

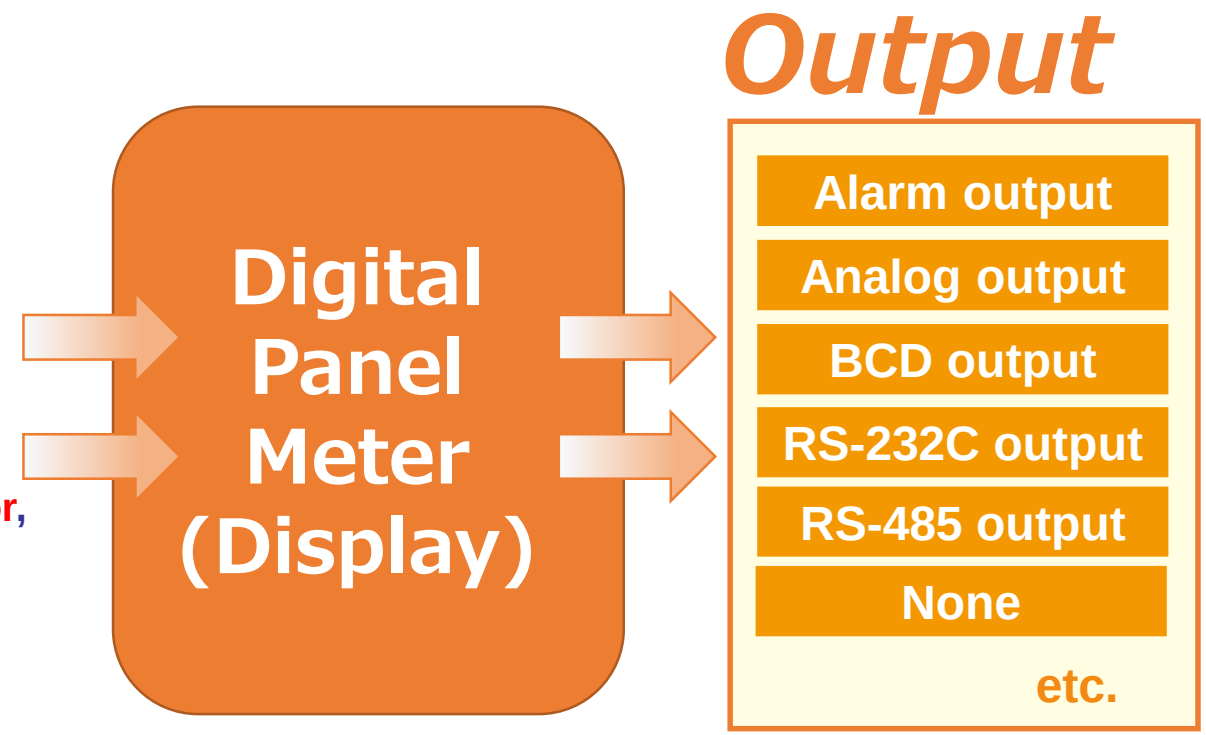
(1) Current / Voltage
Equipment maintenance and
product quality check etc.

(2) Temperature
Thermocouple / RTD measurement

(3) Weight / Pressure
Weight measuring by load cell sensor,
Pressure sensors in piping etc.

(4) Speed / Rotation
Signal from Rotary encoders,
And rotation count of gear etc.

(5) Flow (Flow rate / volume)
Liquid / Gas flow measurement.
Both Flow rate or volume display.
Or difference of 2 tanks by calculation.



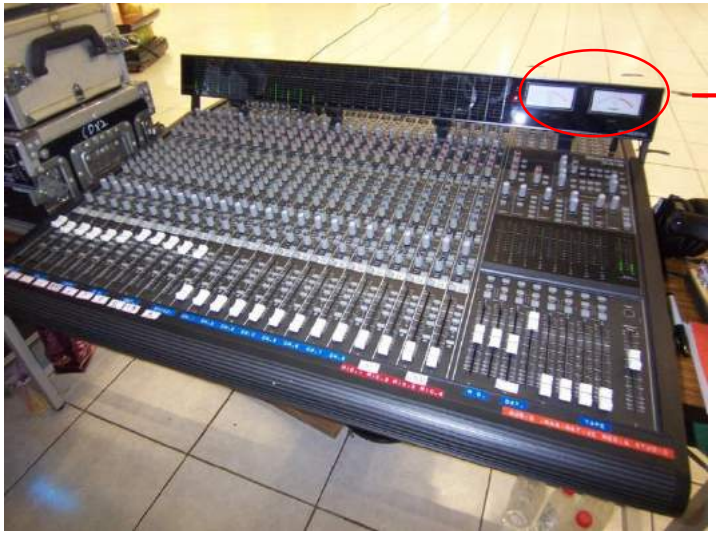
5 Keywords
For Digital panel meter
sales

