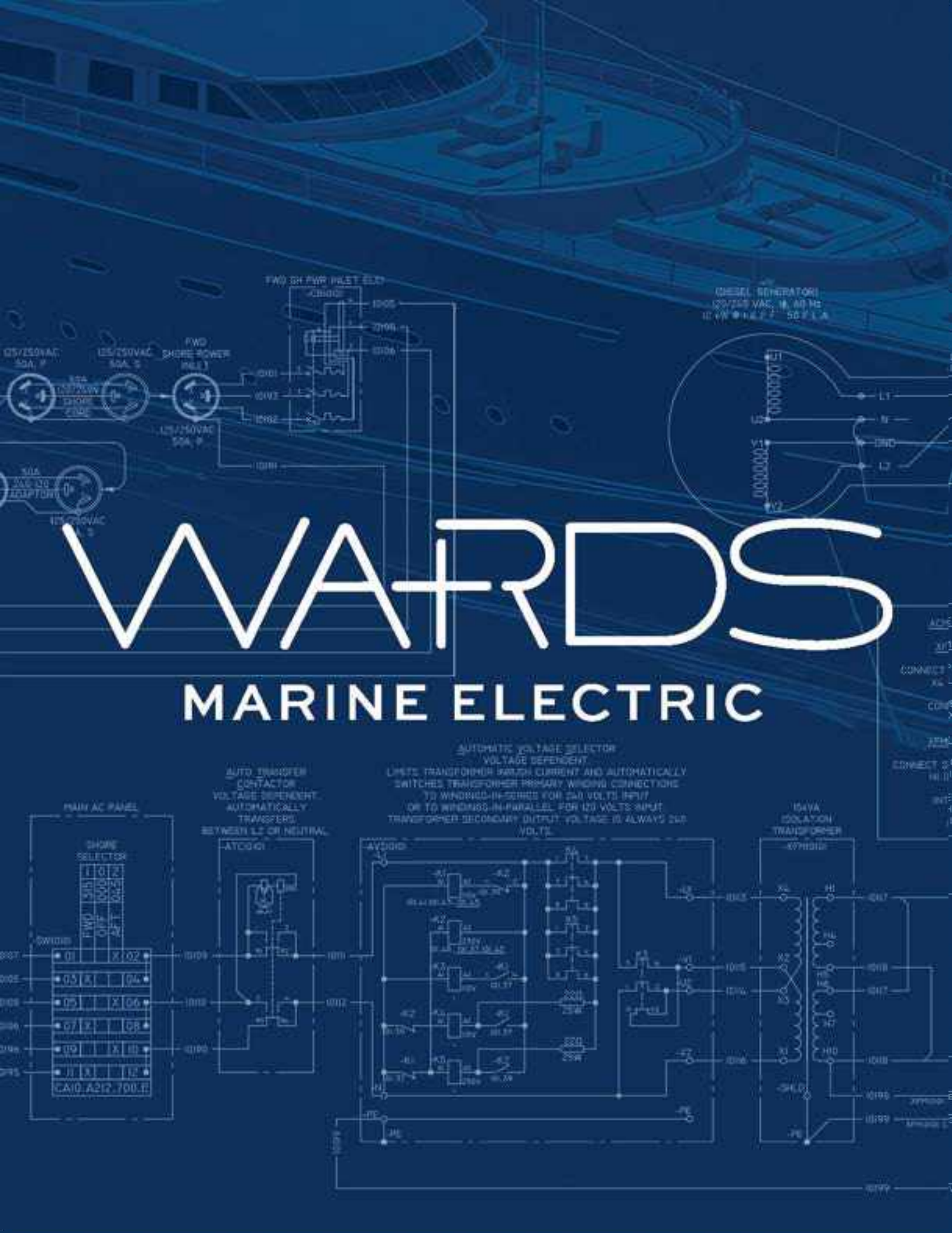

WARDS
MARINE ELECTRIC

Marine Switchgear Systems

Enclosure

- Bulkhead or deck-mounted, as required.
- Made of Aluminum (up to 2 meters wide) or steel.
- Rated IP22 or IP23, as required.
- Custom configurations are available.

