H84xx

Power Meters For Use With 1V CTs

⚠ DANGER ⚠

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Follow safe electrical work practices. See NFPA 70E in the USA, or applicable local codes.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Read, understand and follow the instructions before installing this product.
- Turn off all power supplying equipment before working on or inside the equipment.
- Use a properly rated voltage sensing device to confirm power is off.
  DO NOT DEPEND ON THIS PRODUCT FOR VOLTAGE INDICATION
- Only install this product on insulated conductors.

Failure to follow these instructions will result in death or serious injury.

NOTICE

- This product is not intended for life or safety applications.
- Do not install this product in hazardous or classified locations.
- The installer is responsible for conformance to all applicable codes.
- Mount this product inside a suitable fire and electrical enclosure.

FCC PART 15 INFORMATION

NOTE: This equipment has been tested by the manufacturer and found to comply with the limits for a class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Modifications to this product without the express authorization of Veris Industries nullify this statement.

Installer's Specifications

Electrical Characteristics:	
Type of measurement	True RMS up to the 15th harmonic. On three-phase AC system
Measurement Accuracy:	
Current & Voltage	ANSI C12.16, 0.5%
Power	ANSI C12.16, 1%
Frequency	±-0.01 Hz from 45 to 65 Hz
Data Update Rate	1 sec
Input Voltage Characteristics:	
Measured Voltage Max.	UL to 600VAC (L-L); CE to 300VAC (L-N)
Metering Over-Range	+20%
Impedance	2 MΩ (L-L)/ 1MΩ (L-N)
Frequency Range	45 to 65 Hz
Input Current Characteristics:	
CT Scaling	Primary: Adjustable from 5A to 32,767A
Measurement Input Range	0 to 1.0VAC (+20% over-range)
Impedance	100 kΩ
Control Power*	AC: 100 to 415 ±10%VAC, 5VA; DC: 125 to 250 ±20%VDC, 3W (see * for 600V option)
Control Power Ride Through Time	100 mS at 120VAC
Output:	
Pulse Output #1 H8453V/VB, H8463V/VB	(kWh) N.O., static output (240VAC or 300VDC, 100mA max. at 25°C, derate 0.56mA per °C above 25°C) 2.41kV RMS isolation
Pulse Output #2 H8453V/VB	(Phase Detect or kVARh) N.O., static output (240VAC or 300VDC, 100mA max. at 25°C, derate 0.56mA per °C above 25°C) 2.41kV RMS isolation
Pulse Output #2 H8463V/VB	(Phase Detect or kVARh) N.C., static output (240VAC or 300VDC, 100mA max. at 25°C, derate 0.56mA per °C above 25°C) 2.41kV RMS isolation
RS485 Port; H8436V/VB; H8437V/VB	2-wire, 2400 to 19200 baud, Modbus RTU
Mechanical Characteristics:	
Weight	H8400V=0.81lb; H8400VB=6.35lb; H8400VBS=9.15lb
IP Degree of Protection (IEC 60529)	IP40 front display, meter body IP30 for VB
Display Characteristics	Back-lit green LCD (6 lines total, 4 concurrent values)
Environmental Conditions:	
Operating Temperature	Meter: 0° to 60°C; Display: -10° to 50°C
Storage Temperature	Meter and Display: -40° to 85°C
Humidity Range	5 to 95% RH at 50°C (non-condensing)
Metering Category:	
North America	CAT III; for distribution systems up to 347V L-N/600VAC L-L
CE	CAT III; for distribution systems up to 300V L-N/480VAC L-L
Dielectric Withstand	Per UL 508, EN61010
Conducted and Radiated Emissions	FCC part 15 Class B, EN55011
Safety:	
North America	UL508/C22.2
Europe	CE per IEC 61010

**For control voltages >415VAC order H84xxVBS*

QUICK INSTALL

1. Mount the device in a fire/electrical enclosure. Use the retaining clips for the H84xx-V. Use appropriate wall-mounting screws for the H84xx-VB(S).
2. Wire the device. See the Wiring Diagrams section for options.
3. Configure the communications parameters.

  USA 800.354.8556 or +1.503.598.4564 / support@veris.com

SAFETY

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Only qualified electrical workers should install this equipment. Read entire instructions before performing this work.
- Before performing visual inspections, tests, or maintenance on this equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding.
- Turn off all power supplying the power meter and the equipment in which it is installed before working on it.
- Always use a properly rated voltage sensing device to confirm that all power is off.
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. In the USA, see NFPA 70E.
- Qualified persons performing diagnostics or troubleshooting that require electrical conductors to be energized must comply with NFPA 70 E - Standard for Electrical Safety Requirements for Employee Workplaces and OSHA Standards - 29 CFR Part 1910 Subpart S - Electrical.
- Before closing all covers and doors, carefully inspect the work area for tools and objects that may have been left inside the equipment.
- Use caution while removing or installing panels so that they do not extend into the energized bus; avoid handling the panels, which could cause personal injury.
- NEVER bypass external fusing.
- NEVER short the secondary of a potential transformer.
- Before performing Dielectric (Hi-Pot) or Megger testing on any equipment in which the power meter is installed, disconnect all input and output wires to the power meter. High voltage testing may damage electronic components contained in the power meter.
- Install the power meter in a suitable electrical and fire enclosure.

Failure to follow these instructions may result in death or serious injury.

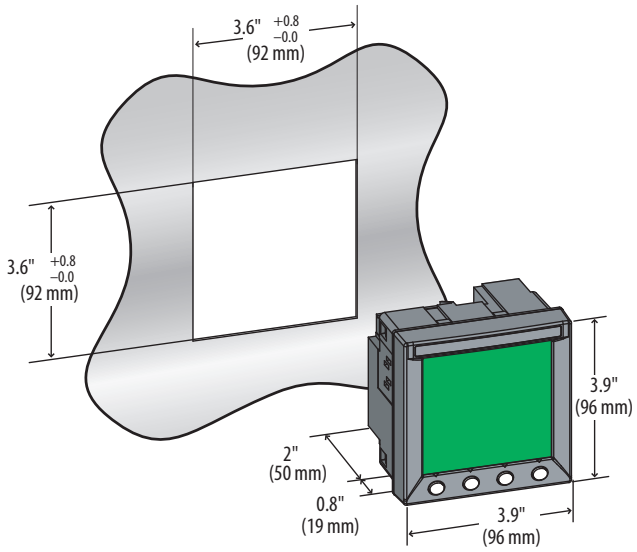
Always observe all National and Local Codes during installation of this product.

Mount the box on a solid surface:

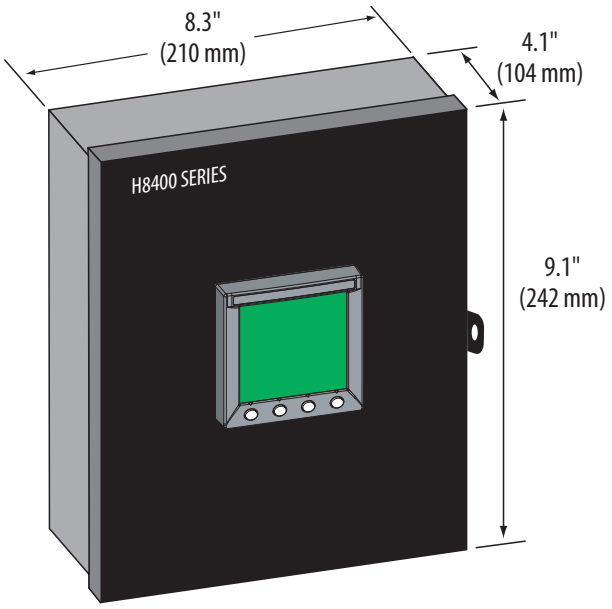
1. For use in a pollution degree 2 or better environment only.
2. Connect appropriate safety earth ground wiring to provided grounding terminal.
3. Disconnect devices: in Europe, provide a switch or circuit breaker rated for a maximum of 20 amps to disconnect the H84xx from the supply source. Place the switch or circuit breaker in close proximity to the equipment and within easy reach of the operator, and mark it as the disconnecting device. The disconnecting device shall meet the relevant requirements of IEC 60947-I and IEC 60947-3 and be suitable for the application. In the US and Canada, disconnecting fuse holders can be used.
4. Provide overcurrent protection for supply conductors with approved current limiting devices suitable for protecting the wiring but not exceeding 20 Amps.
5. Wiring can be up to 12 AWG (2mm) and rated min. 600V.
6. After installation, close the box and secure with the provided plastic cable tie or securing screw. A lockout device may also be used for this purpose.

DIMENSIONS

H84xxV



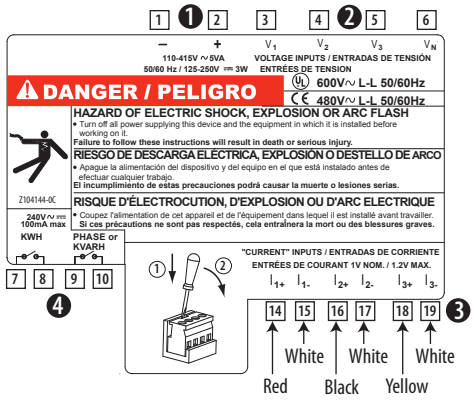
H84xxVB(S)



NOTE: Recommended distance from left side of box to another object is 1.8" (45 mm) to allow meter door to open.

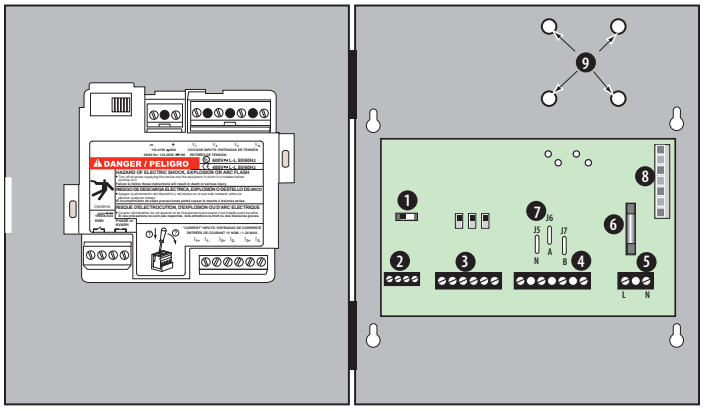
PRODUCT DIAGRAMS

H84xxV



1. Control Power
2. Voltage Inputs
3. 1 Volt "Current" Inputs
4. Pulse Outputs for H8453V, H8463V or RS-485 Output for H8436V, H8437V

H84xxVB(S)



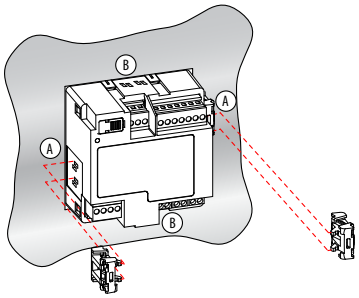
1. RS-485 Terminator Switch (H8436VB/S, H8437VB/S only) *
2. RS-485 Input (H8436VB/S, H8437VB/S) or Pulse Contacts (H8453VB/S, H8463VB/S)
3. 1 Volt "Current" Inputs
4. Voltage Inputs
5. Control Power Input
6. Control Power Fuse — 1/2 Amp, 600VAC
7. Self-Power Connections
8. 600VAC Connections for H84xxVBS or jumper on H84xxVB
9. Studs for 600V transformer — H84xxVBS only

** NOTE: If this unit is the last unit in a daisy chain, then this switch should be in the "on" position. Otherwise, this switch should remain in the "off" position.*

INSTALLATION

H84xxV Mounting

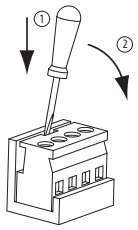
1. Insert the power meter through a 3.6" x 3.6" (92mm x 92mm) cut-out.
2. Attach the two retainer clips to the power meter using the retainer slots at position A or position B.



There are two sets of retainer slots on the left, right, top and bottom of the power meter. The first set is for installation locations thinner than 3 mm (1/8 in.). The second set is for installation locations 3 to 6 mm (1/8 in. to 1/4 in.).

NOTE: For use on a flat surface of a protective enclosure (for example, in the USA, use a NEMA Type 1 rated enclosure or better).

Removing the Connectors:

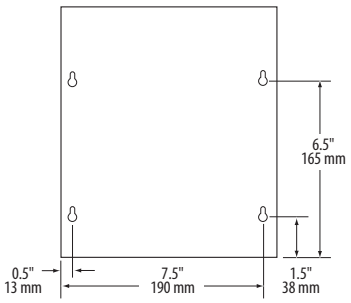


1. Insert the flat end of a screwdriver into the groove between the power meter and the connector, as shown in the image.
2. Pull down the screwdriver to remove the connector.

