Digitrip OPTIM Trip Unit System

For Westinghouse Series C Molded Case Circuit Breakers, SPB Systems Pow-R Circuit Breakers, DSII/DSLII Low Voltage AC Power Breakers

A specification guide for OPTIM, the world's most advanced programmable trip unit system for the next generation of electrical distribution systems.

Cutler-Hammer

EATON

A New Addition to the Family of Digitrip Low Voltage Electronic Trip Units

Digitrip OPTIM™ Trip Units have been designed and engineered to enhance the industry leading family of Cutler-Hammer microprocessor-based rms sensing trip units.

To our family of Digitrip RMS 310, 510, 610, 810, and 910 Trip Units, we've added the new programmable Digitrip OPTIM 750 and 1050 Trip Units…and this means Cutler-Hammer offers the most comprehensive range of electronic trip units in the industry across a seamless family of low voltage circuit breakers.

Introducing OPTIM "The Next Generation"

Digitrip OPTIM is a new programmable communicating microprocessor-based low voltage electronic trip unit system for Westinghouse Series C® Molded Circuit Breakers and low voltage power breakers.

With Digitrip OPTIM, you now have the capability of providing your electrical distribution system with superior programmable protection and coordination… plus a state-of-the-art advanced warning capability along with system diagnostics, monitoring, and communications.

Digitrip OPTIM will enhance your electrical distribution system by allowing you to reduce downtime, manage energy costs, and utilize equipment more efficiently.

RMS 310	RMS 510	RMS 610	OPTIM 750	RMS 810	RMS 910	OPTIM 1050
						
Digitrip Trip Unit Features at a Glance						
rms Sensing — 5 Functions — Front Adjustable	rms Sensing — 9 Functions — Front Adjustable	rms Sensing — 9 Functions — Front Adjustable — Load Monitoring — Diagnostics	rms Sensing — 10 Functions — Programmable — Load Monitoring — Diagnostics — Communications	rms Sensing — 9 Functions — Front Adjustable — Load Monitoring — Diagnostics — Communications — Power & Energy Monitoring	rms Sensing — 9 Functions — Front Adjustable — Load Monitoring — Diagnostics — Communications — Power & Energy Monitoring — Harmonics	rms Sensing — 10 Functions — Programmable — Load Monitoring — Diagnostics — Communications — Power & Energy Monitoring — Harmonics

A Complete Low Voltage System for All Applications

Digitrip OPTIM Trip Units are available in Westinghouse Series C Molded Case Circuit Breakers in R-, N-, and L-Frames, down to a 70 ampere rating plug…and for both SPB Systems Pow-R Breakers and DSII/DSLII Low Voltage AC Power Breakers.

A Digitrip OPTIM system includes an OPTIM 750 or 1050 Trip Unit with hand held Digitrip OPTIMizer programmer and/or a panel mount Breaker Interface Module and/or IMPACC software to set, configure, diagnose, monitor, and test the system.

Series C Molded Case Circuit Breakers

L-Frame N-Frame R-Frame

SPB Systems Pow-R Breakers

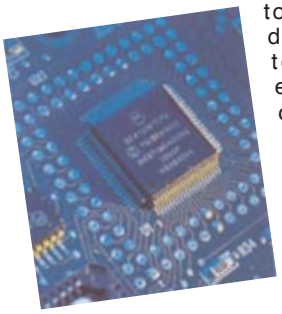
DSII/DSLII Low Voltage AC Power Breakers

Programmability
A New Level of Technology

Superior rms Sensing for Accuracy and Reliability

Digitrip OPTIM Trip Units utilize the proprietary SuRE Plus™ Chip microprocessor providing unparalleled accuracy for protection, system diagnostics, monitoring, and communications.

The new Digitrip OPTIM technology builds upon the original, front adjustable Digitrip RMS Trip Units to provide high reliability and increased functionality to meet the demands of tomorrow's electrical distribution systems.



