

Compact Size & Superior Cost Performance Transducers

0.5 Class Transducer for Power Application

2371A – 2378A

Mounting available for panel or DIN rail

- ▶ Screw mounting
- ▶ 40 mm width (DC-DC Isolator, AC Voltage / Current / Frequency)
- ▶ 55 mm width (Power / Reactive Power / Phase / Power Factor)
- ▶ Selective from various kind of output
- ▶ 600 V AC input rating available
- ▶ Compliance with JIS C1111-1989



0.5 Class Transducer Lineup

- Available for DIN rail or panel mounting.
- Please contact with Yokogawa if not found the required transducer in this lineup.
- Multi-transducer (2479) is described in separate catalog.

Application		Model		Input rating	Output rating / External load	Tolerance	Output ripple	^{*1} Response	Frequency	Input power	Auxiliary power	Input range	Weight	
DC-DC Isolator (photo-coupler isolation)		2371A	00	DC50 mV 1 V 5 V 1-5V 1 mA 4-20 mA	5 V/1 kΩ or more 10 V/2 kΩ or more 1-5 V/1 kΩ or more 1 mA/10 kΩ or less 5 mA/2 kΩ or less 4-20 mA/500 Ω or less	±0.5% of span	1%p-p MAX	0.5 s	DC	V: 1 mA A: 500 mV drop	required	——	380g	
AC voltage, current (average rectified)		2372A	00	AC1 A 5 A 110 V 120 V 150 V 220 V 240 V 300 V 480 V 600 V	5 V/2 MΩ or more 10 V/2 kΩ or more 1-5 V/1 kΩ or more 1 mA/ ^{*4} 5 mA/2 kΩ or less 4-20 mA/500 Ω or less	±0.5% of span	1%p-p MAX	1 s	45-65 Hz	1 VA	^{*4} not req'd for 5 V, 1 mA,	——	350g	
AC voltage, current (RMS rectified)		2373A	00		10 mV/10 kΩ or more 5 V/2 MΩ or more 10 V/2 kΩ or more 1-5 V/1 kΩ or more 1 mA/ ^{*4} 5 mA/2 kΩ or less 4-20 mA/500 Ω or less	±0.5% of span	1%p-p MAX	1 s	45-65 Hz	1 VA	but req'd for others	——	350g	
AC volt, current (true RMS rectified)		2374A	00		same as 2371 A	±0.5% of span	1%p-p MAX	0.5 s	45-10 kHz	0.5 VA	required	——	320g	
Power	1ø2w	2375A	10	110 V/1 A	^{*2} (±) 10 mV/10 kΩ or more (±) 5 V/1 kΩ or more (±) 10 V/2 kΩ or more 1-5 V/1 kΩ or more (±) 1 mA/10 kΩ or less (±) 5 mA/2 kΩ or less 4-20 mA/500 Ω or less 4-12-20 mA/500 Ω or less	±0.5% of span	1%p-p MAX	0.7 s	45-65 Hz	V: 3 VA in w/o aux power, 1 VA in w/ aux power	not required	V: ± 10% w/o aux power, 0-120% w/ aux power A: 0-200% of rating	450g	
	1ø3w		20									V: ± 10% w/o aux power, 20-120% w/ aux power A: 0-200% of rating	450g	
	3ø3w		30											
	3ø4w		40											
Reactive power	1ø2w	2376A	10	110 V/1 A	± 10 mV/10 kΩ or more ± 5 V/1 kΩ or more ± 10 V/2 kΩ or more 1-5 V/1 kΩ or more ± 1 mA/10 kΩ or less ± 5 mA/2 kΩ or less 4-12-20 mA/500 Ω or less	±0.5% of span	1%p-p MAX	0.7 s	45-65 Hz	A: 1 VA		or required	V: ± 10% w/o aux power, 20-120% w/ aux power A: 0-200% of rating	450g
	1ø3w		20										V: ± 10% w/o aux power, 20-120% w/ aux power A: 10-140% of rating	370g
	3ø3w		30											
	3ø4w		40											
Phase	1ø2w	2377A	10	120 V/1 A	± 10 mV/10 kΩ or more ± 6 V/1.2 kΩ or more 1-5 V/1 kΩ or more ± 1 mA/10 kΩ or less ± 5 mA/2 kΩ or less 4-12-20 mA/500 Ω or less	±2°	1%p-p MAX	0.5 s	45-65 Hz	V: 2.5 VA in w/o aux power, 0.5 VA in w/ aux power	or required		V: ± 10% w/o aux power, 50-120% w/ aux power	370g
	1ø3w		20										V: ± 10% w/o aux power, 50-120% w/ aux power A: 10-140% of rating	370g
	3ø3w		30											
	3ø4w		40											
Power factor	1ø2w	2377A	11	120 V/1 A	same as 2376 A	±3° (when ±60°)	1%p-p MAX	0.5 s	45-65 Hz	A: 1 VA		or required	V: ± 10% w/o aux power, 50-120% w/ aux power	370g
	1ø3w		21										V: ± 10% w/o aux power, 50-120% w/ aux power A: 10-140% of rating	370g
	3ø3w		31											
	3ø4w		41											
Frequency		2378A	01	45-55 Hz 110,220 V 120,240 V	same as 2371 A	±0.1Hz	1%p-p MAX	1 s	45-55 Hz	1.5 VA in w/o aux power, 0.5 VA in w/ aux power	not required		V: ± 10% w/o aux power, 50-120% w/ aux power	320g
			02						55-65 Hz 110,220 V 120,240 V					
			03	45-65 Hz 110 V 120 V 220 V 240 V	5 V/2 kΩ or more 10 V/2 kΩ or more 1-5 V/1 kΩ or more 1 mA/10 kΩ or less 5 mA/2 kΩ or less 4-20 mA/500 Ω or less 4.5-6.5 V/2 kΩ or more 4.5-6.5 mA (1500 Ω or less)	±0.2Hz	1%p-p MAX	1 s	45-65 Hz					

