AC WATT/WATTHOUR & VAR/VARHOUR TRANSDUCERS *MODELS* GH- VGH-

ACCURATE TO 0.2% OF READING

DESCRIPTION

The GH Watt/Watthour Transducer provides an analog output proportional to time-averaged instantaneous true power and a relay closure or TTL pulse output calibrated in terms of Watthours of energy consumption by the load. Accuracy is ±0.2% of reading.

A Model VGH VAR/VARhour transducer provides an analog output proportional to time-averaged instantaneous reactive power and a relay closure or TTL pulse output calibrated in terms of VARhours for reactive energy. Accuracy is ±0.2% of reading.

In addition, they are used extensively for sub-metering, generation control and appliance testing to verify compliance with federal standards.

Models are available in 1-, 2-, 2½-, or 3-element configuration. Bidirectional Watt and Watthour or VAR and VARhour outputs are available.

5 YEAR WARRANTY

FEATURES

- Accurate regardless of variations in voltage, current, power factor, or load.
- Available with 1-, 2-, 2½- or 3-element configurations.
- Bidirectional Watt/Watthours available.
- Leading/Lagging VARs/VARhours available.
- Accuracy maintained over wide temperature range.
- Calibration traceable to **NIST**.

APPLICATIONS

- Equipment monitoring for process control.
- Integration into energy management systems or a variety of sub-metering applications.
- Measurement using direct connections, current and/or potential transformers.

50Hz models available: Add suffix **"-50"** to part number

SINGLE-PHASE, TWO-WIRE MODELS WITH INTERNAL SENSOR (ONE-ELEMENT)

INPUTS		F.S. WATTS or VARS	STANDARD GH- OR VGH-						RELAY OPTIONS (ADD SUFFIX) *			
AC VOLTS	AC AMPS		0-±1mAdc	0-±10Vdc	4-20mAdc	4-12-20mAdc	0-±5Vdc	Wh RELAY *	"-T"	"-R"	"-H"	"-K"
0 to 150	0 to 1	100	103B	103D	103E	103EM	103X5	1Wh/Cnt	Wh relay is replaced with a 5Vdc, TTL-compatible pulse.	A second Wh relay or pulse is provided to allow bidirectional (Forward/ Reverse) energy measurement	Wh relay is replaced with a solid-state, Form C (SPDT) relay	Wh relay is replaced with a solid-state, Form C (SPDT) relay operating in "KYZ" format (50% duty cycle)
	0 to 2.5	200	106B	106D	106E	106EM	106X5	1Wh/Cnt				
	0 to 5	500	001B	001D	001E	001EM	001X5	1Wh/Cnt				
	0 to 10	1000	010B	010D	010E	010EM	010X5	1Wh/Cnt				
	0 to 20	2000	019B	019D	019E	019EM	019X5	1Wh/Cnt				
0 to 300	0 to 1	200	104B	104D	104E	104EM	104X5	1Wh/Cnt				
	0 to 2.5	500	107B	107D	107E	107EM	107X5	1Wh/Cnt				
	0 to 5	1000	002B	002D	002E	002EM	002X5	1Wh/Cnt				
	0 to 10	2000	011B	011D	011E	011EM	011X5	1Wh/Cnt				
	0 to 20	4000	020B	020D	020E	020EM	020X5	1Wh/Cnt				
0 to 600	0 to 1	500	105B	105D	105E	105EM	105X5	1Wh/Cnt				
	0 to 2.5	1000	108B	108D	108E	108EM	108X5	1Wh/Cnt				
	0 to 5	2000	003B	003D	003E	003EM	003X5	1Wh/Cnt				
	0 to 10	4000	012B	012D	012E	012EM	012X5	1Wh/Cnt				
	0 to 20	8000	021B	021D	021E	021EM	021X5	1Wh/Cnt				

All standard units require 115Vac instrument power.
Optional 230Vac instrument power - Add suffix **"-22"**
Optional self-powered models - Add suffix **"G"**

To calculate unit scaling when using Current and/or Potential Transformers (CTs or PTs), multiply the base unit scaling by the CT and/or PT ratio.
Example: GH-001D used with 100:5 CTs
CT ratio = 100/5 = 20, so F.S. Watt input = 500W x 20 = 10,000W (0-10kW input = 0-10V output)
Wh Relay scaling = 1Wh/Cnt x 20 = 20Wh/Cnt

*To specify a custom Wh count (pulse) rate, add a "/" suffix to the base model number followed by the desired F.S. counts (pulses) per hour. Range of Available Count (Pulse) Rates:
Min Count (Pulse) Rate ..... All Models 50/hr
Max Count (Pulse) Rate ..... Relay Models ..... 12k Counts/hr
Pulse Models .....12M Pulses/hr

Count (Pulse) rates over 9k/hr will have the contact closure (pulse duration) adjusted for a 50% duty cycle at F.S. input. (maximum count rate).

