

**§ BOX TRANSDUCER §**  
**SMALL SIZED AC MULTI-TRANSDUCER**

**生産終了製品**  
 DISCONTINUED PRODUCT  
**DAIICHI**

**Use**

This device meets the needs of space/man-hour saving of a distribution board measurement related to the development of centralized monitoring of electric power system. By connecting to only one circuit of electric power system, measurement and analog/pulse output of 3 current circuits, 3 voltage circuits, electric power, reactive power, power factor, frequency, and electric energy are possible.



**QT2-93A**  
 (120 × 120 × 130mm/1.0kg)

**Features**

1. Smallest in the industry 120×120×130mm, 1kg.
2. Compatible with DIN rail mounting
3. With switchable measurement range selection for intrinsic power, intrinsic reactive power, power factor, frequency.
4. Limiter of output is settable (upper limit +1%, lower limit -1%).
5. var and cosφ are switchable for power flow measurement.
6. Polarity of LAG/LEAD output of power factor are switchable (standard: LAG side +)

**Type code designation**

(1) (2) (3) (4) (5) (6)  
**QT2** - **93** **A** - **10** - **33** - **1**

(1)

Mark	Series name
QT2	QT2 series

(2)

Mark	Dimensions (mm)
93	120X120X130

(3)

Mark	Contents
A	With auxiliary supply

(4)

Mark	Number of measuring element
2-11	2-11 in total

(5)

Mark	Kind of circuit
12	Single phase 2 wire circuit
13*1	Single phase 3 wire circuit
33	3 phase 3 wire circuit
34*2	3 phase 4 wire circuit

(6)

Mark	Output method
1	DC output

\*1 Voltage element output of single phase 3 wire measurements becomes full scale 300V between RT at rating 100V, but the output between RN and TN can be changed to full scale 300V or 150V by DIP switch S12.

S12: OFF: full scale 300V

ON: full scale 150V

\*2 Measurement of 3 phase 4 wire is voltage balanced type.

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Specification code

<b>Input rating</b>		<b>Output element selection</b>						<b>Output</b>	<b>Auxiliary power</b>
<b>A</b>	<b>V</b>	<b>A</b>	<b>V</b>	<b>W</b>	<b>var</b>	<b>cos</b>	<b>Hz</b>	<b>Wh</b>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Input rating specification

Mark	A	V [those in the case of 3 phase 4 wire are indicated in ( ) ]
0	No specification	No specification
1	0-5A *1	0-150V (0-150/ 3V) *2
2	0-1A *1	0-300V (0-300/ 3V) *3
Z	Other than those above	Other than those above

- \*1. Rated VA consumption is 0.1VA.
- \*2. Rated voltage is 110V (110/ 3V) . Rated VA consumption is 0.25VA.
- \*3. Rated voltage is 220V (220/ 3V) . Rated VA consumption is 0.5VA.

Output element selection specifications

Mark	A	V	W	var	cosφ	Hz	Wh
0	Not available	Not available	Not available	Not available	Not available	Not available	Not available
1	1 element: A <sub>R</sub>	1 element: V <sub>RS</sub> (V <sub>RN</sub> )	Available	Available	Available	Available	Available
2	2 elements: A <sub>R</sub> , A <sub>T</sub>	2 elements: V <sub>RS</sub> , V <sub>ST</sub> (V <sub>RN</sub> , V <sub>TN</sub> )	-	-	-	-	-
3	3 elements: A <sub>R</sub> , A <sub>S</sub> , A <sub>T</sub>	3 elements: V <sub>RS</sub> , V <sub>ST</sub> , V <sub>TR</sub> (V <sub>RN</sub> , V <sub>SN</sub> , V <sub>TN</sub> )	-	-	-	-	-
Z	Other than those above	Other than those above	Other than those above	Other than those above	Other than those above	Other than those above	-

- Mark Z in W, var, cosφ and Hz is the case of a measurement range not included in the following. Also, specify it if the measuring phase of current/voltage 1 or 2 element is different from those above (specifying As for 1 element, for example) .
- Phase voltage measurement is indicated in the parentheses. (Full scale of phase voltage is 150/√3V. Please specify it separately if you want a product of changed full scale.)