Programmability Increases Protection and Coordination Capabilities

Several unique Digitrip OPTIM protection and coordination features can now be electronically programmed* to provide:

- **Time-current settings** with more increments permit the user to OPTIMize system protection and coordination.
- **Improved accuracy and reliability** for system configuration are provided by displaying time-current pickup setpoints in actual amperes.
- **Programmable** short delay and/or instantaneous curve tripping options.
- **Selectable powered and unpowered thermal memory** as well as **selectable sure start discriminator** protection features.
- **Increased system security** is provided by the addition of programmable password protection.

Additionally, application software packages are available to configure, coordinate, and download setpoints to provide faster, more efficient system management.

For improved system coordination, we have added:

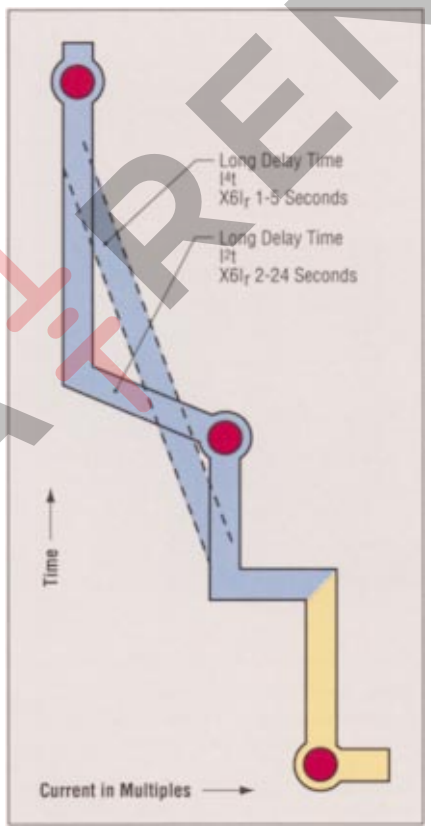
- **I^4t long delay time slope** to the traditional nine LSIG curve shaping options.
- **Short delay and ground delay zone selective interlocking** down to a 70 ampere molded case circuit breaker.

** The breaker continuous current rating is established by the trip unit rating plug.*

Advance Warning Alerts to Potential Problems

An important new feature is the OPTIM advance warning capability that helps keep the system operating and more productive.

- A programmable high load phase and neutral alarm, adjustable between 50 percent and 100 percent of I_r (LDPU setting) will signal an impending trip condition.
- An adjustable ground fault alarm that will alert user of a ground fault condition without tripping the breaker.
- Energy alarming can be performed (such as peak demand exceed) to reduce energy costs.
- THD alarming is included to detect changes in power quality.



System Diagnostics Provide Reduced Downtime

Digitrip OPTIM includes a complete selection of system diagnostic capabilities.

Four cause of trip LEDs are mounted on the front of the trip unit and are complemented by trip event information that is stored in memory after a trip condition.

Remote breaker status indicator is provided by auxiliary and alarm switches for Series C L- and N-Frame Breakers; and by a power relay module for Series C R-Frame, SPB, and DSII/DSLII Breakers.

The Breaker Interface Module provides trip indication information on the front of the unit itself or via relay contacts to a remote location.

System Monitoring - "If You Can't Measure It, You Can't Manage It"

Digitrip OPTIM has an extensive menu of system monitoring capabilities:

- Load monitoring (ABCNG).
- Power factor.
- Power and energy.
- Power quality – current harmonics.
  Accuracy based on full scale sensor rating: 2% Current.
  ± 4% Power.
  ± 5% Energy.

System Communications

All Digitrip OPTIM Trip Units down to a 70 ampere molded case circuit breaker are IMPACC compatible. This means they can be included in the unique Westinghouse IMPACC communications system, specially designed for electrical distribution applications.

All OPTIM programming, configuration, advanced warning, diagnostics, monitoring, and control capabilities can be accessed from a central PC using IMPACC software. Additional software packages can be provided to perform system coordination and energy management as well as waveform capture.

