

## UTILITY SUBMETERING & ENERGY MANAGEMENT PRODUCT SOLUTIONS



HIGH PERFORMANCE SUBMETERING PRODUCTS, SOLUTIONS & SERVICES FOR ALL INDUSTRIES

**SUBMETERING & ENERGY MANAGEMENT PRODUCT CATALOG**

Since 2010, TBWC Technology has grown to become one of the leading suppliers of submetering and energy management products for industry today...

Offering over 500 SKUs, TBWC provides our Distributors a one-stop shop for essential and peripheral products needed for a submetering/energy management system installation, but are many times forgotten.

In addition, TBWC provides submeter users and installers with pre- and post-installation services delivering the support necessary to insure every submeter purchased delivers the accurate and reliable data they need:

Retro-commissioning, i.e., Annual Meter / Submeter System Wellness Check-ups

AMR Automatic Meter Reading System Upgrades, Updates and 3<sup>rd</sup>-party Service Agreements

Custom Dashboards: Available for load segregation, energy management, Net Zero projects, etc.

Represented by qualified Agencies across North America, TBWC Manufacturer's Reps have been providing technical product support, application assistance and expertise in their local communities for decades.

Together with our TBWC contractor/installation solution and distribution partners, we strive to ensure every submeter product or project sold is not only delivered in a timely manner, installed within scope, and meets the original budget, but above all, exceeds your end-use customers' expectation.

Thank-you for the opportunity to serve!



- Delivering long-term sustainable value
- Reducing facility and process OPEX
- Increasing building NOI and asset value



*Achieve Your Sustainability and Energy Management Goals with Submetering from TBWC Technology*

# SUBMETERS & IOT ENERGY MANAGEMENT PRODUCTS

## DIGITAL ELECTRIC SMART METERS

|   |     |
|---|-----|
| DI-SA Stand-Alone Meter Kits .....                | 4-5 |
| DI-HD High Density MMU Multiple Meter Units ..... | 6-7 |
| CTs & Lead Length Extension Cable .....           | 8-9 |

## BTU / ENERGY METERS

|  |    |
|--|----|
| MICRONICS Ultrasonic BTU / Energy Meters ..... | 10 |
|--|----|

## WATER / FLOW / GAS METERS

|  |    |
|--|----|
| MICRONICS Ultrasonic Flow / Water Meters ..... | 11 |
| MULTIMAG™ Water Meters by Honeywell .....      | 12 |
| ELSTER / AMERICAN Gas Meters .....             | 13 |

## AMR AUTOMATIC METER READING APPLIANCE & ENERGY MANAGEMENT SOFTWARE

|  |       |
|--|-------|
| OPTERGY PROTON WebMon Appliance .....    | 14-15 |
| OPTERGY ENTERPRISE Server Software ..... | 16-17 |

## SUBMETERING PRODUCT & SYSTEM ACCESSORIES

|   |    |
|---|----|
| COMMUNICATIONS CABLE RS-485 & Ethernet .....                      | 18 |
| WIRELESS STATIC IP Cellular Modem .....                           | 19 |
| P864 / P864e IDR-ST Data Recorder / Gateway Edge Controller ..... | 20 |

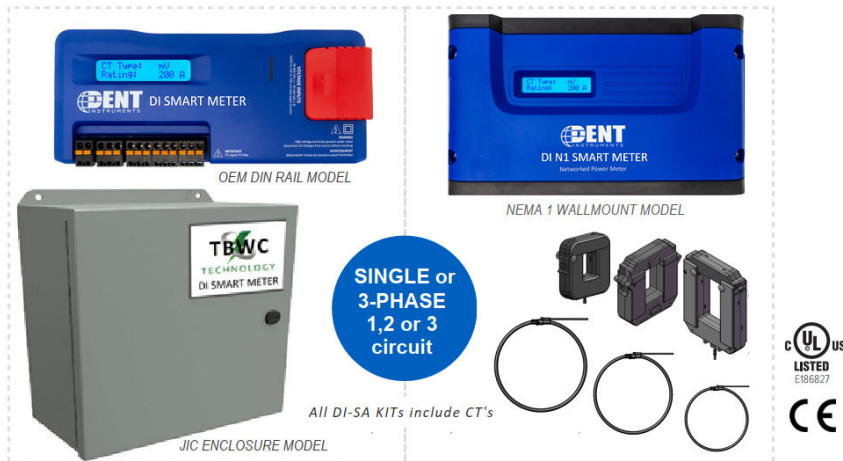
## CASE STUDIES: TBWC TECHNOLOGY VALUE ADDED SERVICES

|  |    |
|--|----|
| MIXED USE RESIDENTIAL/COMMERCIAL with ASHRAE 90.1 Load Segregation ..... | 21 |
| NET ZERO: PV ENERGY MANAGEMENT Web-Enabled System Dashboards .....       | 22 |
| DESIGN & IMPLEMENTATION ASSISTANCE: Commissioning Report Example .....   | 23 |



## NETWORKED SINGLE & 3-PHASE SMART METER KITS

REVENUE GRADE INSTRUMENTS FOR SUPERIOR ENERGY MEASUREMENT



### DI-SA SMART METER KITS

Submetering Made Easy! Whether monitoring a single circuit or a facility's main service entrance, Industry Professional count on DI Smart Meter Kits to accurately deliver the energy use information needed for Energy Management, Energy Conservation, utility cost allocation and recovery applications. Easy-to-install, easy-to-own and easy-to-manage, DI Smart Meters are designed to accurately and reliably deliver the data you need over the life of the system.

### REVENUE-GRADE PERFORMANCE

With a high-speed, continuous input sampling rate of 1 Hz, ANSI C12.20-2015 Class 0.2 revenue grade accuracy can be achieved. All DI-SA Smart Meters are well-suited for accountability metering in commercial, retail, and industrial facility for demand response, energy management and tenant based submetering

### LINE VOLTAGE POWERED

DI-SA Smart Meters are designed to be powered from the same voltage as the load monitored, saving time and money installing. Designed to offer year of hassle-free duty, meter can be retro-commissioned, field reprogrammed and redeployed to a new location as facility or application changes may occur.

### ADVANCED COMMUNICATIONS INCLUDED

DI-SA Smart Meters support both Modbus, (reference SunSpec IEEE-754) and BACnet communications protocols. The meter communications interface is accomplished via serial RS-485 (Modbus RTU or BACnet MS/TP) or via Ethernet (Modbus TCP or BACnet IP) networks, or via a Static IP Modem.

### READY TO INSTALL SUBMETERING KITS

DI-SA Smart Meter Kits include CTS and NEC required instrument overcurrent protection. Available in NEMA 1 wallmount, JIC and NEMA 4X, 6P non-metallic enclosures for safety, security, & protection from the elements in all applications.

### POWERFUL & COST-EFFECTIVE

Line powered and designed to operate on any voltage from 90-600VAC, meters are shipped pre-configured to match your specific project or application. Units feature a USB utility port to enable quick and accurate field installation. An on-board LCD display with thumb wheel makes it easy to verify proper setup.

### POWERFUL TROUBLESHOOTING

Patented circuitry immediately identifies installation errors. HD Series software can be downloaded at no-charge when advanced analytics such as waveform visualization, vector polar plotting, and harmonic distortion analytics are required.

## POWERED BY



### APPLICATIONS

- Tenant Submetering
- Bi-Directional Metering
- Data Centers
- Real-Time Power Monitoring for Saving, Energy Management, Load Segregation & Cost Allocation



### FEATURES

- 3 channels: 3-phase submeter monitors voltage, current, power, energy, and many other electrical parameters on single or three phase systems
- Secure wall mount JIC 3R, 4, 12 & 13 environmental or NEMA 1 indoor enclosure
- Revenue grade. ANSI C12.20-2015 tested. Class 0.2 certification to meet new industry standards in process and pending adoption
- Interval Data Recording: Store up to 63 days of 15-minute kWh consumption data
- Continuous sampling: No blind cycles
- DI Smart Meter Kits are pre-configured and supplied with Solid, Split-Core or Rope Style CTs from 1 to 5000 amp rated
- Line-Powered: 90-600V phase-to-phase
- Display shows real-time information regarding the meter configuration and metered data
- Communicate via industry standard BACnet or Modbus serial or IP protocols
- User-configurable alarm with isolated output
- Data is updated every 1.0 second
- On-board diagnostics confirm proper installation and commissioning
- UL Listed, CE Mark, BTL Certification (pending)
- Advanced technology enables units to be easily field reconfigured to meet facility changes and energy monitoring needs.
- Most cost-effective high-density submetering solution available in the industry today.



## NETWORKED SINGLE & 3-PHASE METERS

REVENUE GRADE INSTRUMENTS FOR IOT ENERGY MANAGEMENT

**BUILD AN INTELLIGENT METER KIT TO MATCH YOUR SPECIFIC APPLICATION**

All models equipped with BACnet and Modbus IP or Serial communications as standard.