AC Power Bus System

- Configurations available: Single, split, or multi-bus.
- Split and multi-bus systems include motor-operated tie breakers/ switches.

Input Circuit Breakers

All input circuit breakers include a(n):

- LSI electronic trip, for long, short, and instantaneous tripping and precise circuit breaker coordination.
- Motor operator, for automated opening and closing.
- Under Voltage release, for safety and control of the circuit breaker.
- Auxiliary contacts, for circuit breaker status indication.

AC Distribution Circuit Breakers

All AC distribution circuit breakers include a(n):

- Thermal-magnetic trip, for delayed and instantaneous tripping.
- Rail-mount or molded-case style, as required.
- Spare capacity of at least 10% for future distribution expansion.

Metering

Digital multimeters for each source and/or bus, to include the following measurements:

- Voltage (V): true RMS, phase, and line.
- Current (I): phase, average, and neutral.
- Real Power (P): real, total, and demand.
- Reactive Power (Q): reactive, total, and demand.
- Apparent Power (S): apparent and total apparent.
- Power Factor (p.f.): power factor and total power factor.
- Frequency (f): actual frequency.
- Total Harmonic Distortion (THD): Voltage and current THD of each phase, up to the 15th harmonic.
- Additional options: Digital and graphical metering available on the optional Touch Screen Interface.
- Analog ground fault current meters for all grounded systems.
- Analog insulation monitors for all isolated systems.

Modes of Operation

At WME, our first principles have always been safety and quality, which is why we design our Marine Switchgear Systems according to our motto, "Manual First, Automation Second."Therefore, a fault in the automation system will never prohibit a power source from being manually connected to the bus, guaranteeing continuity of vessel operations. All WME Marine Switchgear Systems include the following modes of operation:

- Auto Mode: The Power Management System (PMS) provides all protection and operational control of power generation and distribution.
- Manual Mode: The PMS provides background safety operations, but the sources are manually paralleled, connected, and disconnected from the bus by vessel crew.The input circuit breakers are safety interlocked with a manual rotary selector switch.
- Emergency Mode: The PMS is completely offline. Vessel crew are responsible for all protection and operational control.The input circuit breakers are safety interlocked with a manual rotary selector switch.

Automated Control, Protection, and Power Management System (PMS)

Using all off-the-shelf components, with no PLCs or proprietary programming, the WME switchgear control, protection, and power management system provides unsurpassed control and safety features, including:

- Deif PPM-300 controllers, which combine individual synchronizers, load share modules, power factor/VAR controllers, reverse power protection, and protective relays into a single device.These Deif PPM-300 controllers are less complicated and more reliable than multiple, individually mounted and wired components, and the failure of one controller does not affect any other controller or power source.They can be used with any make and size of generator or shore power connection and have approvals and/or certificates from the following agencies: ABS, LR, BV, DNV, GL, RINA, UL, and others.
- Deif PPM-300 operator/display units for each power source and bus tie.
- Seamless transfer to and from all power sources.
- Automatic parallel and load share between generators.
- Synchronization across open bus tie, if fitted on a multi-bus system.
- Protection for O/U Voltage, O/U frequency, overcurrent, reverse power, loss of field, fail to start, fail to stop, fail to close, fail to open, and fail to synchronize.
- Generator priority selection by manual entry, settable time-period, running hours, or "fuel optimization," which runs only those generators necessary to supply the load (suitable for systems with multiple sizes of generators.)

Marine Switchgear Systems

- Addition and subtraction of generators in accordance with load demand.
- Non-essential load shedding and reconnection in accordance with load demand.
- Blackout recovery to automatically bring a generator online when shore power or another generator fails.
- The ability to designate an emergency generator as a "harbor" generator to supply power to the main bus during low-power or nighttime operations. •
- Crew-friendly automation modes, such as:
  - "Heavy Consumer" mode, which adds generating capacity in response to a high-current request signal from equipment, such as a bow thruster or deck crane.
  - "Fixed Power" mode, which runs generators in asymmetrical load share, rotating the heavier load between generators to keep all generators "hot" to prevent "wet stacking."
  - "Secure" mode, which adds a generator to the bus for redundant safety during maneuvering, or for other critical situations.
- An alarm and events log.
- Intra-unit communication via redundant CANBUS.
- A USB service port for easy setup and maintenance.