Output specifications

Mark	A, V, W, var, cosφ, Hz	Mark	A, V, W, var, cosφ, Hz
1	0-100mV ( 1kΩ)	8	±5V ( 600Ω)
2	0-1V ( 1kΩ)	9	±10V ( 2kΩ)
3	0-5V ( 600Ω)	A	0-1mA ( 10kΩ)
4	0-10V ( 2kΩ)	B	4-20mA ( 550Ω)
5	1-5V ( 600Ω)	C	±1mA ( 10kΩ)
6	±100mV ( 1kΩ)	Z	other than those above
7	±1V ( 1kΩ)		

Auxiliary supply specifications

Mark	Description
1	AC90-242V (50/60Hz) (Rated voltage 100/110V) 13VA (Rated voltage 200/220V) 13VA DC88-143V 10W (Rated voltage 110V) AC/DC
2	DC24V±15% 10W
3	DC48V±15% 10W
Z	Other than those above

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Manufacturing range of power energy output pulse unit kWh/pulse (place an order or specify it in the following product range)

Full load power (kW)	Manufacture range of power energy output pulse unit kWh/pulse				Multiplying factor (reference)
	1	0.1	0.01	0.001	
kW<10	1	0.1	0.01	0.001	0.1
10 kW <100	10	1	0.1	0.01	1
100 kW <1,000	100	10	1	0.1	10
1,000 kW <10,000	1,000	100	10	1	100
10,000 kW <100,000	10,000	1,000	100	10	1,000

Note: do not forget to specify VT ratio, CT ratio and output pulse unit (kWh/pulse) when ordering a power energy output pulse. Product may be handled as a specialty goods by the rating of VT or CT.

Manufacture range

Measuring objective		AC rated input range			Frequency	DC rated output range
AC current		1A, 5A			50/60Hz	±0.1-±10V or ±0.1-10mA + 20mA
AC voltage		50-300V			50/60Hz	
Active power	Single phase	50-240V	1A, 5A	(110V, 5A) ±250-600W	50/60Hz	
				(220V, 5A) ±500-1,200W		
3 phase 3 wire or 3 phase 4 wire	50-240V	1A, 5A	(110V, 5A) ±500-1,200W	50/60Hz		
			(220V, 5A) ±1,000-2,400W			
Reactive power	Single phase	50-240V	1A, 5A	(110V, 5A) ±200-600var	50/60Hz	
				(220V, 5A) ±400-1,200var		
3 phase 3 wire or 3 phase 4 wire	50-240V	1A, 5A	(110V, 5A) ±400-1,200var	50/60Hz		
			(220V, 5A) ±800-2,400var			
Power factor	Single phase	50-240V	1A, 5A	LEAD 0-1-LAG 0	50/60Hz	
	3 phase 3 wire or 3 phase 4 wire			LEAD 0.5-1-LAG 0.5		
Frequency		50-240V	-	45-65Hz	-	
auxiliary supply		(1) AC90-242V (Rated voltage AC100/110V, 200/220V) DC88-143V (Rated voltage DC110V) AC/DC (2) DC24V±15% (3) DC48V±15%				

The following specifications are not manufacturable. Please consider other transducer such as AC transducer of 80 series.

Item	Contents
Response time	<0.5 sec. *1
Input frequency	Product which input frequency exceeds the range 45-65Hz
Input	Line voltage of 3 phase 4 wire

\*1 It becomes less than 1 sec. in the case of output specification 100mV.

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Descriptions of front switches



- UP setting for output adjustment (push SW)
- DOWN setting for output adjustment (push SW)
- MAX./OFF/BIAS switching (slide SW) for output adjustment
- Element No. setting for output adjustment (rotary SW)
- Scaling function DIP SW on front of box.

DIP SW	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	OFF (0)	ON (1)
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Measurement range (DIP switches of standard product are all set to zero. Specify in the case of others.) A setting change of the DIP switches becomes effective by a power restoration.

DIP switches

OFF(0)	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	*1
ON(1)												

\*1. Use a S12 which is in factory preset state.