Example: GH-002D-T/500K indicates a F.S. pulse rate of 500k pulses/hr. F.S. Watt input for this model is 1000W. The new Wh per pulse scaling is 0.002Wh/pulse (1000W/500k cts/hr) and pulse duration is 3.6ms ±10% (500k/3600)/2.

For self-powered models, input voltage ranges are limited to: 95-135V for 150V models
200-280V for 300V models
380-550V for 600V models

ORDERING INFORMATION

Example: Single-Phase, 120V, 5A Input with ±0-10Vdc Output proportional to ±0-500 Watts, TTL Pulse Output for Watthours, Each Pulse Proportional to 1.0 Watthour.
GH-001D-T

ORDERING INFORMATION

Example: Single-Phase, 120V, 5A Input with ±0-10Vdc Output proportional to ±0-500 VARs, Self-Powered, 1.0 VARhour per Relay Count.
VGH-001DG

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THREE-PHASE, THREE-WIRE MODELS WITH INTERNAL SENSOR (TWO-ELEMENT)

INPUTS		F.S. WATTS or VARS	STANDARD GH- OR VGH-						RELAY OPTIONS (ADD SUFFIX) *			
AC VOLTS	AC AMPS		0-±1mAdc	0-±10Vdc	4-20mAdc	4-12-20mAdc	0-±5Vdc	Wh RELAY *	"-T"	"-R"	"-H"	"-K"
0 to 150	0 to 1	200	120B	120D	120E	120EM	120X5	1Wh/Cnt	Wh relay is replaced with a 5Vdc, TTL-compatible pulse.	A second Wh relay or pulse is provided to allow bidirectional (Forward/ Reverse) energy measurement	Wh relay is replaced with a solid-state, Form C (SPDT) relay	Wh relay is replaced with a solid-state, Form C (SPDT) relay operating in "KYZ" format (50% duty cycle)
	0 to 2.5	500	129B	129D	129E	129EM	129X5	1Wh/Cnt				
	0 to 5	1000	004B	004D	004E	004EM	004X5	1Wh/Cnt				
	0 to 10	2000	013B	013D	013E	013EM	013X5	1Wh/Cnt				
	0 to 20	4000	022B	022D	022E	022EM	022X5	1Wh/Cnt				
0 to 300	0 to 1	400	121B	121D	121E	121EM	121X5	1Wh/Cnt				
	0 to 2.5	1000	130B	130D	130E	130EM	130X5	1Wh/Cnt				
	0 to 5	2000	005B	005D	005E	005EM	005X5	1Wh/Cnt				
	0 to 10	4000	014B	014D	014E	014EM	014X5	1Wh/Cnt				
	0 to 20	8000	023B	023D	023E	023EM	023X5	1Wh/Cnt				
0 to 600	0 to 1	800	122B	122D	122E	122EM	122X5	1Wh/Cnt				
	0 to 2.5	2000	131B	131D	131E	131EM	131X5	1Wh/Cnt				
	0 to 5	4000	006B	006D	006E	006EM	006X5	1Wh/Cnt				
	0 to 10	8000	015B	015D	015E	015EM	015X5	1Wh/Cnt				
	0 to 20	16000	024B	024D	024E	024EM	024X5	10Wh/Cnt				

THREE-PHASE, FOUR-WIRE MODELS WITH INTERNAL SENSOR (THREE-ELEMENT)

INPUTS		F.S. WATTS or VARS	STANDARD GH- OR VGH-						RELAY OPTIONS (ADD SUFFIX) *			
AC VOLTS	AC AMPS		0-±1mAdc	0-±10Vdc	4-20mAdc	4-12-20mAdc	0-±5Vdc	Wh RELAY *	"-T"	"-R"	"-H"	"-K"
0 to 150 L-N	0 to 1	300	125B	125D	125E	125EM	125X5	1Wh/Cnt	Wh relay is replaced with a 5Vdc, TTL-compatible pulse.	A second Wh relay or pulse is provided to allow bidirectional (Forward/ Reverse) energy measurement	Wh relay is replaced with a solid-state, Form C (SPDT) relay	Wh relay is replaced with a solid-state, Form C (SPDT) relay operating in "KYZ" format (50% duty cycle)
	0 to 2.5	750	132B	132D	132E	132EM	132X5	1Wh/Cnt				
	0 to 5	1500	007B	007D	007E	007EM	007X5	1Wh/Cnt				
	0 to 5	1500	7.5B	7.5D	7.5E	7.5EM	7.5X5	1Wh/Cnt				
	0 to 10	3000	016B	016D	016E	016EM	016X5	1Wh/Cnt				
	0 to 20	6000	025B	025D	025E	025EM	025X5	1Wh/Cnt				
0 to 300 L-N	0 to 1	600	126B	126D	126E	126EM	126X5	1Wh/Cnt				
	0 to 2.5	1500	133B	133D	133E	133EM	133X5	1Wh/Cnt				
	0 to 5	3000	008B	008D	008E	008EM	008X5	1Wh/Cnt				
	0 to 5	3000	8.5B	8.5D	8.5E	8.5EM	8.5X5	1Wh/Cnt				
	0 to 10	6000	017B	017D	017E	017EM	017X5	1Wh/Cnt				
	0 to 20	12000	026B	026D	026E	026EM	026X5	1Wh/Cnt				