3. Digital Panel Meter

6) Applications

(1) Current and Voltage

Application example of audio equipment to power supply monitoring (Voltage/current measuring for maintenance)



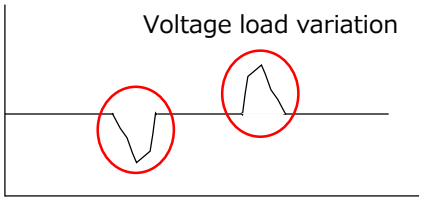
Voltage / current display

Alarm

Alarm display

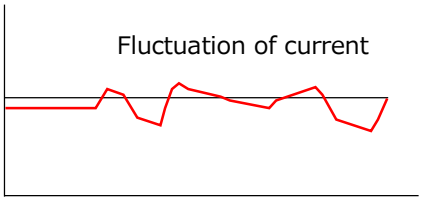
Import to Computer

■ Monitor influence of load variation
When starting or stopping equipment with large load capacity, voltage fluctuation occurs in the same system, and may also affect computers. In order to prevent them, you can monitor the voltage fluctuation situation and check if measures are necessary.



May be influenced by other equipment!?

■ Early detection of equipment deterioration / abnormality
If the control power supply inside the equipment deteriorates, abnormality may appear in the current value flowing in the power supply circuit. By monitoring the current load, sudden equipment failure can be detected beforehand.



May be deterioration of equipment

3. Digital Panel Meter

(2) Temperature (Thermocouple / RTD)

