

Electronic Watt/Watthour & VAR/VARhour Transducers for Three-Phase & Single-Phase Systems

WWH VVH

- Accuracy $\pm 0.25\%$ F.S.
- Measures Forward/Reverse Power & Energy
- Calibration Traceable to N.I.S.T.
- Outstanding Temperature Performance
- Excellent Long-Term Stability
- Meets ANSI/IEEE STD. (IEEE SWC) and BEAMA No. 219 Tests
- Wide Selection of Input & Output Levels



Applications

- Utility revenue metering
- Industrial power demand control

The Ametek Power Instruments Watt/Watthour (WWH) and VAR/VARhour (VVH) Transducers are versatile, compact power transducers that provide simultaneous power (watts or VARs) and energy (watthours and VARhours) measurement. The watt or VAR output is an analog signal proportional to the real or reactive power input. The output accuracy is 0.25% including the effects of current, voltage, power factor, frequency and output load. The watthour or VARhour pulses are continuously transmitted as form "C", three wire, break before make K-Y-Z Relay contact transitions.

The K-Y-Z Relay Contacts are mercury wetted, and rated at 1 billion operations to provide years of bounce free KWH counts. Both the analog and digital signals are available in bi-directional form for co-generation, interchange transactions, or lead/lag reactive power measurement.

Conversion of power and time into watthour or VARhour measurement is accomplished with analog and digital - circuitry providing a wide variety of output ranges without compromising measurement accuracy.

To complete the package Ametek Power Instruments offers a companion product, a self-contained, stand-alone register module (RM) with one or two rollover or counters for direct readout of KWH. The RM includes an internal power supply and rugged mechanical case that mounts easily on any horizontal or vertical surface.

For more information on watt/watthour, VAR/VARhour transducers, application assistance on a special project, or to place an order, consult your nearest Ametek Sales Office.

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Transducers

WWH & VWH Transducers

APPLICATION GUIDE (TABLE NO. 1)

MODEL NUMBER		CONNECTION	VOLTAGE	LOAD
WATT/WATTHOUR	VAR/VARHOUR			
WWH-15*	VWH-15*	1 phase	unrestricted	unrestricted
		3 phase / 3 wire	balanced	balanced
WWH-20	VWH-20	3 phase / 3 wire	unrestricted	unrestricted
WWH-25	VWH-25	3 phase / 4 wire	balanced	unrestricted
WWH-30	VWH-30	3 phase / 4 wire	unrestricted	unrestricted

*Specify single-phase or three-phase calibration.

POTENTIAL OPTIONS (TABLE NO. 2)

OPTIONS	NOMINAL	A2 OPTION	
		SELF POWERED	EXTERNALLY POWERED
P1	120 VAC	85-150 VAC	0-150 VAC
P2	240 VAC	170-300 VAC	0-300 VAC
P3	480 VAC	300-550 VAC	0-500 VAC
Potential Burden Maximum (at normal input)		10VA	.05 VA
Potential Overload Withstand		1.5 x normal rating, continuous	

POWER SUPPLY OPTIONS (TABLE NO. 3)

OPTIONS	EXTERNAL POWER SUPPLY		
	NOMINAL	RANGE	BURDEN MAXIMUM (AT NOMINAL INPUT)
		A2	
E0, self powered	none required for self-powered unit		N/A
E1 } E2 } E3 } externally powered	120 240 440	85-150 170-300 300-550	10 VA 10 VA 10 VA

CURRENT OPTIONS (TABLE NO. 4)

OPTIONS	CURRENT INPUT			CURRENT OVERLOAD WITHSTAND		
	NOMINAL	OVER RANGE WITH FULL ACCURACY	BURDEN (MAXIMUM)	CONTINUOUS AT 65° C	3 SEC./ HOUR	1 SEC./ HOUR
C1 A2 only	0-1 Amps	0-1.5 Amps	0.25 VA	10 Amps	20 Amps	50 Amps
C2 A2 only	0-2 Amps	1-3.0 Amps	0.25 VA	10 Amps	40 Amps	100 Amps
C5	0-5 Amps	0-7.5 Amps	0.25 VA	20 Amps	100 Amps	250 Amps
C10 A2 only	0-10 Amps	0-15 Amps	0.50 VA	20 Amps	250 Amps	400 Amps