Auxiliary power supply: AC 100/110 V, 120 V, 200/220 V, 240 V ±15%, consumption: 2 VA
DC 24 V/48 V ±15%, 85-143 V consumption: 1.5 W

*1 Response time is to reach 99% of output.

*2 Power flow measurement results in output of + or - polarity. Output polarity code to be specified.

*3 Type of no auxiliary power needs auxiliary power code to be specified.

*4 5V/1 kΩ or more and 1 mA/10 kΩ or less: auxiliary power required.

237 A — — — — —

Specified item at order

- model
- input rating, output rating
- reactive power, phase, power factor needs relation of input(lead, lag) and output polarity.
- auxiliary power supply
- caribration power, reactive power (for power, reactive power meter)
- VT ratio, CT ratio

[illegible]

output rating code	DC voltage								DC current					
	5V	10V	±10mV	±5V	±6V	±10V	4.5-6.5V	1-5V	1mA	5mA	±1mA	±5mA	4-20mA	4.5-6.5mA
model	VLS	VMT	VHB	VLU	VLV	VMS	VMB	VLR	AFA	AFX	AFB	AFZ	AHE	AGF
2371A	○	○						○	○	○			○	
2372A	○	○						○	○	○			○	
2373A	○	○						○	○	○			○	
2374A	○	○						○	○	○			○	
2375A	○	○	○	○		○		○	○	○	○	○	○	
2376A			○	○		○		○			○	○	○	
2377A□0			○	○	○			○			○	○	○	
2377A□1			○	○		○		○			○	○	○	
2378A ⁰¹ ₀₂	○	○						○	○	○			○	
2378A ⁰³	○	○					○	○	○	○			○	○

Specific Features

- Compact width 40 mm

40 mm: DC-DC Isolator, AC current, AC voltage and Frequency.
55 mm: Power, Reactive power, Phase and power Factor
Terminal cover: provided for every type.

- Auxiliary power applications

Applicable from non auxiliary power to AC or DC auxiliary power.

- Various output signals

Constant voltage outputs: 5 V, 10 V, 1 - 5 V
Constant current outputs: 1 mA, 5 mA, 4-20 mA
Especially, the constant current type can connect a load corresponding to 10 V. So, it can stand with long distance wiring for such telemeter transmission and general industrial measurement.

- True RMS rectified type 2374A

For general application and high harmonic distortion wave caused by thyristor, the true RMS rectified type with logarithm conversion is recommended.

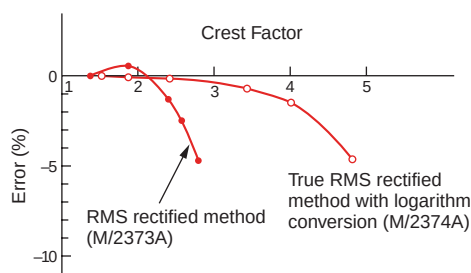


Fig-1 Relation between Crest factor and error in alternating current transducer

General Specification (JIS C1111-1989 complied)