Food processing and process control

3. Digital Panel Meter

(3) Pressure and weight

Measuring and evaluating press fitting of caulking and pressing

Measuring mixing volumes of materials in tanks

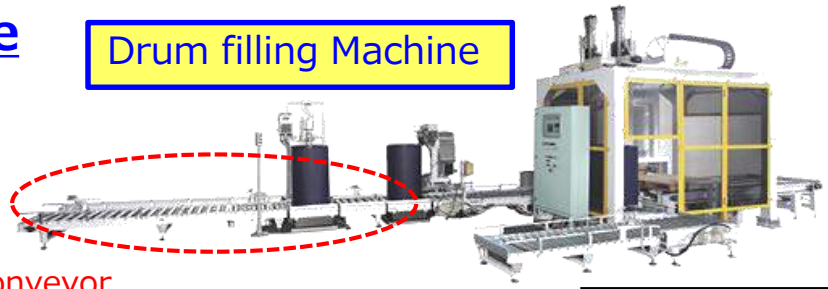
3. Digital Panel Meter

(4) Speed and Rotation

Conveyor Application

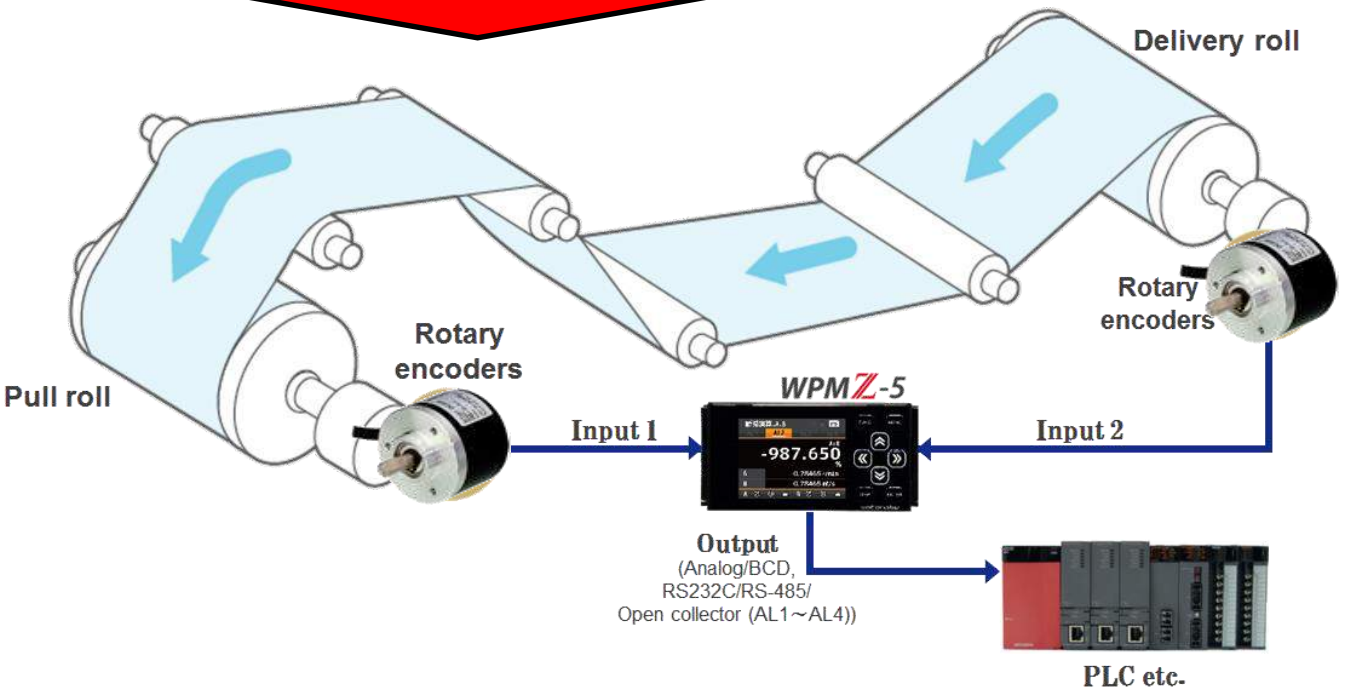
Example

Drum filling Machine



Conveyor

Difference of Conveyor speed



2 input Calculation	Calculation method
Absolute ratio	(B/A)×100
Relative error	(B/A-1)×100
Subtraction	B-A
Density	(B/(A+B))×100
Sum	A+B