**SINGLE-POLE: 120-600V 2-Wire, Single- $\phi$  (1) SPLIT-CORE CT**

**DI-VVV/2W/AMP-PKG-KIT**

**TWO-POLE: 120-600V 3-Wire, Single- $\phi$  (2) SPLIT-CORE CT**

**DI-VVV/3W/AMP-PKG-KIT**

**3-PHASE: 120-600V, 3 or 4-Wire, Three- $\phi$  (3) SPLIT-CORE CT**

**DI-VVV/AMP-PKG-KIT**

**TO COMPLETE YOUR PART # SELECT ONE FROM EACH OF THE FOLLOWING:**

**VVV** Voltage: 120 / 208 / 240 / 277 / 480 / 600

**AMP** Amperage: 20 / 50 / 100 / 200 / 400 / 800 / 5000

**PKG** Packaging: 'N1' Nema 1 ; 'JIC' 3R/4 steel, 'N4X' Non-Metallic

### PART # EXAMPLES:

DI-120/2W/50-N1-KIT      120-600 Volt, 50 Amp, Single-Phase, NEMA 1 wallmount meter, (1) CT  
DI-208/3W/100-JIC-KIT      208-600 Volt, 100 Amp, 2-Pole Single- $\phi$  Meter, JIC steel enclosure, (2) CTs  
DI-480/400-N4X-KIT      480-600 Volt, 400 Amp, 3-Phase Meter, NEMA 4X non-metallic enclosure, (3) CTs

### ADDITIONAL SMART METER DETAIL & OPTIONS:

- For Solid-Core CTs, change suffix "-KIT" to "-SCCTKIT" 100, 200 or 400 Amp. Special order for higher ratings.
- 5000-Amp models feature flexible rope CTs with opening = 5.0" diameter.  
- For larger FRCT openings, add suffix "-7.5" for 7-1/2 inch or "-11.5" for 11-1/2 inch diameter.
- DIN Rail mount models for OEM or specialty applications available. Consult TBWC Tech for more info.
- NOTE: NEC Overcurrent Protection: DI meters have internal, NEC compliant overcurrent protection built in, If voltage to the meter is > #12, proper OCP device is required. See TBWC OCP Tech sheet for detail.
- Optergy Proton browser based Automatic Meter Reading / Energy Management software appliance. Base model supports up to 10 Meters, upgradable to 100. Tenant Billing option for 3 to 60 Tenants.
- Scalable Enterprise Energy Management AMR/EMS Server Software for large and portfolio systems.
- Secure, private wireless Internet service; system and meter reading wellness service plans available.

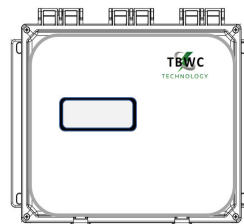
### DI-SMART METER PACKAGING "PKG" OPTIONS



NEMA 1 WALLMOUNT MODEL



JIC ENCLOSURE MODEL



NEMA 4X NON-METALLIC  
ENCLOSURE

### DI Smart Meter KITS

Dimensions & Estimated Ship Weight:

N1-KIT (H) 5.50" x (W) 10.12" x (D) 2.12"  
JIC-KIT (H) 10.0" x (W) 12.0" x (D) 5.00"  
N4X-KIT (H) 10.00" x (W) 12.0" x (D) 5.00"

WT: 12-15 LBS  
WT: 19-22 LBS  
WT: 15-18 LBS

NEMA 1 Wall Mount  
NEMA 3R, 4/12 Security Enclosure  
NEMA 4X, with Viewing Window Display

## PS3HD Certificate of Calibration

### Meter information

Test date: 1/5/2023

Test Time: 1:11 PM

Serial #: P032301044

Technician: 'AES'

Software Version: 2.61

DI-Part #: PS31111111

MAC ID: 00:0D:63:33:1D:A6

Wireless MAC ID:

### Meter Measurements

| Volts Measurement | Voltage Reading  | Voltage Reference  | Percent of Error | Pass/Fail |
|-------------------|------------------|--------------------|------------------|-----------|
| VIN1-L1           | 200.018          | 200.042            | -0.007           | PASS      |
| VIN1-L2           | 200.041          | 200.071            | -0.015           | PASS      |
| VIN1-L3           | 199.996          | 199.991            | 0.002            | PASS      |
| Element A Current | Amperage Reading | Amperage Reference | Percent of Error | Pass/Fail |
| CT1               | 100.005          | 100.004            | 0.001            | PASS      |
| CT2               | 99.997           | 99.994             | 0.003            | PASS      |
| CT3               | 100.001          | 99.999             | 0.001            | PASS      |

### Calibration Reference Instruments Used

| Reference | Make   | Model | Serial # |
|-----------|--------|-------|----------|
| Reference | Radian | RX-10 | 710102   |

### HiPot Test

| Make    | Model                | Serial # |
|---------|----------------------|----------|
| VITREK  | V70                  | 75441    |
| Voltage | Leakage Current (mA) | Result   |
| 1250.0  | 3.13                 | PASS     |

The equipment used to calibrate this device has been calibrated by a certified ISO 17025 laboratory accredited by A2LA, using standards that are traceable to the National Institute of Standards and Technology (NIST).

All meters tested to ANSI C.12.11.20.2 prior to shipment  
Certificate of Calibration test report supplied with each

## MMU MULTI-CIRCUIT HIGH-DENSITY METERING

REVENUE GRADE INSTRUMENTS FOR SUPERIOR ENERGY MEASUREMENT



### MAXIMUM FLEXIBILITY FOR MONITORING

DI-HD Multiple Meter Unit (MMU) cabinets make submetering easy. Their flexible design allows them to be configured for monitoring multiple electrical circuits. Units are supplied pre-programmed and ready to install. Using 0.333mV, internally shunted CTs, up to 64 single, 2-pole or 3-phase meters (192 circuits) can be monitored with a single MMU Cabinet. With data updates every 1 second and revenue-grade accuracy (depending on CT), these MMU cabinets are well suited for data center monitoring, tenant submetering, California T24 or ASHRAE 90.1 load segregation projects and accountability metering in commercial, industrial, retail and other energy monitoring and management applications.

### INDUSTRY STANDARD BACNET OR MODBUS

DI-MMU high-density cabinets are configured to support both BACnet or Modbus communications protocols. Interface to communicate can be accomplished via standard serial RS-485 or Ethernet using either BACnet MS/TP, Modbus RTU or BACnet or Modbus IP. Additionally, DI-MMU16 models allow inputs for up to (2) 3rd-party, 2-wire pulse-output meters (i.e., Electric, Gas, Water & BTU energy) meters to be integrated.

### EASY TO INSTALL AND MANAGE

Save time and money while mitigating any risk associated with the installation of multiple meters and networks. Line powered and designed to operate on any

voltage from 90-600V, DI-MMU Meter Cabinets are NEC compliant. Select models are capable of accepting up to 8 independent voltage references making DI-HD meters ideal for achieving and maintaining ANSI C.12 accuracy compliance.

### PRE-CONFIGURED TO YOUR SPECIFICATION

Prior to shipment, TBWC carefully configures every DI-MMU high-density meter matching the appropriate CTs inputs for each specific meter element: Every DI-HD furnished includes a "CT Load / Panel Schedule", a road map that reduces the amount of time and potential for errors both in installation and post-installation applications where meters need to be added or re-configured. combined with DI Dent Instruments patented\* PhaseChek™ technology, proper CT-phasing in the installation is achieved easily, eliminating expensive trips back to correct.

### SUBMETER NETWORK MANAGEMENT MADE EASY

Whether on-site or remote, contractors & end users appreciate Dent Instruments ViewPoint HD software. Available at no charge, ViewPoint allows a technician to quickly scan the local area network, discover their existing as well as commission any new DI-HD (and DI-SA) meters added to the network. Data provided includes System Description, Basic Meter Setup, and Diagnostics from the scan window. Data provided includes kWh Power Consumption, Kw Demand, PF Power Factor, Waveform Capture Phasor Diagrams, and THD Total Harmonic Distortion.

POWERED BY



A TBWC TECHNOLOGY MANUFACTURING PARTNER

### APPLICATIONS

- Tenant Submetering
- Bi-Directional Metering
- Data Centers
- Real-Time Power Monitoring in Commercial, Retail, and Industrial environments



### FEATURES

- Up to 64 meter elements (192 circuits) to monitor voltage, current, power, energy, and many other electrical parameters on any combination of single and/or three-phase systems
- Up to 8 reference voltage inputs allow DI-MMU HD high-density submeters to be used simultaneously in the same cabinet
- DI-MMU cabinets are supplied with NEC required meter/instrument overcurrent protection
- Line-Powered: 90-600V phase-to-phase
- Revenue grade. ANSI C12.20-2015 tested.
- Display shows real-time information regarding the meter configuration and metered data
- Communicate via industry standard BACnet or Modbus serial or IP protocols
- User-configurable alarm with isolated output. On-board diagnostics confirm proper installation and commissioning
- Interval Data Recording: Store up to 63 days of 15-minute kWh consumption data. Consumption data updated every 1.0 sec. Continuous sampling: No blind cycles
- In addition, the DI-HD meters feature a real-time clock (RTC) ensuring an accurate time stamp on all recorded data records. without need for batteries or maintenance.
- Advanced technology enables units to be easily field reconfigured to meet facility changes and energy monitoring needs.
- Most cost-effective high-density submetering solution available in the industry today.
- UL Listed, CE Mark, BTL Certification (pending)



# MMU MULTIPLE METER UNIT CABINETS

REVENUE GRADE INSTRUMENTS FOR SUPERIOR IOT ENERGY MEASUREMENT  
(CTs sold separately)

**BUILD AN INTELLIGENT HIGH-DENSITY METER KIT TO MATCH YOUR SPECIFIC APPLICATION**  
All models equipped with BACnet and Modbus IP or Serial communications as standard.