PART NUMBERS 7.5 and 8.5 DENOTE 2½-ELEMENT UNITS.

*Custom Watthour or VARhour count rates available - See previous page

SPECIFICATIONS

INPUT

Voltage ..... See Tables
Current ..... See Tables
Frequency Range ..... GH (standard) 58-62Hz
VGH (standard) 60Hz
Option "**-50**" ..... GH 48-52Hz
VGH 50Hz
Power Factor ..... Any
Burden
Voltage 0.1VA/phase
Current 0.28VA/phase
Overload
Voltage ...continuous .... 150V Range 175V
300V Range 350V
600V Range 600V
Current ...continuous .... 5A Range ..... 2 X F.S.
10A Range ..... 2 X F.S.
20A Range ..... F.S.
transient ..... All Ranges, 50A 10s/hr
All Ranges, 250A 1s/hr

DIELECTRIC TEST

Input/Output/Case ..... 1800Vac (RMS)
Surge ..... Withstands IEEE SWC test

INSTRUMENT POWER

Standard ..... 115Vac ±15%, 50/60Hz, 7.5VA
Option "**-22**" ..... 230Vac ±15%, 50/60Hz, 7.5VA

OUTPUT

VGH ..... + = Lagging/ - = Leading
Wh Relay
Standard ..... Form A (SPST, N.O.) 120Vac, 0.5A
Contact closure duration 200ms
Option "**-T**" ..... Pulse ..... 5V, TTL-compatible pulse
Pulse duration 200ms
Option "**-H**" ..... Solid-state, Form C (SPDT) .. 120Vac, 0.1A
Contact closure duration 200ms
Option "**-K**" ..... Solid-state, Form C (KYZ) .. 120Vac, 0.1A
Contact closure duration ..... 50% duty cycle
For custom count rates, contact closure (or pulse) duration may be adjusted to maintain a duty cycle of approx. 50%.
Loading
"B" models ..... (0-1mAdc) 0-10kΩ
"D", "X5" models ..... (0-10Vdc, 0-5Vdc) ..... 2kΩ min.
"E", "EM" models ..... (4-20mAdc) 0-500Ω
Response Time ... (to 99%) ..... <400ms
Field Adjustable Cal. ..... ±2% min.

ACCURACY (Includes effects of voltage, current, load & PF)

GH ..... ±0.2% Rdg./PF, ±0.05% F.S.
VGH ..... ±0.2% Rdg./sinθ, ±0.05% F.S.
Analog Output Ripple ..... <0.5% F.S.

TEMPERATURE & PHYSICAL

Temperature Effect (-20ºC to 60ºC) ..... +0.005%/ºC
Operating Humidity ..... 0-95% non-condensing

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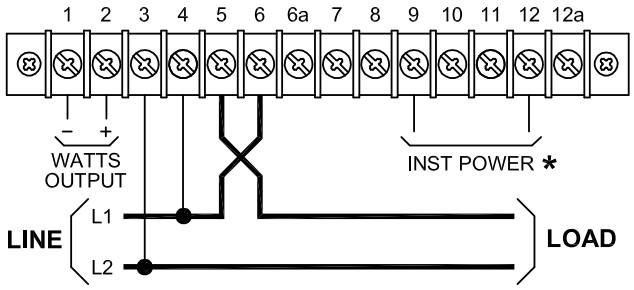
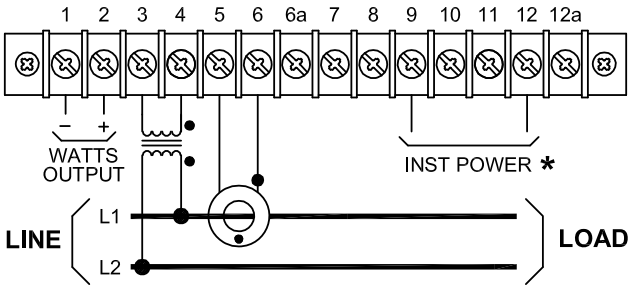
SINGLE-PHASE CONNECTIONS (ONE-ELEMENT)

