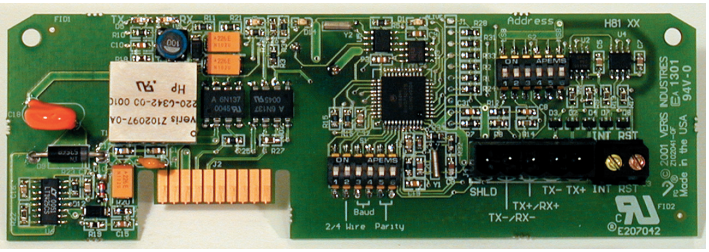
H8163-CB



H8163-CB

Modbus Communication Board for the H81xx Energy Meter

Installer Specifications

Communication Protocols	Modbus RTU
Connection:	
RS-485	Up to 63 devices
2-wire or 4-wire	Field selectable
Baud Rate	2400, 4800, 9600, 19200 baud, selectable
Parity	None/Odd/Even, selectable
Address Range	DIP switch selectable (1-63)
External Inputs:	
Demand Syncronizing or Pulse Counting	Field selectable
Wiring:	
Terminal Block Screw Torque	0.37 ft-lb (0.5 N·m) nominal/0.44 ft-lb (0.6 N·m) max.
Terminal Block Wire Size	26 to 14 AWG (0.13 to 2.08 mm^2)
Environmental Conditions:	
Operating Temperature	0° to 50°C (32° to 122°F)
Storage Temperature	-40° to 70°C (-40° to 158°F)
Humidity Range	0 to 95% RH (non-condensing)
Altitude of Operation	0-2000 m
Agency Approvals	UL 3111 Cat. III pollution degree 2

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.

PRODUCT IDENTIFICATION

H8163-CB Modbus Communication Board for H81xx Energy Meter

QUICK INSTALL

Observe precautions for handling static sensitive devices to avoid damage to the circuitry that is not covered under the factory warranty.

1. Disconnect power to the meter.
2. Set the DIP switches for appropriate network addressing.
3. Wire the communications terminals for 2-wire or 4-wire communication.
4. Disconnect power to the energy meter. Discharge static using an anti-static or grounding strap.
5. Still using the anti-static strap, install the H8163-CB into the slot in the energy meter until the board clicks into place.
6. Restore power to the meter.

TABLE OF CONTENTS

OPERATION

The H8163-CB energy meter communication board is an optional field-installable board for the H8163 energy meter that allows Modbus RTU communication. The H8163-CB also enables the energy meter to provide true kW & kVAR demand information.

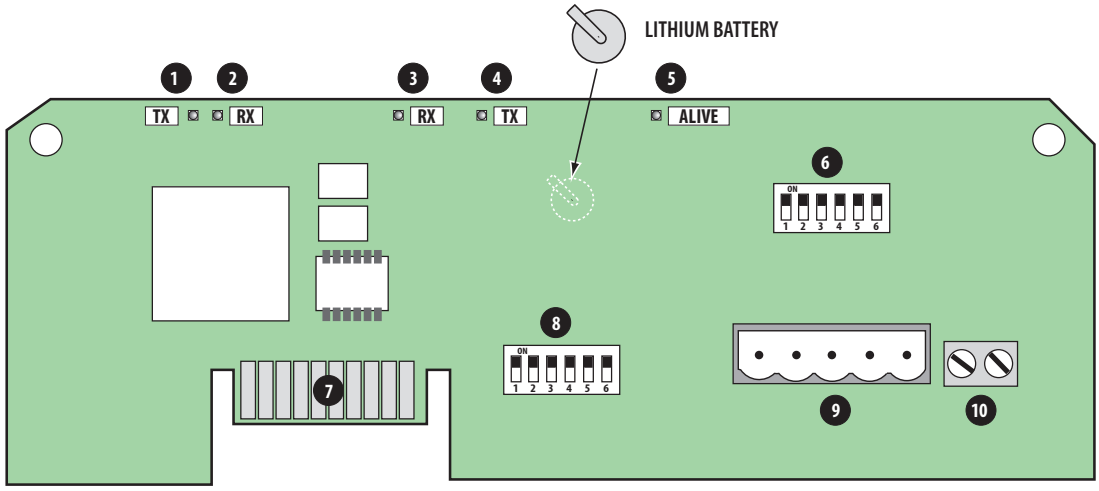
The easy-to-install H8163-CB provides a simple, cost-effective way to network the H8163 energy meter on a Modbus network.

DATA OUTPUT SPECIFICATIONS*

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
kW, Demand
kVAR, Demand
kW, Peak Demand
kVAR, Peak Demand

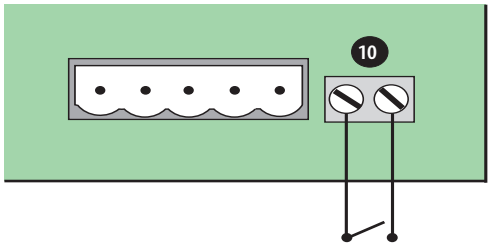
** See the Modbus Point Map on www.veris.com for a full list of data input/output features.*

PRODUCT DIAGRAM



CAUTION! Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type. Dispose of used batteries according to applicable environmental laws.