Type of Input: Floating
Working Temp.: -10-+50°C
Working Humidity: 20-85% R.H.
Storage Temp.: -20-+60°C
Instant Over-load: Current - - - 10 times 5sec at rating
40 times 1sec at rating
Voltage - - - 2 times 10sec at rating
Output adjustable range: more than $\pm 3\%$ (depend on rating)
External adjustment is available.
Insulation: 500 V DC, more than 100 M Ω
- between terminal and case.
- between each terminal (input, output, ground and auxiliary power terminal)
Withstand: 1) 2,600 V AC, 50/60 Hz, 1 minutes
- between input terminal and case (including ground)
- between input and output terminal
- between auxiliary power terminal and input terminal or case (including ground)
2) 1,000 V AC, 50/60 Hz, 1 minutes
- between output terminal and case (including ground)
Impulse: 5,000 V, (1.2 $\times$ 50) μ sec
- between whole of input and power terminal and external case
- between whole of input and output and external case
Casing: 1) Case
Firing retardant ABS resin (equal to UL94-V0)
2) Terminal board
Glass-fiber contained PBT (equal to UL94-V0)
3) Terminal cover
Clear poly-carbonade
4) Color : Black
Terminal screw: M4
Dimensions: Refer to outline drawing
Accessory: Instruction Manual

Manufacturing variation of power/reactive power transducer

The transducer without specification code is adjusted by the following.

	Standard Rating		1 phase 2 wires	1 phase 3 wires 3 phase 3 wires 3 phase 4 wires
	Voltage	Current		
Power	110 V	1 A	($\pm$) 100 W	($\pm$) 200 W
	110 V	5 A	($\pm$) 500 W	($\pm$) 1,000 W
	220 V	1 A	($\pm$) 200 W	($\pm$) 400 W
	220 V	5 A	($\pm$) 1,000 W	($\pm$) 2,000 W

($\pm$) means polarity of power.

	Standard Rating		1 phase 2 wires	1 phase 3 wires 3 phase 3 wires 3 phase 4 wires
	Voltage	Current		
Reactive power	110 V	1 A	$\pm$ 100 var	$\pm$ 220var
	110 V	5 A	$\pm$ 500 var	$\pm$ 1,000var
	220 V	1 A	$\pm$ 200 var	$\pm$ 400var
	220 V	5 A	$\pm$ 1,000 var	$\pm$ 2,000var

In case of model with external CT, VT, the following will be manufacturable.

	Standard Rating		Manufacturable Calibration Watts	
	Voltage	Current	1 phase 2 wires	1 phase 3 wires 3 phase 3 wires 3 phase 4 wires
Power	110 V	1 A	($\pm$) 72 - ($\pm$) 164W	($\pm$) 125 - ($\pm$) 285W
	110 V	5 A	($\pm$)360 - ($\pm$) 820W	($\pm$) 625 - ($\pm$) 1,400W
	220 V	1 A	($\pm$)144 - ($\pm$) 328W	($\pm$) 250 - ($\pm$) 570W
	220 V	5 A	($\pm$)720 - ($\pm$)1,640W	($\pm$)1,250 - ($\pm$) 2,850W

($\pm$) means polarity of power.

	Standard Rating		Manufacturable Calibration Vars	
	Voltage	Current	1 phase 2 wires	1 phase 3 wires 3 phase 3 wires 3 phase 4 wires
Reactive power	110 V	1 A	$\pm$ 72 - $\pm$ 164var	$\pm$ 125 - $\pm$ 285var
	110 V	5 A	$\pm$ 360 - $\pm$ 820var	$\pm$ 625 - $\pm$ 1,400var
	220 V	1 A	$\pm$ 144 - $\pm$ 328var	$\pm$ 250 - $\pm$ 570var
	220 V	5 A	$\pm$ 720 - $\pm$ 1,640var	$\pm$ 1,250 - $\pm$ 2,850var

Also manufacturable with the following condition

Input Power (Reactive) Range	Tolerance	Response
40 to less than 65%	$\pm$ 1.0% of span	less 1 sec
25 to less than 40%	$\pm$ 2.0% of span	less 1 sec

100% input 1 ϕ 2 wires = rating voltage $\times$ rating current
1 ϕ 3 wires = 2 $\times$ rating voltage (PI-N) $\times$ rating current
3 ϕ 3 wires = $\sqrt{3}$ $\times$ rating voltage $\times$ rating current
3 ϕ 4 wires = 3 $\times$ rating phase voltage $\times$ rating current

Calculation for external mounting VT, CT

$$\text{Power transducer input (p)} = \frac{\text{Rating}}{\text{VT ratio} \times \text{CT ratio}}$$

Please check that the results of the above calculation is within manufacturing variation.

Ex.1 In case of rating 3 ϕ 3 wires 20 kW, VT440/110 V, CT30/5 A

$$P = \frac{20 \text{ kW}}{(440/110) \times (30/5)} = 833 \text{ W} \text{ --- Available}$$

Ex.2 In case of 1 ϕ 2 wires 7.5 kW, VT660/110 V, CT20/5 A

$$P = \frac{7.5 \text{ kW}}{(660/110) \times (20/5)} = 312 \text{ W}$$

Tolerance is $\pm 1.0\%$ of span

In case of reactive power, the same calculation shall be applied.