# WATT / WATT-HOUR / VAR / VAR-HOUR

# Model **WTx/WVx**

**Accurate Power & Energy Measurements**

**Sinewave, VFD, & SCR Applications**

**40th Harmonic Measurement per DOE Requirements**

## Microprocessor Based Digital Sampling

- **Accurate Measurement**
  Real power, reactive power, and energy
- **Bi-directional Measurement**
  Forward and reverse watts, watt-hours, leading and lagging VARs, VAR-hours

## Variety of Configurations Available

- Direct connection of 1A, 5A, & 10A
- CT inputs up to 1000A (calibrated as a system)
- Suitable for applications up to 400$V_{L-N}$/693 $V_{L-L}$
- 1, 2, and 3 element versions suitable for all 1Ø and 3Ø power systems
- Standard universal instrument power

## Frequency Range

- **WT3 & WV3 models** 48-62Hz
- **WT5 & WV5 models** 48-62Hz
- **WT6 & WV6 models** 48-62Hz, high accuracy
- **WT7 & WV7 models** 10-500Hz
- **WT9 models** up to the 40th harmonic of 60Hz

## Outputs Formats

- **Analog Output**
  Watts, VARs- 5 industry standard options, pulse output for WH only
- **Serial Communication**
  MODBUS RS422 (4-wire), MODBUS RS232, and MODBUS RS485 (2-wire)
- Custom scaling of outputs available by request

## Accuracy

- **WT3 & WV3 models** ±0.5% F.S.
- **WT5 & WV5 models** ±0.5% F.S.
- **WT6 & WV6 models**
  Watts: ±0.2% Rdg./PF, ±0.04% F.S.
  VARS: ±0.2% Rdg./sinθ, ±0.04% F.S.
- **WT7 & WV7 models** ±0.25% F.S.
- **WT9 models** ±0.2% Rdg./PF, ±0.04% F.S. including 40th harmonic of 60Hz

## Physical Specifications

- ≤1lb
- DIN Rail, 35mm or panel-mount USING 19754 adaptors

## Potential Applications

**VFD Controlled Motors**

**Energy Efficiency Certification**

**Wind Power Generation**

**Process Control Incl. SCR controllers**

**Pump Efficiency Measurement**

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04/2019

## SPECIFICATIONS

### INPUT

**Voltage**..... Nominal ..... Select from table
Range ..... With accuracy ..... 25% to 125% of Nominal
Overrange..... Without damage ..... 150% of nominal
**Current**..... Nominal ..... 1A-1000A w/ CT's
Range ..... With accuracy ..... 5% to 110% of Nominal
Overrange..... Without damage ..... 200% Nominal
**Power Factor..** . With accuracy ..... 0.5Lead - 1 - 0.5Lag
**Frequency**
Range ..... With accuracy ... Wx3/5 48-62(50/60Hz std.)
Wx6 ... 48-62(50/60Hz std.)
Wx7 ..... 10-500Hz
Wx9 ..... 50/60Hz, 40th Har.

### Burden

Voltage..... All models ..... ≤0.5mA/phase
Current ..... All models ..... ≤0.25VA/phase

### DIELECTRIC TEST

Input to Output/Inst. Pwr./Case ..... 3000V, 60Hz, 1min.
Inst. Pwr. to Output/Case ..... 3000V, 60Hz, 1min.
Output to Case..... 500V, 60Hz, 1min.

### ACCURACY (Setpoint, linearity and repeatability at 25°C)

Wx3/5 models..... ±0.5% F.S.
Wx6 models..... Watts..... ±0.2% Rdg./PF, ±0.04% F.S.
VARs ..... ±0.2% Rdg./sinθ, ±0.04% F.S.
Wx7 models..... ±0.25% F.S.
WT9 models..... ±0.2% Rdg./PF, ±0.04% F.S.

### TEMPERATURE

Range ..... Operating..... -10° to 50°C
Storage ..... -25° to 75°C
Effect..... ±0.005%/°C, ±0.05% F.S.