**MMU4:** For up to (4) single, 2-Pole or 3- $\phi$  meters. w/(1) voltage references

**MMU4-PKG-(1)VR-KIT**

**MMU8:** For up to (8) single, 2-Pole or 3- $\phi$  meters. w/(1 or 2) voltage references

**MMU8-PKG-(1 or 2)VR-KIT**

**MMU16:** For up to (16) single, 2-P or 3- $\phi$  meters. w/(1 or 2) voltage references

**MMU16-PKG-(1 or 2)VR-KIT**

**MMU20-64:** For (20 to 64) single, 2-P or 3- $\phi$  meters. w/(2-8) voltage references

**MMUxx-PKG-(2 to 8)VR-KIT**



**N1 ABS PLASTIC  
WALLMOUNT MODEL**



**JIC NEMA 3R, 4, 12  
SECURITY ENCLOSURE**



**N4X NON-METALLIC  
PAD LOCKABLE  
SECURITY ENCLOSURE**

**TO COMPLETE YOUR PART # SELECT ONE FROM EACH OF THE FOLLOWING:**

**xx** = # of Meters: 4 / 8 / 16 / 20 / 24 / 32 / 36 / 40 / 48 / 52 / 56 / 64

**PKG** = Packaging: '**N1**' Nema 1 ; '**JIC**' 3R/4 steel, '**N4X**' Non-Metallic (N4X available in MMU4 thru MMU32 models only)

**(#)** = Number of VR's required: MMU20 = (1 or 2) | MMU24 or 32 = (1, 2 or 3) | MMU36 = (1, 2, 3 or 4) |

MMU40 = (1 thru 5) | MMU48 = (1 thru 6) | MMU52 = (1 thru 7) | MMU56 & 64 = (1 thru 8) |

**PART # EXAMPLES:**

**DI-MMU8-N1-(2)VR-KIT** 8-Element (24 Circuit) Multiple Meter Unit. NEMA 1 Enclosure w/(2) Voltage Ref., BACnet/Modbus  
**DI-MMU16-JIC-(1)VR-KIT** 16-Element (48 Circuit) Multiple Meter Unit. NEMA 3R, 4/12 Cabinet w/(1) Voltage Ref, BACnet/Modbus  
**DI-MMU32-N4X-(4)VR-KIT** 32-Element (96 Circuit) HD Multiple Meter Unit. NEMA 4X, w/(4) Volt Ref., BACnet/Modbus

**ADDITIONAL SMART METER DETAIL & OPTIONS:**

- NOTE: NEC Overcurrent Protection: DI meters have internal, NEC compliant overcurrent protection built in, If voltage to the meter is > #12, a proper OCP device is required. See TBWC OCP Tech sheet for detail.
- OPTIONS—(Consult your TBWC Technology Representative for additional information):
  - OEM or special applications, DI-MMU4, 8 & 16 units available in backpanel mount configurations (no enclosure)
  - Automatic Meter Reading, Load Segregation, Utility Cost Recovery and Tenant Billing software solutions available
  - MMU Cabinets in 304 or 316 Stainless, Aluminum or custom enclosures (all NEMA types) available upon request.
- Optergy Proton browser based Automatic Meter Reading / Energy Management software appliance. Base model supports up to 10 Meters, upgradable to 100. Tenant Billing option for 3 to 60 Tenants.
- Scalable Enterprise Energy Management AMR/EMS Server Software for large/portfolio systems: No annual licensing fees. Options: VPN internet WAN services, AMR system wellness checks, meter reading/management reporting & service agreements.

## DI-HD High-Density Smart Meter

Dimensions (H x W x D) & Estimated Ship Weight (LBS):

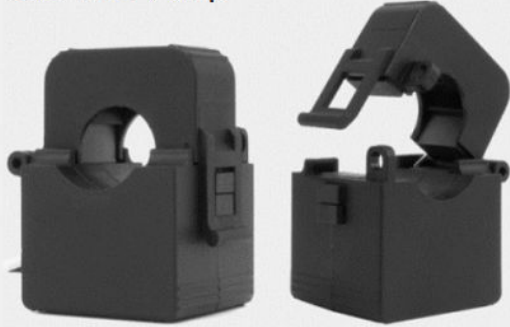
| SIZE (HxWxD) | -JIC- NEMA 3R, 4, 12/13 | WT. (LBS) | -N4X- NEMA 4X        | WT. (LBS) | -N1- NEMA 1         | WT. (LBS) |
|--------------|-------------------------|-----------|----------------------|-----------|---------------------|-----------|
| MMU4         | 9.8" x 9.8" x 3.1"      | 37        | 12.0" x 10.0" x 4.0" | 7         | 13.3" x 9.8" x 3.1" | 4         |
| MMU8         | 13.3" x 9.8" x 3.1"     | 38        | 16.0" x 14.0" x 7.0" | 10        | 13.3" x 9.8" x 3.1" | 5         |
| MMU16        | 13.3" x 9.8" x 3.1"     | 39        | 16.0" x 14.0" x 7.0" | 11        | 13.3" x 9.8" x 3.1" | 6         |
| MMU20-32     | 24.0" x 30.0" x 8."     | 74        | 20.0" x 16.0" x 8.0" | 17        |                     |           |
| MMU36-64     | 42.0" x 30.0" x 8."     | 132       |                      |           |                     |           |



# SPLIT-CORE CT's

## 0.333mV CURRENT TRANSFORMERS

0.5-100 Amp



1.0-200 Amp



2.0-400 Amp



4.0-800 Amp



### Notes:

All DI-SA Smart Meter Kits supplied include CT's. CT's for DI-HD MMU High-Density Meter models must be ordered separately.

CT's can be installed up to 500 feet away from both DI-SA stand alone or DI-HD high density smart meters.

Split/solid-core and flexible rope CT's are equipped with 12" to 36" lead lengths that can be field extended using the appropriate twisted pair and shielded cable.

Please see the following page for specifications and CT lead length extension cables offered.

Reference NEMA, NEC and local electrical code rules for proper installation guidelines.

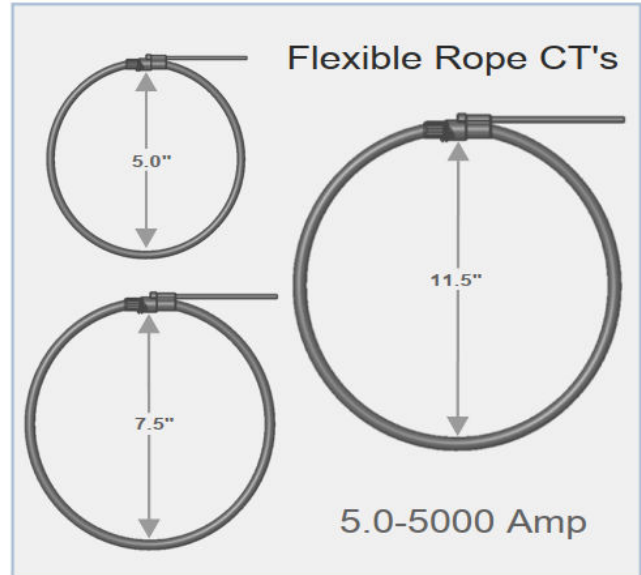
### Split-Core Model Numbers

| Model #  | Amperage | Window Dim.  | Weight   |
|----------|----------|--------------|----------|
| 100A-CT  | 100      | 0.72"x 0.62" | 0.35 lbs |
| 200A-CT  | 200      | 1.0" x 1.40" | 0.55 lbs |
| 400A-CT  | 400      | 1.3" x 1.70" | 1.25 lbs |
| 800A-CT  | 800      | 2.0" x 5.50" | 1.75 lbs |
| 1200A-CT | 1200     | 2.0" x 2.00" | 1.50 lbs |



# SPLIT-CORE & FLEXIBLE ROPE CT's

0-0.333mV OUTPUT



## SOLID-CORE CT's



## CT LEAD-LENGTH EXTENSION CABLE



### Flexible Rope CT Model Numbers

| Model #         | Amps | Window | Weight   |
|-----------------|------|--------|----------|
| 5000A-FRCT-5.0  | 5000 | 5.0"   | 0.85 lbs |
| 5000A-FRCT-7.5  | 5000 | 7.5"   | 1.25 lbs |
| 5000A-FRCT-11.5 | 5000 | 11.5"  | 1.60 lbs |
| 5000A-FRCT-14.5 | 5000 | 14.5"  | 1.85 lbs |

### Solid-Core CT Model Numbers

|           |     |      |          |
|-----------|-----|------|----------|
| 50A-SCCT  | 50  | 0.5" | 0.20 lbs |
| 100A-SCCT | 100 | 0.5" | 0.20 lbs |
| 200A-SCCT | 200 | 0.5" | 0.20 lbs |

### CT Lead Length Extension Cable

For Split or Solid-Core CTs, 20AWG Twisted Pair, 600V  
**CBL-SOSCCT-(CTL)**  
 Specify CT Cable Length in feet: CTL = 250, 500, 1000

For Flexible Rope CTs, 26AWG Shielded Cable, 1000V  
**CBL-ROCOIL-(RCT)**  
 Specify Rope CT Cable Length in feet = 328, 820, 1640

#### \*\* IMPORTANT \*\*

When looking from the source side of the load(s) being monitored, you should see an arrow on the CT assembly, with the direction of the arrow pointing clockwise around the conductor(s) being monitored.