ANALOG OUTPUT OPTIONS, WATT OR VAR (TABLE NO. 5)

OPTIONS	OUTPUT			
	RANGE (F.S.)	CURRENT LIMITING	LOAD	COMPLIANCE
X1 } X5 } X10 } X20 } A2 only	0± 1 mADC 0± 5 mADC 0± 10 mADC 0± 20 mADC	— — 15-20 mADC 30-40 mADC	0-10K 0-3K 0-1.5K 0-750	± 11 volts ± 15 volts ± 15 volts ± 15 volts
XA } XB } X (0-VDC)	4-20 mADC (unipolar power) 4-12-20 mADC (bipolar) DC voltage, ± 10 V max	30-40 mADC 30-40 mADC —	0-750 0-750 —	+ 15 volts + 15 volts —

DIGITAL OUTPUT OPTIONS WATTHOUR OR VARHOUR (TABLE NO. 6)

OPTIONS	OUTPUT - WATTHOUR OR VARHOUR	CONTACT RATING	CONTACT LIFE
Y1	Uni-directional — single 3-wire output	100 VA, 2 A, and 500V maximum, resistive load)	10 ⁹ operations
Y2	Bi-directional — dual 3-wire outputs		

FREQUENCY OPTIONS (TABLE NO. 7)

OPTIONS	CALIBRATION FREQUENCY
F50	50 Hz $\pm$ 2 Hz
F60	60 Hz $\pm$ 2 Hz

MOUNTING ORIENTATION (TABLE NO. 8)

OPTIONS	ORIENTATION (MOUNTING PLATE)
H0	horizontal mounting $\pm$ 30°
H1	vertical mounting $\pm$ 30°

CALIBRATE ADJUSTMENT OPTIONS (TABLE NO. 9)

OPTIONS	CALIBRATE ADJUSTMENT	ZERO ADJUSTMENT
	WITH ACCURACY OPTION A2	WITH ACCURACY OPTION A2
W0 (standard)	$\pm$ 10%	$\pm$ 2%
W1 (extended)	50-125%	$\pm$ 2%
W2 (extended)	75-200%	$\pm$ 2%

CALIBRATION (TABLE NO. 10)

Standard Digital Option: 1 count (contact transfer)/watthour or VARhour, specify option ZDO.

Standard Analog Option: Full scale calibration, watts or VARs, determined by multiplying value in Table 10A by factor shown in Table 10B. Specify option ZAO.

Non-Standard Digital Option: State desired counts per hour at the secondary of the PT and CTs and indicate the PT and CT ratios.

Non-Standard Analog Option: Indicate fullscale value in watts or VARs, or provide fullscale load, PT & CT ratios. Specify option ZA1.

TABLE 10B

POTENTIAL INPUT OPTIONS	CURRENT INPUT OPTION		
	C1 (0-1)	C2 (0-2)	C5 (0-5)
P1	100	200	500
P2	200	400	1000
P3	400	800	2000

TABLE 10A

FOR MODEL NUMBER	MULTIPLY BY
WWH/VVH-15 1 phase connection	1
WWH/VVH-15 3 phase connection	2
WWH/VVH-20	2
WWH/VVH-25, 30	3

ACCURACY (TABLE NO. 11)

OPTION	ACCURACY	Accuracy includes the effects of:
A2	$\pm$ 0.1% F.S. typical $\pm$ 0.25% F.S. worst case	• potential, within range • current, within range • power factor, within range • frequency, nominal • load, within range • humidity, within range • ambient temperature 25°C $\pm$2°C • external power supply, within range

Operating Temperature Range: -20° to +65°C

Operating Humidity: 0-99%, non-condensing

Output Ripple, Peak: 1% for option A2

Response Time (to 99%): 400 m.s.