H84xxVB(S) Mounting

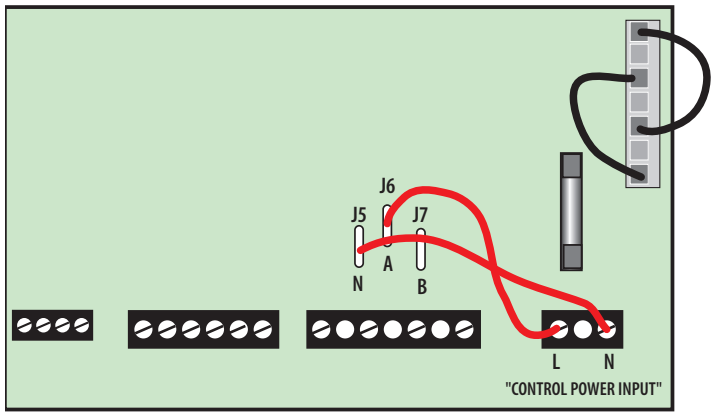
Mount the meter box at an appropriate height allowing for easy viewing of the display.

Allow a clearance of 1.8" (45mm) of open space on the left side of the meter to allow the meter door to open.



WIRING DIAGRAM

H84xxVB(S)



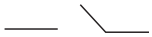
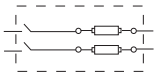
CONTROL POWER may be taken from the voltage inputs by selecting appropriate jumper connections.* CONTROL POWER must be below 415V L-L and a maximum of 300V from either line to ground. For operation up to 600VAC, use the X050 DJU 600V to 300 dropping transformer provided in H84xx-XBS products.

In this product, the jumpers connect to J6 and J8 with 480 or 600V Delta power systems.

** Set jumpers for N & A. If product will be used on a 480V or higher Delta installation, provide a separate control power source or use the optional X050 DJU 600V to 300 dropping transformer.*

NOTE: Voltage inputs and control power for distribution systems up to 347V L-N and 600 V L-L comply with metering category III. Also, terminal wiring should have a minimum temperature rating of 80°C.

The following symbols are used in the diagrams:

Symbol	Description
	Voltage disconnect switch
	Fuse
	Earth ground
	Current transformer
	Potential transformer
	Protection containing a voltage disconnect switch with a fuse or disconnect circuit breaker (the protection device must be rated for the available short-circuit current at the connection point).

SUPPORTED SYSTEM TYPES

Voltages Less Than or Equal to 347VAC L-N/600VAC L-L, Direct Connect, No PTs

	CTs		Voltage Connections			Meter Configuration		
Number of wires	Qty	ID	Qty	ID	Type	System Type	PT Primary Scale	Figure Number
SIngle-Phase Wiring								
2	1	I1	2	V1, Vn	L-N	10	No PT	12
2	1	I1	2	V1, V2	L-L	11	No PT	13
3	2	I1, I2	3	V1, V2, Vn	L-L with N	12	No PT	14
Three-Phase Wiring								
3	3	I1, I2, I3	3	V1, V2, V3	Delta	31	No PT	15
3	1	I1	3	V1, V2, V3	Delta (balanced)	32	No PT	16
4	3	I1, I2, I3	3	V1, V2, V3, Vn	4-Wire Delta	40	No PT	17
4	3	I1, I2, I3	3	V1, V2, V3, Vn	Wye	40	No PT	17
4	1	I1	3	V1, V2, V3, Vn	Wye (balanced)	44	No PT	23

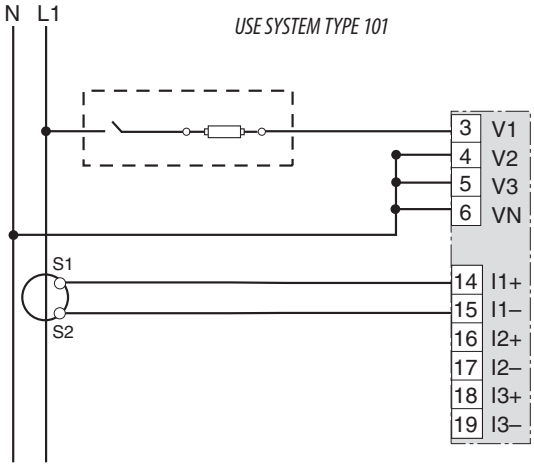
Voltages Greater Than 347VAC L-N/600VAC L-L

	CTs		Voltage Connections			Meter Configuration		
Number of wires	Qty	ID	Qty	ID	Type	System Type	PT Primary Scale	Figure Number
Three-Phase Wiring								
3	3	I1, I2, I3	2	V1, V3 (V2 to ground)	Delta	31	Based on voltage	18
3	1	I1	2	V1, V2, V3 (Vn to ground)	Delta (balanced)	32	Based on voltage	19
4	3	I1, I2, I3	3	V1, V2, V3 (Vn to ground)	Grounded Wye	40	Based on voltage	20
	3	I1, I2, I3	2	V1, V2, V3 (Vn to ground)	Wye	42	Based on voltage	21
4	1	I1	3	V1, V2, V3 (Vn to ground)	Grounded Wye (balanced)	44	Based on voltage	22

H84XXV WIRING DIAGRAMS

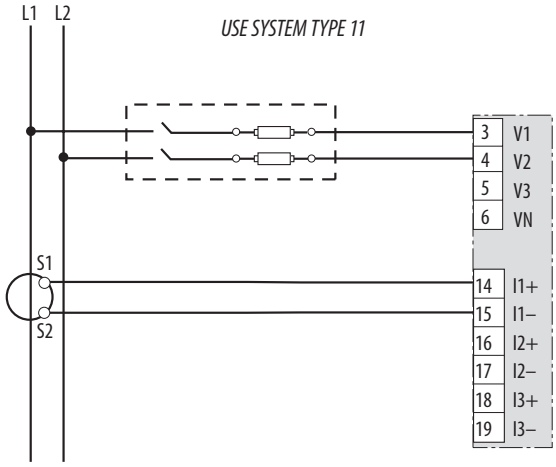
1-Phase Line-to-Neutral 2- Wire System 1 CT

USE SYSTEM TYPE 101



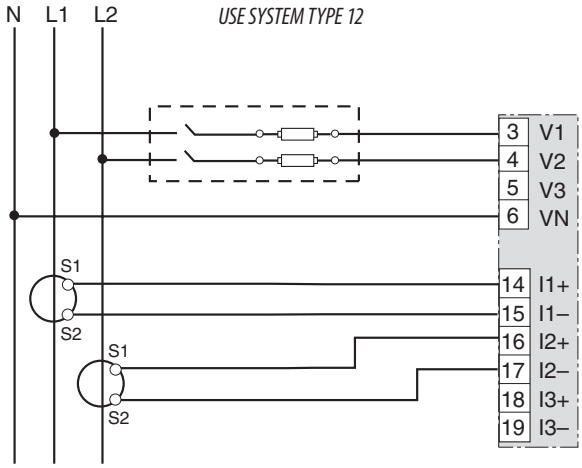
1-Phase Line-to-Line 2-Wire System 1 CT

USE SYSTEM TYPE 11



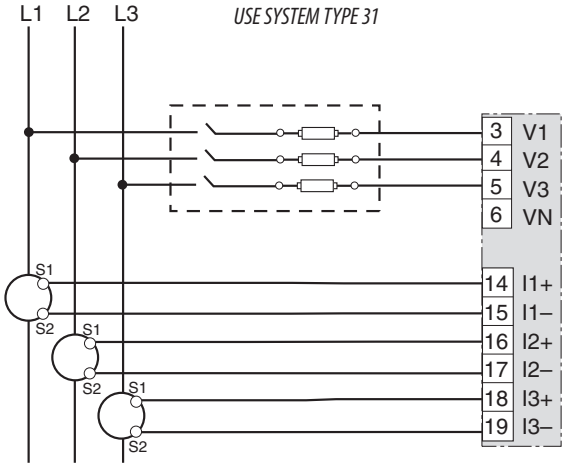
1-Phase Direct Voltage Connection 2 CT

USE SYSTEM TYPE 12



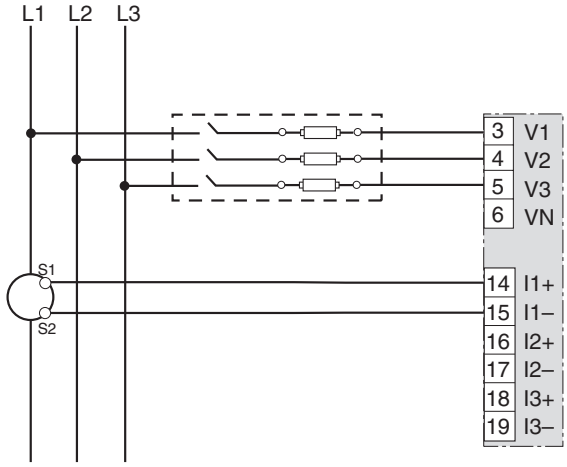
3-Phase 3-Wire 3 CT no PT

USE SYSTEM TYPE 31



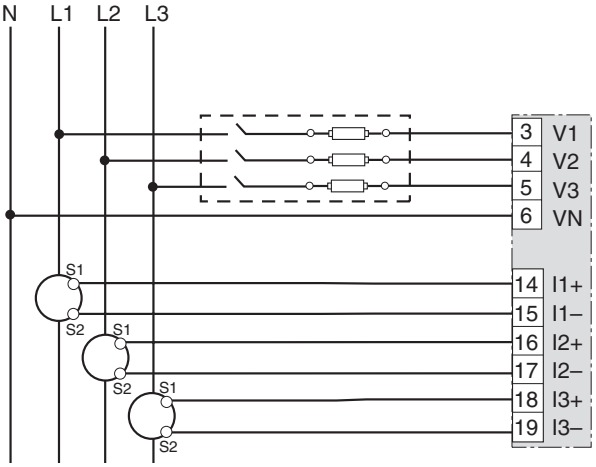
Balanced 3-Phase 3-Wire Direct Voltage Input Connection 1 CT

USE SYSTEM TYPE 32



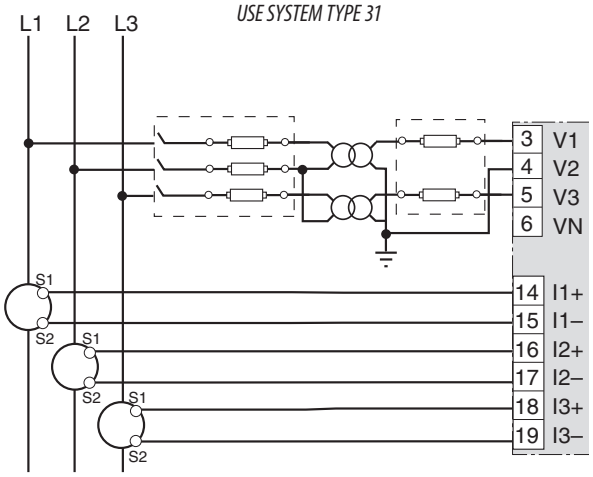
3-Phase 4-Wire Wye Direct Voltage Input Connection 3 CT

USE SYSTEM TYPE 40



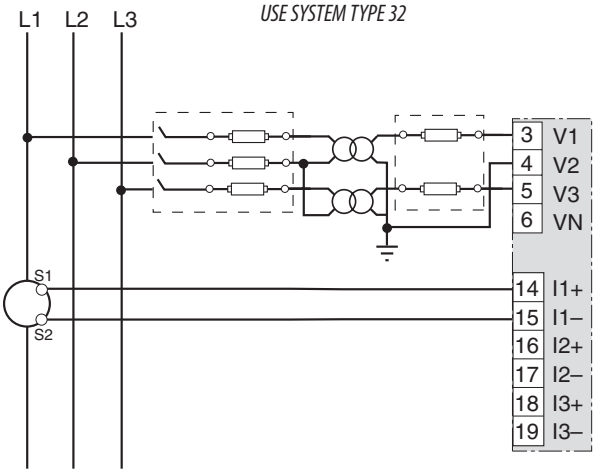
3-Phase 3-Wire Delta Connection 3 CT 2 PT