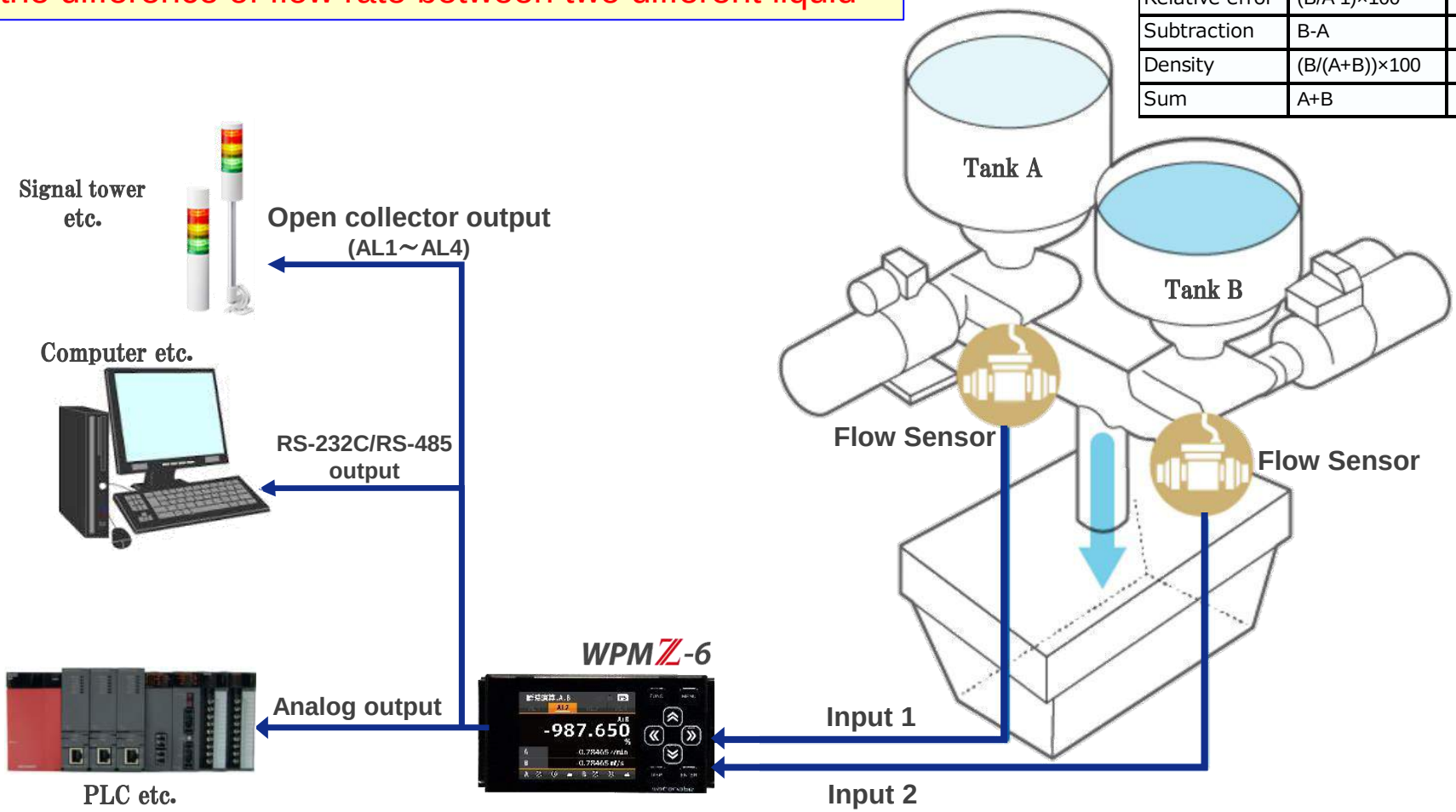
3. Digital Panel Meter

(5) Flow

Tank flow measurement

Stabilize the mixing process by monitoring
the difference of flow rate between two different liquid

2 input Calculation	Calculation method	WPMZ-6	
		Instantaneous	Totalized
Absolute ratio	(B/A)×100	○	×
Relative error	(B/A-1)×100	○	×
Subtraction	B-A	○	○
Density	(B/(A+B))×100	○	×
Sum	A+B	○	○



Market Approach

Digital Panel Meter

Signal Converter

4. Market Approach

1) Reconfirmation of Keywords

Signal Converter

(1) Isolate
Isolators

(2) Sensor power supply
Distributors

(3) Signal convert / distribute
Various type of Signal converters

"5 Keywords"
Also applies to
Signal Converters!

Digital Panel Meter

(1) Current / Voltage
Equipment maintenance and
product quality check etc.

(2) Temperature
Thermocouple / RTD measurement

(3) Weight / Pressure
Weight measuring by load cell sensor,
Pressure sensors in piping etc.

(4) Speed / Rotation
Signal from Rotary encoders,
And rotation count of gear etc.

(5) Flow (Flow rate / volume)
Liquid / Gas flow measurement.
Both Flow rate or volume display.
Or difference of 2 tanks by calculation.

4. Market Approach

2) Main customers

Semiconductor/ Display / Electric

SAMSUNG
LG
SK hynix
Hanwha
TOSHIBA
Panasonic
MITSUBISHI ELECTRIC
HITACHI Inspire the Next
Canon
TDK
RENESAS
ROHM SEMICONDUCTOR
TOKYO ELECTRON DEVICE
DAIKIN

Automobile

HYUNDAI
TOYOTA
KIA MOTORS The Power to Surprise
HONDA The Power of Dreams
SUZUKI
NISSAN
DENSO
AISIN AW
ADVICS
MITSUBA

Steel / Heavy industry

JFE Steel Corporation
NIPPON STEEL & SUMITOMO METAL
posco
BAOSTEEL
Hitachi Metals, Ltd.
MITSUBISHI HEAVY INDUSTRIES

4. Market Approach

3) Target market

1) Semiconductor
2) Automotive
3) Power Plant(Water power plant, Thermal power plant)
4) Water Supply Plant(Public investment)
5) Steel Manufacturing
6) Test Machine Manufacturing
7) Factory Automation Machine Manufacturing
8) Process Automation Machine Manufacturing
9) Ship Manufacturing
10) Machine Tool Manufacturing

4. Market Approach

4) Promoting company & department

It is difficult to sell if promoting to different department…

(1) [Factory] Production engineer / Process design Department

(2) [Factory] Equipment maintenance / Electrical construction Department

(3) [Outsourcing] Control panel manufacturer (Design development)

(4) [Outsourcing] Equipment manufacturer (Design development)