Power Factor Range: Unity to lead or lag zero

Self Powered: Available with option E0 (A2 only)

Isolation: 2000 V rms, minimum, Input/Output/Power/Case

Influences Affecting Accuracy:

Temperature: $\pm$ 0.25%, max. for option X1 from -20° to +65° C
 $\pm$ 0.5%, max. for all other output options from
-20° to +65° C

Long Term Stability: $\pm$ 0.25%/year, max., noncumulative

Frequency: $\pm$ 0.1%/Hz max. from 50 or 60 Hz, $\pm$ 10 Hz, for all
watt/watthour transducers $\pm$ 3% max. up to 450 Hz

External Magnetic Field

Less than 0.01% of rated output with a magnetic field of 100
ampere-turns produced by a straight conductor six-feet long
carrying a current of the same frequency and phase as the
applied voltage and positioned in any direction 10 inches from the
center of the unit.

Size: See outline dimensions on page 8.20

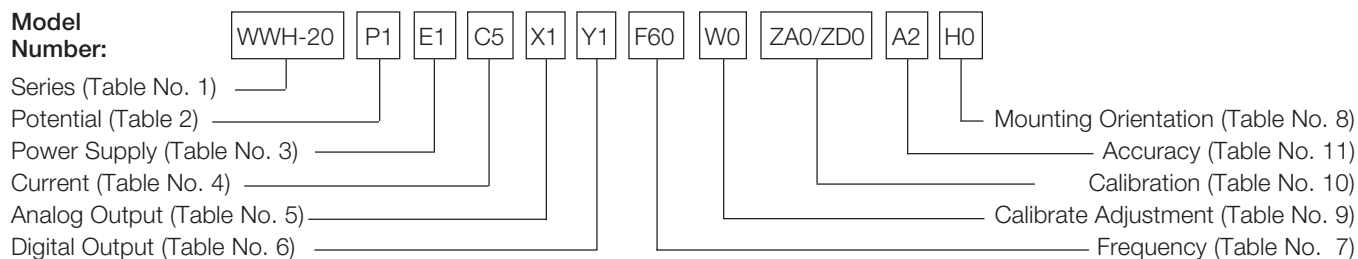
Orientation: see table 8.

Weight (nominal): 6.5 pounds (2.95 kilos)

Ordering Information:

To avoid delays in delivery, always specify by model number and appropriate option suffixes in the order shown in the following example. No order is complete unless all suffixes are specified.

**Model
Number:**

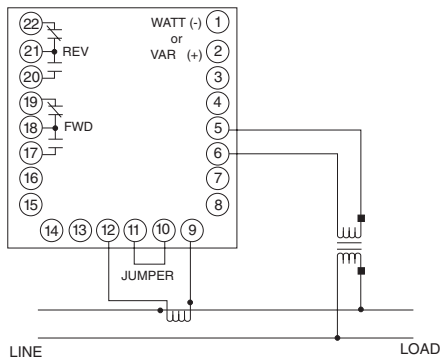


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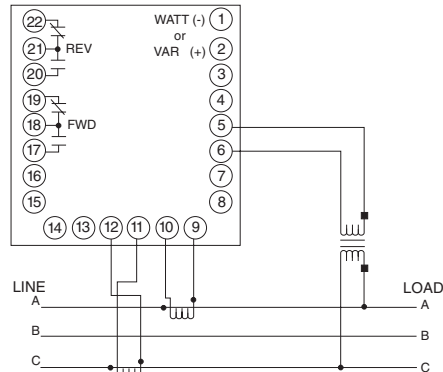
Connection Diagrams & Outline Dimensions

WWH-15 & VWH-15 Single-Phase Connection Unrestricted



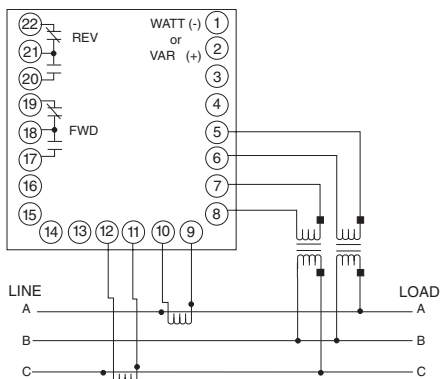
Connect external power to terminals 15 and 16.