USE SYSTEM TYPE 31



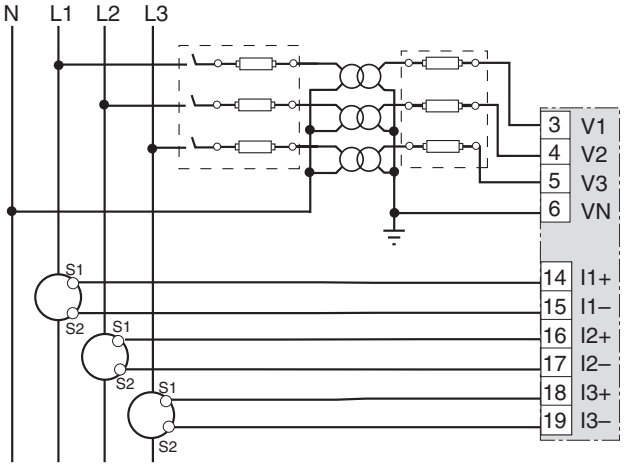
Balanced 3-Phase 3-Wire 1 CT 2 PT

USE SYSTEM TYPE 32



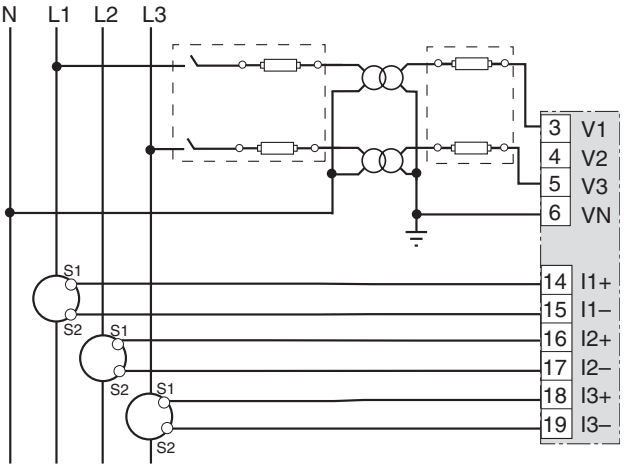
3-Phase 4-Wire Wye Connection 3 CT 2 PT

USE SYSTEM TYPE 40



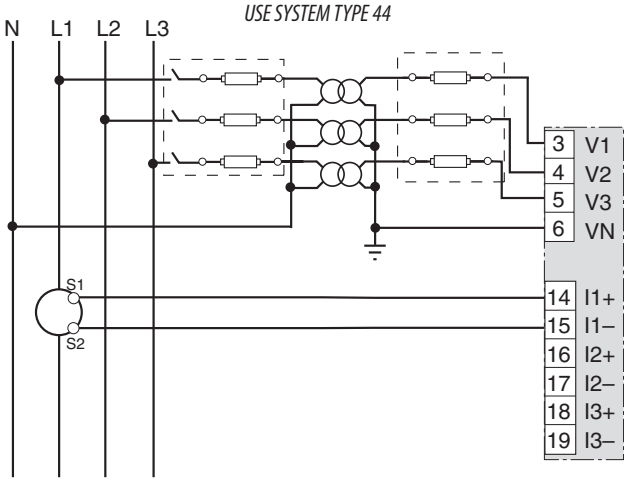
3-Phase 4-Wire Wye 3 CT 2PT (for balanced voltage)

USE SYSTEM TYPE 42



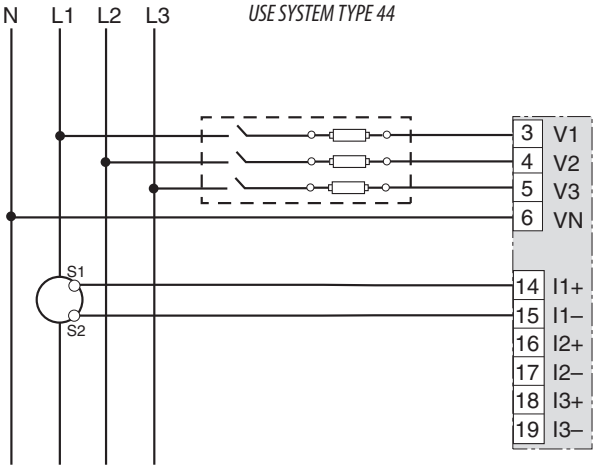
Balanced 3-Phase 4-Wire 3 PT 1 CT

USE SYSTEM TYPE 44



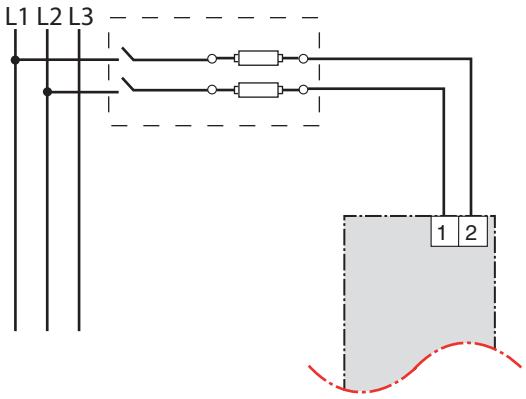
Balanced 3-Phase 4-Wire Direct Voltage Input Connection 1 CT

USE SYSTEM TYPE 44



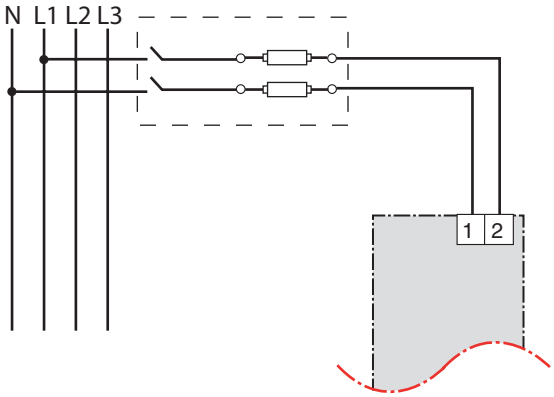
Control Power

Direct Connect Control Power C (Phase to Phase)



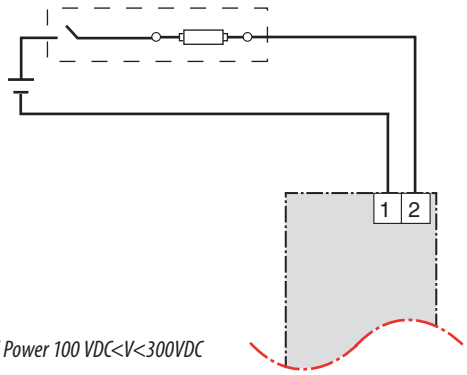
- *Phase to Phase only when voltage <415 +10%VAC max.*
- *See Table below.*

Direct Connect Control Power (Phase to Neutral)



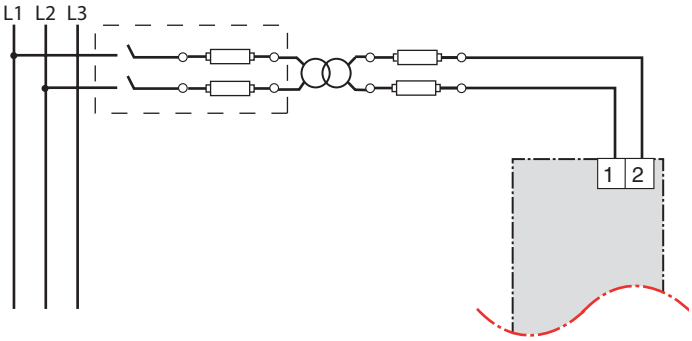
- *Phase to Neutral only when voltage <415+10% VAC max.*
- *See Table below.*

Direct Connect Control Power (DC Control Power)



- *DC Control Power 100 VDC<V<300VDC*
- *See Table below.*

Control Power Transformer (CPT) Connection



- *Control Power Transformer 120 or 240VAC. Secondary 50VA max.*
- *See Table below.*

Fuse Recommendation

1. To avoid distortion, use parallel wires for control power and voltage inputs. Keep the fuse close to the power source.
2. Use with 480Y/277V and 208Y/120V systems.
3. For an open delta PT connection with 120V L-L secondaries, use system type 31.

Control Power Source	Source Voltage (V)	Fuse	Fuse Amperage (mA)
CPT	Vs < 125V	FNM or MDL	250
CPT	125 < Vs < 240V	FNQ or FNQ-R	250
CPT	240 < Vs < 305V	FNQ or FNQ-R	250
Line Voltage	Vs < 240V	FNQ-R	250
Line Voltage	Vs > 240V	FNQ-R	250
DC	Vs < 300V	LP-CC	500

NOTES:

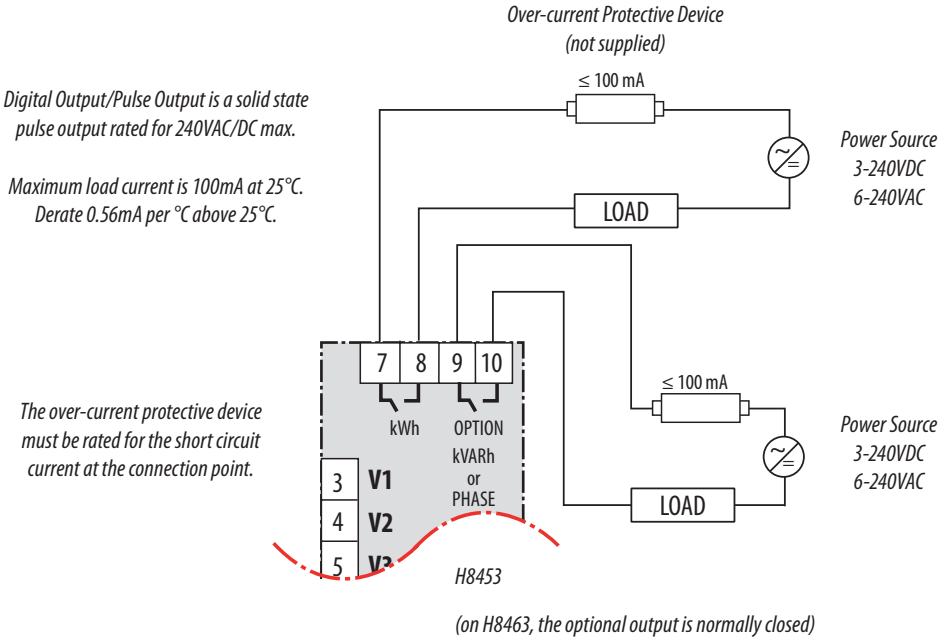
Place over-current protection as close to the device as possible.
For selecting fuses and circuit breakers other than those listed above, use the following criteria:

- Rate over-current protection as listed above.
- Select current interrupt capacity based on the installation category and fault current capability.
- Select over-current protection with a time delay.
- Base the voltage rating on the input voltage applied.
- If a 0.25A fuse is not available with the required fault current capability, use a fuse rated at a maximum of 0.5A.

PULSE OUTPUT CAPABILITIES

Solid-state Pulse Output

The H8453 has two normally open solid-state KY outputs. The H8463 has one normally open KY output and one normally closed KZ solid-state output. One is dedicated to kWh, and the other is field-selectable for Phase Detect or kVARh. See the Setup section for configuration information.



*The power source should not be a safety extra low voltage (SELV) circuit. Pulse outputs are not SELV rated.

COMMUNICATIONS

Communications Capabilities

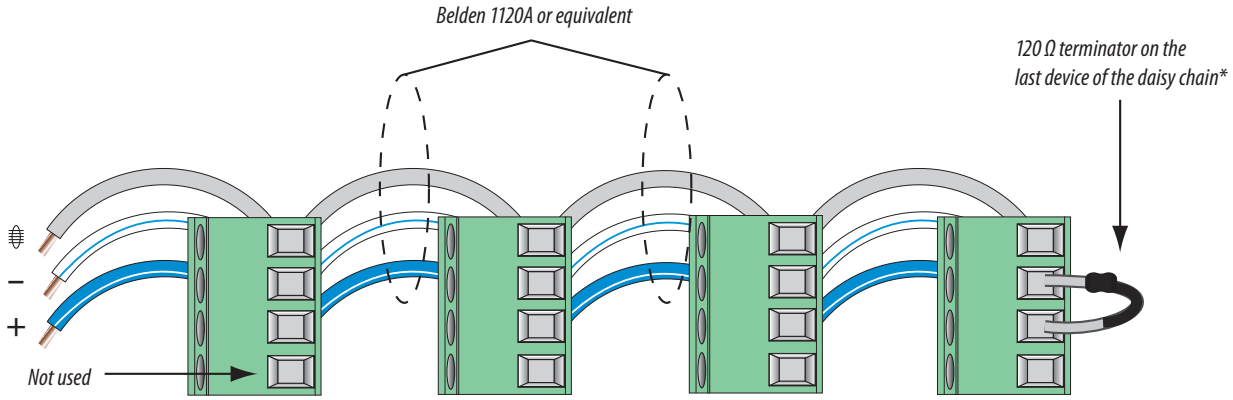
RS-485 Communications Distances:

Baud Rate	Maximum Communication Distances	
	Feet	Meters
9600	8000	2438
19200	6000	1829

Note: Use distances as a guide only; they are not guaranteed. Refer to the master device's documentation for any additional distance limitations.

Daisy-chaining Devices to the Power Meter

The RS-485 slave port allows the power meter to be connected in a daisy chain with up to 31 2-wire devices.