If the arrow is not on source side, inaccurate readings may result.



# ULTRAFLO U1000MKII-HM

## FIXED ULTRASONIC CLAMP ON BTU ENERGY METER

The U1000MKII-HM is an ultrasonic clamp-on thermal, heat/energy meter that uses ultrasound to measure flow rate and PT100 temperature sensors to measure flow and return temperatures.

The U1000MKII-HM displays energy rate and totalized energy with pulse output and communication options, for use as a standalone meter or as an integral part of an Energy Management EMS or BMS system.

Simple to install: Connect power and enter the pipe inside diameter; adjust the sensors; and clamp onto the pipe...no specialist, technician or tools required! A cost-effective alternative to insertion style meters as no downtime is necessary to install.



### CATALOG #      U1000MKII-HM OPTIONS & ACCESSORY DESCRIPTION

|              |  |
|--------------|--|
| 804-11001400 | Pulse Output Ultrasonic Water/Flow Meter 3/4" to 4.5" OD Copper, Steel, Plastic Pipe, 0°C to +85°C   |
| 804-11001402 | Pulse & Modbus Ultrasonic Water/Flow Meter 3/4" to 4.5" OD Copper, Steel, Plastic Pipe, 0°C to +85°C |
| 804-11001600 | Pulse Output Ultrasonic Water/Flow Meter >4" to 6.0" OD Copper, Steel, Plastic Pipe, 0°C to +85°C    |
| 804-11001602 | Pulse & Modbus Ultrasonic Water/Flow Meter >4" to 6.0" OD Copper, Steel, Plastic Pipe, 0°C to +85°C  |

### INDUSTRIES:

- Building Services
- Energy Management
- Commercial HVAC
- Industrial Process
- Pharmaceutical
- Petrochemical
- Food Industries

### Recommended for:

- Hot water < 85°C (185°F)
- Chilled water
- Potable water
- Demineralized water
- Chilled Water with Glycol

### Application/use:

- BTU energy metering
- Tenant HVAC energy cost recovery
- Central plant process control
- For metering LTHW or chilled water circuits
- Pipe Materials:

### SPECIFICATION

#### Measurement Technique:

Ultrasonic transit time method for flow measurement.  
Turn Down Ratio: 200:1

#### Accuracy:

+/- 1% to 3% of flow reading for >0.3m/s (1ft/s).

#### Flow Velocity Range:

0.1m/s to 10m/s (0.3 ft/s to 32 ft/s).

#### Pipe Range: 2 options. 3/4" - 4" Sch 40 and >4" to 6"

Note Pipe size is dependent on pipe type & internal diameter.

#### Water Temp Range:

0°C to 85°C (32°F to 185°F).

#### Pulse Output: Pulse or Frequency.

Pulse for Volume flow and Alarms.

Frequency for flow rate.

Output can be configured as loss of signal / low flow alarm.

#### 4-20mA Output:

Optional 4-20mA flow proportional output

#### Modbus Communication:

Optional Modbus RTU slave, RS485 serial link hardware layer.

# ULTRAFLO U1000MKII-FM

## FIXED ULTRASONIC CLAMP ON FLOW / WATER METER

The U1000MKII-FM is an ultrasonic permanent/fixed clamp-on flow metering solution for measuring flow rate and total flow with a volume pulse output and optional Modbus or 4-20mA flow proportional output, which can be used as a stand-alone meter or as part of an integral management system.

Simple to install: Connect power and enter the pipe inside diameter; adjust the sensors; and clamp onto the pipe...no specialist, technician or tools required!

A cost-effective alternative to traditional mechanical in-line meter installations, means no pipe tapping (dry servicing), no downtime and maximum reliability.

Compact, rugged, and reliable, the U1000MKII-FM ultrasonic



### **CATALOG #      U1000MKII-FM OPTIONS & ACCESSORY DESCRIPTION**

|              |  |
|--------------|--|
| 804-11001400 | Pulse Output Ultrasonic Water/Flow Meter 3/4" to 4.5" OD Copper, Steel, Plastic Pipe, 0°C to +85°C   |
| 804-11001402 | Pulse & Modbus Ultrasonic Water/Flow Meter 3/4" to 4.5" OD Copper, Steel, Plastic Pipe, 0°C to +85°C |
| 804-11001600 | Pulse Output Ultrasonic Water/Flow Meter >4" to 6.0" OD Copper, Steel, Plastic Pipe, 0°C to +85°C    |
| 804-11001602 | Pulse & Modbus Ultrasonic Water/Flow Meter >4" to 6.0" OD Copper, Steel, Plastic Pipe, 0°C to +85°C  |

### **INDUSTRIES:**

- Building Services
- Energy Management
- Water Treatment
- Chemical
- Pharmaceutical
- Petrochemical
- Food

### **Recommended for:**

- Hot water < 85°C (185°F)
- Chilled water
- Potable water
- Demineralized water
- Chilled Water with Glycol

### **Application/use:**

- Hot water metering and flow measurement
- Flow measurement for heat metering
- Chilled water metering and flow measurement
- Flow measurement for chilled water energy metering

### **SPECIFICATION**

#### **Measurement Technique:**

Ultrasonic transit time method for flow measurement.

Turn Down Ratio: 200:1

#### **Accuracy:**

+/- 1% to 3% of flow reading for >0.3m/s (1ft/s).

#### **Flow Velocity Range:**

0.1m/s to 10m/s (0.3 ft/s to 32 ft/s).

**Pipe Range:** 2 options. 3/4"- 4" Sch 40 and >4" to 6"

Note Pipe size is dependent on pipe type & internal diameter.

#### **Water Temp Range:**

0°C to 85°C (32°F to 185°F).

#### **Pulse Output:** Pulse or Frequency.

Pulse for Volume flow and Alarms.

Frequency for flow rate.

Output can be configured as loss of signal / low flow alarm.

#### **4-20mA Output:**

Optional 4-20mA flow proportional output

#### **Modbus Communication:**

Optional Modbus RTU slave, RS485 serial link hardware layer.

- **Meets AWWA C708 Accuracy**
- **Hot or Cold meter models**
- **Pulse Output**
- **ECO Brass - No Lead**
- **Gallons or Cubic Meter Register**

The MultiMag™ series water meters utilize multijet principles for accurate water measurement and are known for their simplicity, longevity and accuracy.

The MultiMag™ is tested to the most recent AWWA C708 accuracy standards. The pulse output capability allows for the MultiMag™ to be used for remote reading. The MultiMag™ is intended for horizontal applications. In addition to the various sizes, the MultiMag is also available in hot and cold versions.



## Technical Characteristics

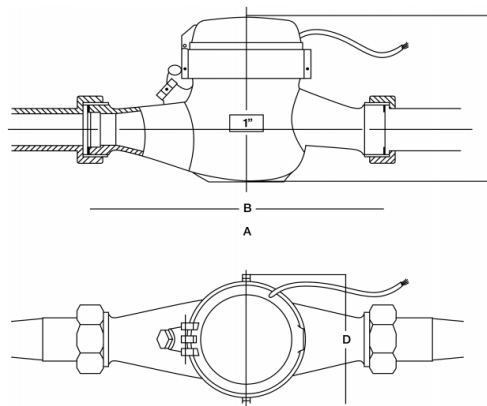
TEMPERATURE .....Cold .....105° F, 41° C  
Hot .....194° F, 90° C

MAX PRESSURE .....150psi

MATERIALS .....Body.....ECO Brass - NO LEAD  
Internals .....Thermoplastic

PULSE OUTPUT .....6mA @ 12vdc

PULSE VALUE .....1/1gal (1/1L) or 1/10gal (1/10L)



| FLOW RATE - gpm / (m³/hr) |                    |                     |                      |                    |         |
|---------------------------|--------------------|---------------------|----------------------|--------------------|---------|
| GPM                       | 3/4"<br>(19mm)     | 1"<br>(25mm)        | 1-1/2"<br>(38mm)     | 2"<br>(50mm)       | % Error |
| MIN                       | 0.5<br>(0.11)      | 0.75<br>(0.17)      | 1.5<br>(0.34)        | 2<br>(0.45)        | 3       |
| MAX                       | 30<br>(6.8)        | 50<br>(11.4)        | 100<br>(22.7)        | 160<br>(36)        | 1.5     |
| CONTINUOUS                | 15<br>(3.4)        | 25<br>(5.7)         | 50<br>(11.4)         | 80<br>(18)         |         |
| RANGE                     | 2-30<br>(0.45-6.8) | 3-50<br>(0.68-11.4) | 5-100<br>(11.1-22.7) | 8-160<br>(1.18-36) |         |