Other Optional Features Available:

- Böning Ship Automation Touch-Screen Interface (TSI) for simple, enhanced system control and monitoring (ABS, LR, and DNV approved.) The TSI serves as the interface between the operator and the control system, containing screens for the control, management, monitoring, and setup of the vessel's AC power generation and distribution system.With soft keys to navigate the system screens, controlling the vessel's power and viewing data is quick and easy. Our TSI's come in 10", 12" and 15" size options.
- Additional status indication and pre-programmed control functions via the Deif Additional Operator Panel (AOP). (16 status indicators and 8 control functions per AOP)
- "Shore Power Priority" mode provides automatic transfer to shore power whenever shore power is available (only with TSI.)
- Shore power converter communication (only with A/Sea or Magnus converter and TSI.)
- Engine communication via J1939 CANBUS (if available.)
- Ethernet port for remote communication via TCP/IP and SMS/email function.
- Bi-directional communication with vessel's Alarm and Monitoring System.
- Manual generator starting and stopping.
- Manual generator speed adjustment.
- Manual generator voltage adjustment.
- Manual generator paralleling with independent reverse-power protection, sync scope, and sync check relay.
- Analog zero-crossing voltmeter for manual paralleling.
- Analog kWh meter for monitoring shore power usage.
- Analog power factor meter.
- Analog kVAR meter.
- An AC-powered 24VDC power supply to allow manual control of the switchboard in the event all three 24VDC power sources have failed.

Arc Fault Protection System

- WME provides arc fault protection on all switchgear with voltage that exceeds 240VAC, including optical sensors located at the input circuit breakers, main bus bars, and distribution bus bars, and an arc flash relay that opens the input circuit breakers, eliminating the arc fault in 50-75ms.

Safety Labels

- WME provides safety labels on all manufactured switchgear, conforming to NEC-110-16 & NFPA 70E-2021.

Manual Switchgear Systems

Enclosure

- Mounting options: Bulkhead or deck-mounted, as required.
- Material options: Aluminum (up to 2 meters wide) or steel.
- Protection: IP22 or IP23, as required.
- Configuration: Custom configurations are available.

AC Power Bus System

- System configurations: Single, split, or multi-bus.

Power Source Selection

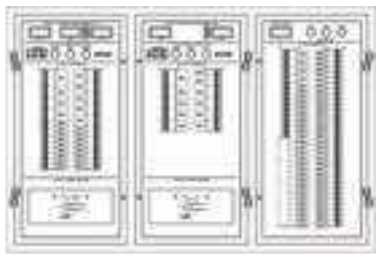
- Mechanism: Input circuit breaker selection using a rotary switch interlock and/or contactors for local and remote operation.

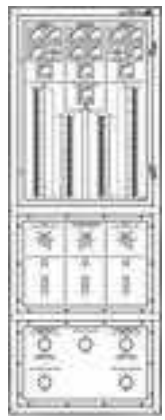
AC Distribution Circuit Breakers

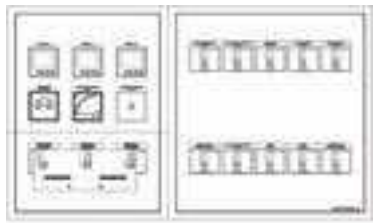
- Features:
- Thermal-magnetic trip for delayed and instantaneous tripping.
- Mounting style: Rail-mount or molded-case, as required.
- Spare capacity: At least 10% for future distribution expansion.