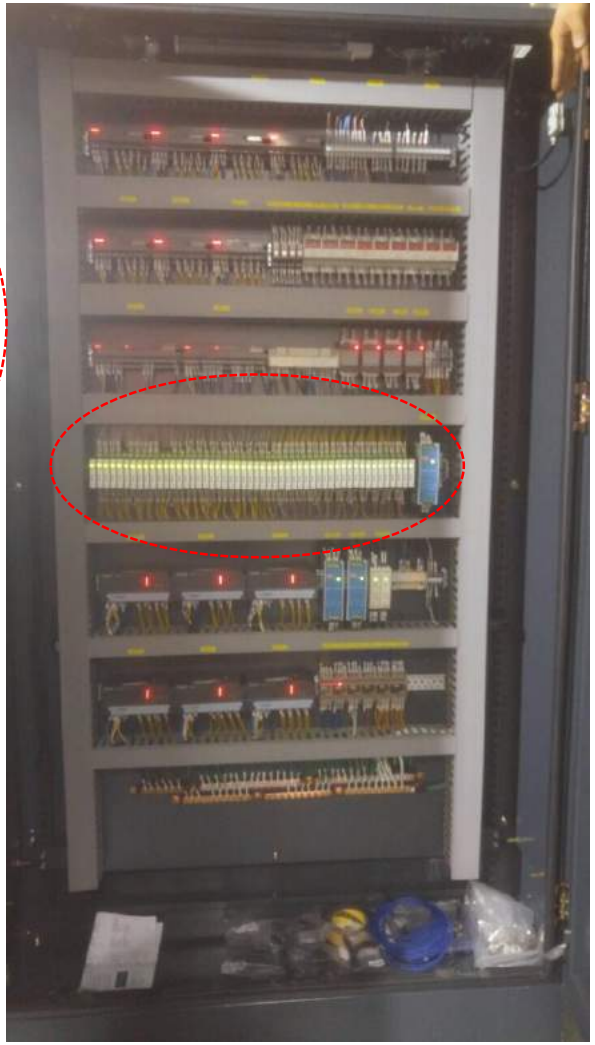
(5) [Outsourcing] Electrical construction, Contractor of equipment

4. Market Approach

5) Location of use -1

1) There are so many control panel in most of factories.
Also you can see digital panel meters on the surface of panel.

2) Just open the door of control panel.
Signal converter is installed inside of control panel.



3) There are many signal converters of Watanabe.
Even competitor's, we can provide product for replacement.
Our line up can cover most of functions of other's.

4. Market Approach

5) Location of use -2

We can find Digital Panel Meter is on the surface of Panel board like this.（This example is A6000）

Also can find the other company's meter.

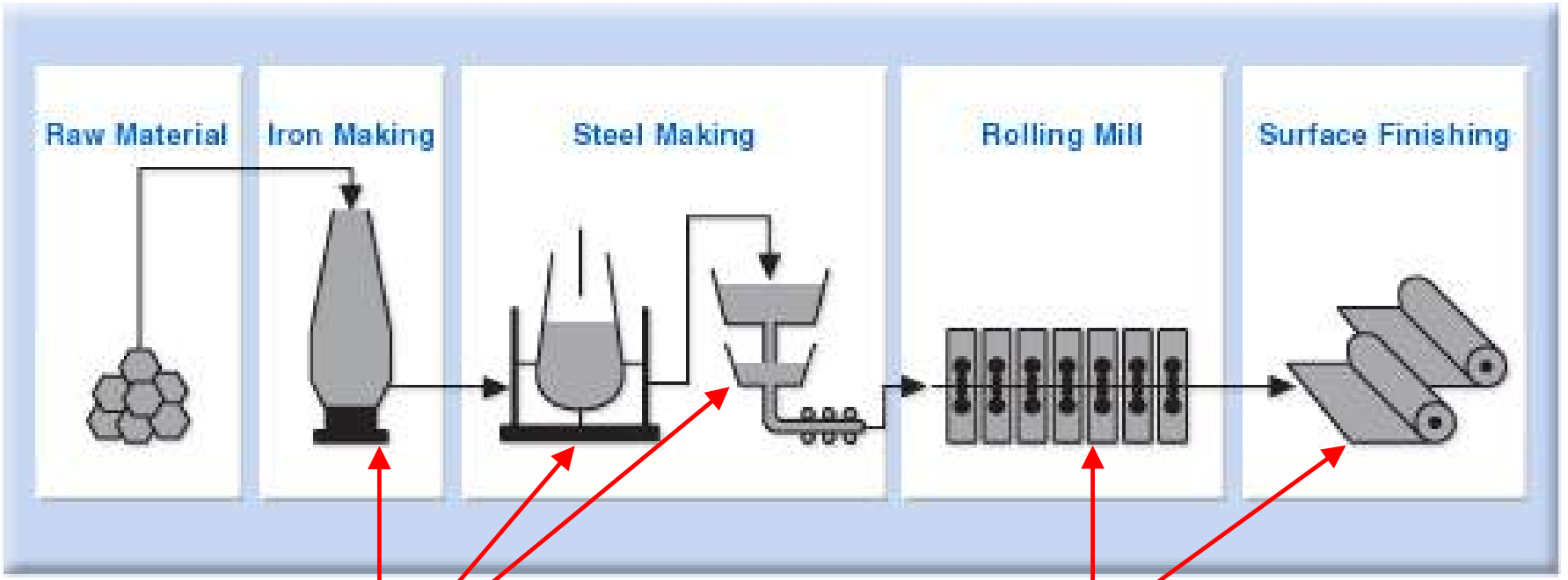
There's the case equipment has meter on the surface.