**PULSE OUTPUT METER MODEL NUMBERS\***

| <u>NPT</u> | <u>COLD WATER METERS</u>      |
|------------|-------------------------------|
| 3/4"       | WMDP-MMAG-34-NL-G-PR-10-CONS  |
| 1.0"       | WMIP-MMAG-1-NL-G-PR-10-CONS   |
| 1.5"       | WMIP-MMAG-112-NL-G-PR-10-CONS |

\*Includes Connection Set Hardware

| DIMENSIONS - Inches / (mm) |                   |                   |                    |                    |
|----------------------------|-------------------|-------------------|--------------------|--------------------|
|                            | 3/4"<br>(19mm)    | 1"<br>(25mm)      | 1-1/2"<br>(38mm)   | 2"<br>(50mm)       |
| <b>A</b>                   | 11.5"<br>(292)    | 15.6"<br>(396)    | 17.8"<br>(452)     | 21.0"<br>(533)     |
| <b>B</b>                   | 7.5"<br>(190.5)   | 10.75"<br>(273)   | 12.625"<br>(320)   | 15.25"<br>(387)    |
| <b>C</b>                   | 5.3"<br>(134.6)   | 5.3"<br>(134.6)   | 6.8"<br>(172.7)    | 6.8"<br>(172.7)    |
| <b>D</b>                   | 3.9"<br>(99)      | 3.9"<br>(99)      | 4.8"<br>(122)      | 4.8"<br>(122)      |
| <b>Weight</b>              | 4 lb.<br>(1.8 kg) | 5 lb.<br>(2.3 kg) | 10 lb.<br>(4.5 kg) | 14 lb.<br>(6.4 kg) |

## HOT WATER METERS

WMHP-MMAG-34-NL-G-PR-10-CONS  
WMHP-MMAG-1-NL-G-PR-10-CONS  
WMHP-MMAG-112-NL-G-PR-10-CONS

FOR ADDITIONAL SIZES, CAPACITIES AND MODELS OFFERED, CONSULT TBWC TECHNOLOGY



# Gas Meters

## Description

From 250 Series diaphragm type gas meters for light commercial or larger residential applications to GTX Series turbine gas meters for large industrial applications, Elster / American Gas Meters by Honeywell are very compact, light weight, high accuracy and maintenance free solution for natural gas or other non-corrosive gases applications.

Meters are equipped with pulse output for interfacing with IDR (interval data recorders) or Optergy P864 edge controllers.

Various models are available that can accommodate pipe sizes ranging from 3/4" to over 8". Specify NTC (non-temperature compensated) for indoor or mild weather outdoor use, For use in more extreme weather conditions or harsh duty environmental applications, temperature compensated meters (TC) are available.

To determine the appropriate Gas Meter needed for your specific application, please provide the following:



| Location / Gas Type .....   | Load <sup>1</sup> .....                | Pipe Size.....  |
|---|--|---|
| <input type="checkbox"/> Indoor                                     | <input type="checkbox"/> 0-250 MBH     | <input type="checkbox"/> 0.75" (3/4") <input type="checkbox"/> 3.0"   |
| <input type="checkbox"/> Outdoor                                    | <input type="checkbox"/> 250-425 MBH   | <input type="checkbox"/> 1.0" <input type="checkbox"/> 4.0"           |
| <input type="checkbox"/> Natural Gas                                | <input type="checkbox"/> 425-630 MBH   | <input type="checkbox"/> 1.25" (1-1/4") <input type="checkbox"/> 6.0" |
| <input type="checkbox"/> Propane                                    | <input type="checkbox"/> 630-800 MBH   | <input type="checkbox"/> 1.5" (1-1/2") <input type="checkbox"/> 8.0"  |
| <input type="checkbox"/> Other non-corrosive gas,<br>specify: _____ | <input type="checkbox"/> 800-14000 MBH | <input type="checkbox"/> 2.0" <input type="checkbox"/> >8.0"          |
|   | <input type="checkbox"/> >14000 MBH    |   |

Gas pressure in PSIG (pounds per square inch gauge) at the utility service entrance: \_\_\_\_\_

What system or device will the pulse output of the meter be plugging into? \_\_\_\_\_

If more than one pulse output meter will be plugging into an IDR or P864, please advise total quantity \_\_\_\_

Any special install requirements (vertical or horizontal pipe, space restrictions, approvals\*, etc.)? \_\_\_\_ (yes/no)

### \*Sample of Approvals

- ANSI B109.1
- Industry Canada AG-0393
- State of New York, Dept. of Public Service 97-G-1488
- Maryland PSC COMAR 20.55.07.02
- California Bureau of Weights & Measures

<sup>1</sup>NOTES: Gas meters are sized by their capacity in BTU/hour (or Cubic Feet/hour). 1 MBH = 1000 BTU per hour. The smallest gas meter TBWC offers is load rated for 250,000 BTU/hour which is equivalent to 250 MBH or 250,000 Cubic Ft/hr, which is typical of the load an apartment, small house or in a light commercial application.

TBWC offers gas meters with capacities up to 56,000,000 BTU/hr using the FM style (Fluidic Oscillation) meter. The MBH load requirements of equipment, i.e., a boiler, HVAC unit, furnace, hot water heater, oven, etc. can be commonly found on the device nameplate. When more than one piece of equipment is served by a single meter, add each of the nameplate loads together to determine gas meter required.





# OPTERGY PROTON WEBMON

ENERGY MANAGEMENT / AMR AUTOMATIC METER READING APPLIANCE

Optergy's Proton is a web-based controller that integrates building automation and energy management systems.

The Proton provides the tools to visualize, monitor, control and report on building operation in real time.

Access to the system is via a local Wi-Fi or network connection using common web-browsers.

Supports BACnet MSTP, IP and Modbus RTU, IP via (4) onboard RS485 Serial communication ports and (1) RJ45 ethernet IP port.

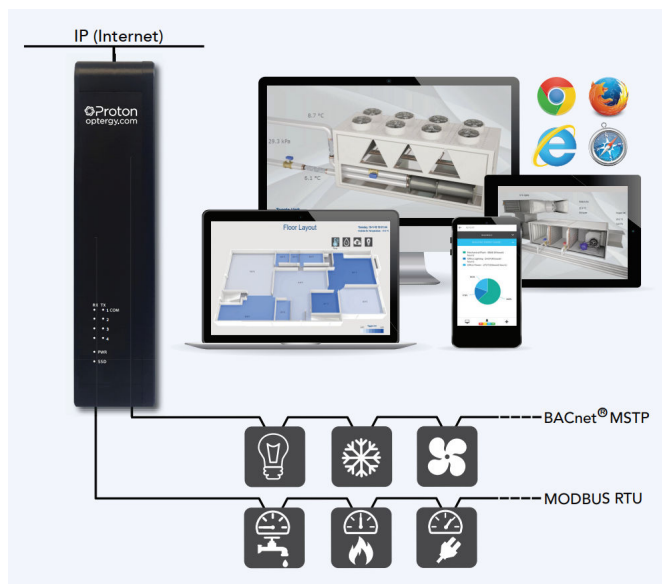
## MAIN FEATURES:

- AMR—Automated Meter Reading & Reporting
- Energy and Building Management
- Access via any PC or Mobile Device
- Web Server with customizable content
- Remote Management
- All Web-based Tools included
- Graphic Displays
- BACnet IP and MS/TP
- MODBUS IP and RTU
- Simple Licensing: Updates at no-charge
- Small and compact: Store decades of energy logs

| Product feature by model       | Proton P10 | Proton P20 | Proton P50 | Proton P100 |
|--------------------------------|------------|------------|------------|-------------|
| Devices (BACnet/Modbus/Meters) | 10         | 20         | 50         | 100         |
| Optimum start points           | 10         | 20         | 50         | 100         |
| Demand limiting points         | 10         | 20         | 50         | 100         |
| Weather & Forecast             | ✓          | ✓          | ✓          | ✓           |
| Public displays                | ✗          | ✓          | ✓          | ✓           |
| Tenants                        | ✗          | ✗          | 3          | 10          |
| Utility billing                | ✗          | ✗          | ✓          | ✓           |
| After hours billing            | ✗          | ✗          | ✓          | ✓           |

*The number of users is not restricted. The administrator group has the ability to add or modify users, define access to displays, and set the navigation path specific to the user role.*

- No annual fee or cost associated with any updates.
- Proton WebMon appliance grows with your system.
- Field upgradable to suit expansion without need to replace..



## PROTON MODELS & FEATURES:

### P10 Proton

Supports up to 10 meters / connected devices. As with all models, includes Utility Summary Report.

### P20 Proton

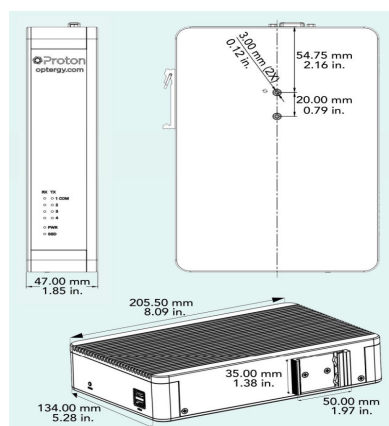
Supports up to 20 meters / connected devices. Includes scrolling public display screen feature.