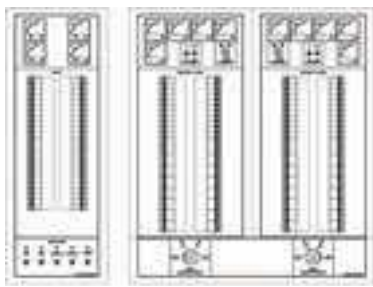
Metering

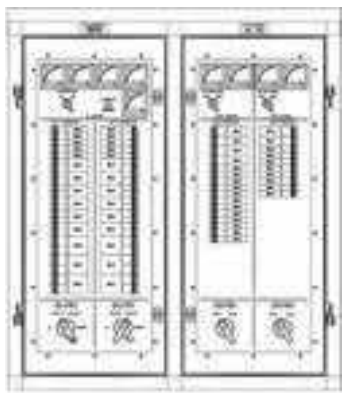
- Digital multimeters for each source and/or bus, including measurements for:
  - Voltage (V): True RMS, phase and line.
  - Current (I): Phase, average and neutral.
  - Real Power (P): Real, total, and demand.
  - Reactive Power (Q): Reactive, total, and demand.
  - Apparent Power (S): Apparent and total apparent.
  - Power Factor (p.f.): Power factor and total power factor.
  - Frequency (f): Actual frequency.
  - Total Harmonic Distortion (THD): Voltage and current THD of each phase, up to the 15th harmonic.
- Digital and graphical metering may also be viewed on the optional Touch Screen Interface.
- Analog ground fault current meters for all grounded systems.
- Analog insulation monitors for all isolated systems.

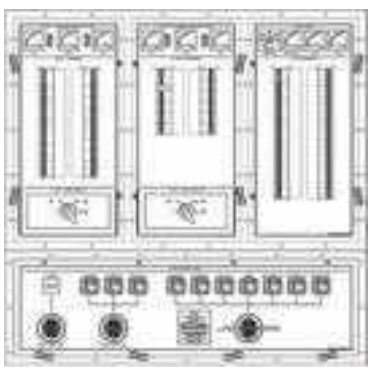


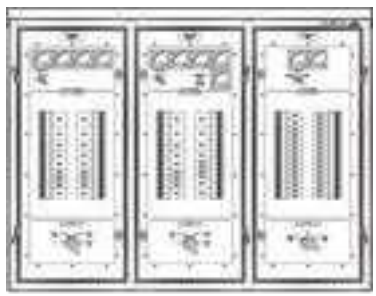












Generator Protection Unit

Unique Features:

- Each controller contains all the functions that are needed to protect electrical equipment with a breaker, for example, a diesel generator, a busbar, or a motor.
- Each controller includes processor technology and high-speed internal communication to provide fast protection functions.
- Processor, communication, measurement, and input/output hardware modules may be replaced or added in the field. The controller automatically recognizes the new hardware modules.
- The controller display unit color graphic screen allows fast access to live data. The operator can use the screen to manage alarms. With the right authorization, the operator can also check and/or change the I/O and parameter configuration. The light indicators of the display unit are visible over a long distance. The display processor can display all languages.
- You can connect several GPU 300 controllers to create one communication network. Redundant communication between the controllers is possible.

Protection & Power Management, PPM 300

Unique Features:

- Incorporating an extensive range of control, protection and supervision functions, PPM 300 applications range from genset control and protection to engineered power management solutions developed for diesel generators (including emergency diesel generators), shaft generators, shore connections, and bus tie breakers.
- PPM 300 power management systems control and monitoring applications meet and maintain set power requirements and guarantee stable operation. PPM 300 power management systems also incorporate market leading fuel optimization technology.
- In multi-master solutions, the integrated PPM 300 controllers connect and communicate as a closed circuit to eradicate single point failures: in cases of unit fall-out, the master functionality automatically moves to another host, keeping the system not just operational but safe and reliable at all times.
- The PPM 300's modular build supports on-site replacement of processor, communication, measurement, and input-output modules with comprehensive class approvals. Changes to the unit at sea or in the field are assisted with automatic recognition functionality facilitating fast, easy and cost-saving service, repairs, and upgrades.
- The controller display unit includes a 5" color graphic screen with intuitive sequences and icons for fast readout of live data, and easy access to alarms handling and controller setup.
- Functionality is defined and targeted according to user permission levels.