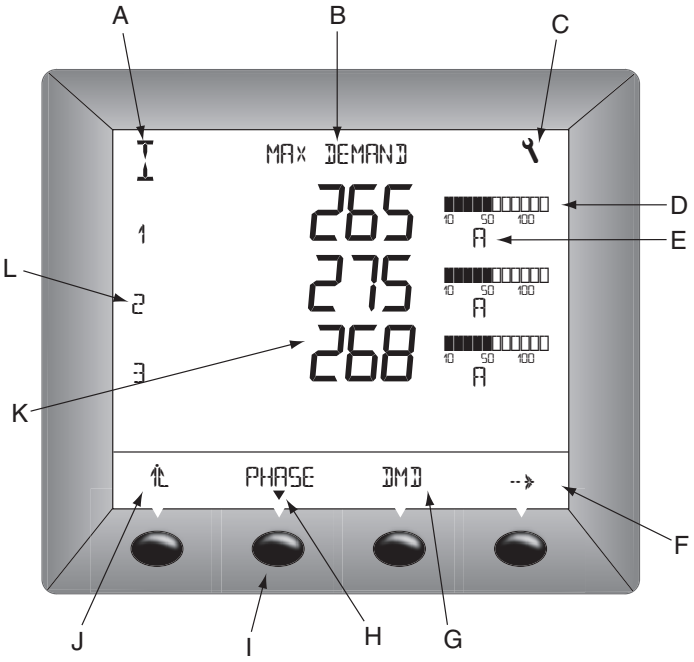
- If the power meter is the first device on the daisy chain, connect it to the host device using a RS-232 to RS-485 converter.
- If the power meter is the last device on the daisy chain, terminate it with the terminator provided.
- The first device on the chain should also have a 120 Ω terminator between + and -.
- The terminal's voltage and current ratings are compliant with the requirements of the EIA RS-485 communications standard

** A 120 Ω resistor is included on the circuit board inside the H8436VB/S and H8437VB/S units.*

OPERATION

Operating the Display

The power meter is equipped with a large, back-lit LCD display. It can display up to five lines of information plus a sixth row of menu options.



Power Meter Display

A. Type of measurement
B. Screen Title
C. Maintenance icon
D. Bar Chart (%)
E. Units
F. Display more menu items
G. Menu item
H. Selected menu indicator
I. Button
J. Return to previous menu
K. Values
L. Phase

Button Symbols

Navigation	
----------→	View more menu items on the current level.
↰	Return to the previous menu level.
▼	Indicates the menu item is selected and there are no menu levels below the current level.
Change Values	
+	Change values or scroll through the available options. When the end of a range is reached, press + again to return to the first value or option.
←----------	Select the next number of a series.
OK	Move to the next editable field or save the changes and exit the screen if the last editable field is selected.

Note: Changes are automatically saved.

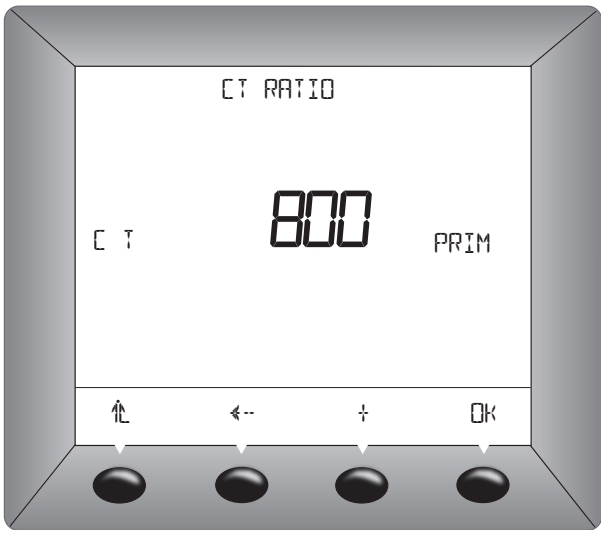
H84XX DEFAULT SETTINGS

Model	H8436X/37x	H8453x	H8463x
CT Primary Ratio	100A	100A	100A
CT Secondary Ratio	1 V	1 V	1 V
PT Ratio	1:1 (none)	1:1 (none)	1:1 (none)
Frequency	60 Hz	60 Hz	60 Hz
Setup Password	00000	00000	00000
Reset Password	00000	00000	00000
Display Mode	IEEE	IEEE	IEEE
System Type	40	40	40
Modbus Address	001	N/A	N/A
Modbus Baud Rate	19200 baud	N/A	N/A
Modbus Parity	None	N/A	N/A
1st Pulse Contact	N/A	N.O.	N.O.
kWh Pulse Width	N/A	100ms	100ms
kWh Pulse Energy Index	N/A	1 kWh/Pulse	1 kWh/Pulse
2nd Pulse Contact	N/A	N.O.	N.C.
2nd Pulse Contact Output	N/A	kVARh	Phase Loss
kVARh Pulse Width	N/A	100ms	100ms
kVARh Pulse Energy Index	N/A	1 kVARh/Pulse	1 kVARh

SETUP

Set Up the Power Meter

1. Press -----> until you see SETUP.
2. Press SETUP. Enter your password (Default password is 00000).
3. Press + to change a digit, <----- to select the next digit.
4. Press OK.

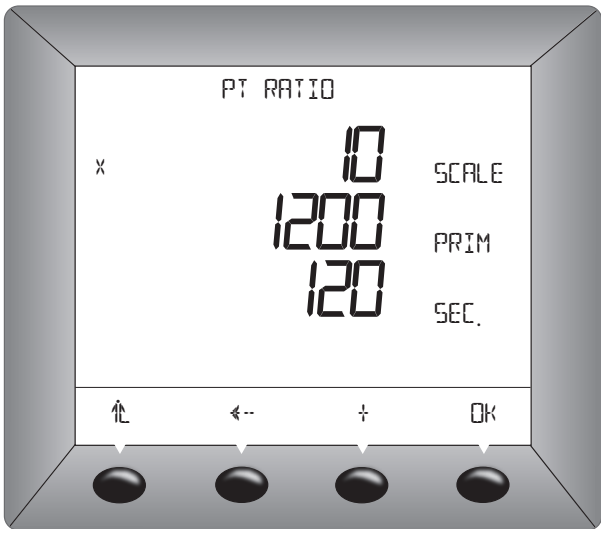


Set Up CTs

1. Press CT. ----->
2. Enter the PRIM CT (primary CT) number (1 to 32767, using the + and <----- buttons).
3. Press OK.

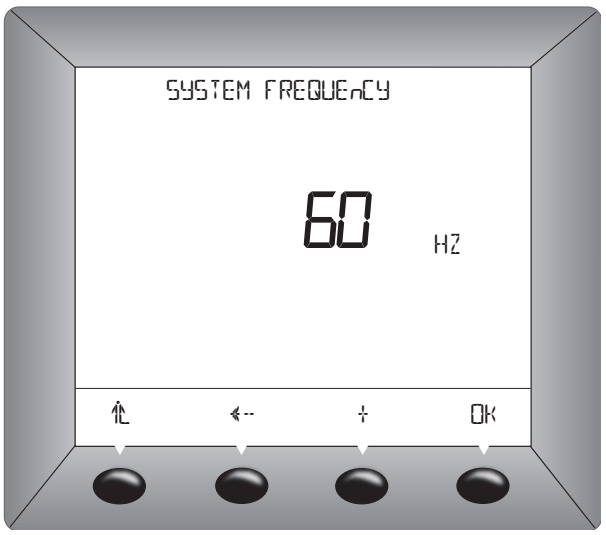
Set Up PTs

1. Press PT. The default is NO PT. Single Phase System types (10, 11, 12) do not allow PTs.
2. Press +
3. Select the SCALE value: x1, x10, x100, NO PT (for direct connect).
4. Press OK.
5. Enter the PRIM (primary) value.
6. Press OK.
7. Enter the SEC. (secondary) value.
8. Press OK.



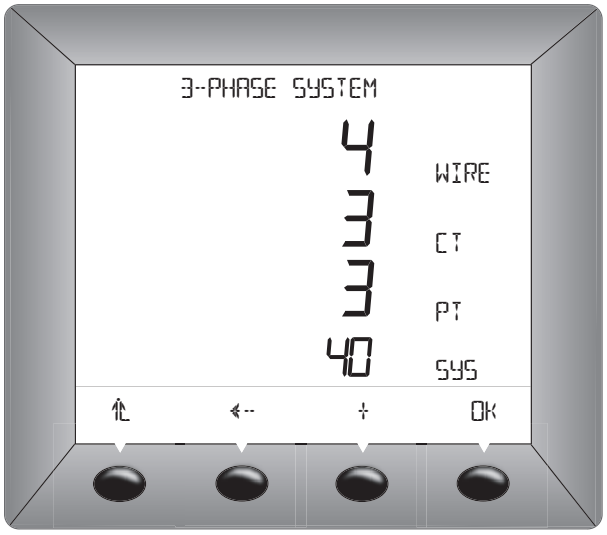
Set Up the System Frequency

1. Press -----> until HZ is visible.
2. Press HZ.
3. Press + to select the frequency: 50 Hz or 60 Hz (default is 60Hz).
4. Press OK.



Set Up the Meter System Type

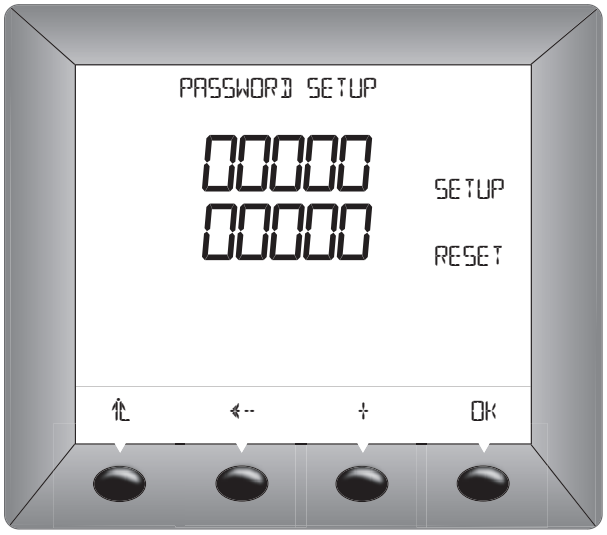
1. Press -----> until SYS is visible.
2. Press SYS.
3. Press + to select the SYS (system type): 10, 11, 12, 30, 31, 32, 40, 42, 44. NOTE: See Wiring section for a description of the system types.
4. Press OK.



Set Up the Passwords

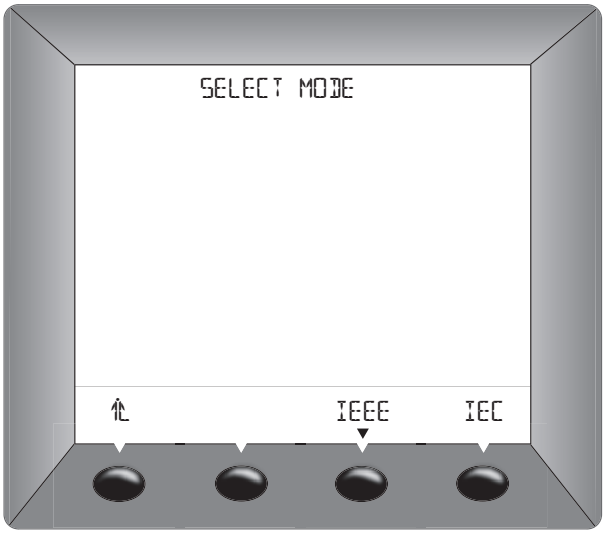
NOTE: The default passwords are 00000.

1. Press -----> until PASSW (password) is visible.
2. Press PASSW.
3. Press + to change a digit in the SETUP password, <----- to select the next digit. NOTE: This sets the password to enter the Setup Menu or change SETUP via Modbus.
4. Press OK.
5. Enter the RESET (password to reset the power meter) password. NOTE: This sets the password required to reset stored values such as kWh via the local RESET menu or remotely via Modbus (if so equipped.)
6. Press OK to return to the SETUP MODE screen.



Select the Display Operating Mode

1. Press -----> until MODE is visible.
2. Press MODE.
3. Press IEEE or IEC. NOTE: IEEE mode uses W/VA/VAR terminology. IEC mode uses P/Q/S.
4. Press 1; to return to the SETUP MODE screen.

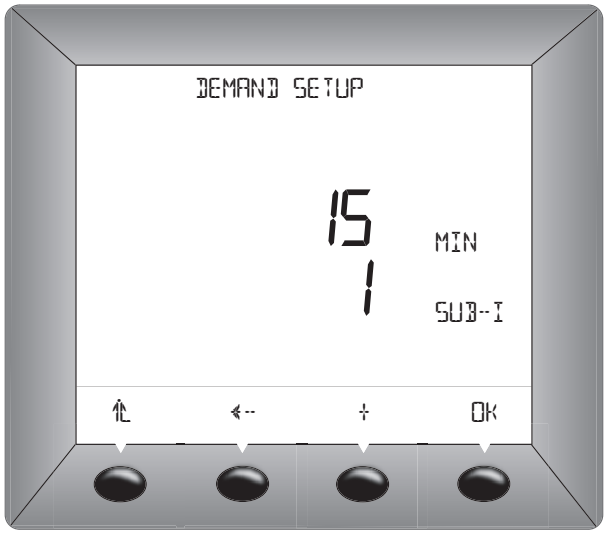


Set Up Demand

1. Press -----> until DEMND (demand) is visible. (H8437V/VB/S only)
2. Press DEMND.
3. Enter the MIN (interval in minutes): 0 to 60. Press + to change a digit, <----- to select the next digit.
4. Press OK. Enter the SUB-I (number of subintervals): 1 to 60. Press + to change a digit, <----- to select the next digit.
5. Press OK.