### P50 Proton

Supports up to 50 meters / connected devices. Includes scrolling public display screens feature. Tenant meter management (3 tenants expandable to 53) Utility billing statements and after-hours billing capability.

### P100 Proton

Supports up to 100 meters / connected devices. Tenant meter management (3 tenants expandable to 53) Utility billing statements and after-hours billing capability.



## DIMENSIONS:

- (W) 1.85"
- (H) 8.09"
- (D) 5.28"
- (WT) 2.5 lbs



# OPTERGY PROTON WEBMON

ENERGY MANAGEMENT / AMR AUTOMATIC METER READING APPLIANCE

## BACNET AND MODBUS

BACnet and Modbus combined offer the best interoperable solution with minimal integration effort.

## TRENDS, ALARMS, SCHEDULES AND CALENDARS

Users can create trends, alarms, schedules and calendars.

Trend graphs can be modified to view multiple trends and view over a defined time interval. Users will be able to view a list of all alarms, with the ability to acknowledge and/or to clear. Multiple schedules can be calendar to override standard schedule entries.

## EMAIL NOTIFICATION

Alarm notifications and saved reports can automatically email at a pre-defined frequency to any user with email credentials.

## TEXT MESSAGING (SMS) ALARM

WITH ESCALATION AND ACKNOWLEDGMENT

Proton can send text messages when an alarm occurs. If not acknowledged, Proton WebMon escalates to any number of predetermined recipients after a user defined time period elapses.

## OPTIMUM START POINTS

Calculates the optimal plant start time to ensure the building achieves temperature when the occupied period begins.

## REPORTING

Proton's flexible reporting system contains pre-packaged reports with specified time periods. Allows simple generation of custom reports, with multiple output options such as Web, PDF and CSV. These can be automatically emailed at predetermined intervals.

## DEMAND LIMITING

Reduce the amount of energy consumed by your devices during peak periods. This feature allows the user to create and arrange analog or binary load controls.

### --- MODEL NUMBERS ---

|                  |                                |
|------------------|--------------------------------|
| P10 PROTON       | Up to 10 Meters / Devices      |
| P20 PROTON       | Up to 20 Meters / Devices      |
| P50 PROTON       | Up to 50 Meters / Devices*     |
| P100 PROTON      | Up to 100 Meters / Devices*    |
| P-TEN001         | Additional 10 Tenants          |
| P-TEN002         | Additional 50 Tenants          |
| PROTON-NEMA-ENCL | NEMA 4X IP66 16x14x8 Enclosure |

\*Includes Utility Tenant Billing / Cost Allocation feature for up to (3) Tenants. Up to an additional (50) Tenants can be added.

## HARDWARE SPECIFICATIONS

|                            |   |
|----------------------------|---|
| Model                      | Proton 10-20-50-100   |
| Processor                  | Integrated Intel J1900 2.00GHz Quad Core processor  |
| Ethernet                   | 2* RTL8111F GbE port  |
| Storage                    | 120GB mSATA SSD   |
| RAM                        | 4GB   |
| Connections and Indicators | 2 x USB 2.0 port<br>PWR led (power)<br>HDD led (drive activity)<br>TX (Amber) & RX (Green) led on each RS-485 Port<br>4 x 3 pin connector (RS-485)<br>1 x Display Port<br>1 x VGA Port<br>2 x RJ-45 Ethernet Port<br>1 x 3 pin connector (12V DC) |
| RS-485 baud rates          | 9.6k, 19.2k, 38.4k, 76.8k, 115.2k   |
| BIOS                       | AMI 64Mb Flash ROM  |
| Watchdog                   | Watchdog Timer support. 0~255 step  |
| Power                      | 12V DC 5A 60W   |
| Operating Temp             | -10°C ~ 60°C  |
| Storage Temp               | -20°C ~ 70°C  |
| Relative Humidity          | 5%-95% (non-condensing)   |
| OS                         | Debian LINUX OS ver 7   |

## MAIN FEATURES:

### TOOLS

All the necessary web based tools to customize, configure, and program the Proton are included with easy to use help.

### PUBLIC DISPLAYS (Proton 20 / Proton 50 / Proton 100)

Scrolling which are public displayed displays in order are supported for a predetermined by a list of time accessible. Proton URLs supports an unlimited number of public displays on a per-user basis allowing you to communicate with building users.

### UTILITY BILLING / TENANTS (Proton 50 / Proton 100)

Tenant space basis allowing you to communicate with building users. Spaces can be linked to utility meters with automatic billing. Invoices contain the energy and cost details as well as payment instructions

### AFTER HOURS BILLING (Proton 50 / Proton 100)

Tenants may create after hours scheduling events that incur energy use charges. This feature can log events, create after hours usage invoices and automatically notify the tenants.

### MAINTENANCE TICKETS

Users can report problems to facility management.

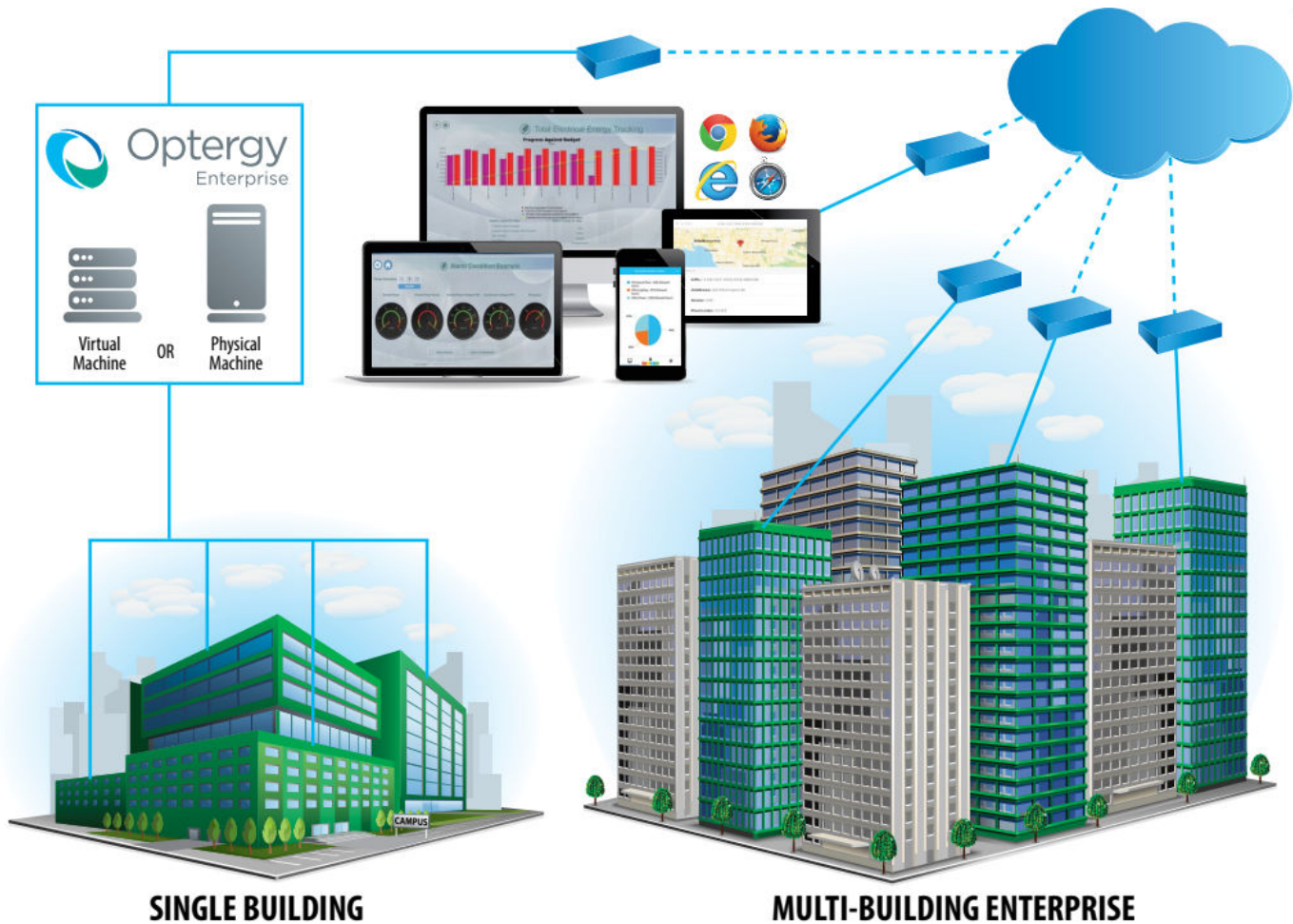
Proton WebMon administrators can post follow ups and keep track



# OPTERGY ENTERPRISE SERVER SOFTWARE

ENERGY MANAGEMENT AMR SOFTWARE FOR CUSTOMER SUPPLIED SERVERS

Optergy Enterprise is a web-based building management software that integrates Metering, Building Automation, Energy Management and Facilities Management tools to control, measure, manage and report on building data in real time. Optergy Enterprise is a scalable solution that can be hosted locally on-site, in a virtual environment or in the cloud allowing easy access to building data.