4. Market Approach

6) Type of Industries

(1) Steel manufacture process

1) **Isolators** (Isolation), **Distributors** (Sensor power supply) for each equipment.



2)Needs **Temperature**, **Pressure** management.
Also, **Flow** management of melted steel.
Uses many **Sensors** and **Converters** at many points.

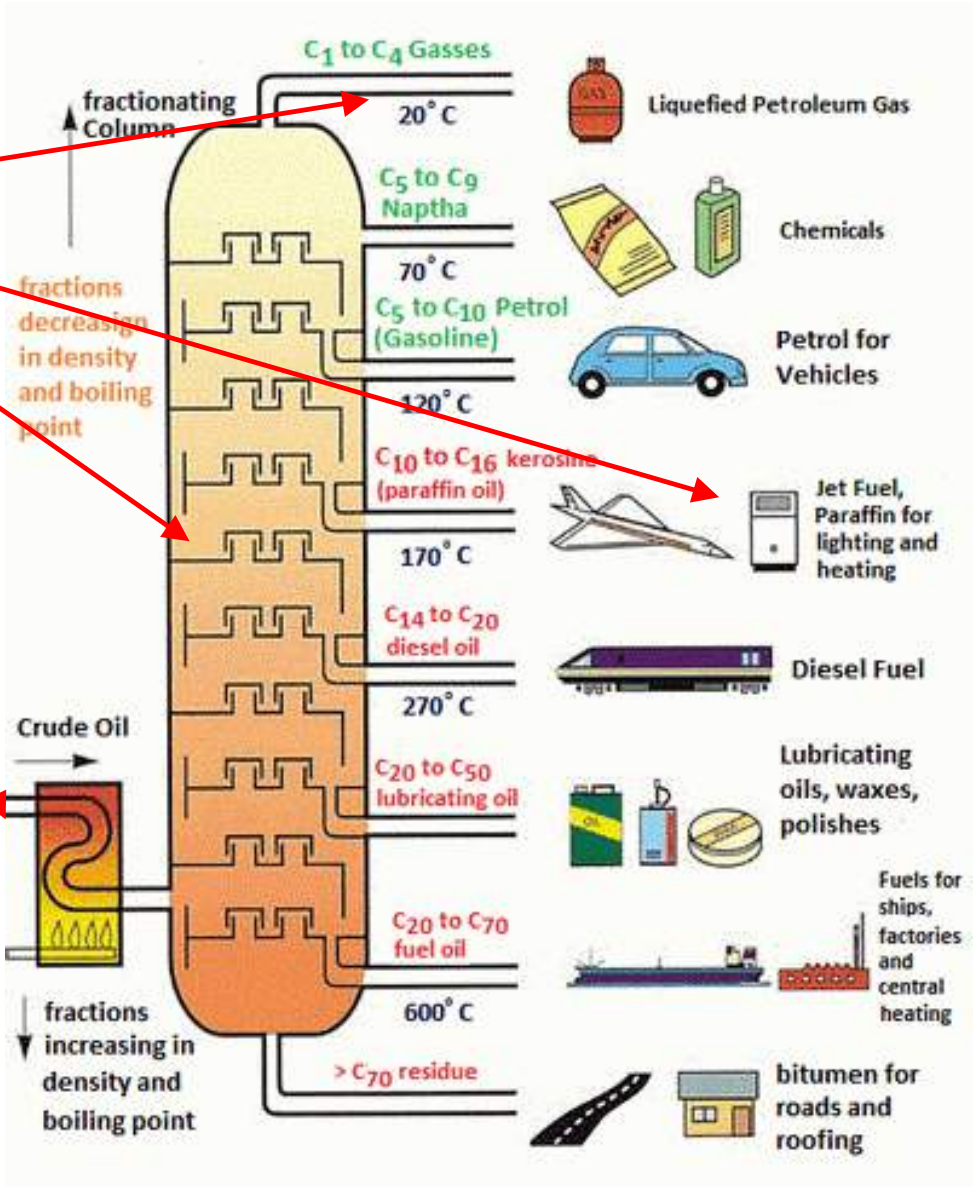
3) **Speed** (Rotation) management of conveyor, rolls.