1. ***RS-485 LED (TX):*** Red LED; blinks to indicate data transmission from the H8163-CB to the master.
2. ***RS-485 LED (RX):*** Red LED; blinks to indicate data reception from the master to the H8163-CB.
3. ***LED from Main Board (RX):*** Green LED; blinks to indicate data reception from the main board.
4. ***LED from Main Board (TX):*** Green LED; blinks to indicate data transmission to the main board.
5. ***ALIVE LED:*** Green LED; should blink once per second to indicate normal operation.
6. ***Network Address DIP Switches:*** Use these DIP switches to set the network address for the H8163-CB. See the Settings table on page 3 for more information.
7. ***Connection to Energy Meter:*** Install the H8163-CB in the energy meter by inserting this connector into the connection slot at the top of the energy meter.
8. ***Communication DIP Switches:*** Use these DIP switches to set the H8163-CB wiring type, baud rate, and parity. See "Setting the Communication DIP Switches" on page 3 for instructions.
9. ***RS-485 Communication Terminals:*** Insert the RS-485 connector into these terminals. See Wiring Diagrams on page 4 for instructions on wiring the connector for 2-wire or 4-wire communications.
10. ***Input Connector:*** Use this terminal as the input connector for "end of demand interval" signal from the utility or other source. Use an interposing isolated relay as the dry contact for this terminal, as pictured below.



CONFIGURATION

This section describes the communications settings you must make to the H8163-CB. When daisy-chaining Modbus devices, follow these guidelines:

- Connect up to 63 H8163-CB devices on a single daisy chain.
- Each H8163-CB device on the daisy chain must have a unique address. Before connecting the H8163-CB to the RS-485 communication wires, set the address according to directions on this page.
- Set the wiring type, baud rate, and parity according to directions in "Selecting Wiring Type, Baud Rate, and Parity Settings" on this page. The settings for each H8163-CB must match the other devices on its daisy chain.
- For RS-485 cables, use shielded, twisted-pair wire (Belden Cable 1120A or equivalent).
- Terminate the last device on the daisy chain to ensure reliable communication per the RS-485 standard (120 Ω nominal impedence).

Selecting The Network Address DIP Switches

Use the network address DIP switches to select the network address. Each H8163-CB on a daisy chain must have a unique network address (from 1 to 63). Devices with the same address as another on the chain will be unable to communicate.

Always set the address before you install the H8163-CB in the energy meter and before you connect the energy meter to the daisy chain.

Each of the six DIP switches has a unique address value. The Modbus Addressing section on page 6 lists DIP switch positions for specific addresses.

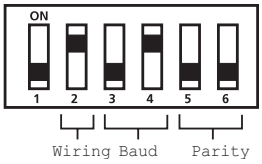
Network Address DIP Switch Values

Switch	Value
1	1
2	2
3	4
4	8
5	16
6	32

Selecting Wiring, Baud Rate, and Parity Settings

Parameter		Switch Number and Setting					
		1	2	3	4	5	6
Wire Type	2-wire	-	On				
	4-wire	-	Off				
Baud Rate	2400	-		Off	Off		
	4800	-		On	Off		
	9600	-		Off	On		
	19200	-		On	On		
Parity	None	-				Off	Off
	Even	-				On	Off
	Odd	-				On	On

Setting the Communication DIP Switches



Switch 1 is unused. Always leave it in the OFF position.

This example illustrates the default switch settings for a 2-wire device that uses 9600 baud rate with no parity.

RS-485 COMMUNICATIONS SETUP

Daisy Chain Maximum Distances

The maximum number of devices allowed on a single daisy chain is determined by combining the baud rate, the length of the daisy chain, and the types of RS-485 devices (2-wire/4-wire) on the chain. The RS-485 interface will support daisy chains that fall within the specifications shown below.