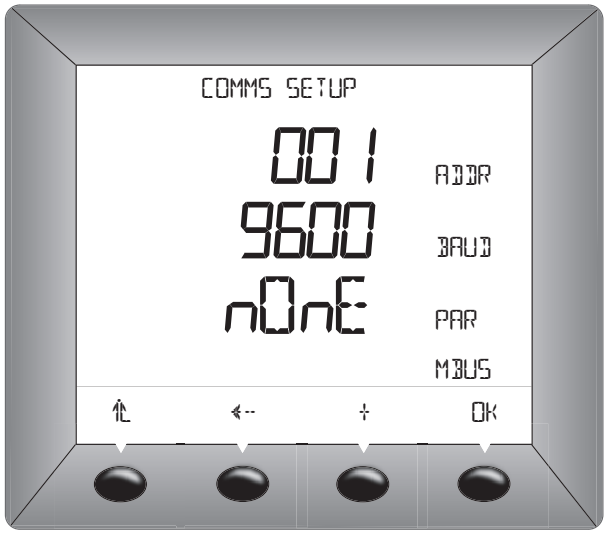
NOTE: The calculation method used for SUB-I is as follows:

- 0 = sliding block
- 1 = block
- >1 = rolling block (The SUB-I value must divide evenly into the MIN value. For example, if MIN is 15, SUB-I can be 3, 5, or 15. If you selected 3, you would have 3 subintervals at 5 minutes each.)



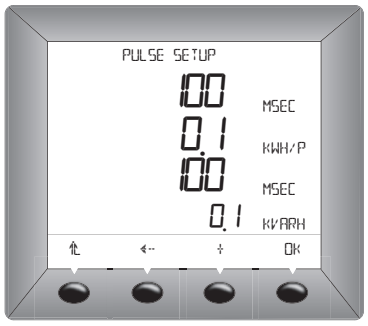
Set Up Communications (H8436V/VB, H8437V/VB)

1. Press -----> until COM is visible.
2. Press COM.
3. Enter the ADDR (meter address): 1 to 247. Press + to change a digit, <----- to select the next digit.
4. Press OK.
5. Press + to select the BAUD (baud rate): 2400, 4800, 9600 or 19200.
6. Press OK.
7. Press + to select the parity: EVEN, ODD, NONE.
8. Press OK to return to the SETUP MODE screen.



Set Up Pulse Options (H8453V/VB, H8463V/VB)

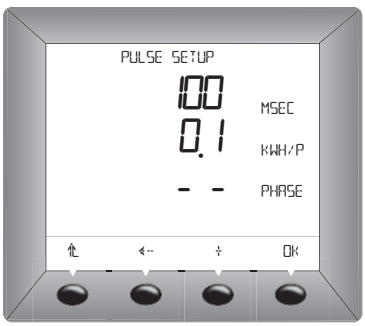
1. Press -----> until PULSE is visible.
2. Press PULSE.
3. Press + to select the MSEC (kWh pulse duration in milliseconds): 100, 300, 500, or 1000.
4. Press OK.
5. Press + to select the kWh/P (pulse weight): 0.1, 1, 10, 100, 1000, or 10000.



6. Press OK.
7. Select the MSEC (kVARh pulse duration in milliseconds): PHASE, 100, 300, 500, or 1000.

NOTE: Selecting PHASE changes the output operation from kVARh to PHASE DETECT. If phase is selected, the H8453V/VB will close the contacts on the PHASE kVARh output when all three phase voltages are within 25% of each other and no phase is less than 82.5 volts Line to Neutral. The H8463V/VB will open the contacts on the Phase kVARh output when all three phase voltages are within 25% of each other and no phase is less than 82.5 volts line to neutral.

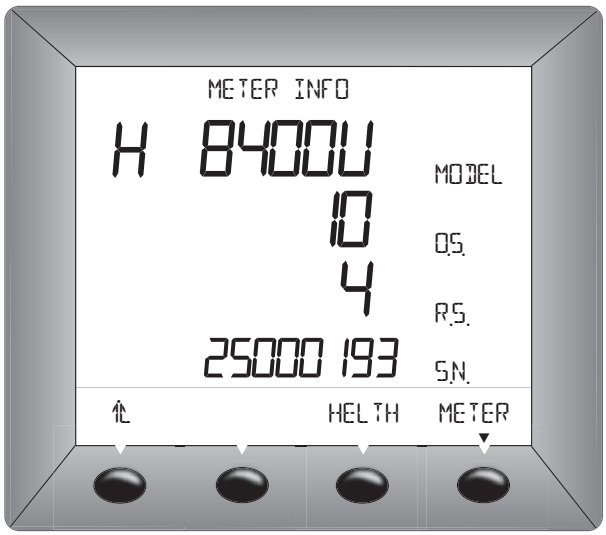
8. Press OK.
9. Select the kVARh (pulse weight): 0.1, 1, 10, 100, 1000, or 10000. This is unavailable if PHASE is selected above.
10. Press OK to return to the SETUP MODE screen.



DIAGNOSTICS

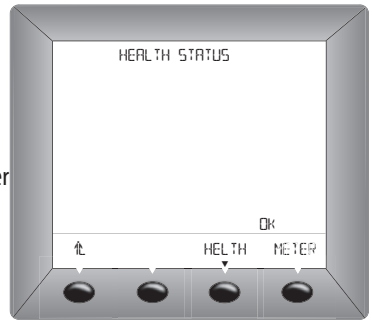
View the Meter Information

1. From the SUMMARY screen, DIAGN (diagnostics)
2. Press METER (meter info).
3. View the meter information (model number, firmware operating system version, firmware reset system version, and power meter serial number).



Check the Health Status

1. Press HELTH
2. View the health status. If there are no problems, OK is displayed on the lower right (see right).



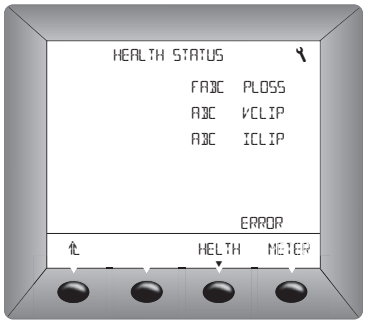
Reset Energy Accumulators: kWh, kVAh, and kVARh, (Ph, Qh, Sh), (H8453V, H8463V, H8436V)

1. From the SUMMARY screen, RESET is visible.
2. Press RESET.
3. Enter the RESET password (00000 is the default).
4. Press OK.
5. Press YES to RESET, NO to cancel. The RESET value displayed is a lifetime count of the number of times the energy accumulators have been reset. This is a security feature to detect tampering.

Reset Menu, (H8437V) (see below)

1. From the SUMMARY screen, RESET is visible.
2. Press RESET.
3. Enter the RESET password (00000 is the default).
4. Press OK.
5. Press -----> until the parameter you want to reset is displayed.

The ***wrench icon*** is displayed on all screens when a health problem is detected (see right). Problems are shown on the right of the screen with the location in the center.

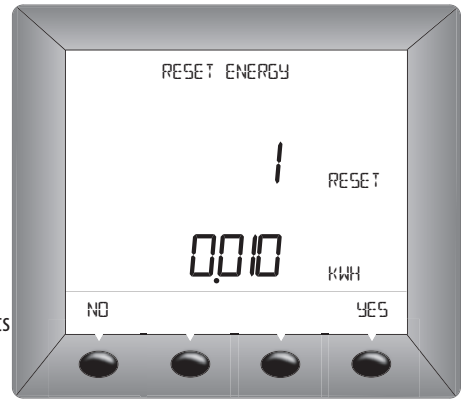


Problem:

PLOSS: Phase Loss. F indicates unable to establish frequency lock on Phase A. In 3 phase systems, A, B, and or C indicates that the Phase voltage is 25% lower than the other phases or if the voltage has dropped below 82 volts Line to Neutral.

VCLIP: Voltage Clipping. Indicates the voltage input is too high for the meter to measure.

ICLIP: Current Clipping. Indicates the current input is too high for the meter to measure.



6. Press the parameter to cancel.
7. Press YES to reset.
8. Menu Options:

METER - Performs all the resets below.

ENERG - Resets energy accumulations (the only reset on the H8436V, H8453V and H8463)

DEMND - Resets Demand calculations and maximum values.

MINMX- All stored minimum and maximum values.

TIMER - Resets usage and elapsed timers.

MENU TREES

Definitions

BDS – Basic Data Stream. Only the Real Energy and Power data points are output.

FDS – Full Data Stream. 26 data points minimum as on the Enercept H8036.

EDS – Extended Data Stream. In addition to the FDS, includes Frequency (phase A), Current THD, Voltage and THD on each phase.

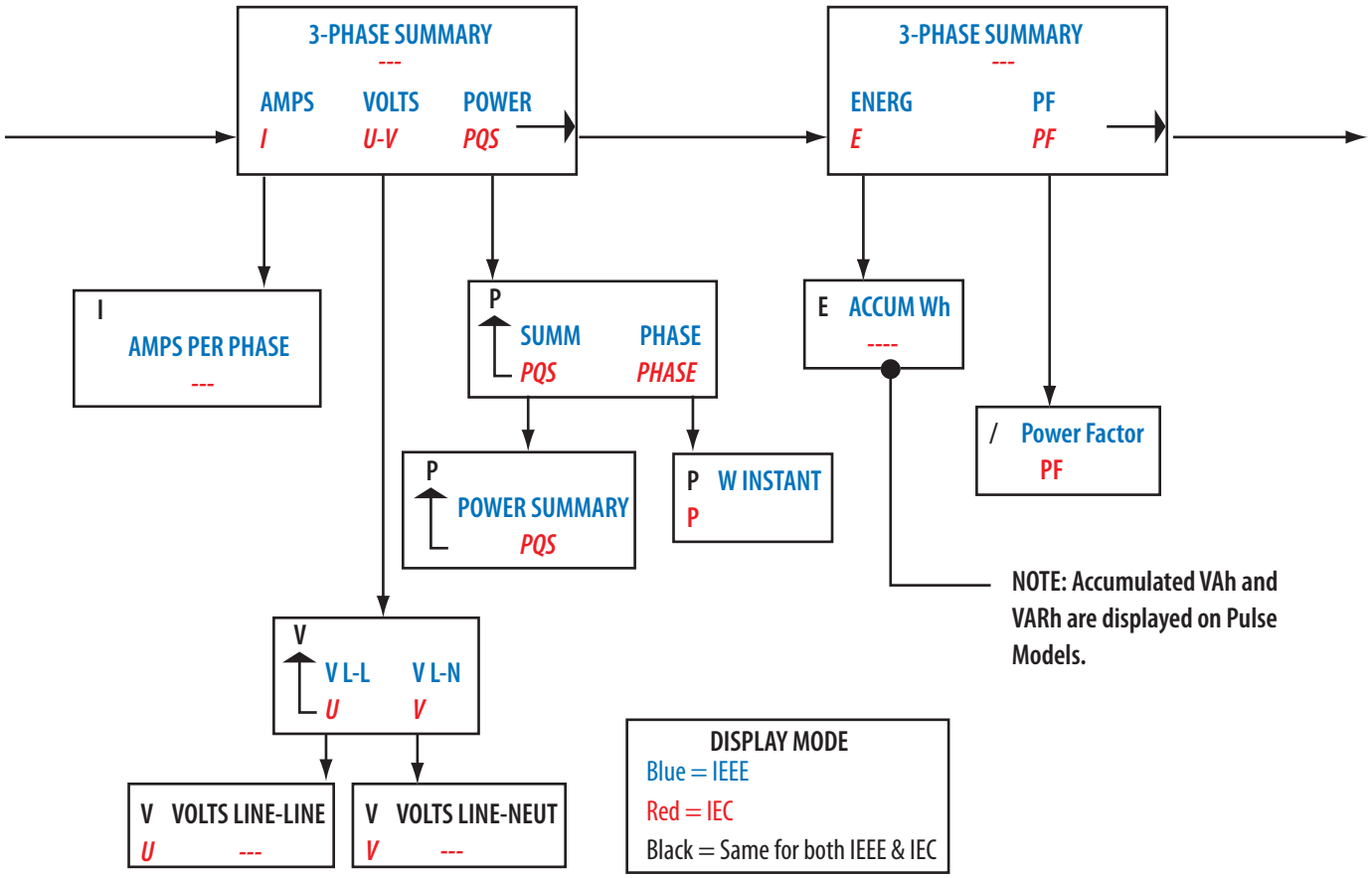
System Types

Support system types 10, 11, 12, 31, 32, 40, 42, & 44.

