Installation Instructions
H8163-CB Energy Meter Communication Board

VERIS INDUSTRIES
PORTLAND, OREGON USA
Toll Free in USA 1.800.354.8556
Tel USA 1.503.598.4564
FAX USA 1.503.598.4664
http: / / www.veris.com
email: sales@veris.com

- ***This product is not intended for life or safety applications.***
- ***This product is not intended for installation in hazardous or classified locations.***
- ***Read instructions thoroughly before installing this equipment.***

Severe injury or death can result from electrical shock during contact with high voltage conductors or related equipment. Disconnect and lock-out all power sources during installation and service. Applications shown are suggested means of installing sensors, but it is the responsibility of the installer to ensure that the installation is in compliance with all national and local codes. Installation should be attempted only by individuals familiar with codes, standards, and proper safety procedures for high-voltage installations.

⚠ DANGER!

HAZARD OF ELECTRIC SHOCK, BURN OR EXPLOSION

- Only qualified workers should install this equipment. Such work should be performed only after reading this entire set of instructions.
- **NEVER** work alone.
- 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 possiblity of backfeeding.
- Turn off all power supplying the energy meter and the equipment in which it is installed before installing the EMCB.
  NOTE: The energy meter may be connected to multiple power sources.
  CAUTION: ESD warning. This product subject to damage by static electricity. Handle the board only by the upper corner during installation.
- Beware of potential hazards, wear personal protective equipment, and carefully inspect the work area for tools and objects that may have been left inside the equipment.
- The successful operation of this equipment depends upon proper handling, installation, and operation. Neglecting fundamental installation requirements may lead to personal injury as well as damage to electrical equipment or other property.

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

Applications

- Commercial tenant submetering
- Performance contracting
- Cost allocation
- Real time power monitoring via local display or through control/data acquisition systems.

Features

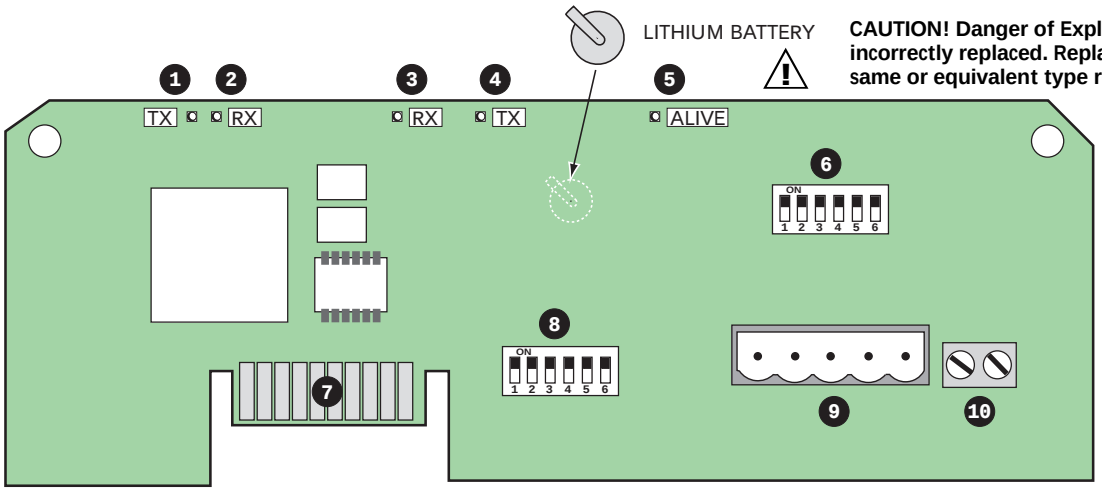
- Easily network to existing systems via Modbus RS-485 output
- Field selectable parity: odd/even/none
- Works with 2-wire and 4-wire systems
- Field selectable baud rate: 2400, 4800, 9600, 19200

DESCRIPTION

The H8163-CB Energy Meter Communication Board is an optional field-installable board for the H8163 Energy Meter, providing Modbus RTU communications capability. 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.

COMPONENT LOCATIONS



CAUTION! Danger of Explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Figure 1

1. **RS-485 LED (TX)**
Red LED; blinks to indicate that the H8163-CB is transmitting data to the master.