### PHYSICAL

Humidity..... Operating..... 95% RH non-condensing
Weight ..... ≤1lb.
Enclosure ..... Mounting ..... DIN rail, 35mm
(may be panel mounted using 19754 adaptors)
Material ..... ABS, UL94HB
Connections..... Screw terminals

### OUTPUT

**Analog**

Note: WTx models = 1 output for watts.
WVx models = 2 outputs, 1ea for watts and VARs

Type..... Select from table
Scaling..... **1** .(1Ø 2W)..... F.S. = $V_{L-N}$ (NOM) x I (NOM)
**2** .(1Ø 3W)..... F.S. = $V_{L-N}$ (NOM) x I (NOM) x 2
**3**. (3Ø 3W).F.S. = $V_{L-L}$ (NOM)/1.2 x I (NOM) x 2
**4**. (3Ø 4W)..... F.S. = $V_{L-N}$ (NOM) x I (NOM) x 3
Loading ..... **B**..... (±1mAdc) ..... ≤10kΩ
**C,D** . (±5Vdc, ±10Vdc) ..... ≥2kΩ
**E** ..... (4-20mAdc, 4-12-20mAdc) ..... ≤500Ω
Response ..... Standard (typical, to 90% F.S). ..... 50mS
**1** .(for zero-crossing SCRs) ..... 5S
Polarity..... Watt ... Pos(+) = Forward..... Neg(-) = Reverse
VAR....Pos(+) = Lagging..... Neg(-) = Leading
Ripple ..... Input frequency ≥48Hz ..... ≤±0.5% F.S.

**Pulse**

WT5,6,7,9 models = 2 Wh outputs,1ea forward/reverse
WV5,6,7,9 models = 2 Wh outputs,1ea forward/reverse
2 VARh outputs, 1ea lagging/leading

Type..... Wh..... Form C, solid-state relay
VARh..... Open collector transistor
**T** .(Wh) ..... 5Vdc, TTL compatible pulse
**K** (Wh) ..... KYZ operation, solid-state relay
Scaling..... Pulse weight is 0.0001, 0.001, 0.01, 0.1 or 1kWh/kVARh as .....required to provide best resolution while maintaining pulse rate between 1000 and 10,000 pulses per hour at F.S. input.
Solid-state relay rating ..... 125Vac/dc, 0.1A
Open collector transistor rating..... 28Vdc, 50mA
Closure / pulse duration ..... Nominal 200mS

### INSTRUMENT POWER

Standard universal..... 85-265V, 47-63Hz, ≤10VA
115-300Vdc, ≤10VA

## MODEL SELECTION

| TRANSDUCER TYPE | | SYSTEM CONFIGURATION | | INPUT VOLTAGE - NOMINAL | | | | |
|---|---|---|---|---|---|---|---|---|
| AA | Measured Parameter(s) and Features | B | Phase (no. of elements) | C | 1Ø 2W (Vac) | 3Ø 3W (Vac) | 3Ø 4W (Vac) | 1Ø 3W (Vac) |
| T3 | Watt | 1 | 1Ø2W (1 ele.) | 1 | 120VL-N | 120VL-L | 69VL-N/120VL-L | 120VL-N/240VL-L |
| T5 | Watt and Wh | 2 | 3Ø3W (2 ele.) | 2 | 240VL-N | 240VL-L | 120VL-N/208VL-L | |
| T6 | Watt and Wh, High accuracy | 3 | 3Ø4W (3 ele.) | 3 | 480VL-N | 480VL-L | 277VL-N/480VL-L | |
| T7 | Watt and Wh, Variable Frequency | 4 | 1Ø3W (2 ele.) | 4 | | | **346VL-N/600VL-L | |
| T9 | Watt and Wh, 40th Harmonic of 60Hz | | | | | | | |
| V3 | Watt and VAR | | | | | | | |
| V5 | Watt, VAR, Wh, VARh | | | | | | | |
| V6 | Watt, VAR, Wh, VARh, High accuracy | | | | | | | |
| V7 | Watt, VAR, Wh, VARh, Variable frequency | | | | | | | |

**Suitable for 400VL-N/693L-L

**W [AA] – [B] [C] – [DDD] ( [D]*) – [E] – [F] [G]** (Replace letters in boxes with selected options.)

| INPUT CURRENT - NOMINAL | | | |
|---|---|---|---|
| Direct Input (no CTs) | | With External CTs | |
| DDD | Aac | DDD(D*) | Aac |
| 001 | 1A | 100(S) | 100A |
| 005 | 5A | 200(S) | 200A |
| 010 | 10A | 300(S) | 300A |
| | | 400(S) | 400A |
| | | 500(S) | 500A |
| | | 600(S) | 600A |
| | | 800(S) | 800A |
| | | 1000(S) | 1000A |

* S indicates split-core CTs.

| ANALOG OUTPUT(S) (Watt and/or VAR) | | | |
|---|---|---|---|
| E | Type | F | Response |
| B | ±1mAdc | (blank) | 50mS (std.) |
| D | ±10Vdc | 1 | 5S |
| E | 4-20mAdc | | |
| EM | 4-12-20mAdc | | |
| X5 | ±5Vdc | | |

| PULSE OUTPUT (WH only) | |
|---|---|
| G | Type |
| (blank) | Form C, solid-state relay (std.) |
| T | 5V, TTL compatible pulse |
| K | Form C, solid-state relay, KYZ operation |

| SERIAL COMMUNICATION (replaces analog outputs) | |
|---|---|
| M2 | MODBUS RS422 (4-wire) |
| M3 | MODBUS RS232 |
| M5 | MODBUS RS485 (2-wire) |

N/A (leave blank)

| COMMUNICATION CONNECTOR | |
|---|---|
| (blank) | RJ-45 connector (std.) |
| R | External Adaptor, RJ-45 to DB9 |
| B | Screw terminals |

NOTE: Models Wx7/WT9-xx are not available with direct input or with split-core CTs. Solid-core external CTs only.