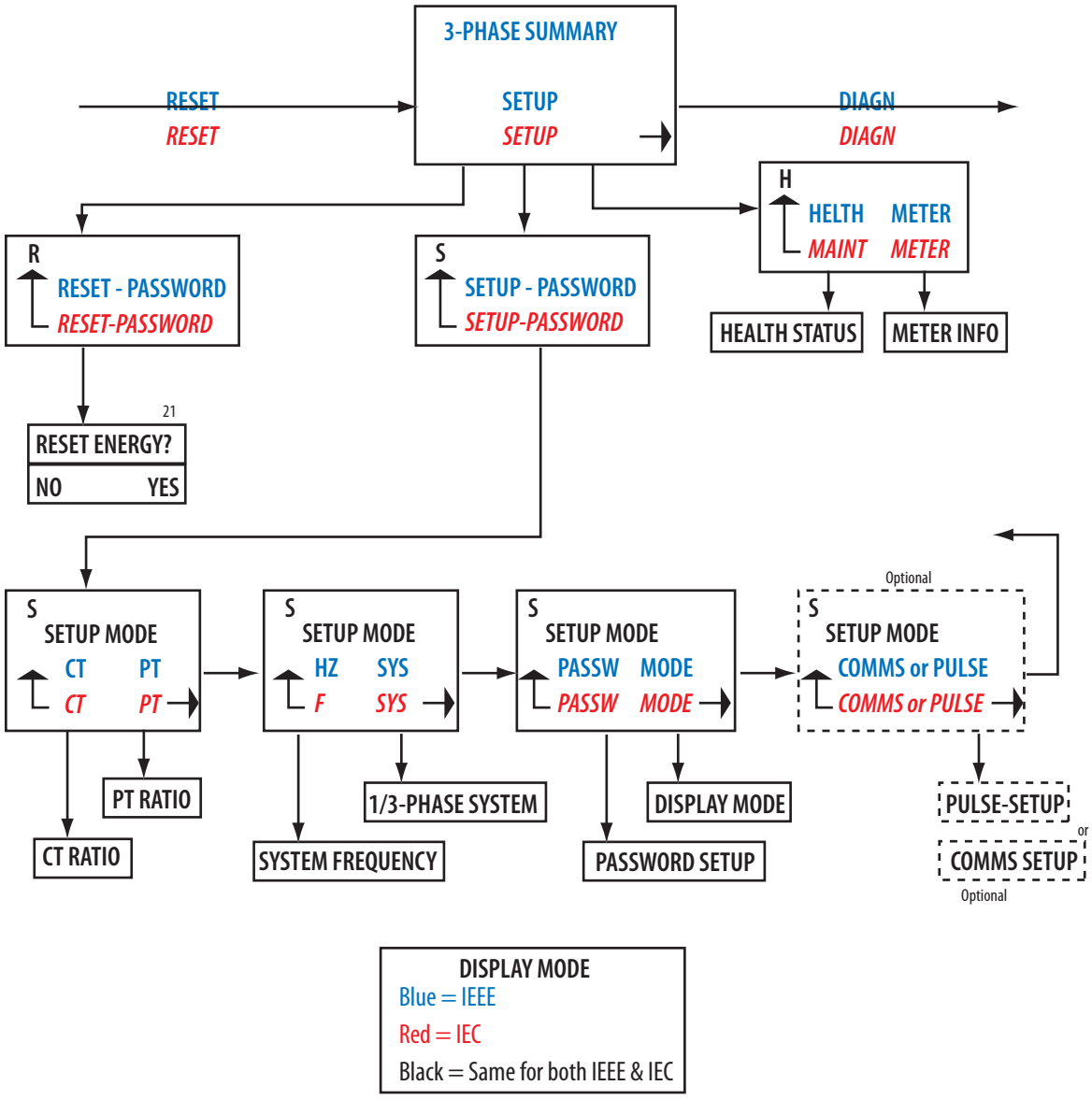
Modbus Point Map

The Basic Data Stream (BDS) matches the Veris H8035 Enercept meter. The Full Data Stream (FDS) matches the H8036 Enercept. The Extended Data Stream (EDS) is unique to the H84xx Series and adds parameters such as Frequency, Demand, and THD. The configuration of the H84xx is also unique to this device. Integer registers begin at 001 (0x001). Floating point registers begin at 257 (0x101). Configuration registers begin at 129 (0x081).

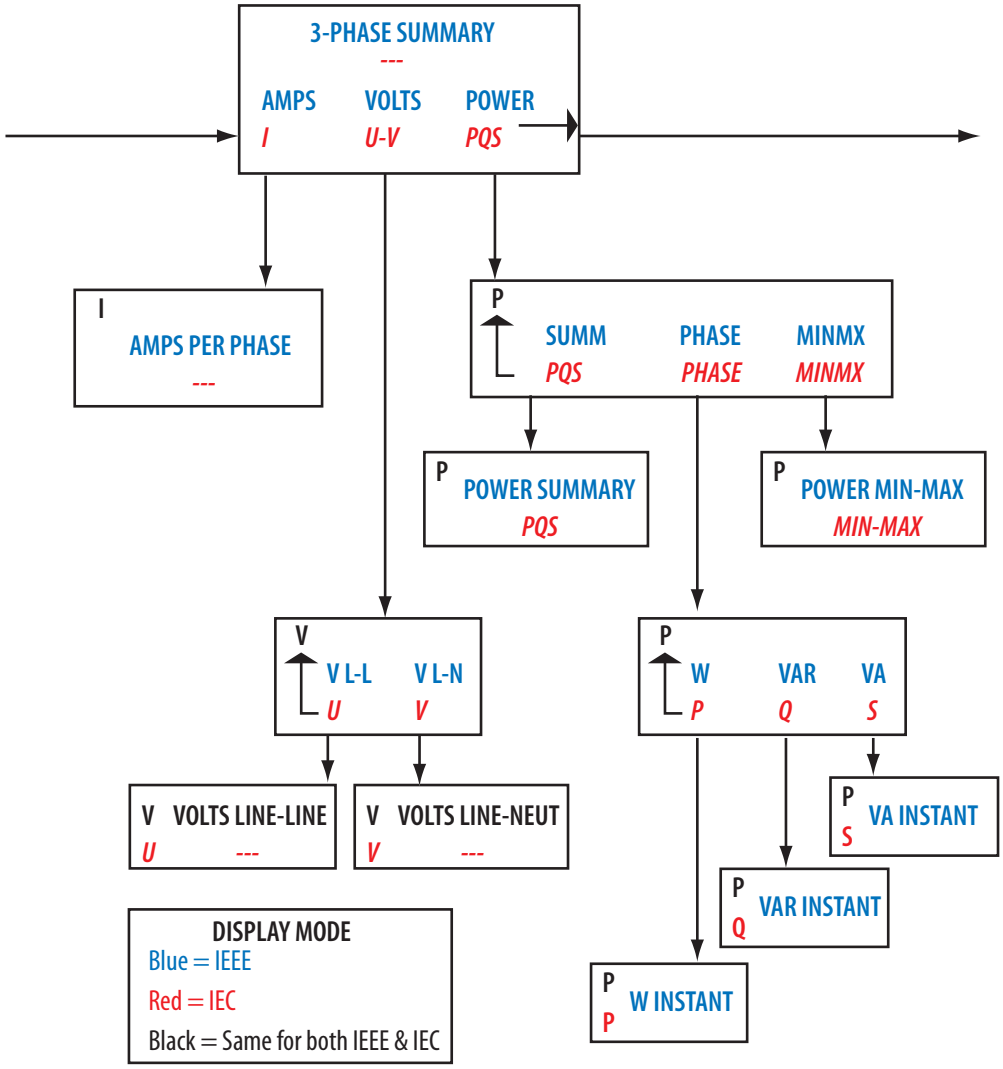
H8436/H8453/H8463 FDS Menu Tree (Full Data Stream)



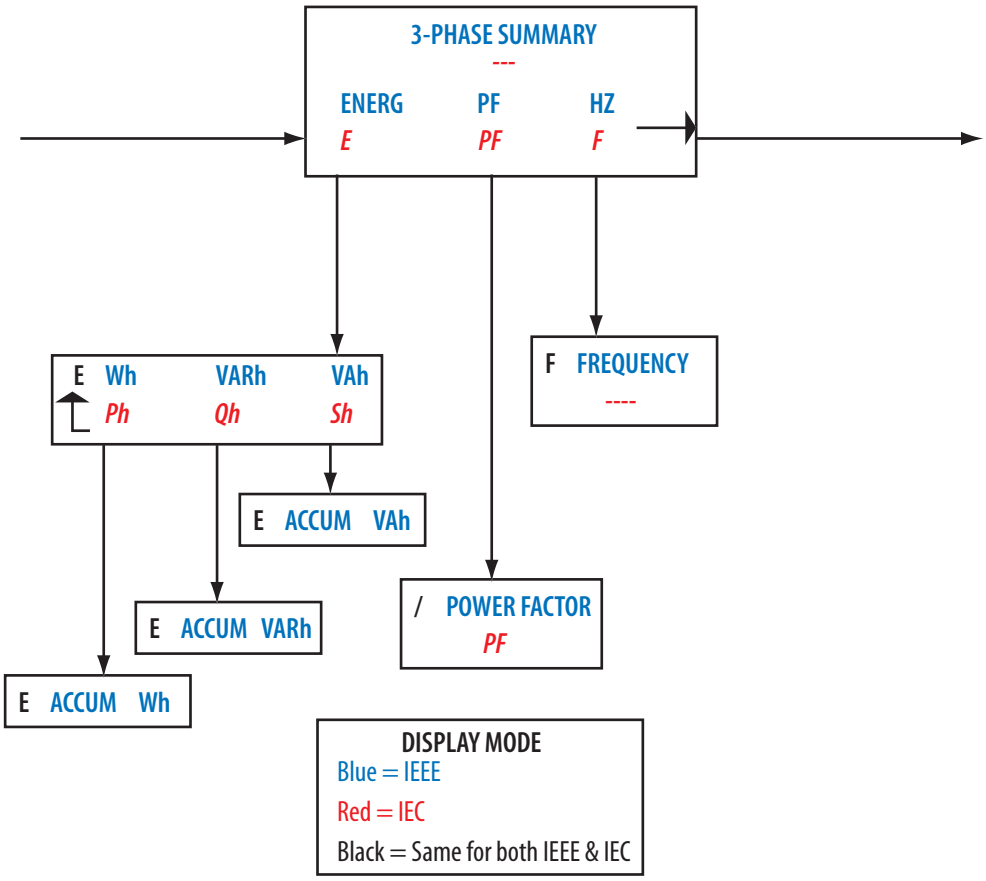
H8436/H8453/H8463 FDS Menu Tree (Full Data Stream), continued



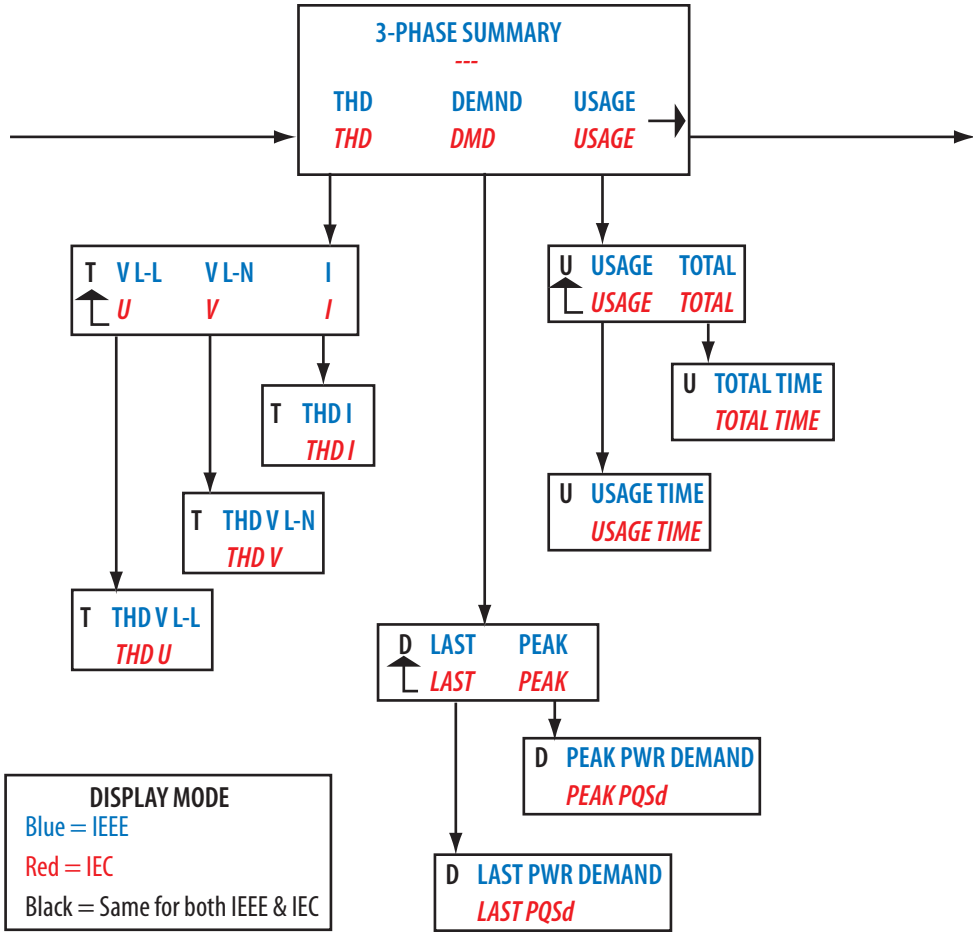
H8437 EDS Menu Tree (Enhanced Data Stream)