Field Testing to Verify Performance

Trip or no trip testing can be performed on OPTIM Trip Units to verify operation. Testing can be completed by using a Digitrip OPTIMizer, the Breaker Interface Module, or IMPACC software. An Auxiliary Power Module can be provided for bench testing.

Three Programming Methods Provide Optimum Design Flexibility

Digitrip OPTIMizer

Hand Held Programmer

The OPTIMizer plugs into the front of the trip unit and is powered by a nine volt battery. The Digitrip OPTIMizer hand held programmer accesses, displays, and configures information from OPTIM Trip Units.

An operator can use the OPTIMizer to:

- **Complete Initial System Setup**
  - – Select breaker addresses.
  - – Select system frequency (50/60 Hz).
  - – Set system baud rate.
  - – Set system password.
- **Configure the System**
  - – Change time-current setpoints.
  - – Select protection options.
  - – Select alarm levels.
- **Display Information**
  - – Breaker information.
  - – Time-current setpoints.
  - – Metered values.
  - – Trip event information.
- **Test Trip Unit Performance**
  - – Phase and ground.
  - – Trip/no trip.

Breaker Interface Module

Panel Mounted User Interface

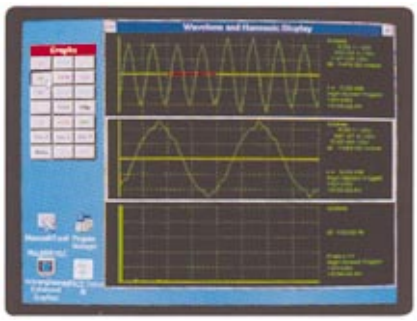
The Breaker Interface Module can be mounted directly on the assembly or at a remote location and can be used to access, configure, and display information from OPTIM Trip Units.

An operator can use the Breaker Interface Module to:

- **Setup Initial System**
  - – Select system frequency (50/60 Hz).
  - – Set system password.
- **Configure the System**
  - – Change time-current setpoints.
  - – Select protection options.
  - – Select alarm levels.
- **Display Information**
  - – Breaker information.
  - – Time-current setpoints.
  - – Metered values.
  - – Trip event information.
- **Test Trip Unit Performance**
  - – Phase and ground.
  - – Trip/no trip.

All Features of the OPTIMizer PLUS…

- **Expanded Energy Monitoring**
  - – Set addresses for group energy monitoring.
  - – Group energy readings.
- **Local and Remote Indication**
  - – Remote indication/alarming.
  - – Breaker status LED indication.
- **Expanded Communications**
  - – Communicates with:
    - • OPTIM Trip Units.
    - • Digitrip RMS 810 and 910 Trip Units.
    - • IQ Energy Sentinels and Universal IQ Energy Sentinels.
    - • Up to 50 devices.

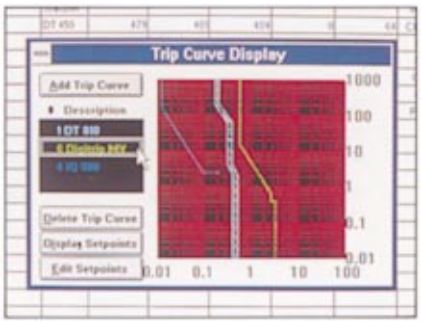


IMPACC Communications

Programming and Other Capabilities from a Personal Computer

All OPTIM programming, configuration, advance warning, diagnostic, monitoring, and control capabilities can be accessed from a central personal computer using IMPACC Series III software. Other software packages are available, including a Coordination Package that displays, configures, and coordinates time-current protection curves for OPTIM Trip Units and other devices that can be included on an IMPACC System.