2. **RS-485 LED (RX)**
Red LED; blinks to indicate that the H8163-CB is receiving data from the master.

3. **LED from Main Board (RX)**
Green LED; blinks to indicate that the H8163-CB is receiving data from the main board.

4. **LED from Main Board (TX)**
Green LED; blinks to indicate that the H8163-CB is transmitting data to the main board.

5. **"ALIVE" LED**
Green LED; should blink once per second to indicate normal operation of the H8163-CB.

6. **Network Address DIP Switches**
Use these DIP switches to set the network address for the H8163-CB. See pg. 3 for settings.

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 pg. 3 for settings.

9. **RS-485 Communication Terminals**
Insert the RS-485 connector into these terminals. See Figure 6 on page 5 and Figure 7 on page 5 for instructions on wiring the connector for 2-wire or 4-wire communications.

10. **End of Demand Subinterval Terminal**
Use this terminal as the input connector for "end of demand interval" signal from the utility or other source.

An interposing isolated relay should be used as the dry contact for this terminal, as pictured below in Figure 1a.

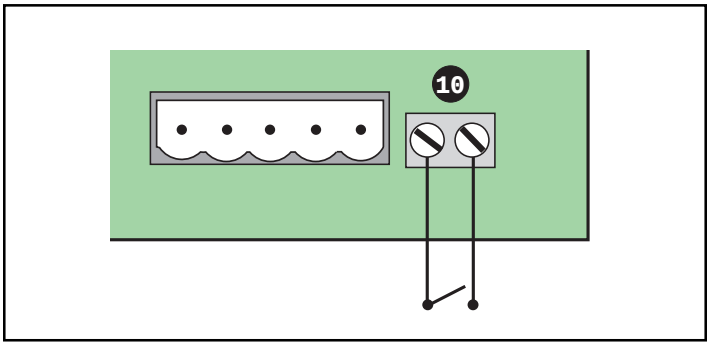


Figure 1a

INSTALLATION

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

- You can 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 in "Selecting the Network Address DIP Switches" on this page. If you assign the same address to two devices, neither device will communicate.
- Set the wiring type, baud rate, and parity according to directions in "Selecting Wiring Type, Baud Rate, and Parity—Communication DIP Switches" on this page. The settings for each H8163-CB must match the other devices on its daisy chain.
- For RS485 cables, use shielded, twisted-pair wire (Belden Cable 1120A or equivalent).
- Terminate the last device on the daisy chain. If the H8163-CB is the last device, see instructions in "Terminating the H8163-CB" on page 6.

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 1–63). Devices with the same address will be unable to communicate.

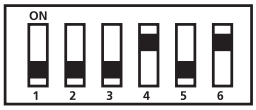
Always set the address before you install the H8163-CB in the energy meter and before you connect the energy meter to the daisy chain.

Each of the six DIP switches has a unique address value, page 8 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

Figure 2



8 + 32 = 40

In this example, the network address for the device is 40. From Figure 2, you can see that switch 4 and 6 offer the only combination of values that total 40.

This figure illustrates how to set the switches. Up is ON; down is OFF.

Figure 3

Selecting Wiring Type, Baud Rate, and Parity– Communication DIP Switches

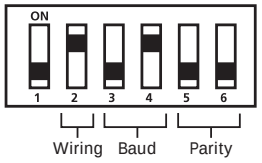
Use the communication DIP switches (pictured below) to set the H8163-CB wiring type, baud rate, and parity.

Figures 4 & 5 list the baud rate and parity switch settings. Figure 5 illustrates the locations of the switches that control wiring, baud rate, and parity.

Wiring, Baud Rate, and Parity Settings

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

Figure 4



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 no parity.

Figure 5 - **Setting the Communication DIP Switches**

RS-485 COMMUNICATIONS

This section describes the procedures for wiring the communications connection and terminating the H8163-CB (if it is the last device in its daisy chain).