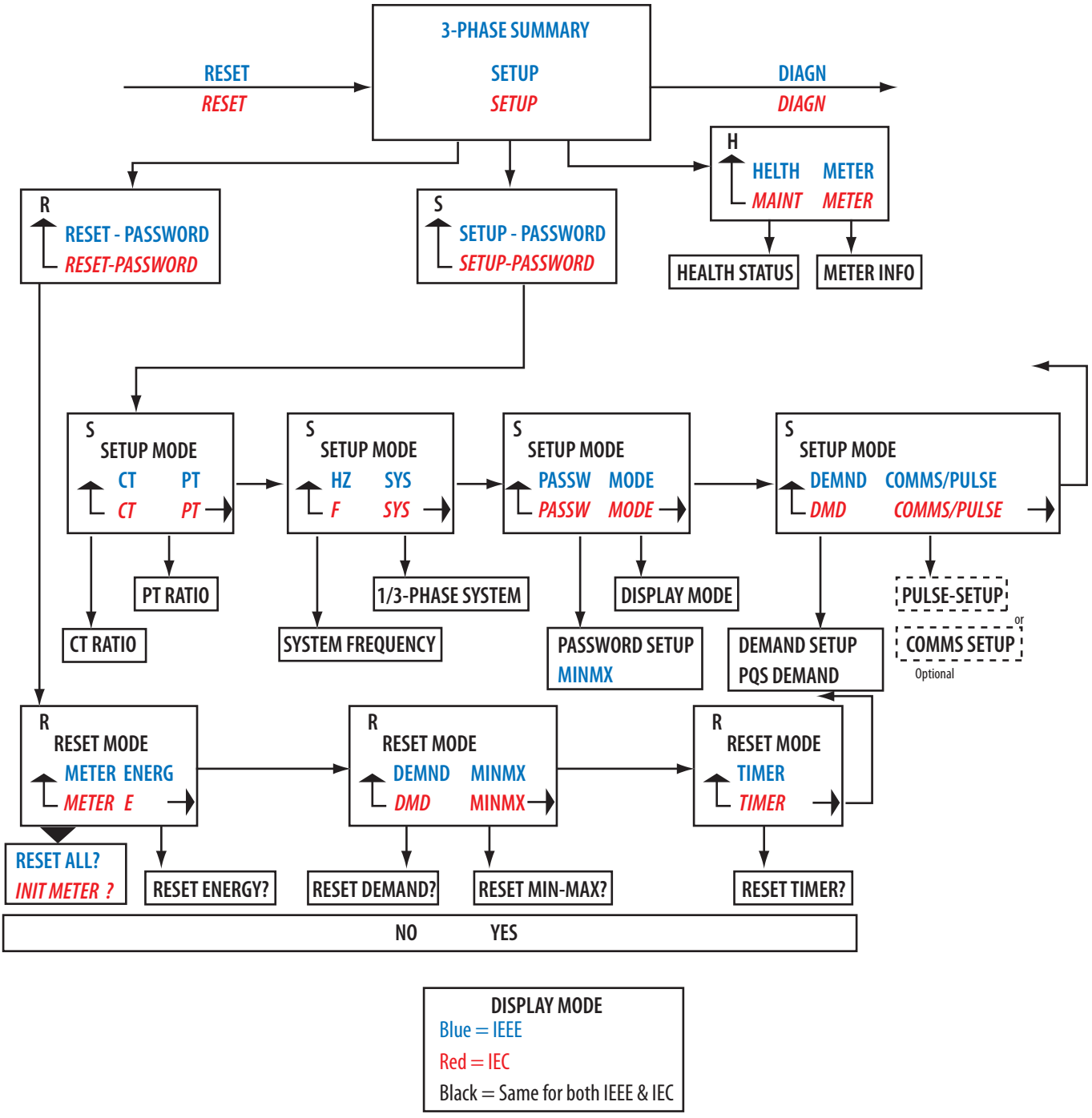
H8437 EDS Menu Tree (Enhanced Data Stream), continued



H8437 EDS Menu Tree (Enhanced Data Stream), continued



H8437 EDS Menu Tree (Enhanced Data Stream), continued



H8436-FDS	H8437-EDS	H8400 REG.	R/W	NV	Format	Units	Scale Factor/ Mult.	Range	Description
Integer Statistics									
3-Phase Summary									
--- BDS ---									
•	•	001	R	NV	ULong	kWh	E	0-0xFFFF	Real Energy Consumption (LSW)
•	•	002	R	NV		kWh	E	0-0xFFFF	Real Energy Consumption (MSW)
•	•	003	R		UInt	kW	W	0-32767	Total Instantaneous Real Power (3 Phase Total)
--- FDS ---									
•	•	004	R		UInt	kVA	W	0-32767	Total Instantaneous Apparent Power (3 Phase Total)
•	•	005	R		UInt	kVAR	W	0-32767	Total Instantaneous Reactive Power (3 Phase Total)
•	•	006	R		UInt	Ratio	0.0001	0-10000	Total Power Factor (Total kW / Total kVA)
•	•	007	R		UInt	Volt	V	0-32767	Voltage, L-L, Average of 3 Phases
•	•	008	R		UInt	Volt	V	0-32767	Voltage, L-N, Average of 3 Phases
•	•	009	R		UInt	Amp	I	0-32767	Current, Average of 3 Phases
Per Phase									
•	•	010	R		UInt	kW	W	0-32767	Real Power, Phase A
•	•	011	R		UInt	kW	W	0-32767	Real Power, Phase B
•	•	012	R		UInt	kW	W	0-32767	Real Power, Phase C
•	•	013	R		UInt	Ratio	0.0001	0-10000	Power Factor, Phase A
•	•	014	R		UInt	Ratio	0.0001	0-10000	Power Factor, Phase B
•	•	015	R		UInt	Ratio	0.0001	0-10000	Power Factor, Phase C
•	•	016	R		UInt	Volt	V	0-32767	Voltage, Phase A-B
•	•	017	R		UInt	Volt	V	0-32767	Voltage, Phase B-C
•	•	018	R		UInt	Volt	V	0-32767	Voltage, Phase A-C
•	•	019	R		UInt	Volt	V	0-32767	Voltage, Phase A-N
•	•	020	R		UInt	Volt	V	0-32767	Voltage, Phase B-N
•	•	021	R		UInt	Volt	V	0-32767	Voltage, Phase C-N
•	•	022	R		UInt	Amp	I	0-32767	Current, Instantaneous, Phase A
•	•	023	R		UInt	Amp	I	0-32767	Current, Instantaneous, Phase B
•	•	024	R		UInt	Amp	I	0-32767	Current, Instantaneous, Phase C
--- EDS ---									
	•	025	R		UInt	Amp	I	0-32767	Current, Instantaneous, Neutral
	•	026	R		UInt	Hz	0.01	4500-6500	Frequency (derived from Phase A)
	•	027	R	NV	UInt	kW	W	0-32767	Total Real, Power Minimum
	•	028	R	NV	UInt	kW	W	0-32767	Total Real, Power Maximum
Accumulated Energy									
	•	029	R	NV	ULong	KVAh	E	0-0xFFFF	Apparent Energy Consumption (LSW)
	•	030	R	NV		KVAh	E	0-0xFFFF	Apparent Energy Consumption (MSW)
	•	031	R	NV	ULong	KVARh	E	0-0xFFFF	Reactive Energy Consumption (LSW)
	•	032	R	NV		KVARh	E	0-0xFFFF	Reactive Energy Consumption (MSW)
Per Phase Power									
	•	033	R		UInt	kVA	W	0-32767	Apparent Power, Phase A
	•	034	R		UInt	kVA	W	0-32767	Apparent Power, Phase B
	•	035	R		UInt	kVA	W	0-32767	Apparent Power, Phase C
	•	036	R		UInt	kVAR	W	0-32767	Reactive Power, Phase A
	•	037	R		UInt	kVAR	W	0-32767	Reactive Power, Phase B
	•	038	R		UInt	kVAR	W	0-32767	Reactive Power, Phase C

H8436-FDS	H8437-EDS	H8400 REG.	R/W	NV	Format	Units	Scale Factor/ Mult.	Range	Description	
Demand										
	•	039	R		UInt	kW	W	0-32767	Total Real Power Present Demand	
	•	040	R		UInt	kVA	W	0-32767	Total Apparent Power Present Demand	
	•	041	R		UInt	kVAR	W	0-32767	Total Reactive Power Present Demand	
	•	042	R	NV	UInt	kW	W	0-32767	Total Real Power Max Demand	
	•	043	R	NV	UInt	kVA	W	0-32767	Total Apparent Power Max Demand	
	•	044	R	NV	UInt	kVAR	W	0-32767	Total Reactive Power Max Demand	
Usage Time										
	•	045	R	NV	UInt	Hours	1	0-32767	Usage Hours	This combination timer counts the total time for which the absolute current on at least one phase is >0.1 Amp.
	•	046	R	NV	UInt	Minutes	1	0-59	Usage Minutes	
	•	047	R	NV	UInt	Hours	1	0-32767	Total Hours	This timer counts the total time since the usage timer was reset.
	•	048	R	NV	UInt	Minutes	1	0-59	Total Minutes	
	•	049	R	NV	UInt	%	.01	0-10000	Percent Usage	Percent Usage = Usage Time / Total Time .
THD										
	•	050	R		UInt	%	0.1	0-10000	THD, Voltage A-N	
	•	051	R		UInt	%	0.1	0-10000	THD, Voltage B-N	
	•	052	R		UInt	%	0.1	0-10000	THD, Voltage C-N	
	•	053	R		UInt	%	0.1	0-10000	THD, Voltage A-B	
	•	054	R		UInt	%	0.1	0-10000	THD, Voltage B-C	
	•	055	R		UInt	%	0.1	0-10000	THD, Voltage A-C	
	•	056	R		UInt	%	0.1	0-10000	THD, Current Phase A	
	•	057	R		UInt	%	0.1	0-10000	THD, Current, Phase B	
	•	058	R		UInt	%	0.1	0-10000	THD, Current, Phase C	
Configuration										
--- BDS ---										
--- FDS ---										
•	•	129	R/W		UInt			N/A	Reset: - Write 30078 to clear all Energy Accumulators to 0 (All). - Write 14255 to reset all Power Min/Max to Present Values (H8400 EDS Only). - Write 21212 to reset Peak Demand values to Present Demand Values (H8400 EDS Only). - Write 10001 to clear the Usage Timers to 0 (H8400 EDS Only). - Read always returns 0.	
•	•	130	R/W		UInt			10,11,12,30,31, 32,40,42,44	System Type	
•	•	131	R/W		UInt			1-32767	CT Ratio – Primary	Current Inputs
5A	5A	132	R/W		UInt			1 or 5 A	CT Ratio – Secondary (H8400A Only, unused on H8400V)	
•	•	133	R/W		UInt			1-32767	PT Ratio – Primary	Voltage Inputs
•	•	134	R/W		UInt			0,1,10,100	PT Ratio – Scale (0 = No PT)	
•	•	135	R/W		UInt			100,110,115, 120	PT Ratio – Secondary	
•	•	136	R/W		UInt	Hz		50 or 60		
•	•	137	R/W		UInt			0.1		