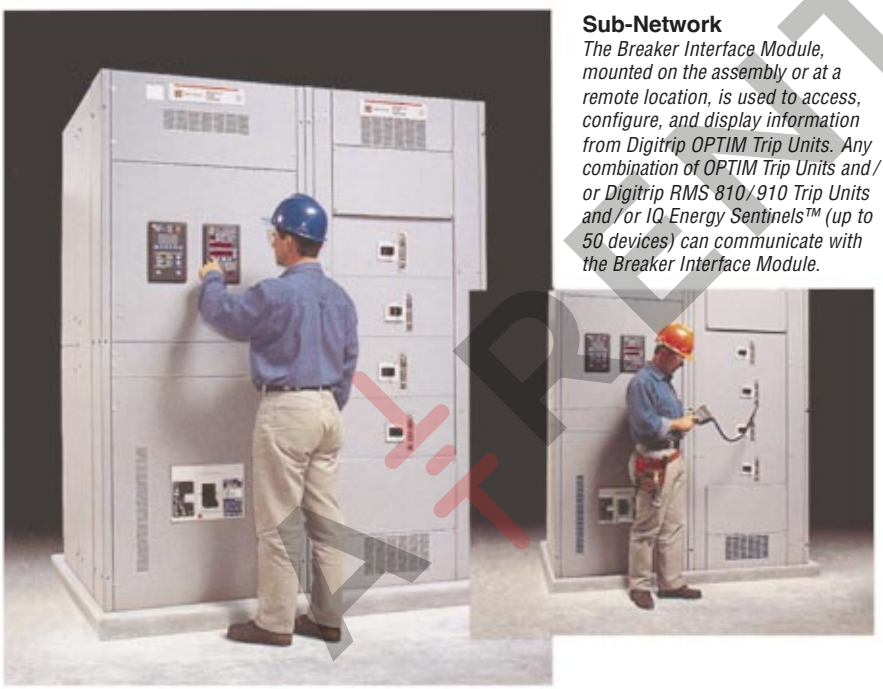
Custom Billing Software, a stand alone application specific software package, provides the capabilities to determine energy usage data by individual departments or tenants in a facility…and then creates “electric bills” based on this data.



Waveform and harmonic display software is capable of performing a waveform capture of phase currents A, B, and C. In addition, total harmonic distortion (THD) and individual harmonic contents of phase currents A, B, and C neutral or ground.

A Wide Range of Applications

Stand Alone
The hand held Digitrip OPTIMizer is used to program individual OPTIM Trip Units.



Sub-Network
The Breaker Interface Module, mounted on the assembly or at a remote location, is used to access, configure, and display information from Digitrip OPTIM Trip Units. Any combination of OPTIM Trip Units and/or Digitrip RMS 810/910 Trip Units and/or IQ Energy Sentinels™ (up to 50 devices) can communicate with the Breaker Interface Module.

Field Bus
With IMPACC communications, the plant operator, facilities engineer, and/or maintenance engineer can monitor and control the entire power distribution system from a central PC.

OPTIM Control Power Requirements for Switchboards and Switchgear

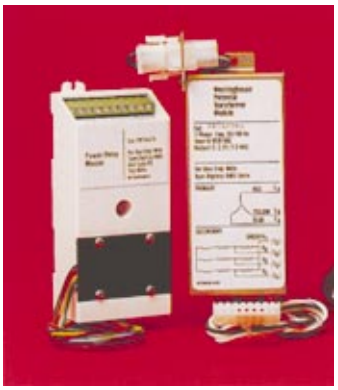
A 30 volt DC power supply is supplied for all OPTIM Trip Units that are supplied to communicate on a main or sub-network system.

- An externally mounted 30 volt DC power supply is supplied to feed up to 16 Series C L- and N-Frame Breakers and the Breaker Interface Module.
- An internally mounted 30 volt DC power supply (Auxiliary Power Module) is supplied for Series C R-Frame, SPB, and DSII/DSLII Breakers.

For OPTIM 1050 Trip Units, a Potential Transformer Module (PTM) is supplied to provide voltage for power and energy monitoring.

- An externally mounted PTM is supplied to feed up to 16 Series C L- and N-Frame Breakers.
- An internally mounted PTM is supplied for Series C R-Frame, SPB, and DSII/DSLII Breakers.

Cutler-Hammer has switchboard and switchgear designs than permit for the various components and wiring arrangements required for Digitrip OPTIM. Contact your Cutler-Hammer distributor or sales engineer for additional information.