DIP SW			Input 110V 5A (1A)	Input 220V 5A (1A)
S1	S2	S3	W measurement range	
0	0	0	0-1kW (0-200W)	0-2kW (0-400W)
0	0	1	0-833W (0-166.6W)	0-1.666kW (0-333.3W)
0	1	0	0-750W (0-150W)	0-1.5kW (0-300W)
0	1	1	0-500W (0-100W)	0-1kW (0-200W)
1	0	0	±1kW (±200W)	±2kW (±400W)
1	0	1	±833W (±166.6W)	±1.666kW (±333.3W)
1	1	0	±750W (±150W)	±1.5kW (±300W)
1	1	1	±500W (±100W)	±1kW (±200W)

DIP SW		Input 110V 5A (1A)	Input 220V 5A (1A)
S4	S5	var measurement range	
0	0	LAG/LEAD 1kvar (LAG/LEAD 200var)	LAG/LEAD 2kvar (LAG/LEAD 400var)
0	1	LAG/LEAD 833var (LAG/LEAD 166.6var)	LAG/LEAD 1.666kvar (LAG/LEAD 333.3var)
1	0	LAG/LEAD 750var (LAG/LEAD 150var)	LAG/LEAD 1.5kvar (LAG/LEAD 300var)
1	1	LAG/LEAD 500var (LAG/LEAD 100var)	LAG/LEAD 1kvar (LAG/LEAD 200var)

DIP SW		cosφ measurement range
S6		
0		(LEAD) 0.5-1-0.5 (LAG)
1		(LEAD) 0-1-0 (LAG)

DIP SW			Hz measurement range
S8	S9		
0	0		45-55Hz
0	1		55-65Hz
1	0		45-65Hz
1	1		-

Consult with us for measurement range of W, var, cosφ and Hz not included in the table above. Measurement range switching of the element becomes unavailable.

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Setting of output limiter

Correction at the time of power flow measurement

Polarity of power factor output

DIP SW	Output limiter
S11	
0	Without output limiter (standard)
1	With output limiter

DIP SW	Correction at the time of power flow measurement
S10	
0	Without reverse power flow correction (standard)
1	With reverse power flow correction

DIP SW	cosφ polarity
S7	
0	LAG side as output upper limit (standard)
1	LEAD side as output upper limit

**Element number setting for output adjustment**

Corresponding to each element number. (See the table below)

Output elements being set become adjustment objectives, UP/DOWN switches become effective.

Output No.	1	2	3	4	5	6	7	8	9	10
Setting element (3 phase 3 wire)	Output 1 A1 (phase R)	Output 2 A2 (phase S)	Output 3 A3 (phase T)	Output 4 V12 (RS line)	Output 5 V23 (ST line)	Output 6 V31 (TR line)	Output 7 W	Output 8 var	Output 9 cosφ	Output 10 Hz

**MAX./OFF/BIAS switching (MAX./BIAS) for output adjustment**

Selector switch for MAX. and BIAS adjustment of specified element. Also, UP/DOWN switches become ineffective by setting to OFF all of the time when not performing setting.

**UP setting (UP) for output adjustment**

Raises the output value of a chosen adjustment objective, fine adjustment is available by pushing it briefly, and coarse adjustment by pushing it continuously.

**DOWN setting (DOWN) for output adjustment**

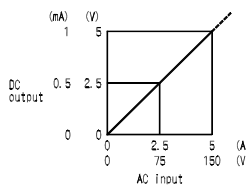
Drops the output value of a chosen adjustment objective, fine adjustment is available by pushing it briefly, and coarse adjustment by pushing it continuously.

**Input/output relationship diagram(1/2)**

**Current/voltage**

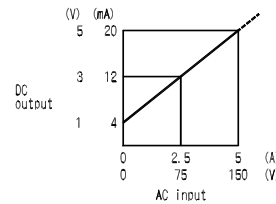
B-1

Input	Output
5A	5V or 1mA
150V	



B-2

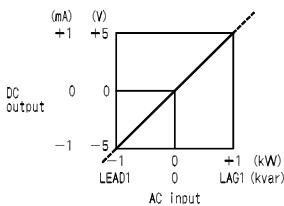
Input	Output
-5A	4-20mA or 1-5V
0-150V	



**AC power/reactive power**

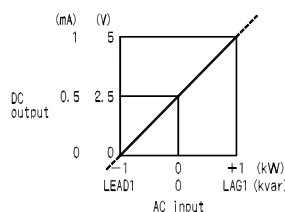
B-3

Input	Output
±1kW	±5V or ±1mA
LEAD 1kvar- LAG 1kvar	-5+5V or -1+1mA



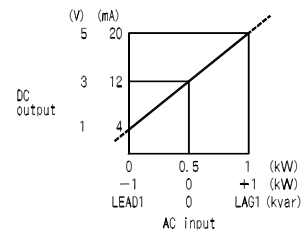
B-4

Input	Output
-1kW+1kW	0-5V or 0-1mA
LEAD 1kvar- LAG 1kvar	



B-5

Input	Output
0-1kW	4-20mA or 1-5V
-1kW+1kW	
LEAD 1kvar-LAG 1kvar	



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Specifications and functions