4-Wire Daisy Chain Maximum Distances

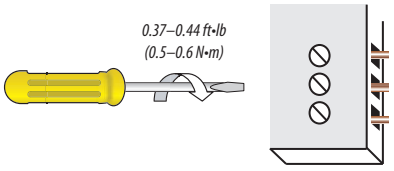
Baud Rate	Maximum Distances	
	1-16 Devices	17-32 Devices
2400	10,000 ft. (3048 m)	5000 ft. (1524 m)
4800	10,000 ft. (3048 m)	5000 ft. (1524 m)
9600	10,000 ft. (3048 m)	4000 ft. (1219 m)
19200	5000 ft. (1524 m)	2500 ft. (762 m)

2-Wire Daisy Chain Maximum Distances

Baud Rate	Maximum Distances	
	1-8 Devices	9-16 Devices
2400	10,000 ft. (3048 m)	5000 ft. (1524 m)
4800	10,000 ft. (3048 m)	5000 ft. (1524 m)
9600	10,000 ft. (3048 m)	4000 ft. (1219 m)
19200	5000 ft. (1524 m)	2500 ft. (762 m)

Wiring the Connector

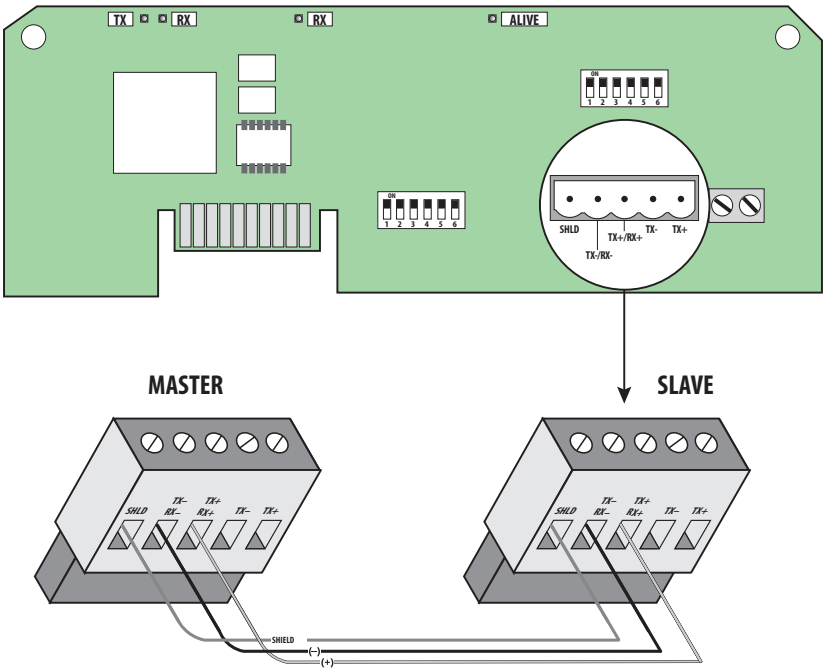
1. Remove the connector from the RS-485 communication terminals of the H8163-CB.
2. Wire the communications connector as shown on page 4 (2-wire or 4-wire communication). The wire type setting in the communication DIP switch must match this wiring type.
3. Use a small, flat-blade screwdriver to tighten the connector screws. Apply the correct torque: 0.37-0.44 ft·lb (0.5-0.6 N·m).



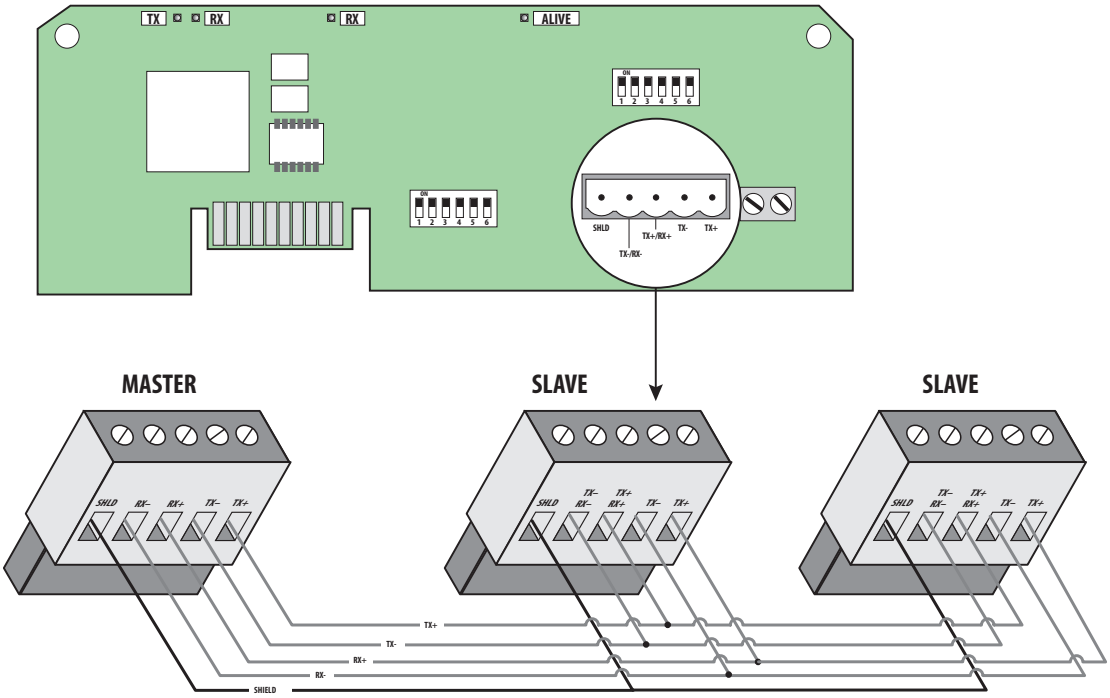
4. Replace the connector on the RS-485 communication terminals of the H8163-CB.
5. If the H8163-CB is the last device in a daisy chain, terminate it to ensure reliable communication per the RS-485 standard (120 Ω nominal impedence).