Paralleling & Protection Unit, PPU 300

Unique Features:

- The controller contains the functions required to protect and control a generator and its breaker (specifically, a diesel generator, a shaft generator, a shore connection, or a bus tie breaker). You can connect up to 12 controllers to create one system, with load sharing sections.
- Typically, a PLC or operator will send commands to the PPU 300 to close or open the breaker. For a diesel generator, the PLC or operator can also send commands to start or stop the generator, change the regulationmode, and change the regulation set points.
- The controller display unit can have push-buttons for the operator to change the controller mode, close and open the breaker, and start and stop a diesel generator. The color graphic screen shows status and info messages.
- Each controller includes processors and high-speed internal communication. This provides fast protection functions. The controller design is modular, and hardware modules may be replaced or added in the field.

Protective Voltage Relay, RMV-112D

Unique Features:

- These uni-line protective Voltage relays are applied for protection of generators, motors and transformers against adverse system Voltage conditions.They are applicable to both marine- and land-based installations.
- The following uni-line types are available
  - Type RMV-112D – underVoltage and overVoltage relay (U< + U>), 3º
  - Type RMV-122D – overVoltage relay (2 levels: U> + U>)
  - Type RMV-132D – underVoltage relay (2 levels: U< + U<)
  - Type RMV-142D – underVoltage and overVoltage relay (U< + U>), 1º

Double Overcurrent Relay, RMC-132D

Unique Features:

- This double overcurrent relay uni-line RMC-132D is applied in cases where protection against overcurrent at two levels is required (I> + I>)

Reverse Power Relay, RMP-121D

Unique Features:

- The protective reverse power relay uni-line RMP-121D forms part of a complete DEIF series of relays for protection and control of generators, and is applicable to both marine and land-based installations.
- The RMP-121D is type-approved by major classification societies.

Phase Sequence Relay, RMT-111Q96

Unique Features:

- The phase sequence relay with relay contacts type RMT-111Q96 is applied for check of the phase sequence of a power plant. A check of the phase sequence is required for connecting equipment to a new Voltage source e.g. when changing from generator power to shore power.
- The indicator can also be applied for alarm indication on phase breakage.
- The RMT-111Q96 is equipped with two LEDs on the front for indication of the phase condition.

Selectable AC-Transducer, TAS-311DG

Unique Features:

- TAS-311DG is a micro-controller-based AC-transducer with 1 analog output for measurement of RMS-Voltage, RMS current, phase angle or frequency on an AC-network.
- The PC configuration software allows free choice of Voltage, current, phase angle or frequency measurement including configuration of the measuring range and output range without any mechanical settings or adjustments inside the transducer.
- The transducer holds no mechanical moving parts like potentiometers and therefore the calibration stability is excellent. TAS-311DG can be delivered pre-configured or it can be delivered un-configured for customer configuration through the PC-interface.

Selectable AC-Transducer, TAS-321DG

Unique Features:

- TAS-321DG is a micro-controller-based AC-transducer with 1 analog output for measurement of bi-directional current.
- The transducer can be used for measurement of active power or reactive power on a 3-phase network where only 2 phases are available for the measurement. TAS-321DG can be delivered pre-configured or it can be delivered un-configured for customer configuration through the PC-interface

Selectable AC-Transducer, TAS-331DG

Unique Features:

- TAS-331DG is a micro-controller-based AC-transducer with 1 analog output for measurement of power or reactive power on an AC-network. The transducer holds no mechanical moving parts like potentiometers and therefore the calibration stability is excellent.
- TAS-331DG can be delivered pre-configured to the desired measuring value and range or it can be delivered un-configured for customer configuration through the PC-interface. The PC-configuration makes free adjustment of the full input range and output range possible without any mechanical settings or adjustments inside the transducer

Touch Screen Interface BÖNING

Unique Features:

- The WME touchscreen interface is a convenient way to view and control all of the operations and data generated by the PPM-300 controllers. The TSI systems are interfaces only; all of the operational logic, alarms, and configuration is handled by the Deif processors. The other system uses Böning touchscreen equipment and is also mounted on one of the switchboard doors. Comes with the Deif configuration utility and TeamViewer remote access software, which allows our engineers to remotely log into the system for remote diagnosis and maintenance.
- Offers SMS support that can send a text message with alarm data.
- Since both systems are interfaces to the Deif processors, the same control and display data is available.
- Böning systems are available with 10", 15", 19" and 24" displays.