Item	Specifications
Tolerance	AC voltage $\pm 0.5\%$ (percentage error against output span) AC current $\pm 0.5\%$ (percentage error against output span) AC power $\pm 0.5\%$ (percentage error against output span) AC reactive power $\pm 0.5\%$ (percentage error against output span) Power factor $\pm 1.5\%$ (percentage error against output span) Frequency $\pm 0.5\%$ (percentage error against output span) Electric energy power factor 1: $\pm 2.0\%$ power factor: 0.5 (Delay): $\pm 2.5\%$ (pursuant to normal level)
Influence of temperature	$23 \pm 10$ tolerance %
Characteristics	AC/DC transducer in conformity with JIS C1111-1989 in tolerance, Normal electric energy meter in conformity with JIS C1216-1995 in tolerance
Response time	Time it takes to fall within $\pm 1\%$ of the final steady-state value when applied an rated input. 1 sec.
Output ripple	1% P-P against output span
External adjustment of output	BIAS, MAX adjustable by front switch. Both $\pm 5\%$ adjustable against output span (fine adjustment possible). However, Wh can not be adjusted from outside.
Pulse output	Electric energy pulse output Photo MOS FET relay 1a contact Maximum contact capacity AC/DC 125V 70mA (resistance load, inductive load) Output pulse width 250ms $\pm 20\%$
Overload capacity	Voltage circuit: 2 times of rated voltage (10 sec.) 1.2 times (continuity) Current circuit: 40 times of rated current (1 sec.) 20 times (4 sec.) 10 times (16 sec.) 1.2 times (continuity) Auxiliary supply: 1.5 times (10 sec.) 1.2 times (continuity) 1.3 times at the time of DC110V
Output line surge	1250A 8/20 $\mu$ s, positive/negative polarity
Insulation resistance	Between input terminal, output terminal, auxiliary supply terminal and outer case (earth): 50M at DC500V Between output (except pulse output) and pulse output: 50M at DC500V Non-insulation (minus common) between outputs (except pulse output)
Commercial frequency withstand voltage	Between input terminal, output terminal, auxiliary supply terminal and outer case (earth): AC2, 000 (50/60Hz) for 1 min. Between output (except pulse output) and pulse output: AC1, 500 (50/60Hz) for 1 min. Non-insulation (minus common) between outputs (except pulse output)
Lightning impulse withstand voltage	Between electric circuit and outer case (earth): 5kV 1.2/50 $\mu$ s positive/negative polarity 3 times each Between all input and output terminals 5kV 1.2/50 $\mu$ s positive/negative polarity 3 times each
Noise withstand	SWC noise: in conformity with ANSI C37.90a standard, when applying repeatedly an attenuated oscillatory waveform of 1-1.5MHz, peak voltage 2.5-3kV, no damage occurs. (power source, voltage circuit, current circuit) Output error within $\pm 10\%$ Spike noise: no destruction or a malfunction occurs when applying repeatedly a spike noise of 100ns, 1 $\mu$ s for 5 min.. power source, voltage circuit, current circuit Normal/common mode 1.5kV Pulse output Common mode 1kV Output circuit (except pulse output) Induction 1kV Output error within $\pm 10\%$ Radio noise: error within $\pm 10\%$ when continuously irradiating a radio wave of 150MHz, 400MHz, 900MHz band at 5W 1m. Electrostatic noise: no damage at 10kV
Oscillation and impact	Oscillation: 16.7Hz, 19.6m/s <sup>2</sup> 1 hour for each direction of X, Y, Z and 10-55Hz sweep Impact: 490m/s <sup>2</sup> Direction X, Y, Z 3 times each
Structure	Material Terminal block: fire-retardant ABS (V - 0) Box: fire-retardant ABS (V - 0) Terminal cover: polycarbonate Appearance color: black (Munsell N1.5) Terminal screw: Input, auxiliary supply, earth terminal: M4 screw Output terminal: M3 screw
Operating temperature/humidity range	-10+55 , 30-85%RH
Storage temperature range	-25+70

1. Due to the principle of operation, the error grows bigger when measuring the following inverter output directly.

(1) AV error becomes 2% and W 3% in the case of SCR phase angle control.