WIRING

*2-Wire Communications **



*4-Wire Communications **



** If the H8163-CB is the last device in a daisy chain, terminate it to ensure reliable communication per the RS-485 standard (120 Ω nominal impedence).*

INSTALLING THE H8163-CB IN THE ENERGY METER

Complete the Communications Setup and Wiring instructions before installing the board inside the meter.

The H8163-CB is designed as a plug-and-play accessory for the H8163 energy meter. Follow these instructions to install the H8163-CB into the energy meter.

1. Turn off all power to the energy meter and the equipment in which it is installed.

    a. Remove the voltage terminal from the energy meter and all fuses.

    b. Always use a properly rated voltage sensing device to confirm that power is off.

2. To discharge static, follow the instructions that come with your anti-static or grounding strap. We recommend using an anti-static or grounding strap until the installation is complete.

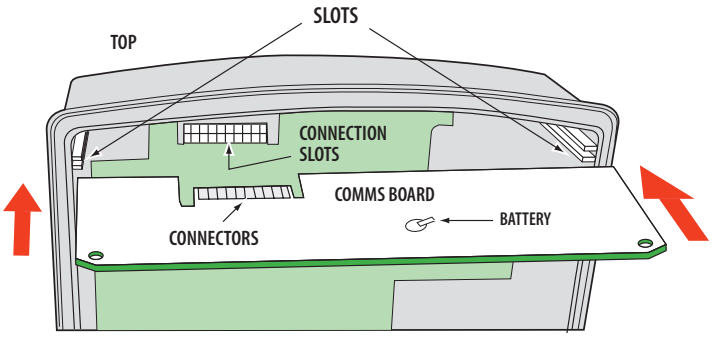
3. Slide the H8163-CB into the slot in the H8163 housing. The sides of the H8163-CB slide down into the channels on either side of the energy meter. When the male connection to the H8163 board clicks into place, the H8163-CB is properly installed.

4. Insert the communication terminal onto the RS-485 communication terminals.

5. If the demand subinterval feature is used, wire into the end of demand subinterval terminal.

6. Replace the voltage terminal into the energy meter.

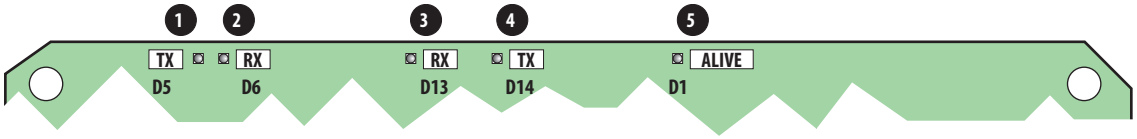
Observe precautions for handling static sensitive devices to avoid damage to the circuitry that is not covered under the factory warranty.



TROUBLESHOOTING

If communications are not working properly, first check that the board is properly seated in its slot in the energy meter, and that the connector has clicked into place in the connection slot on the meter.

There are five LEDs that indicate various types of communication.