Enclosed Distribution Panelboards

Unique Features:

- Panelboard enclosures are all aluminum and rated IP20. A drip shield for meeting IP22 applications may be added by the customer.
- Available in 125-amp or 250-amp bus capacity.
- AC single-phase (A1) or three-phase (A3) bus configurations are available.
- DC single-pole (D1) or two-pole (D2) bus configurations are available.
- The 125A panelboards come in 12, 24, 36 and 48 pole versions and have screw-fastened flat front panels or formed hinged doors No*1.
- The 250A bus panelboards come in 24, 36, 48, 60 and 72*2 pole versions and have screw-fastened flat front panels.
- Circuit breakers are rail-mounted stationary to the enclosure, not to the front panel.The front panel is easily removed for service.
- Circuit breakers are front connectable, easily changeable and available in 1, 2 or 3-pole units in 3, 6, 10, 16, 20, 25, 32, 40, 50 or 63 amp capacity.
- Panelboards are configurable for either top or bottom cable entry. Cable entry penetrations and fittings are provided by customer.
- All AC panelboards are fitted with neutral and grounding buses.
- All DC panelboards are fitted with negative and grounding buses.
- Supply conductors are terminated directly to the power, neutral (or DC negative) and grounding buses.
- Branch circuit conductors are terminated directly to the circuit breakers and to the neutral (or DC negative) and grounding buses.
- Panelboards are painted with Awl Grip in "Matterhorn White".
- Panelboards are supplied with a face mounted reverse-engraved overlay with two circuit breaker label strips for displaying panelboard and circuit breaker identification.
- Various custom options are available, including metering and "Power Available" indicator lights. Please contact WME for additional details.

125A Bus Distribution Panel

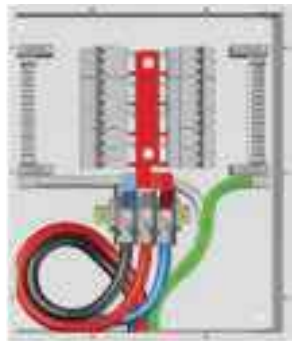
Unique Features:

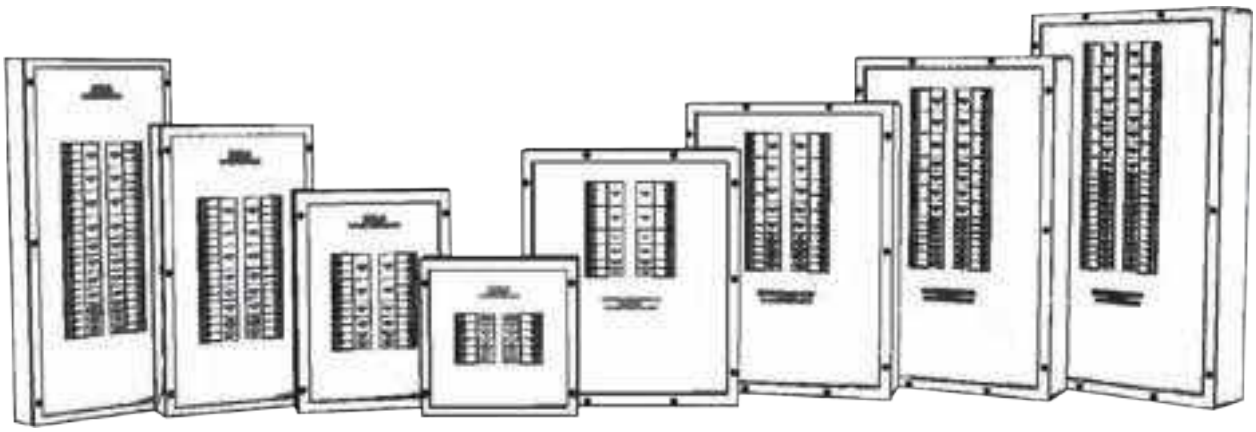
- The enclosure and cover plate are precision formed and stamped. Any cover will fit any other enclosure of the same size. Hinged doors are also available. For hinged doors, please add 12.7mm (½") to enclosure height and width dimensions.
- Normal mounting is with the neutral (or DC negative) and grounding buses at the top with the supply cable entering from the bottom, as shown at right, but the enclosure may be inverted for supply cable top entry.
- The cover panel is symmetrical and may be mounted with overlay text up regardless of whether the enclosure is mounted buses up or buses down so the decision to mount buses up or down may be made in the field.
- The supply cable may be sized up to 1/0AWG [70mm2] maximum (2AWG [35mm2] max for 12-pole).The supply conductors connect directly to the line buses with ¼" bolts and captive nuts and directly to the neutral (orDC negative) and grounding buses with pressure terminals. The neutral bus (blue terminals) is raised so the grounding conductors pass under it to connect to the grounding bus (green terminals).
- Output cables may be up to 2AWG [35mm2], the maximum size conductor that will fit in the CB terminal, and may enter from either top or bottom, as required.
- Circuit breaker arrangement should be final before engraving the circuit breaker label strips.
- A drip shield for meeting IP22 applications may be added by the customer.