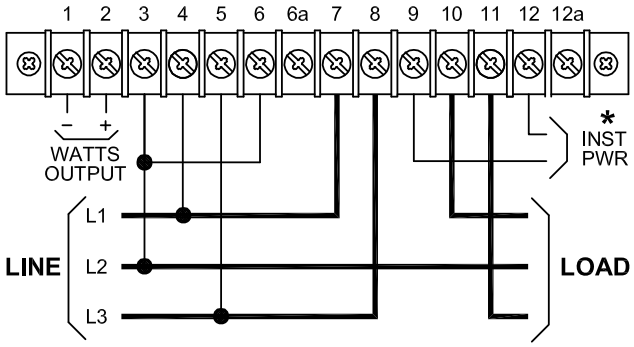


DIRECT CONNECTION



USING POTENTIAL AND CURRENT TRANSFORMERS

THREE-PHASE, THREE-WIRE CONNECTIONS (TWO-ELEMENT)



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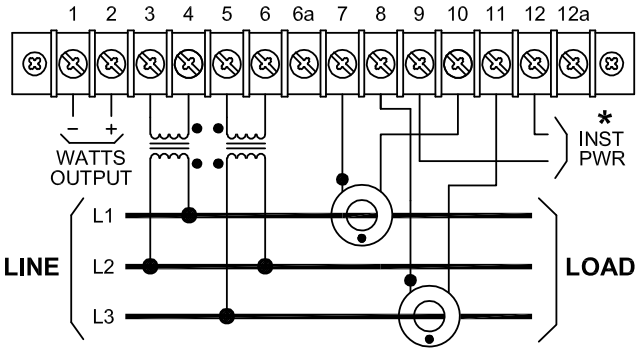
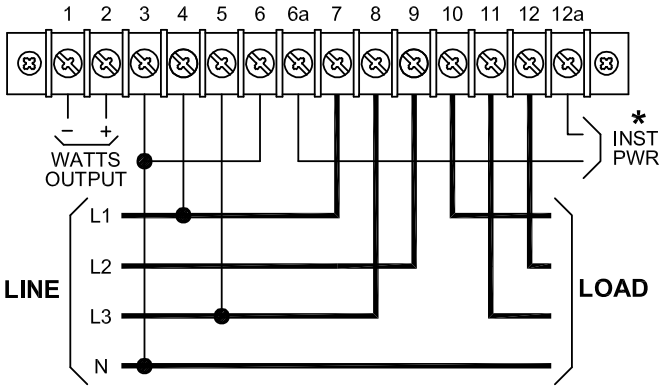
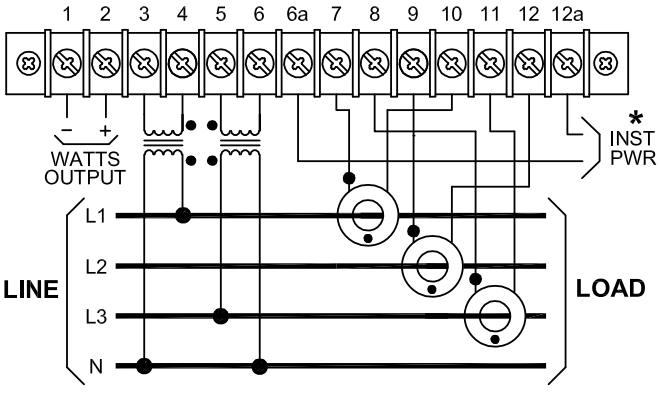


USING POTENTIAL AND CURRENT TRANSFORMERS

THREE-PHASE, FOUR-WIRE CONNECTIONS (2-1/2 ELEMENT)



DIRECT CONNECTION



USING POTENTIAL AND CURRENT TRANSFORMERS

* 115Vac ON MODELS WITH B, D, E, EM OR X5 SUFFIX.
* 230Vac ON MODELS WITH -22 SUFFIX.
* NOT REQUIRED ON MODELS WITH G SUFFIX.