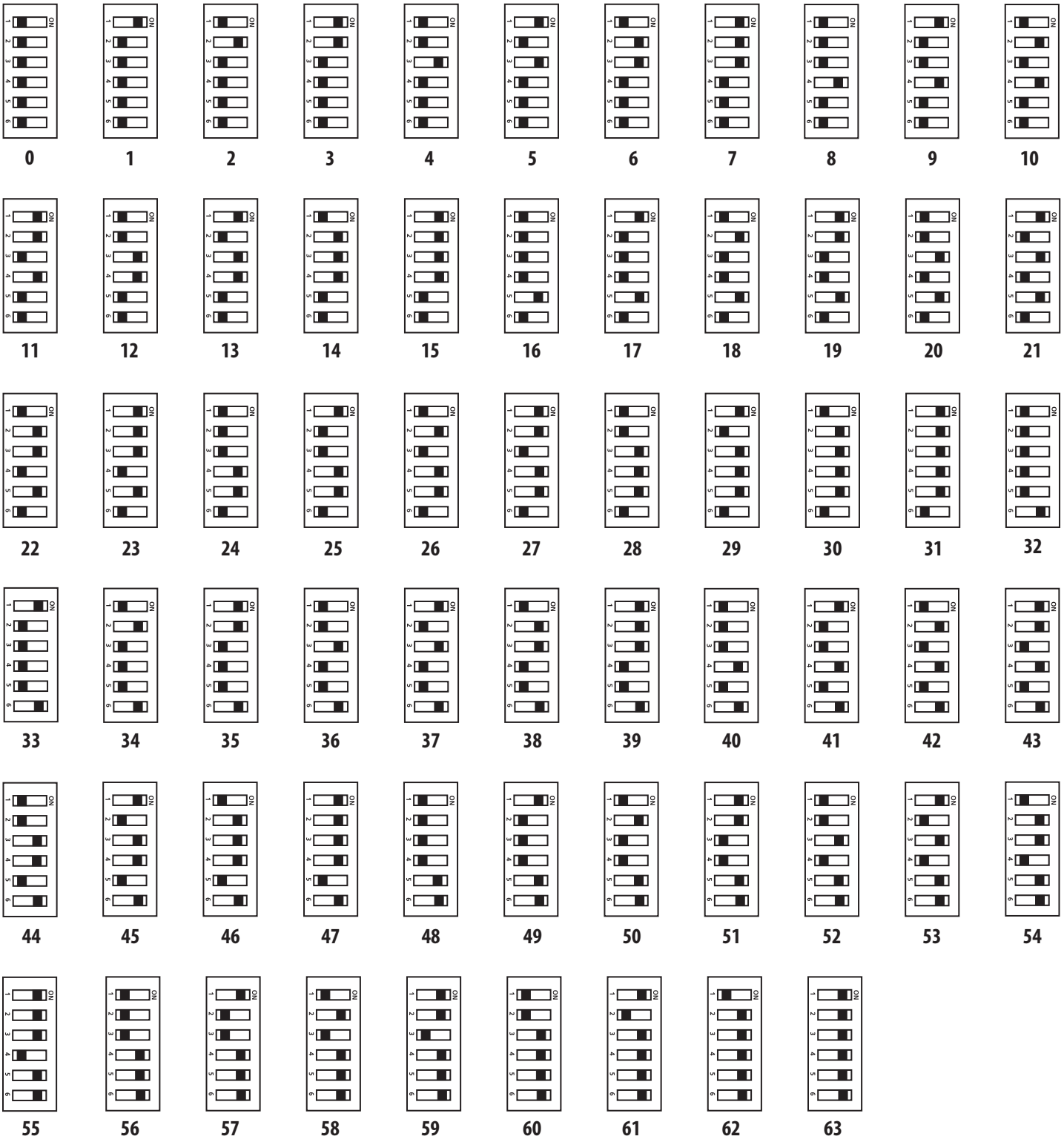


During normal operation, all five LEDs will blink regularly. When an error occurs, the abnormal LED will help determine where that error is.

LED Number	LED Description	Abnormal Operation	Solution
1	RS-485 (TX)	Not blinking	No communication from the H8163 to the master. · Check the wiring; TX+/TX- and RX+/RX- may be reversed. Correct the wiring. · If RX is blinking, verify the DIP switch address, parity, baud rate, and wire type.
2	RS-485 (RX)	Not blinking	No communication from the master. The RX+/RX- may be reversed. Correct the wiring.
3	From main board (RX)	Not blinking	Main board not responding. Contact customer support for assistance.
4	From main board (TX)	Not blinking but "Alive" LED is blinking	Internal communications board diagnostic event. Contact customer support for assistance.
5	"Alive" status	Steadily lit	Internal communications board diagnostic event. Contact customer support for assistance.

MODBUS ADDRESS SETUP

The figure below illustrates the network address DIP switch settings for each network address. See "Selecting the Network Address DIP Switches" on page 3 for instructions on setting the switches.