Please use A: AETT2-91A, V: VETT2-91A, W: WTT2-92A-□ if accuracy is required.

(2) Can not be used in the case of cycle control. Use the following products instead.

A: AETT2-82AC, V: VETT2-82AC, W: WTT2-83AC-12 or 33

2. Analog output terminal (-) becomes an internal electric common.

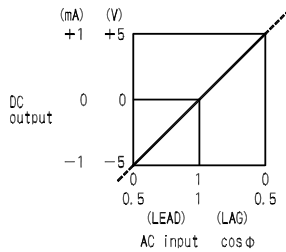
Input/output relationship diagram(2/2)

Power factor

Output becomes approximately equal to power factor 1 when input voltage is 0V or input current is 0A.

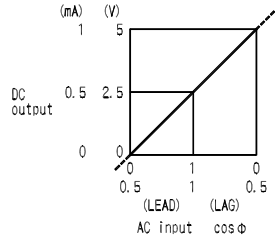
B-6

Input	Output
LEAD 0-1-LAG 0	-5~0~+5V, or -1~0~+1mA
LEAD 0.5-1-LAG 0.5	



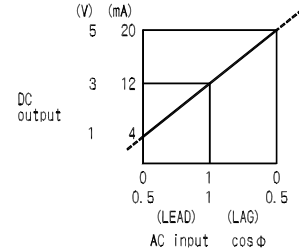
B-7

Input	Output
LEAD 0-1-LAG 0	0~2.5~5V, or 0~0.5~1mA
LEAD 0.5-1-LAG 0.5	



B-8

Input	Output
LEAD 0-1-LAG 0	4~12~20mA, or 1~3~5V
LEAD 0.5-1-LAG 0.5	

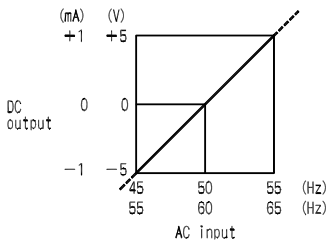


Frequency

Output becomes approximately -5V, -1mA when input voltage is 0V.

B-9

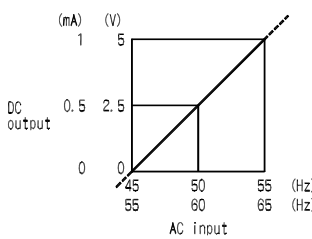
Input	Output
45~55Hz	-5~+5V, or -1~+1mA
55~65Hz	



Output becomes approximately 0V, 0mA when input voltage is 0V.

B-10

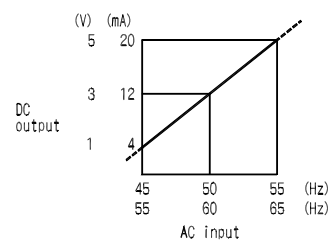
Input	Output
45~55Hz	0~5V, or 0~1mA
55~65Hz	



Output becomes approximately 1V, 4mA when input voltage is 0V.

B-11

Input	Output
45~55Hz	4~20mA, or 1~5V
55~65Hz	

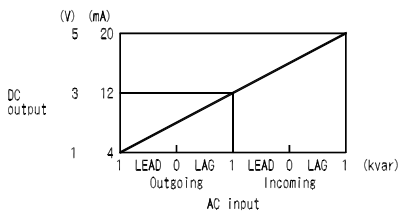


With power flow correction  
(4th quadrant output)

B-12

Reactive power

Input	Output
LEAD 1kvar- LAG 1kvar	4~20mA, or 1~5V

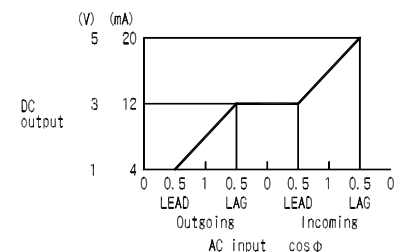
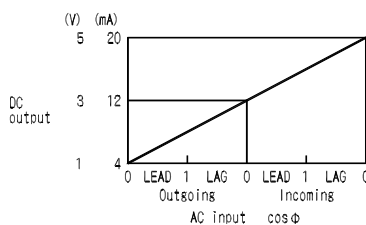


Output becomes approximately equal to power factor 1 when input voltage is 0V or input current is 0A.