WWH-15 & VWH-15 Three-Phase Connection Balanced Load



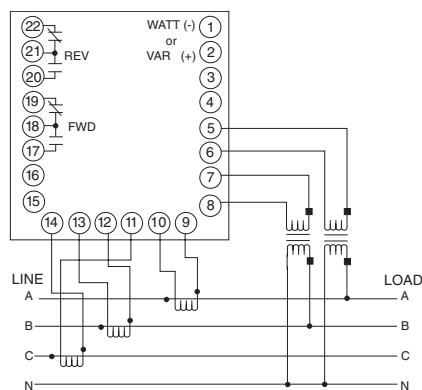
Connect external power to terminals 15 and 16.

WWH-20 & VWH-20 Unrestricted



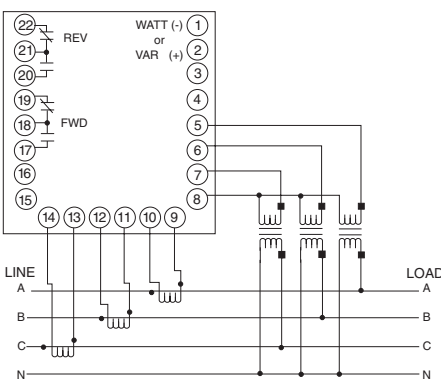
Connect external power to terminals 15 and 16.

WWH-25 & VWH-25 Balanced Load



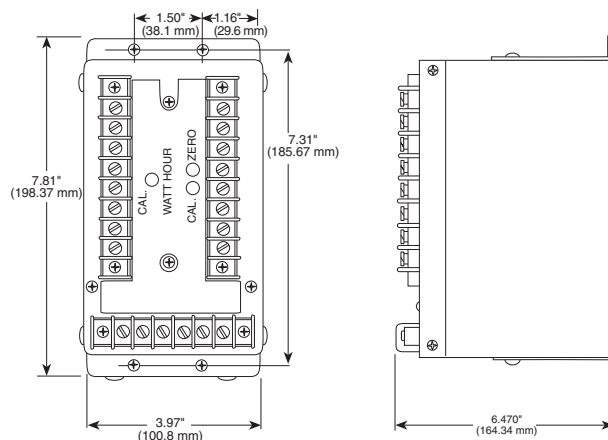
Connect external power to terminals 15 and 16.

WWH-30 & VWH-30 Balanced Load



Connect external power to terminals 15 and 16.

Outline Dimensions, All Models



Above transducers are also available in rack-mounted configurations.

Display Register Module for WWH and VVH Transducers

RM-10

RM-20

- Single or Dual Displays
- Non-Volatile Display Register
- Self-Contained Power Supply
- Dual Displays for Forward and Reverse Energy Metering Applications
- Meets ANSI-C37.90.1-1974 IEEE SWC and BEAMA No. 219 Tests



The Ametek Power Instruments watthour and VARhour register modules are an optional companion product to the Ametek watt/watthour (WWH) and VAR/VARhour (VVH) transducers. The RM-10 single register module will accumulate and visually display the total watthour or VARhour pulses from the WWH or VVH electronic transducers.

The RM modules can be ordered with these options:

- Single display for uni-directional (co-generation) energy readings.
- Resettable or non-resettable displays
- Re-transmitting mercury-wetted relays for interfacing to remote displays or centralized data acquisition systems.
- A wide range of external power supply inputs

General Specifications

Display Register Operation:

The non-volatile display will register one count for each transfer of the input (bi-stable Form C, 3-wire). RM display modules have a typical life of 10^8 counts.