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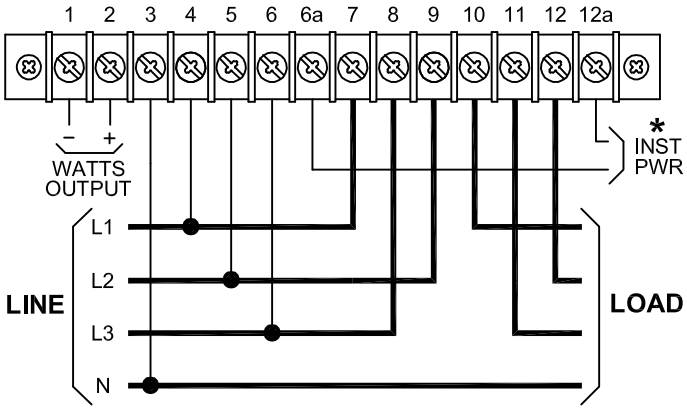
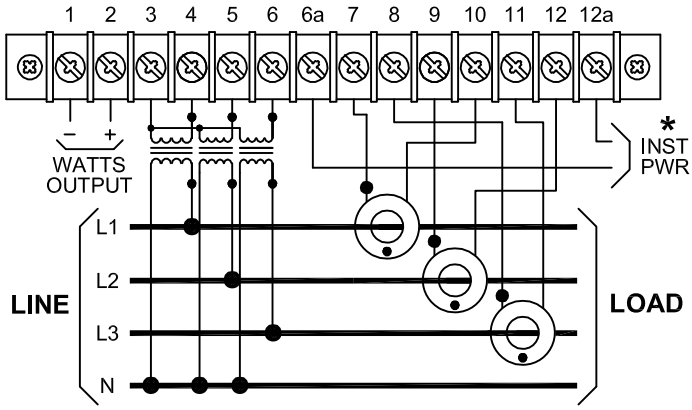
THREE-PHASE, FOUR-WIRE CONNECTIONS (THREE-ELEMENT)



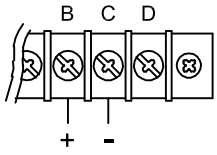
DIRECT CONNECTION



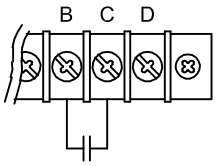
USING POTENTIAL AND CURRENT TRANSFORMERS

* 115Vac ON MODELS WITH B, D, E, EM OR X5 SUFFIX.
* 230Vac ON MODELS WITH -22 SUFFIX.
* NOT REQUIRED ON MODELS WITH G SUFFIX.

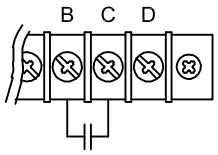
WATTHOUR OR VARHOUR OUTPUT CONNECTIONS

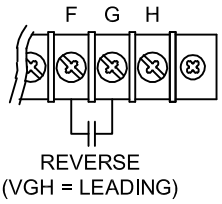


OPTION "-T"
TTL OUTPUT

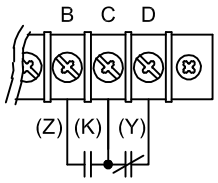


STANDARD OUTPUT
SPST RELAY
(VGH = LAGGING)

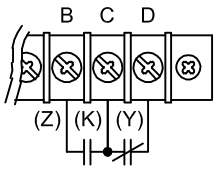


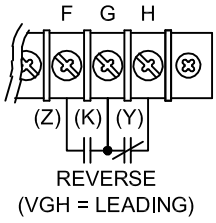


OPTION "R"
BIDIRECTIONAL
SPST RELAY



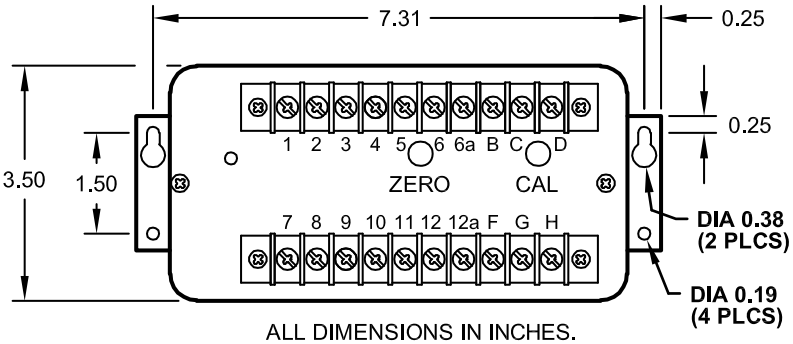
OPTION "H" OR "K"
SPDT RELAY
(VGH = LAGGING)





OPTION "RH" OR "RK"

CASE DIMENSIONS



ALL DIMENSIONS IN INCHES.

CASE HEIGHT 5.88"
1PH 2W 2.9 LBS
3PH 3W 3.3 LBS
3PH 4W 3.8 LBS

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