## ORDERING INFORMATION

EXAMPLE: Watt/Wh transducer, 3Ø 4W, 277VL-N/480VL-L, 200A with solid-core CTs, ±0.5%F.S. accuracy analog output is ±10V with 50mS response, pulse output is form C solid-state relay.

Analog output scaling: 0-166.2kW Input = 0-10V Output
Pulse output scaling: 0.1kWh per pulse

Model number is: **WT5-33-200-D**

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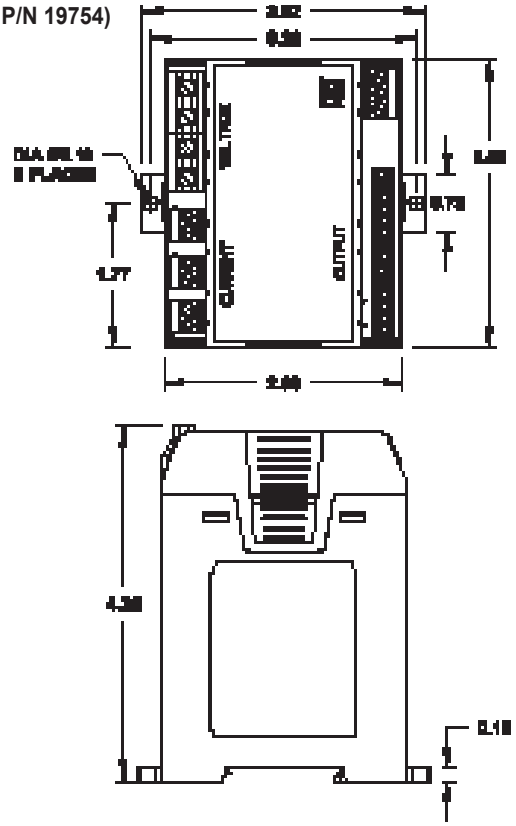
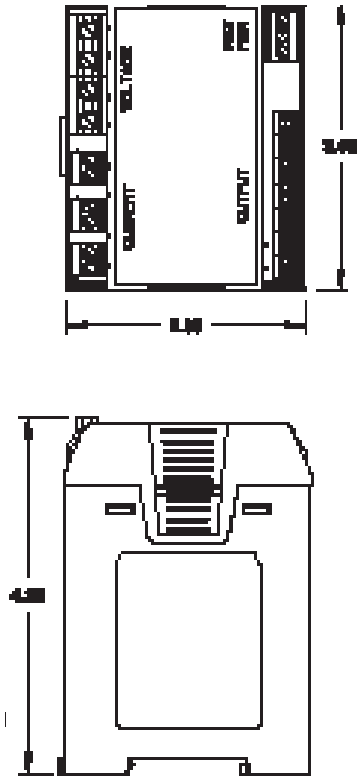
## CASE DIMENSIONS

### WITH PANEL MOUNT ADAPTERS

(OSI P/N 19754)

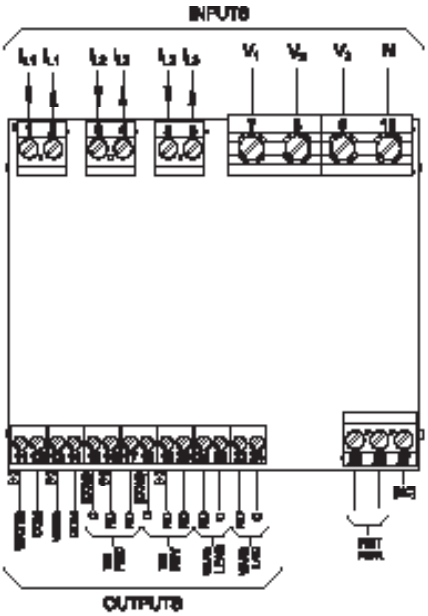


### DIN RAIL MOUNTING (35MM)



All dimensions in inches. Tolerance - 0.00±0.03 (unless otherwise specified) Dwg# 0902-01016-B Rev-C

## TERMINAL IDENTIFICATION

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