  USA 800.354.8556 or +1.503.598.4564 / support@veris.com

MODBUS POINT MAP

Int	Float	R/W	NV	Model	Description	Notes
1	257/258	R	NV		Energy Consumption, kWh, Low-word integer	Both 257/258 and 259/260 have the same floating point value.
2	259/260	R	NV		Energy Consumption, kWh, High-word integer	
3	261/262	R			Real Power, kW	
4	263/264	R			Reactive Power, kVAR	
5	265/266	R			Apparant Power, kVA	
6	267/268	R			Total Power Factor	
7	269/270	R		-1	Not Applicable - reads 0xFFFF/NaN (int/float)	
				-2	Avg Voltage, L-L, ave of 1	
				-3	Avg Voltage, L-L, ave of 3	
8	271/272	R		-1	Avg Voltage, L-N, ave of 1	
		R		-2	Avg Voltage, L-N, ave of 2	
		R		-3	Avg Voltage, L-N, ave of 3	
9	273/274	R		-1	Avg Current, average of 1	
		R		-2	Avg Current, average of 2	
		R		-3	Avg Current, average of 3	
10	275/276	R		-1	Real Power, phase A (same as Real Power, kW (3))	
				-2/-3	Real Power, phase A	
11	277/278	R		-1	Not Applicable – reads as 0xFFFF/NaN (int/float)	
				-2/3	Real Power, phase B	
12	279/280	R		-1/-2	Not Applicable – reads as 0xFFFF/NaN (int/float)	
				-3	Real Power, phase C	
13	281/282	R		-1	Power Factor, phase A (Same as Total PF (6))	
				-2/-3	Power Factor, phase A	
14	283/284	R		-1	Not Applicable – reads 0xFFFF/NaN (int/float)	
				-2/-3	Power Factor, phase B	
15	285/286	R		-1/-2	Not Applicable – reads 0xFFFF/NaN (int/float)	
				-3	Power Factor, phase C	
16	287/288	R		-1	Not Applicable – reads 0xFFFF/NaN (int/float)	
				-2/-3	Voltage, phase A-B	
17	289/290	R		-1/-2	Not Applicable – reads 0xFFFF/NaN (int/float)	
				-3	Voltage, phase B-C	
18	291/292	R		-1/-2	Not Applicable – reads 0xFFFF/NaN (int/float)	
				-3	Voltage, phase A-C	
19	293/294	R		-1	Voltage, phase A-N (Same as Avg. L-N (8))	
				-2/-3	Voltage, phase A-N	
20	295/296	R		-1	Not Applicable – reads 0xFFFF/NaN (int/float)	
				-2/-3	Voltage, phase B-N	
21	297/298	R		-1/-2	Not Applicable – reads 0xFFFF/NaN (int/float)	
				-3	Voltage, phase C-N	
22	299/300	R		-1	Current, phase A (Same as Avg. Current (9))	
				-2/-3	Current, phase A	

R: R = Read-only, R/W = read from either format, write to integer format only
NV: Value is stored in non-volatile memory

Int	Float	R/W	NV	Model	Description	Notes
23	301/302	R		-1	Not Applicable – reads 0xFFFF/NaN (int/float)	
				-2/-3	Current, phase B	
24	303/304	R		-1/-2	Not Applicable – reads 0xFFFF/NaN (int/float)	
				-3	Current, phase C	
25	305/306	R			Present Demand Sub-Interval	The currently accumulating sub-interval demand, which is constantly changing.
26	307/308	R			Present Demand (kW)	The present demand, updated at the end of every sub-interval. This value is the average of the previous N sub-intervals, where N is the number of sub-intervals (register 37).
27	309/310	R	NV		Peak Demand	The highest demand value (register 26) that has occurred. This value is also displayed on LCD for MAX kW when the comms board is present.
28	311/312	R			Present kVAR Sub-Interval	The currently accumulating sub-interval kVAR, which is constantly changing.
29	313/314	R			Present kVAR	The present kVAR, updated at the end of every sub-interval. This value is the average of the previous N sub-intervals, where N is the number of sub-intervals (register 37).
30	315/316	R	NV		Peak kVAR	The highest kVAR value (register 28) that has occurred.
31		R	NV		Count of kWh resets	The number of times the kWh accumulator has been reset. This value can never be reset. It will roll over from 65535 to zero.
32		R	NV		Count of Peak Demand Resets	The number of times the peak demand (register 27) has been reset. This value can never be reset. It will roll over from 65535 to zero.
33		R	NV		Count of Peak kVAR Resets	The number of times the peak kVAR (register 30) has been reset. This value can never be reset. It will roll over from 65535 to zero.
34		R			Count of elapsed Sub-Intervals	The number of sub-intervals that have elapsed. Because the demand (register 28) is updated every sub-interval, read this register to determine whether an identical value in register 28 is actually the same demand interval or if it is a new interval and the load has remained steady.
35		R			Number Readings in Present Sub-Interval	The number of readings that are represented by the present sub-interval (register 25). This register acts as an unsigned integer. See below for explaination of sub-interval reading count overflow. This register will increment every 200 msec (5 times per second).
36		R/W	NV		Sub-Interval Length	Sets the length of a sub-interval. Value is the number of seconds * 5, e.g. 4500 is 15 minutes. For sync-to-comms or sync-to-demand-reset-input (hardware signal), set this to zero.
37		R/W	NV		Number of Sub-Intervals per Demand Interval	Sets the number of sub-intervals that make a single demand interval. Legal values are 1 to 6. For block demand, set this to 1.
38		R	NV		System ID	This register reads as 15024 for the basic meter and 15025 for the enhanced model to help identify the meter.
39		R	NV		CT Size	This register reads as the CT size, 100, 300, etc.
40		R	NV		CT Number	The number of CTs that are connected, 1, 2, or 3.