4) **Flow rate** management of coating solution of steel production

4. Market Approach

(2)Oil Refining process

Temperature, Pressure,
Flow measurement
is necessary at many points



4. Market Approach

(3)Semiconductor manufacturing process

Semiconductor manufacturing has many process,
And has control panel with converters and meters in each process.

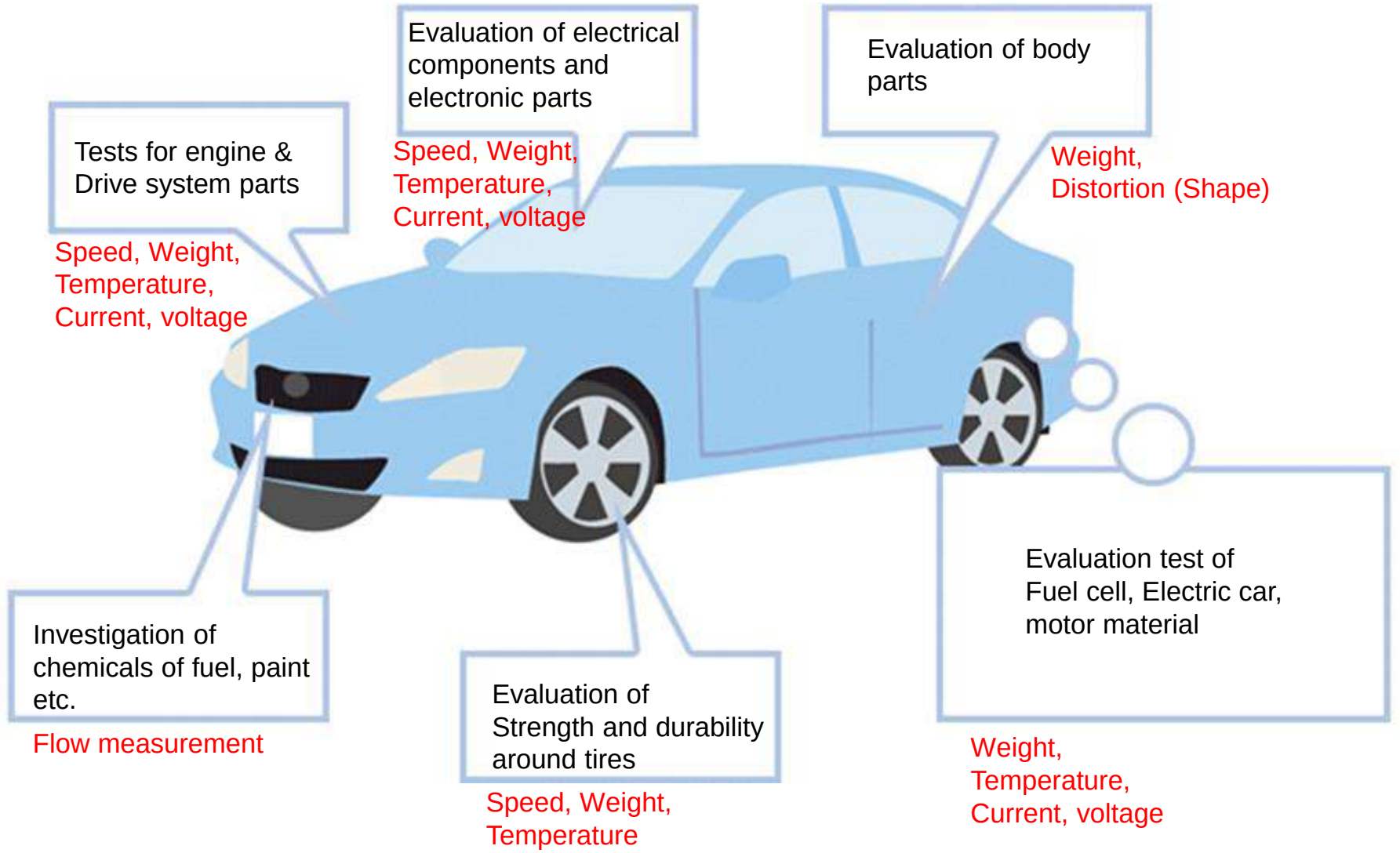
Many pipes requires management at factory