DC power is provided to OPTIM Trip Units by the Potential Transformer Module (left) or the Auxiliary Power Module (right).

Typical Specifications - Select from Three Families of Low Voltage Circuit Breakers with Digitrip OPTIM Trip Units

Select Appropriate Circuit Breaker and Add Desired Trip Unit	Circuit Breakers Ampere Range		Series C̄ Molded Case Circuit Breakers 70-2500 Amperes	SPB Systems Pow-R Circuit Breakers 200-5000 Amperes	Type DSII/DSLII AC Power Breakers 100-4000 Amperes
	Digitrip Electronic Trip Units	RMS 310	K-, L-, N-, and R-Frames See SA-11581C for Specifications		
		RMS 510	R-Frame	See SA-11581C for Specifications	
		RMS 610	R-Frame	See SA-11581C for Specifications	
		OPTIM 750	L-, N-, and R-Frames	Specify Digitrip OPTIM 750 Electronic Trip Units	
		RMS 810	R-Frame	See SA-11581C for Specifications	
		RMS 910	R-Frame	See SA-11581C for Specifications	
		OPTIM 1050	L-, N-, and R-Frames	Specify Digitrip OPTIM 750 Electronic Trip Units ***PLUS*** Digitrip OPTIM 1050 Trip Unit Functions	

Series C̄ Molded Case Circuit Breakers with Digitrip OPTIM Trip Units

Protective devices shall be molded case circuit breakers providing complete circuit overcurrent protection by having inverse time and instantaneous tripping characteristics.

Circuit breakers shall be operated by a toggle-type handle and shall have a quick-make, quick-break over-center switching mechanism that is mechanically trip free. Automatic tripping of the breaker shall be clearly indicated by the handle position. Contacts shall be non-welding silver alloy, and arc extinction shall be accomplished by means of DE-ION® arc extinguishers. A push-to-trip button on the front of the circuit breaker shall provide a local manual means to exercise the trip mechanism.

Circuit breakers shall have a minimum symmetrical interrupting capacity as indicated on the drawings. Where indicated, circuit breakers shall be UL listed for series application. Where indicated, circuit breakers shall be current limiting.

Circuit breakers rated 100 ampere and below shall be Westinghouse Series C̄, as manufactured by Cutler-Hammer, with thermal magnetic trip units and inverse time-current characteristics. Circuit breakers rated 125 ampere through 2500 ampere shall be Westinghouse Series C̄ with microprocessor-based rms sensing trip units. Where indicated, provide circuit breakers UL listed for application at 100 percent of their continuous ampere rating in their intended enclosure.

Each molded case circuit breaker microprocessor-based tripping system shall consist of three current sensors, a trip unit, and a flux-transfer shunt trip. The trip unit shall use microprocessor-based technology to provide the adjustable time-current protection functions. True rms sensing circuit protection shall be achieved by analyzing the secondary current signals received from the circuit breaker current sensors and initiating trip signals to the circuit breaker trip actuators when predetermined trip levels and time delay settings are reached.

SPB Systems Pow-R Circuit Breakers with Digitrip OPTIM Trip Units

Circuit breaker shall be Westinghouse SPB Systems Pow-R Breaker, as manufactured by Cutler-Hammer with Digitrip OPTIM Trip Units.

All breakers shall be UL tested for applications in their intended enclosure for 100 percent of their continuous ampere rating.

All breakers shall be provided with a true two step stored energy mechanism which allows closing in a maximum of five cycles whether the breaker is manually or electrically operated.

Both manual and motor operated breakers shall have identical physical dimensions. Manually operated breakers shall be field convertible to electrically operated without voiding the UL label. As a safety feature, anti-pump provisions shall be provided as standard for electrically operated breakers and optional for manual breakers with spring release solenoids. Both manual and electrically operated breakers shall have multiple charge/close provisions providing the following sequences: Charge-Close-Recharge-Open-Close-Open.