R: R = Read-only, R/W = read from either format, write to integer format only
NV: Value is stored in non-volatile memory

Int	Float	R/W	NV	Model	Description	Notes
41		R/W			Command (bit mapped): bit 0 (mask 1) = Begin New Demand Sub-Interval bit 1 (mask 2) = Clear kWh accumulator bit 2 (mask 4) = Reset Peak Demand bit 3 (mask 8) = Reset Peak kVAR bits 4-15 = Write as zeros to avoid activating any additional commands that might be added in future revisions	
42		R/W	NV		Phase Loss, Latching Register (bit mapped): bit 0: phase A (unpredictable results on phase A) bit 1: phase B bit 2: phase C bits 3 to 15 = write as zeros. This latching register should be cleared by user.	
43		R	NV		Count of Phase Losses	The number of times a phase loss has occurred on any phase. This can never be reset and will roll over from 65535 to zero.
44		R/W	NV		Date/Time Month 1-12 (LSB) Day 1-31 (MSB)	
45		R/W	NV		Date/Time Year 0-199 (LSB) Hour 0-23 (MSB)	
46		R/W	NV		Date/Time Minutes 0-59 (LSB) Seconds 0-59 (MSB)	
47		R	NV		Phase Loss Timestamp, Month 1-12 (LSB) Day 1-31 (MSB)	
48		R	NV		Phase Loss Timestamp, Year 0-199 (LSB) Hour 0-23 (MSB)	
49		R	NV		Phase Loss Timestamp, Minutes 0-59 (LSB) Seconds 0-59 (MSB)	
50		R	NV		Last Restart Timestamp, Month 1-12 (LSB) Day 1-31 (MSB)	
51		R	NV		Last Restart Timestamp, Year 0-199 (LSB) Hour 0-23 (MSB)	
52		R	NV		Last Restart Timestamp, Minutes 0-59 (LSB) Seconds 0-59 (MSB)	
53		R	NV		Last KWh Reset Timestamp, Month 1-12 (LSB) Day 1-31 (MSB)	
54		R	NV		Last KWh Reset Timestamp, Year 0-199 (LSB) Hour 0-23 (MSB)	
55		R	NV		Last KWh Reset Timestamp, Minutes 0-59 (LSB) Seconds 0-59 (MSB)	
56		R	NV		Reset System Firmware Version	
57		R	NV		Operating System Firmware Version	
58		R	NV		Serial Number LSW	
59		R	NV		Serial Number MSW	

R: R = Read-only, R/W = read from either format, write to integer format only
NV: Value is stored in non-volatile memory

MULTIPLIER TABLE

MB Point	Unit/Description kWh	100A	200A	300/400A	800A	1600A	2400A
1	kWh	0.007813	0.015625	0.03125	0.0625	0.125	0.25
2	kWh	512	1024	2048	4096	8192	16384
3	kW	0.004	0.008	0.016	0.032	0.064	0.128
4	kVAR	0.004	0.008	0.016	0.032	0.064	0.128
5	kVA	0.004	0.008	0.016	0.032	0.064	0.128
6	PF	3.05E-05	3.05E-05	3.05E-05	3.05E-05	3.05E-05	3.05E-05
7	V_LL	0.03125	0.03125	0.03125	0.03125	0.03125	0.03125
8	V_LN	0.015625	0.015625	0.015625	0.015625	0.015625	0.015625
9	Amps	0.003906	0.007813	0.015625	0.03125	0.0625	0.125
10	kW_a	0.001	0.002	0.004	0.008	0.016	0.032
11	kW_b	0.001	0.002	0.004	0.008	0.016	0.032
12	kW_c	0.001	0.002	0.004	0.008	0.016	0.032
13	PF_a	3.05E-05	3.05E-05	3.05E-05	3.05E-05	3.05E-05	3.05E-05
14	PF_b	3.05E-05	3.05E-05	3.05E-05	3.05E-05	3.05E-05	3.05E-05
15	PF_c	3.05E-05	3.05E-05	3.05E-05	3.05E-05	3.05E-05	3.05E-05
16	V_ab	0.03125	0.03125	0.03125	0.03125	0.03125	0.03125
17	V_bc	0.03125	0.03125	0.03125	0.03125	0.03125	0.03125
18	V_ac	0.03125	0.03125	0.03125	0.03125	0.03125	0.03125
19	V_an	0.015625	0.015625	0.015625	0.015625	0.015625	0.015625
20	V_bn	0.015625	0.015625	0.015625	0.015625	0.015625	0.015625
21	V_cn	0.015625	0.015625	0.015625	0.015625	0.015625	0.015625
22	Amps_a	0.003906	0.003906	0.003906	0.003906	0.003906	0.003906
23	Amps_b	0.003906	0.003906	0.003906	0.003906	0.003906	0.003906
24	Amps_c	0.003906	0.003906	0.003906	0.003906	0.003906	0.003906
25	kWd	0.004	0.008	0.016	0.032	0.064	0.128
26	kWd	0.004	0.008	0.016	0.032	0.064	0.128
27	kWd	0.004	0.008	0.016	0.032	0.064	0.128
28	kVARd	0.004	0.008	0.016	0.032	0.064	0.128
29	kVARd	0.004	0.008	0.016	0.032	0.064	0.128
30	kVARd	0.004	0.008	0.016	0.032	0.064	0.128