B-13

Power factor

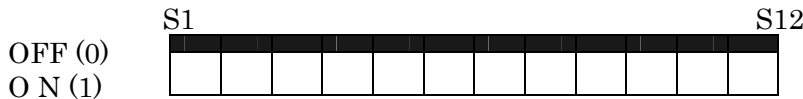
Input	Output
LEAD 0-1-LAG 0	4~20mA, or 1~5V
LEAD 0.5-1-LAG 0.5	



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Factory preset (standard) (if not being specified)  
DIP Switch



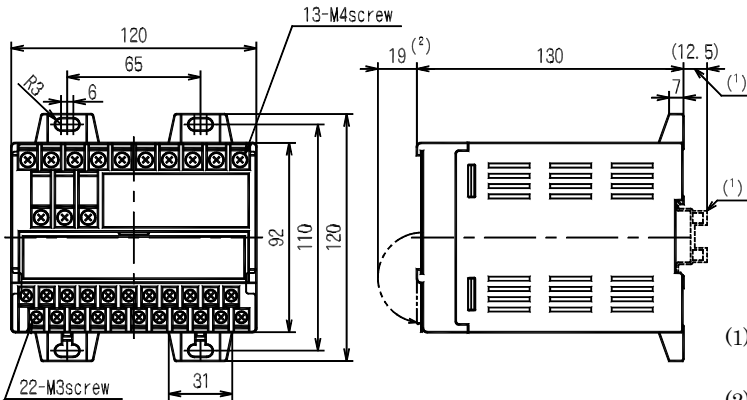
\*1

\*1 DIP switch S12: ON at the time of 3 phase 4 wire

Input rating in the case of 150V, 5A  
W measurement range: 0-1kW  
Hz measurement range: 45-55Hz  
Output limiter: No output limiter  
Correction at the time of power flow compensation: Without power flow correction

var measurement range: LEAD 1-0-LAG 1kvar  
Power factor measurement range: LEAD 0.5-1-LAG 0.5  
Power factor polarity: LAG side is output upper limit

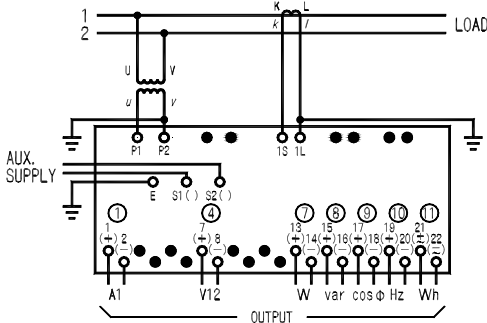
### Dimensions



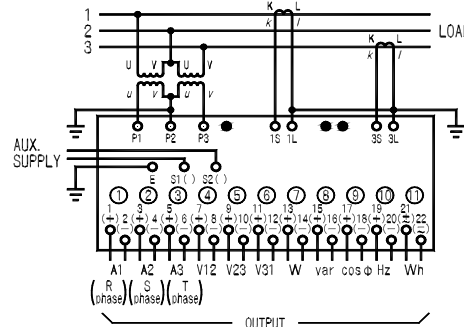
- (1) The case of mounting on a DIN rail (height 15mm). (Use a DIN standard 35mm rail)
- (2) Dimensions when switch cover is open.

### Connection diagram

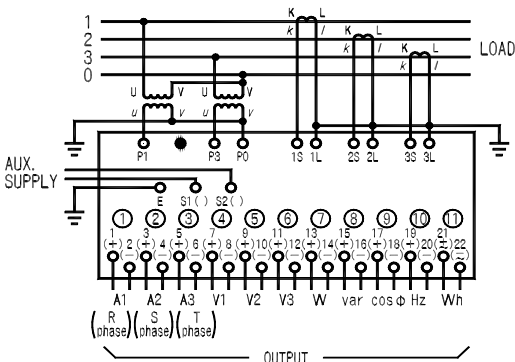
#### Single phase



#### 3 phase/single phase 3 wire (in the case of single phase 3 wire, phase 2 becomes phase N)



#### 3 phase 4 wire



It becomes S1 (+), S2 (-) in the case of DC power source.

### Purchase specifications

#### Specifications

Please specify Type code, specification and quantity.

Type                      Specification code  
**QT2-93A-10-33-1**

Note:

Please specify the objective element if you want factory preset other than standard measurement range.

Please specify VT ratio, CT ratio, unit of pulse output in the case of a product with electric energy pulse output.