Connect your building's power, water and gas meters together with building automation, lighting, weather and forecast data via a secure network.

Optergy Enterprise provides the tools to analyze, compare, and aggregate the data to provide real time benchmarking, forecasting and alarming. All data is logged into a powerful relational database to ensure data is never lost.

Optergy Enterprise provides 24/7 monitoring of utility metering and sub-metering, and can notify you of the location, time and cost implications of detected anomalies.

This data is presented in a series of automated reports via an intuitive user-friendly web interface that can be accessed from any smart device.

Optergy Enterprise provides real-time measurements and feedback specific to each client's needs. These reports can be accessed via internet connection anytime, anywhere.

With Optergy Enterprise, users can effectively measure, track and manage energy, target waste and be alerted to the most critical conditions in the building.



# OPTERGY ENTERPRISE SERVER SOFTWARE

ENERGY MANAGEMENT AMR SOFTWARE FOR CUSTOMER SUPPLIED SERVERS

## BASE LICENSE BUILT-IN FEATURES

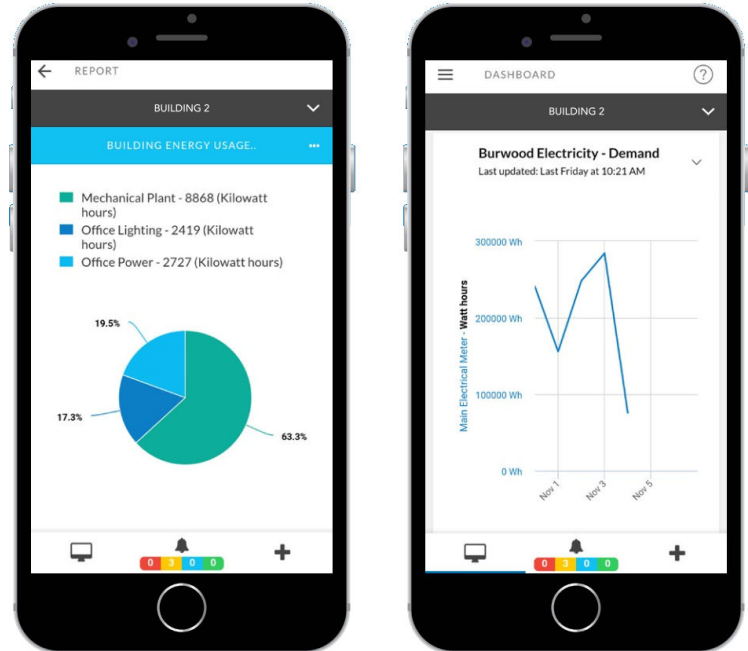
- BACnet protocol
- Modbus protocol
- Display tool for creating custom displays
- Unlimited number of live displays
- Unlimited number of public displays
- Unlimited number of users and groups
- User activity monitoring and reporting
- System diagnostic and maintenance tools
- Automatic data backup
- FTP remote data archiving/backup
- Maintenance reporting system
- Automated email notifications and reports
- System notifications
- Bookmarks (User defined URLs)
- Space management/hierarchy

## BUILDING MANAGEMENT FEATURES

- 150 (expandable) devices (BACnet/Modbus/Meters)
- Ability to manage BACnet objects:  
Alarms – Schedules – Trend logs – Calendars
- BACnet alarm escalation
- 50 (expandable) optimum start areas (zones)
- Text message (SMS) alarming and alarm escalation
- Weather and forecast (online or weather station)

## ENERGY MANAGEMENT FEATURES

- Comprehensive meter/utility reporting
- Utility report auto email functionality
- All meter parameters available as BACnet points
- Automated graphical live meter display screens
- Meter status and hierarchy screens
- Energy dashboards
- Customizable meter parameter alarming
- Association meters with spaces
- 50 (expandable) demand limiting points (zones)
- 3 tenants (expandable)
- After hours, activation and billing
- Utility tariff and billing



*Optergy Enterprise provides flexible, scalable licensing options. There are no ongoing fees. Start with an Optergy OE base license, and add additional licensing options as needed or required.*

## LICENCE CODE LICENCE OPTIONS

|            |   |
|------------|---|
| <b>OBL</b> | Base: Building and Energy Management Licence Devices (150 included with base licence) |
| <b>TCM</b> | Traffic Counter Module  |
| <b>PMM</b> | Building Performance Management Module  |
| <b>PPM</b> | Project Performance Module  |
| <b>TEN</b> | Tenants (additional tenants for after hours and/or utility tariff)                    |
| <b>AMM</b> | Asset Management Module   |
| <b>OSA</b> | Optimum Start Additional Areas  |
| <b>API</b> | Application Program Interface Module  |
| <b>DLP</b> | Demand Limiting Additional Points   |
| <b>APS</b> | Audio Paging System   |

## MINIMUM HARDWARE REQUIREMENTS

| NUMBER OF DEVICES | MINIMUM PROCESSOR         | MINIMUM MEMORY | MINIMUM HARD DRIVE         | COMPLIANT UPS |
|-------------------|---------------------------|----------------|----------------------------|---------------|
| <70               | Quad Core Celeron or Atom | 4GB            | 320GB                      | Yes           |
| <500              | Intel i5                  | 16GB           | 2 x 1TB Server Grade HDD's | Yes           |
| >500              | Intel Xeon                | 32GB           | 2 x 1TB Server Grade HDD's | Yes           |

\*If VIRTUAL, any configuration as noted above based on the number of devices\*

# RS-485 SERIAL COMMUNICATION CABLE FOR USE WITH OPTERGY AMR / EMS NETWORKS

## What is RS485?

RS485 or EIA (Electronic Industries Association) RS485 is a balanced line, half-duplex transmission system that allows smart devices to communicate over distances of up to 4000 ft.(1.2 km).

The table of Parameters below summarizes the RS-485 Standard. RS-485 Serial communications allows computers and computing equipment to communicate with up to 64 devices, i.e., Smart Meters, Gateways, etc. via BACnet MSTP or Modbus RTU protocol.

| PARAMETER                                      |                               |
|--|-------------------------------|
| Mode of Operation                              | Differential                  |
| Number of Drivers and Receivers                | 32 Drivers,<br>32 Receivers   |
| Maximum cable length (metres)                  | 1200                          |
| Maximum data rate (baud)                       | 10 M                          |
| Maximum common mode voltage (Volts)            | 12 to -7                      |
| Minimum Driver Output Levels (Loaded)          | +/- 1.5                       |
| Minimum Driver Output Levels (Unloaded)        | +/- 6                         |
| Drive Load (Ohms)                              | 60 (min)                      |
| Driver Output short circuit current Limit (mA) | 150 to Gnd, 250 to -7 or 12 V |
| Minimum receiver input Resistance (kohms)      | 12                            |
| Receiver sensitivity                           | +/- 200mv                     |



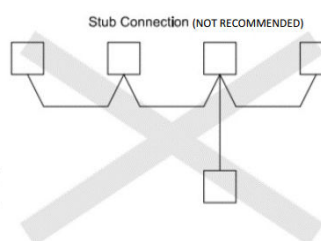
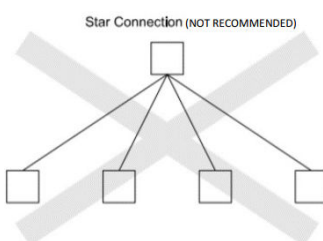
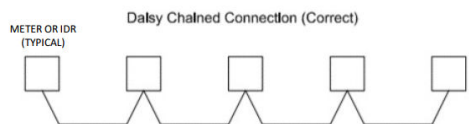
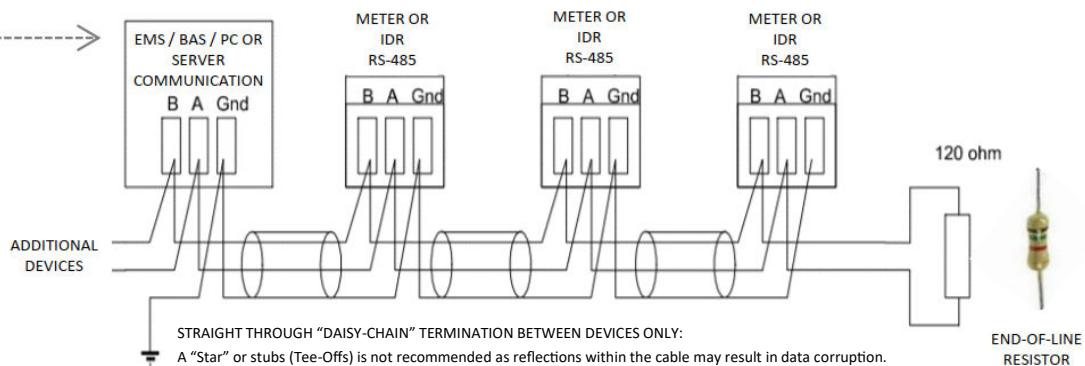
## RS-485 DESCRIPTION

Data Communication Cable for use in BACnet MS/TP or Modbus RTU Networks

1 Pair #18 Str BC, PVC-NYL Insulation  
600V TC 90C Dry/Wet Plenum Rated

## \*\* ORDERING INFORMATION \*\*

| PART NUMBER     | LENGTH | WT.        |
|-----------------|--------|------------|
| TBWC-1120A-100  | 100'   | 6.65 lbs.  |
| TBWC-1120A-500  | 500'   | 33.25 lbs. |
| TBWC-1120A-1000 | 1000'  | 66.65 lbs. |



Please refer to your product owners manual and installation guide or contact the EIA or other RS485 device manufacturers for additional information on BACnet MSTP or Modbus RTU RS485 Serial networks.