Temperature, Pressure, Flow measurement at
Piping which uses various kinds of chemicals and gas.

There are also large water treatment facilities for product washing many times.
Converters and meters are used inside the control panels

4. Market Approach

(4)Automobile manufacturing-1



4. Market Approach

(5)Automobile manufacturing-2

1) Die casting, resin molded parts

Converters are used for control boards of molding machines and casting machines.
There are facilities related to the adjustment of liquids, such as factory water treatment, machining cutting fluid preparation, etc.

· Temperature: Melting holding furnace, melt, sleeve, mold, hydraulic oil, cooling water
· Pressure / Weight : Mold clamping, injection etc.
· Speed, flow rate: Injection speed, cooling water, release agent, flow rate of molten metal etc.
· Insulation, sensor power supply: Within equipment

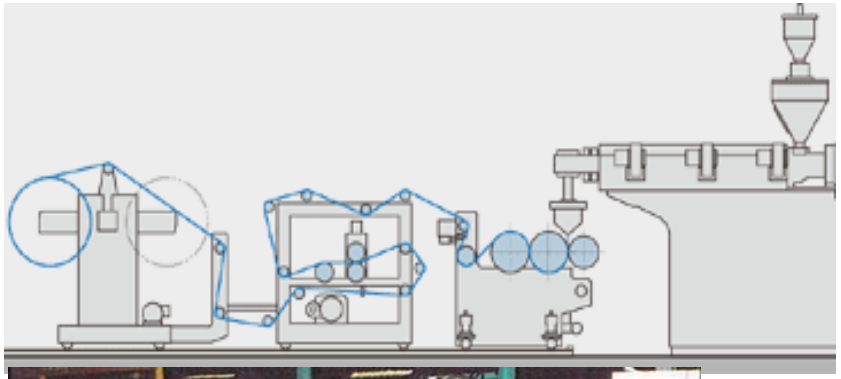
2) Press, bending, forged parts

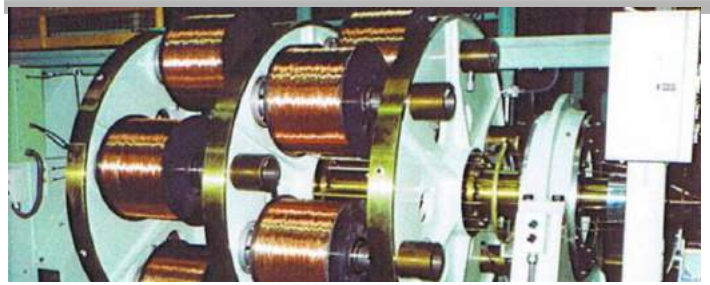
We use heavy (load cell) meter relays and transducers for press machines.

· Pressure / weight: In press machine control panel
· Temperature: In the case of forged products, sintered products, etc. Heat treatment process available
· Insulation, sensor power supply: within equipment

4. Market Approach

(6)Automobile manufacturing-3





3) Electronic parts
Various usage. Automation is progressing in most manufacturing processes, and various management and quality confirmation are required.

· Temperature: Measurement of temperature rise at current application. Heat treatment. Thermal shock test.
· Pressure / Weight: Tension control of wire rods, pressure impairment treatment, etc.
· Speed, flow rate: Resin material, fluid sealed
· Insulation, sensor power supply: Within each device
· Current, Voltage: Withstand voltage test, magnetic property check etc.

4) Sheet, wire material
Originally different. We summarized Roll to roll as a common item. Control to eliminate sagging is essential.

· Pressure / weight: Tension control, cutting process, etc.
· Rotation / Speed: Speed Control of Roll Delivery
· Insulation, sensor power supply: Within each device
· Current, Voltage: Withstand voltage test, magnetic property check etc.

Thank you!