The breaker control faceplate shall include color coded visual indicators to indicate contact and stored energy status. Local control pushbuttons shall be provided for opening and closing the breaker. For electrically operated breakers, a local charge pushbutton shall be provided as standard.

A selective override circuit shall be provided on breakers having short time adjustments but without instantaneous adjustments that will allow the breaker to be applied at its maximum interrupting capacity while providing full selectivity up to its rms symmetrical short time rating.

Type DSII/DSLII Air Circuit Breakers with Digitrip OPTIM Trip Units

Circuit breakers shall be Westinghouse Type DSII/DSLII, as manufactured by Cutler-Hammer with Digitrip OPTIM Trip Units.

All breakers shall be UL tested for applications in their intended enclosure for 100 percent of their continuous ampere rating.

The circuit breakers shall have silver-tungsten butt type contacts which operate under high pressure. The arcing contacts shall be of arc-resisting silver-tungsten. The breaker shall be equipped with DE-ION arc extinguishers which effectively enclose the arcing contacts and confine the arc to reduce the disturbance caused by the short circuit interruption. Each breaker shall be equipped with a position indicator, mechanically connected to the circuit breaker mechanism.

Both electrically operated, and manually operated breakers shall have stored energy operating mechanisms. Only one stroke of the operating handle shall be necessary to charge the stored energy spring when operating the manual breaker. The release of the energy to close the breaker manually shall be by means of a mechanical pushbutton which insures positive control of the closing operation. Electrical close shall be initiated by means of a release solenoid.

Digitrip OPTIM Trip Units for Series C̄ L-, N-, and R-Frame, SPB, DSII/DSLII Circuit Breakers

Add the following specification:

Provide Westinghouse Digitrip OPTIM Trip Units as manufactured by Cutler-Hammer with the following features:

Interchangeable rating plugs shall establish the continuous trip ratings of each circuit breaker. Rating plugs shall be fixed as indicated. Rating plugs shall be interlocked so they are not interchangeable between frames, and interlocked so that a breaker cannot be closed and latched with the rating plug removed.

System coordination shall be provided by the following microprocessor-based programmable time-current curve shaping adjustments. The short time pickup adjustment shall be dependent on the long time pickup setting.

- Programmable long time setting.
- Programmable long time delay with selectable I^2t or I^4t curve shaping.
- Programmable short time setting.
- Programmable short time delay with selectable flat or I^2t curve shaping and zone selective interlocking.
- Programmable instantaneous setting.
- Programmable ground fault setting, trip or alarm.
- Programmable ground fault delay with selectable flat or I^2t curve shaping and zone selective interlocking.

The microprocessor-based trip unit shall have a powered / unpowered selectable thermal memory to provide protection against cumulative overheating should a number of overload conditions occur in quick succession.

Provide zone interlocking for the short time delay and ground fault delay trip functions for improved system coordination. The zone interlocking system shall restrain the tripping of an upstream circuit breaker and allow the circuit breaker closest to the fault to trip with no intentional time delay. In the event that the downstream breaker does not trip, the upstream breaker shall trip after the preset time delay.

When the instantaneous adjustment has been deselected, a selectable discriminator circuit shall be provided to prevent the breaker from being closed and latched onto a faulted circuit.

The trip unit shall have an information system that utilizes battery backup LEDs to indicate mode of trip following an automatic trip operation. The indication of the mode of trip shall be retained after an automatic trip. A trip reset button shall be provided to turn off the LED indication after an automatic trip. A test pushbutton shall energize an LED to indicate battery status.

Circuit breakers 1200 ampere frame and below shall be provided with a 30 volt DC power supply mounted within the assembly. In addition, provide a minimum of one auxiliary switch and one bell alarm, each with Form C contacts in each breaker. Provide additional auxiliary switches, bell alarms, shunt trips, and undervoltage releases where indicated on the drawings.

Circuit breakers 1600 ampere frame and above shall be provided with a power relay module to supply control power. Internal relays shall provide contacts for remote indication of the mode of trip (long delay, short circuit, ground fault) and high load.