# WIRELESS COMMUNICATIONS

## CS-IPM CELLULAR STATIC IP MODEM

### What is RS485?

The CS-IPM Cellular Modem from TBWC enables secure Internet of things (IOT) connectivity to smart devices and their networks via a local mobile carrier.

### Main Features:

- 3G/4G WAN connection.
- One Giga-Ethernet port for comprehensive LAN connection.
- Simple Web GUI for basic settings and 3G/4G status.
- Designed for commercial/industrial M2M environments.
- Small, compact and fanless form factor supplied in a secure enclosure
- Excellent for internet failover: Never lose network connectivity again. Perfect as primary and WAN backup.

End Users can avoid internet or IT configuration downtime using the CS-IPM 4G LTE Modem to connects energy management devices and systems wirelessly to the internet for initial commissioning and serve. TBWC's 4G-LTE annual service plans are backed by AT&T or Verizon providing a secure trusted hardware platform with advanced firmware protection.



| Country | Mobile Operator         | LTE Bands                | WCDMA Band |
|---------|-------------------------|--------------------------|------------|
| USA     | AT&T, Verizon, T-Mobile | B2/B4/B5/B12/B13/B14/B66 | B2/B4/B5   |

| Model            | CS-IPM   |
|------------------|--|
| Description      | Protectli IDG400 4G LTE Modem (external)   |
| Device Interface | <ul style="list-style-type: none"> <li>• LTE Module: 1*LTE-Cat.4, 3GPP Release 11, 1*micro SIM slot</li> <li>• Ethernet : 1*RJ45 Gigabit Ethernet</li> <li>• Power Input : Micro USB DC 5V</li> <li>• Antenna Con.: 2*SMA (F)-LTE</li> </ul> |
| WAN & Uplink     | <ul style="list-style-type: none"> <li>• WAN: Cellular &amp; Config</li> <li>• Cellular: 3GPP, 2G/3G/LTE, IP Pass-through, IPv4/6</li> <li>• Network Monitor: ICMP/DNS Query</li> </ul>  |
| Protocol         | <ul style="list-style-type: none"> <li>• LAN &amp; VLAN: DHCP Server</li> <li>• IPv6: Cellular IPv6</li> </ul>   |

| Security Firewall:                  | SPI Firewall with Stealth Mode   |
|-------------------------------------|--|
| Administration                      | Web UI   |
| Environment                         | <ul style="list-style-type: none"> <li>• Operation Temperature: -22°F-158°F (-30°C-70°C)</li> <li>• Storage Temperature: -40°F-185°F (-40°C-85°C)</li> <li>• Humidity: 10%~95% (non-condensing)</li> </ul> |
| Certification & Carrier Approval    | <ul style="list-style-type: none"> <li>• FCC</li> <li>• Verizon</li> <li>• AT&amp;T</li> <li>• PTCRB</li> </ul>  |
| Chassis / Enclosure Dimensions / WT | <ul style="list-style-type: none"> <li>• Fanless, Aluminum, Black - 3.0" x 3.0" x 1.0" - 0.3 lbs.</li> <li>• Gray, Polycarbonate - 16" x 14" x 8" - 8.0 lbs.</li> </ul>                                    |



## EDGE CONTROLLER

The P864 is an edge controller that can add smart monitoring and control to any facility. The controller can operate on an enterprise IP network, added to any legacy BACnet network, or stand-alone.

The P864 controller can directly control its inputs and outputs using BACnet IP and MS/TP.

The P864 controller can host control logic, schedules, trends, alarms and is expandable using the 864e expansion modules up to 144 hardware data points.

The P864 stores all 864e data into memory in the event of power interruption. Normal operation resumes after power is restored.

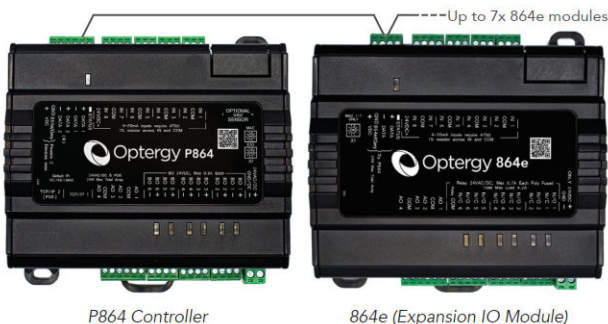
The P864 can be powered using PoE+ (Power over Ethernet) simplifying communication wiring and power needs.

### MAIN FEATURES

- 8 x universal inputs\*
- 6 x binary (NO/NC) outputs
- 4 x analog (0-10V or 4-20ma) outputs
- Add up to 7 additional (864e) input/output modules
- TCP/IP or RS-485 connectivity
- Ethernet switched in/out (10/100 Mbps)
- Powered via PoE+ (IEEE 802.3 AT), 24 VAC, 24 VDC
- BACnet IP to MS/TP Router (RS-485 Serial to Ethernet IP)

### APPLICATIONS

- Energy Metering
- Load Control
- Master Controller Central Plants
- Small Building Control
- Large built up AHU
- Unitary Controller Air Handling Unit



P864 Controller

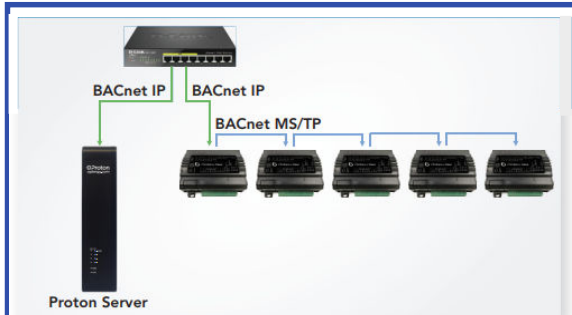
864e (Expansion IO Module)

### PART NUMBER

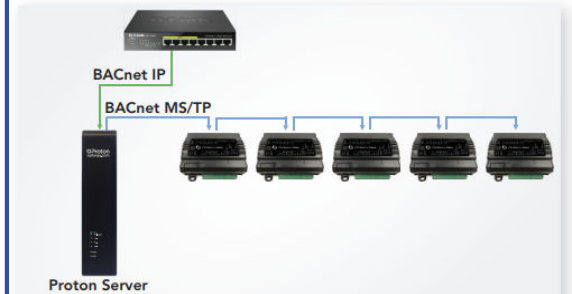
P864  
864e  
P864-MDR-60-24

### DESCRIPTION

Programmable Controller  
Expansion Module  
Power Supply 85-264VAC to 24VDC



BACnet IP Controller, MS/TP Routing and Server



Traditional BACnet MS/TP Routing and Server



PoE BACnet IP Controllers and Server

\*Universal inputs: 12-bit resolution, software selectable for pulse inputs (up to 100 Hz); 10K Type 2 thermistor; 3K thermistor, dry contact, 0-5 VDC/4-20 mA or 0-10 VDC signals.



## UTILITY SUBMETERING & ENERGY MANAGEMENT PRODUCT SOLUTIONS

### *Gain the oversight you need...*

Ask about our TBWC Technology value-added services:

From periodic system wellness checks, to cost-effective NEC required load studies or to determine whether the facility you serve is compliant with the new IEEE 519-2022 standard whose aim is to maximize the efficiency and OPEX cost of the facility and impact on the utility side of the meter.

### *Effectively measure, track, and control energy use with energy monitoring:*

TBWC Technology provide the product solutions clients need to gain visibility of their utility consumption, creating the opportunity to allocate cost, eliminate waste, and means of controlling peak period consumption and facility wellness.

State and local energy code compliant product solutions from industry leading product and technology providers, to deliver affordable, easy to install, easy to own, and easy to manage submetering and energy management.

Products and solutions configured to provide the real-time measurements and feedback specific to each client's specific needs. Reports can be accessed via their internet / IT connection anytime, anywhere.

Data is presented in a series of automated reports via an intuitive, user-friendly web interface accessed from any browser, from any smart device.

Analyze, compare, & aggregate data reliably, providing real time consumption data, forecasting and alarming. All data is securely logged into a powerful relational database ensuring data is never lost.

24/7 monitoring of utility and sub-metering systems: If and when any anomaly is detected, the system will send notifications with location, time and issue detail.

## HIGH PERFORMANCE SUBMETERING PRODUCTS, SOLUTIONS & SERVICES FOR ALL INDUSTRIES

For more information, please contact your TBWC Sales Representative:

Or send your inquiry to: [INFO@TBWCtechnologies.com](mailto:INFO@TBWCtechnologies.com)