DIVISOR TABLE

MB Point	Unit/Description kWh	100A	200A	300/400A	800A	1600A	2400A
1	kWh	128	64	32	16	8	4
2	kWh	1.953E-3	9.765E-4	4.8828E-4	2.4414E-4	1.2207E-4	6.1035E-5
3	kW	250	125	62.5	31.25	15.625	7.8125
4	kVAR	250	125	62.5	31.25	15.625	7.8125
5	kVA	250	125	62.5	31.25	15.625	7.8125
6	PF	32768	32768	32768	32768	32768	32768
7	V_LL	32	32	32	32	32	32
8	V_LN	64	64	64	64	64	64
9	Amps	256	128	64	32	16	8
10	kW_a	1000	500	250	125	62.5	32.25
11	kW_b	1000	500	250	125	62.5	32.25
12	kW_c	1000	500	250	125	62.5	32.25
13	PF_a	32768	32768	32768	32768	32768	32768
14	PF_b	32768	32768	32768	32768	32768	32768
15	PF_c	32768	32768	32768	32768	32768	32768
16	V_ab	32	32	32	32	32	32
17	V_bc	32	32	32	32	32	32
18	V_ac	32	32	32	32	32	32
19	V_an	64	64	64	64	64	64
20	V_bn	64	64	64	64	64	64
21	V_cn	64	64	64	64	64	64
22	Amps_a	256	128	64	32	16	8
23	Amps_b	256	128	64	32	16	8
24	Amps_c	256	128	64	32	16	8
25	kWd	250	125	62.5	31.25	15.625	7.8125
26	kWd	250	125	62.5	31.25	15.625	7.8125
27	kWd	250	125	62.5	31.25	15.625	7.8125
28	kVARd	250	125	62.5	31.25	15.625	7.8125
29	kVARd	250	125	62.5	31.25	15.625	7.8125
30	kVARd	250	125	62.5	31.25	15.625	7.8125

NOTES

Integer format registers represent the data as 16-bit integer values. Float format registers represent the same data, as 32-bit floating point values.

For measured data, the float format registers are recommended. The integer format registers are difficult to use for the measured data, as a multiplier must be employed for each to calculate the correct value. Most of the multipliers change, depending on the CT size. Reading the float format registers avoids the need to use multipliers.

Modbus Block Reads

There is no maximum block size restriction, as with the 80xx Series power meters, as the entire Modbus response is fully buffered. However, the total number of registers requested may not exceed 125, as the Modbus protocol only allows up to 256 bytes.

125 registers * 2 bytes per register + 5 bytes overhead = 255 bytes.

Demand Computation, Internal Algorithm

The meter computes average kW/kVAR, by accumulating every kW/kVAR reading and keeping a count of the number of kW/kVAR readings accumulated. This occurs every 200 msec (5 Hz). The accumulated value, divided by the number of kW/kVAR readings, is the present sub-interval demand (kW/kVAR), which is read at registers 25 (kW) and 28 (kVAR).

A sub-interval may be terminated in three ways.

1. If a write to the command register has bit #0 set.
2. If the hardware signal (interval reset) is detected.
3. If the sub-interval length (register 36) is set to a nonzero level and the count of the number of kW readings equals or exceeds the nonzero sub-interval length.

Although there are three ways to end a sub-interval, it is assumed that applications will use only one of them.

The maximum legal sub-interval length is 65535 readings, which corresponds to 3 hours, 38 minutes, 27.2 seconds. When the 65535th reading is taken, the sub-interval reading counter overflows. The H8163-CB detects this and ends the sub-interval. The next sub-interval begins on the next reading. In normal operation, it is expected that a sub-interval will not last longer than 1 hour.

When a sub-interval ends, the average kW/kVAR during that sub-interval (the accumulated kW/kVAR readings divided by the number of readings) is added to a six-value FIFO (first in, first out) that stores the six most recent sub-intervals. The kW/kVAR accumulator and count of kW/kVAR readings are cleared to zero to begin a new sub-interval. The count of sub-intervals (register 34) is incremented. The present demand is recomputed by averaging the first N elements of the FIFO, where N is the value in register 37. If the new present demand is higher than the stored peak demand, then the peak demand is updated to the new present demand.

Miscellaneous

Some registers list a model suffix. These registers apply only to those models. Registers that are not available for the particular model will read "0xFFFF" for integer points and "NaN" for floating point registers.

The kW accumulator is reset by writing to the command register with bit #1 set. This clears the kWh accumulator to zero. Any writes to the kWh points are ignored.

Floating Point Registers

All floating point values are compatible with the "32 bit IEEE real" format. All floating point variables are read-only. All read/write points must be written to their integer registers.