250A Bus Distribution Panel

Unique Features:

- The enclosure and cover plate are precision formed and stamped. Any cover will fit any other enclosure of the same size.
- Normal mounting is with the circuit breakers at the top, as shown at right, with the supply cable entering from the bottom,-- but the enclosure may be inverted for supply cable top entry.
- The supply cable may be sized up to 4/0AWG [120mm2] conductors maximum. The supply conductors connect directly to the 10mm line bus studs with nuts and directly to the neutral (or DC negative) and grounding buses with pressure terminals. As this size conductor may be very difficult to bend, there is enough room within the enclosure to make a complete service loop before connecting to the power bus.
- Output cables may be up to 2AWG [35mm2], the maximum size conductor that will fit in the CB terminal, and may enter from either top or bottom, as required.
- A drip shield for meeting IP22 applications may be added by the customer.





125A, 48-POLE	125A, 36-POLE	125A, 24-POLE	125A, 12-POLE	250A, 24-POLE	250A, 36-POLE	250A, 48-POLE	250A, 60-POLE
WME-125-48-A1	WME-125-36-A1	WME-125-24-A1	WME-125-12-A1	WME-250-24-A1	WME-250-36-A1	WME-250-48-A1	WME-250-60-A1
WME-125-48-A3	WME-125-36-A3	WME-125-24-A3	WME-125-12-A3	WME-250-24-A3	WME-250-36-A3	WME-250-48-A3	WME-250-60-A3
WME-125-48-D1	WME-125-36-D1	WME-125-24-D1	WME-125-12-D1	WME-250-24-D1	WME-250-36-D1	WME-250-48-D1	WME-250-60-D1
WME-125-48-D2	WME-125-36-D2	WME-125-24-D2	WME-125-12-D2	WME-250-24-D2	WME-250-36-D2	WME-250-48-D2	WME-250-60-D2
MM INCH	MM INCH	MM INCH	MM INCH	MM INCH	MM INCH	MM INCH	MM INCH
H 800 31.5	H 650 25.6	H 500 19.7	H 350 13.8	H 594 23.4	H 702 27.6	H 810 31.9	H 918 36.1
W 350 13.8	W 350 13.8	W 350 13.8	W 350 13.8	W 500 19.7	W 500 19.7	W 500 19.7	W 500 19.7
D 97 3.8	D 97 3.8	D 97 3.8	D 97 3.8	D 145 5.7	D 145 5.7	D 145 5.7	D 145 5.7

Specifications subject to change without notice. Consult WME for latest configuration.
*1 for 125A enclosures with hinged doors, please add 12.7MM (1/2") to enclosure W & H.
*2 250A, 72-pole version available, special order, 6-8 week lead-time. 72-Pole Size, 1026MM (40.4")H x 500MM (19.7")W x 145MM (5.7")D

GENERAL *Information*

Standard Terms of Payment:

Hours of Operation:

Monday through Friday, from 8:00 am to 4:00 pm EST, excluding holidays.