A red LED shall be provided on the face of the trip unit and preset to flash on and off when an adjustable high load level is exceeded. A time delay shall be provided to avoid nuisance alarms.

The microprocessor-based trip units shall be capable of monitoring the following data:

- Instantaneous value of phase, neutral, and ground current.
- Minimum and maximum current values.
- Average demand current.
- System diagnostic information such as alarms and cause of trip.
- Approximate level of fault current that initiated an automatic trip operation.

The monitored data shall be displayed by a hand held programmer, a breaker interface module, or a remote computer.

The trip unit shall be capable of two way communication via a network twisted pair for remote monitoring and control. The trip unit shall be provided with an address. Transmittable parameters shall include protection settings individual phase, neutral, and ground current; minimum and maximum currents; average demand current; breaker status (open / closed / tripped); trip events and mode of trip; information on external network commands; data or program memory test failure; missing or defective rating plug; test operation; or communication failure. The breaker shall be capable of responding to open and closed commands via the communication network. Where indicated, provide electrical operators that respond to a close command via the communication network.

The trip unit shall contain test capability. Testing shall be carried out by using a hand held programmer, a breaker interface module, or a remote computer to select the values of test current within a range of available settings. Then basic protection functions shall not be affected during test operations. The breaker may be tested in either the “Trip” or “No Trip” test mode. Provide an optional auxiliary power module to allow the breaker trip unit to be bench tested with a 120 volt AC external power source.

A hand held programming unit shall be provided to set/change the network communication breaker address for each device, set the system baud rate, distribution frequency, display breaker information, and display monitored values. In addition, provide password protection for programming time-current setpoints and to perform functional testing of phase and ground trip characteristics. The programmer shall be self-powered by an internal battery. Provide one hand held programming unit when other means of programming the circuit breakers are not provided.

Provide a local area network connecting each circuit breaker trip unit to a breaker interface module. The breaker interface module shall be capable of setting the distribution frequency, displaying breaker information, and displaying monitored values. In addition, provide password protection for programming time-current setpoints, and to perform functional testing of phase and ground trip characteristics. The breaker interface module shall have help message capabilites and shall communicate information for up to 50 devices including Digitrip OPTIM, 810, and 910 Trip Units, and IQ Energy Sentinels. Provide a 30 volt DC power supply for the breaker interface module that is to be mounted within the assembly. Provide a product operated network interface (PONI) for the breaker interface module to communicate via the IMPACC network to a remote computer.

Provide Cutler-Hammer Westinghouse Digitrip OPTIM 750 Trip Units.

Digitrip OPTIM 1050 Trip Units for Series C̄ L-, N-, and R-Frame, SPB, DSII/DSLII Circuit Breakers

Add the following specification to the Digitrip OPTIM 750 specifications from above:

The microprocessor-based trip units shall be capable of monitoring the following data:

- Peak demand (kW).
- Present demand (kW).
- Reverse energy (kWh).
- Forward energy (kWh).
- Total energy (kWh).
- Power factor.
- Percentage harmonic content.
- Total harmonic distortion (THD).

The monitored data shall be displayed by a hand held programming unit, a breaker interface module, or a remote computer.

Circuit breakers 1200 ampere frame and below shall be provided with a potential transformer, suitable for operation up to 600 volts. The potential transformer shall be mounted externally to the circuit breakers and provided with a dielectric disconnect plug.

Circuit breakers 1600 ampere frame and above shall be provided with a potential transformer module, suitable for operation up to 600 volts. The primary of the potential transformer module shall be connected internally to the load side of the circuit breaker through a dielectric disconnect plug or fusible link.

The trip unit shall be capable of two way communications via a network twisted pair for remote monitoring and control. Transmittable parameters shall include the addition of power and energy values, power factor, total harmonic distortion, harmonic content, and waveform capture via the IMPACC communications network.

Provide Cutler-Hammer Westinghouse Digitrip OPTIM 1050 Trip Units.

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