H8436-FDS	H8437-EDS	H8400 REG.	R/W	NV	Format	Units	Scale Factor/ Mult.	Range	Description	
•	•	138	R/W		SInt		-4 0.0001 -3 0.001 -2 0.01 -1 0.1 0 1.0 1 10.0 2 100.0 3 1000.0 4 10000.0		Scale Factor I (current) Default = -2	Note: These registers contain a signed integer, which scales the corresponding parameters.
•	•	139	R/W		SInt				Scale Factor V (voltage) Default = -1	
•	•	140	R/W		SInt				Scale Factor W (power) Default = -2	
•	•	141	R/W		SInt				Scale Factor E (energy) Default = -2	
•	•	142	R		UInt				Reserved, always returns 0	
•	•	143	R		UInt				Reserved, always returns 0	
•	•	144	R		UInt				Reserved, always returns 0	
•	•	145	R		UInt				Reserved, always returns 0	
•	•	146	R		UInt				Error Bitmap: bit0: Phase A Voltage out of range bit1: Phase B Voltage out of range bit2: Phase C Voltage out of range bit3: Phase A Current out of range bit4: Phase B Current out of range bit5: Phase C Current out of range bit6: Frequency out of range or insufficient voltage on Phase A to determine frequency. *range of 45-65 Hz. bit7: Reserved for future use bit8: Phase Loss A bit9: Phase Loss B bit10: Phase Loss C bit11-15: Reserved for future use	
•	•	147	R	NV	UInt			0-32767	Count of Energy Accumulator resets	
--- EDS ---										
	•	148	R	NV	UInt			0-32767	Count of Usage Timer resets	
	•	149	R/W	NV	UInt	Minutes		1-60	(Power) Demand Block Interval – Used for PQS (P=Real Power KW, Q=Reactive Power KVAR, and S=Apparent Power KVA) demand calculations.	
	•	150	R/W	NV	UInt			0-60	Number of Power Demand Block Sub-Intervals - Sets the number of sub-intervals per Demand Block Interval (above). The method of demand calculation is set as follows: 0 = Sliding Block. Like rolling block, but with a subinterval of 15 seconds is used for Demand Intervals <= 15 minutes, or 60 seconds for intervals > 15 minutes. 1 = Block. Fixed block with no sub-intervals. >1 = Rolling Block. The number of sub-intervals per block. This value must divide evenly into the Block Demand Interval (above). For example, if the Demand Block Interval is 15 minutes, valid Sub-Interval values are: 3, 5, or 15. If the value of 3 is chosen, then there will be 3 subintervals of 5 minutes each.	
Floating Point Statistics										
3-Phase Summary										
--- BDS ---										
•	•	257/258	R	NV	Float	kWh			Real Energy Consumption	
•	•	259/260	R		Float	kW			Total Instantaneous Real Power	
--- FDS ---										
•	•	261/262	R		Float	kVA			Total Instantaneous Apparent Power	
•	•	263/264	R		Float	kVAR			Total Instantaneous Reactive Power	
•	•	265/266	R		Float	Ratio		0.0-1.0	Total Power Factor (Total KW / Total KVA)	
•	•	267/268	R		Float	Volt			Voltage, L-L, Average of 3 Phases	
•	•	269/270	R		Float	Volt			Voltage, L-N, Average of 3 Phases	
•	•	271/272	R		Float	Amp			Current, Average of 3 Phases	

H8436-EDS	H8437-EDS	H8400 REG.	R/W	NV	Format	Units	Scale Factor/ Mult.	Range	Description	
Per Phase										
•	•	273/274	R		Float	kW			Real Power, Phase A	
•	•	275/276	R		Float	kW			Real Power, Phase B	
•	•	277/278	R		Float	kW			Real Power, Phase C	
•	•	279/280	R		Float	Ratio		0.0-1.0	Power Factor, Phase A	
•	•	281/282	R		Float	Ratio		0.0-1.0	Power Factor, Phase B	
•	•	283/284	R		Float	Ratio		0.0-1.0	Power Factor, Phase C	
•	•	285/286	R		Float	Volt			Voltage, Phase A-B	
•	•	287/288	R		Float	Volt			Voltage, Phase B-C	
•	•	289/290	R		Float	Volt			Voltage, Phase A-C	
•	•	291/292	R		Float	Volt			Voltage, Phase A-N	
•	•	293/294	R		Float	Volt			Voltage, Phase B-N	
•	•	295/296	R		Float	Volt			Voltage, Phase C-N	
•	•	297/298	R		Float	Amp			Current, Instantaneous, Phase A	
•	•	299/300	R		Float	Amp			Current, Instantaneous, Phase B	
•	•	301/302	R		Float	Amp			Current, Instantaneous, Phase C	
--- EDS ---										
	•	303/304	R		Float	Amp			Current, Instantaneous, Neutral	
	•	305/306	R		Float	Hz		45.0-65.0	Frequency (derived from Phase A)	
	•	307/308	R	NV	Float	kW			Total Real Power Minimum	
	•	309/310	R	NV	Float	kW			Total Real Power Maximum	
	•	311/312	R	NV	Float	kVAh			Apparent Energy Consumption	
	•	313/314	R	NV	Float	kVARh			Reactive Energy Consumption	
Per Phase Power										
	•	315/316	R		Float	kVA			Apparent Power, Phase A	
	•	317/318	R		Float	kVA			Apparent Power, Phase B	
	•	319/320	R		Float	kVA			Apparent Power, Phase C	
	•	321/322	R		Float	kVAR			Reactive Power, Phase A	
	•	323/324	R		Float	kVAR			Reactive Power, Phase B	
	•	325/326	R		Float	kVAR			Reactive Power, Phase C	
Demand										
	•	327/328	R		Float	kW			Total Real Power Present Demand	
	•	329/330	R		Float	kVA			Total Apparent Power Present Demand	
	•	331/332	R		Float	kVAR			Total Reactive Power Present Demand	
	•	333/334	R	NV	Float	kW			Total Real Power Max Demand	
	•	335/336	R	NV	Float	kVA			Total Apparent Power Max Demand	
	•	337/338	R	NV	Float	kVAR			Total Reactive Power Max Demand	
Usage Time										
	•	339/340	R	NV	Float	Hours		>= 0.0	Usage Hours	This combination timer counts the total time for which the absolute current on at least one phase is >0.1 Amp.
	•	341/342	R	NV	Float	Minutes		0.0-59.0	Usage Minutes	
	•	343/344	R	NV	Float	Hours		>= 0.0	Total Hours	This timer counts the total time since the usage timer was reset.
	•	345/346	R	NV	Float	Minutes		0.0-59.0	Total Minutes	
	•	347/348	R	NV	Float	%		0.0-100.0	Percent Usage	Percent Usage = Usage Time / Total Time.

H8436-FDS	H8437-EDS	H8400 REG.	R/W	NV	Format	Units	Scale Factor/ Mult.	Range	Description
THD									
	•	349/350	R		Float	%		0.0-1000.0	THD, Voltage A-N
	•	351/352	R		Float	%		0.0-1000.0	THD, Voltage B-N
	•	353/354	R		Float	%		0.0-1000.0	THD, Voltage C-N
	•	355/356	R		Float	%		0.0-1000.0	THD, Voltage A-B
	•	357/358	R		Float	%		0.0-1000.0	THD, Voltage B-C
	•	359/360	R		Float	%		0.0-1000.0	THD, Voltage A-C
	•	361/362	R		Float	%		0.0-1000.0	THD, Current, Phase A
	•	363/364	R		Float	%		0.0-1000.0	THD, Current, Phase B
	•	365/366	R		Float	%		0.0-1000.0	THD, Current, Phase C
Modbus Configuration (Downloadable firmware support only)									
•	•	7000	R	NV	UInt			0-32767	Firmware Version, Reset System (Boot Down Loader)
•	•	7001	R	NV	UInt				Firmware Version, Operating System (Application)
•	•	7002/03	R	NV	ULong				Serial Number (date/time of manufacture in UTC)
•	•	7004	R	NV	UInt			15166	Device ID
•	•	7005	R	NV	UInt			1-247	Modbus Address
•	•	7006	R	NV	UInt			2400,4800, 9600,19200	Baud rate
•	•	7007	R	NV	UInt				Password (always returns 0). Used only for download.
•	•	7008	R		UInt				Self test (always returns 0)
•	•	7009	R		UInt			0,65535	PLOS. Returns the one's complement of software's safe vectors flag. Indicates if the Application (OS) or Boot (Downloader/Reset System) is running.
•	•	7010	R		UInt				Reserved, always returns 0
•	•	7011	R		UInt				Reserved, always returns 0
•	•	7012	R		UInt				Reserved, always returns 0
•	•	7013	R		UInt				Reserved, always returns 0
•	•	7014	R		UInt				Reserved, always returns 0
Command Interface (Downloadable firmware support only)									
•	•	7015	R/W		UInt				Command
•	•	7016-031	R/W		UInt				Parameters
•	•	7032	R/W		UInt				Status
•	•	7033	R/W		UInt				Result
•	•	7034	R/W		UInt				I/O Data
•	•	7035-162	R/W		UInt				Data Area

Note 1: Calculate demand using sliding, fixed, or rolling block intervals. See registers 4117-4119 for settings.

Note 2: DOWNLOADABLE FIRMWARE. When the Operating System is erased, only registers 7000-7162 are available. Register 7001 (Firmware Version, Operating System) reads as 0 in this condition. Additionally, the ID string returned from a "Report ID" query (0x11) will be "Veris Power Meter - RESET SYSTEM RUNNING".

Note 3: THD (Total Harmonic Distortion) is calculated as the % ratio over the fundamental frequency. H_n is the nth harmonic.

$$\frac{\sqrt{H_2^2 + H_3^2 + H_4^2 + H_5^2 + \ldots \text{ to the 15th harmonic}}}{H_1}$$

Note 4: Unused or unsupported Integers return 0x8000, Floats 0x7FC00000

Legend

R/W: R=Read only, R/W=Read/Write
NV: Value is stored in non-volatile memory

Format

UInt: Unsigned 16-bit integer, read most significant Byte (MSB) first.

SInt: Signed 16-bit integer, read most significant Byte (MSB) first.

ULong: Unsigned 32-bit integer; Upper 16-bits Most Significant Word (MSW), in lowest numbered register (257/258)=MSW/LSW)

Float: 32-bit floating point; encoded per IEEE Standard 754 single precision; Upper 16-bits Most Significant Word (MSW) in lowest numbered register (257/258)=MSW/LSW)

Scale Factor/Multiplier

Integer Registers must be multiplied by this value to be read correctly in the given units. Scale Factors I, V, W, and E are configurable (see registers 138-141).

Defaults are: I = 0.01, V = 0.1, W = 0.01, E = 0.01

Modbus Commands Supported

0X03: Read holding registers
0x04: Read input registers
0x06: Preset single register
0x10: Preset multiple registers
0x11: Report ID
Return string:
byte0: address
byte1: 0x11
byte2: #bytes following w/out crc
byte3: ID byte = 250
bytes4: status = 0xFF
bytes5+: ID string = "H84__ Power Meter"
last 2 bytes: CRC
0x2B: Read Device Identification, BASIC implementation (0x00, 0x01 and 0x02 data), Conformity Level 1.
Object Values:
0x01: Vendor Name = "Veris Industries"
0x02: Product Code = "H84__"
0x03: Major/Minor Revision = "Vxx.yyy", where xx.yyy is the OS version number (reformatted version of the Modbus register #7001, (Firm ware Version, Operating System). If register #7001 == 12345, then the 0x03 data would be "V12.345").

When the Operating System is erased, only registers 7000-7162 are available. Register 7001 (Firmware Version, Operating System) will read as 0 in this condition.

DATA OUTPUTS

Full Data Set (FDS)

kWh, Consumption
kW, Real Power
kVAR, Reactive power
kVA, Apparent power
Power factor
Voltage, line to line
Voltage, line to neutral
Amps, Average current
kW, Real power ØA
kW, Real power ØB
kW, Real power ØC
Power factor ØA
Power factor ØB
Power factor ØC
Voltage, ØA to ØB
Voltage, ØB to ØC
Voltage, ØA to ØC
Voltage, ØA to Neutral
Voltage, ØB to Neutral
Voltage, ØC to Neutral
Amps, Current ØA
Amps, Current ØB
Amps, Current ØC

Extended Data Set (EDS), Full Data Set (FDS)

Amps, Current Neutral
Frequency
kVAh, Consumption
kVARh, Consumption
Minimum Real power
Maximum Real power
KVA, Apparent Power, Per Phase
KVAR, Reactive Power, Per Phase
KW, Total Real Power Present Demand
KVA, Total Apparent Power Present Demand
KVAR, Total Reactive Power Present Demand
KW, Total Real Power Max Demand
KVA, Total Apparent Power Max Demand
KVAR, Total Reactive Power Max Demand
THD, Voltage A-N, B-N, C-N
THD, Voltage A-B, B-C, A-C
THD, Current, Per Phase
Usage Hours
Usage Minutes
Total Hours
Total Minutes

TROUBLESHOOTING

Problem	Cause	Solution
The maintenance wrench icon appears in the power meter display.	There is a problem with the inputs to the power meter.	Go to DIAGN>HELTH (MAINT). The error messages describe the problem. See the Diagnostics section (page 16) for details.
The display is blank after applying control power to the meter.	The meter is not receiving adequate power.	Verify that the meter control power (terminals 1 and 2) are receiving the necessary voltage. See the Control Power wiring diagram (page 9). Verify that the LED is blinking. Check the fuse.
The data displayed is inaccurate.	Incorrect setup values	Verify the values entered for power meter setup parameters (CT and PT ratings, system type, nominal frequency, etc.). See the Setup section (page 13).
	Incorrect voltage inputs	Check power meter voltage input terminals to verify adequate voltage.
	Power meter is wired improperly.	Check all CTs and PTs to verify correct connection to the same service, PT polarity, and adequate powering. Check shorting terminals, if used. See the Wiring Diagrams (pages 6-8) section for more information.
Cannot communicate with power meter from a remote personal computer.	Power meter address is incorrect.	Verify that the meter is correctly addressed (see Setup section).
	Power meter baud rate is incorrect.	Verify that the baud rate of the meter matches that of all other devices on its communications link (see Setup section).
	Communications lines are improperly connected.	Verify the power meter communications connections (see the Communications section).
		Verify the terminating resistors are properly installed on both ends of a chain of units. Units in the middle of a chain should not have a terminator.