Operating Temperature Range: -20° to +70°C

RM-10 Single Display Register Input

Characteristics: Single Form C relay, 3-wire, SPDT dry contact. Maximum rate 15,500 counts per hour.

RM-20 Dual Display Register Input

Characteristics: Dual Form C relay, 3-wire, SPDT dry contact each input. Maximum rate 15,500 counts per hour.

Visual Output:

Digit height: 0.125" (3.18mm)
6 digit display: resettable via push-button
8 digit display: non-resettable

Re-Transmitting Relay Output Option:

Isolated mercury-wetted contact relay (single or dual), Form C, 3-wire SPDT. Contact rated for 2 Amps at 100 VA and 500 Volts resistive. The relay output is a bi-stable device with one normally open and one normally closed contact. Each time a count registers, both contacts change state.

Weight: Approximately 3.9 lbs. (1.7kg)

For more information on the Register Module, application assistance on a special project or to place an order, call your nearest Ametek sales office.

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Specifications

Type and Quantity of Display Registers (Table 1)

OPTION	RM-10 (SINGLE DISPLAY REGISTER)	OPTION	RM-20 (DUAL DISPLAY REGISTER)
R1	One 6-digit register Resettable (Useable with Y1 option on the WWH-VVH Transducer	R2	Two 6-digit registers Resettable (Useable with Y2 option on the WWH-VVH Transducer
R3	One 8-digit register No-resettable (Useable with Y1 option on the WWH/VVH Transducer).	R4	Two 8-digit register No-resettable (Useable with Y2 option on the WWH/VVH Transducer).

External Power Option (Table 2)

OPTION	EXTERNAL POWER	SUPPLY (Nominal)	OPERATING RANGE	TYPICAL RANGE
E1	120 VAC	50/60 Hz	85-150	1.5 VA
E2	240 VAC	50/60 Hz	170-300	1.5 VA
E3	480 VAC	50/60 Hz	300-550	1.5 VA

Re-transmitting Relay Option (Table 3)

OPTION	RELAYS
B0	No Re-transmitting Relays
B1	One Re-transmitting Relay
B2	Two-Re-transmitting Relays

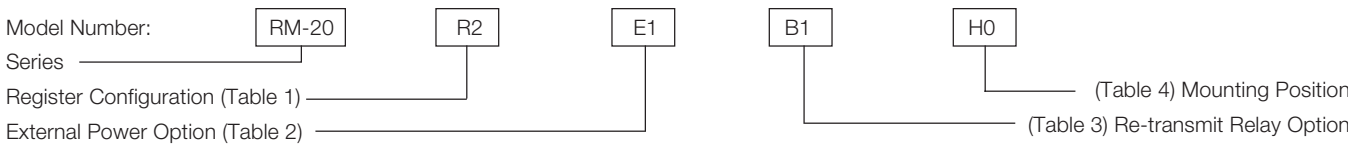
Mounting Orientation (Table 4)

OPTION	ORIENTATION (MOUNTING PLATE)
H0	Horizontal Mounting $\pm 30^\circ$
H1	Vertical Mounting $\pm 30^\circ$

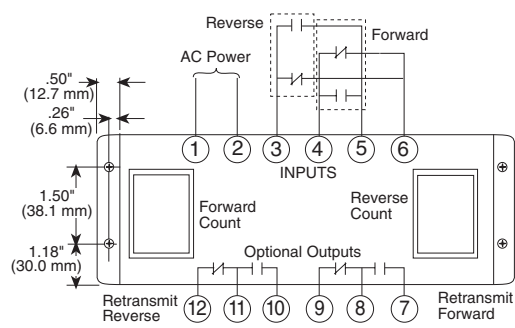
Ordering Information

To avoid delays in delivery, always specify by model number and appropriate option suffixes.

The order is complete with all suffixes are specified



Connection Diagram



Outline Dimensions