Prices

Please be advised that prices and discounts are subject to change without prior notice. The prices listed in our catalog are exclusively list prices. Trade discounts are available solely upon approval. It is important to note that the prices do not encompass sales, use, excise, or any similar taxes. In order to be exempt from state sales tax, Ward's Marine Electric, Inc. (WME) must have an original signed and current Florida Annual Resale Certificate for Sales Tax on file. Some items are available via a particular order and may be subject to a special handling fee.

Warranty (Equipment)

Warranty of products is the sole responsibility of the manufacturer. With respect to products manufactured by our suppliers, Ward's Marine Electric, Inc. (WME) makes no express warranties whatsoever and disclaims any thereof. WME has taken appropriate measures to assure the quality of these products and that their own fully supportable warranty backs them. WME will provide warranty information for these products upon request. Products manufactured by WME (other than our Marine Switchgear Systems line of switchboards and panel boards) are warranted to be free from defects in materials and workmanship under normal use and operation. The warranty period shall be one year from the date of shipment. The obligation of this warranty shall be limited to repairing or replacing any part of the completed product that WME agrees is defective. Products returned for warranty evaluation and repair must include a copy of the sales invoice, and shipment will be at the customer's expense. For warranty information regarding our Marine Switchgear Systems line of products, please call our engineering department. To the extent allowed by law, this warranty is exclusive and made expressly in lieu of all other warranties, including the warranties of merchantability and fitness for a particular purpose. WME shall not be liable for any incidental or consequential damages from violating this warranty.

Warranty (Service)

Ward's Marine Electric, Inc. (WME) warrants its work for ninety (90) days from the completion date of such work, except as provided for in this paragraph. The warranty is in place of all expressed or implied warranties granted to a boat owner under Florida law. This warranty does not apply to defects caused by the owner's negligence, corrosion, or defective work in areas hidden from view or inaccessible to WME workmen. If WME sells the equipment, the owner shall look solely to the manufacturer's warranty for any defect in the equipment sold hereunder. This warranty does not include travel expenses, travel time, labor charges, or freight charges if required. WME shall not be liable for any incidental or consequential damages resulting from its work.

Shipping

Unless otherwise specified, the appropriate carrier, F.O.B. Fort Lauderdale, FL, or Riviera Beach, FL, will send all shipments. Merchandise is shipped and packaged in compliance with carrier requirements. All Hazardous materials and or products, if purchased for resale, must be prepared in accordance with HMR (US DOT 49CFR parts 100-185) Hazardous Material Regulation. Product MSDS are available upon request. Title to all merchandise ordered and sold, and risk of loss thereon, shall pass to the customer upon delivery. The customer will be responsible for freight on items drop shipped from manufacturers and any inbound freight charges for special order items. The customer shall submit any claims directly to the carrier for

shortages and damages su_ered in transit. All orders will be subject to a $6 handling fee. This fee is charged regardless of and in addition to any freight charges.

Returns

A copy of the sales invoice must accompany all returns. All goods must be returned within 15 days of purchase, in new condition and original boxes, to receive full credit and not incur a 20% restocking and handling fee. No returns will be accepted after 30 days. Special orders (non-stock items), items cut to length, and items made to order are not returnable. Returned goods shipping charges must be prepaid.

Payment

WME accepts VISA, MasterCard, and American Express credit cards for payment. Terms of payment are to be specified. With approved credit, standard payment terms are 30 days net unless otherwise noted under the terms code on the sales invoice front page. A monthly service charge of 1.5% will be included on all past-due accounts. In the event of a suit for collection, reasonable attorney's fees, and collection costs, including any appellate costs, will be added to this invoice. All special-order items, marine switchgear, and custom panel boards require a full 50% deposit and payment before shipping and delivery.

Liability

Seller's liability on any claim for loss or damage arising out of or connected with the supplying of any goods hereunder, or their sale, resale, operation or use, whether based on contract, warranty, tort (including negligence), or other grounds, shall not exceed the price allowable to such good or part thereof involved in the claim. Seller shall not, under any circumstance, be liable for any labor charges without Seller's prior written consent.