Daisy Chain Maximum Distances

The maximum number of devices capable of being supported on a single daisy chain is determined based on the combination of baud rate, the length of the daisy chain, and the types of RS-485 devices (2-wire/4-wire) on the daisy 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. (3,048 m)	5,000 ft. (1,524 m)
4800	10,000 ft. (3,048 m)	5,000 ft. (1,524 m)
9600	10,000 ft. (3,048 m)	4,000 ft. (1,219 m)
19200	5,000 ft. (1,524 m)	2,500 ft. (762 m)

2-Wire Daisy Chain Maximum Distances

Baud Rate	Maximum Distances	
	1–8 Devices	9–16 Devices
2400	10,000 ft. (3,048 m)	5,000 ft. (1,524 m)
4800	10,000 ft. (3,048 m)	5,000 ft. (1,524 m)
9600	10,000 ft. (3,048 m)	4,000 ft. (1,219 m)
19200	5,000 ft. (1,524 m)	2,500 ft. (762 m)

Wiring the Connector

For this procedure, remove the connector from the RS-485 communication terminals of the H8163-CB (see page 5). To wire RS-485 communications, follow these steps:

1. Wire the communications connector as shown in Figure 6 (2-wire communication) or Figure 7 (4-wire communication).

   NOTE: The Wire Type setting in the communication DIP switch must match this wiring type (see Figure 4 for communication DIP switch settings).

2. Use a small, flat-blade screwdriver to tighten the connector screws.

3. Replace the connector on the RS-485 communication terminals of the H8163-CB.

4. If the H8163-CB is the last device on the daisy chain, terminate it, following directions in "Terminating the H8163-CB".

RS-485 COMMUNICATIONS

2-wire Communications Wiring

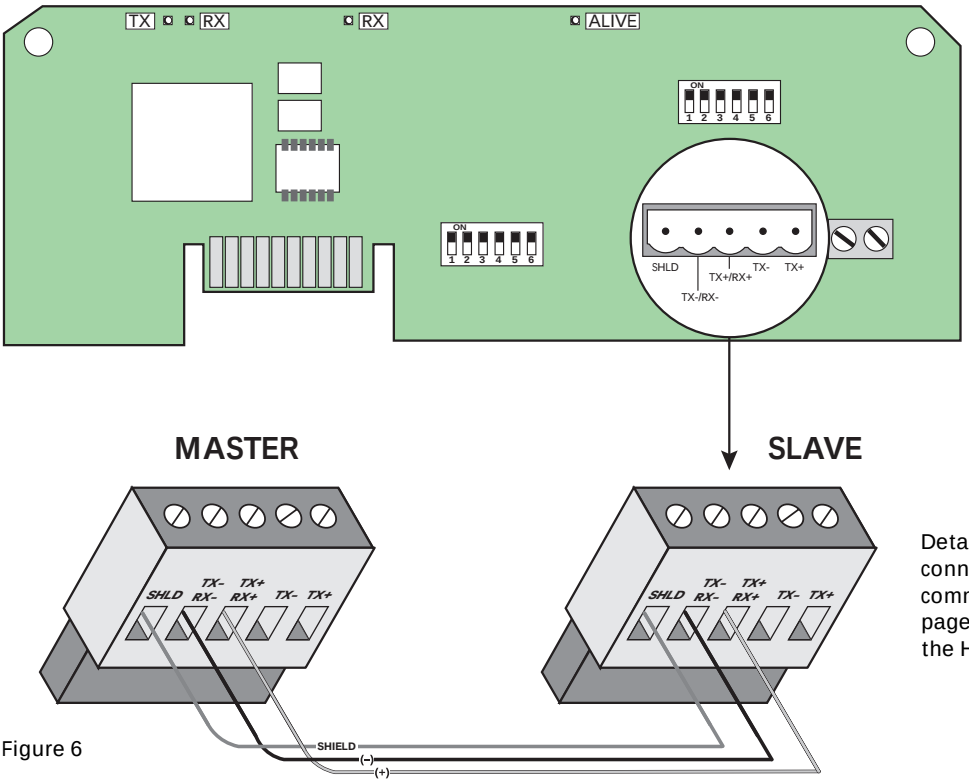


Figure 6

Detail showing MODBUS connector wired for 2-wire communication. *See note on page 6 regarding terminating the H8163-CB.

4-wire Communications Wiring

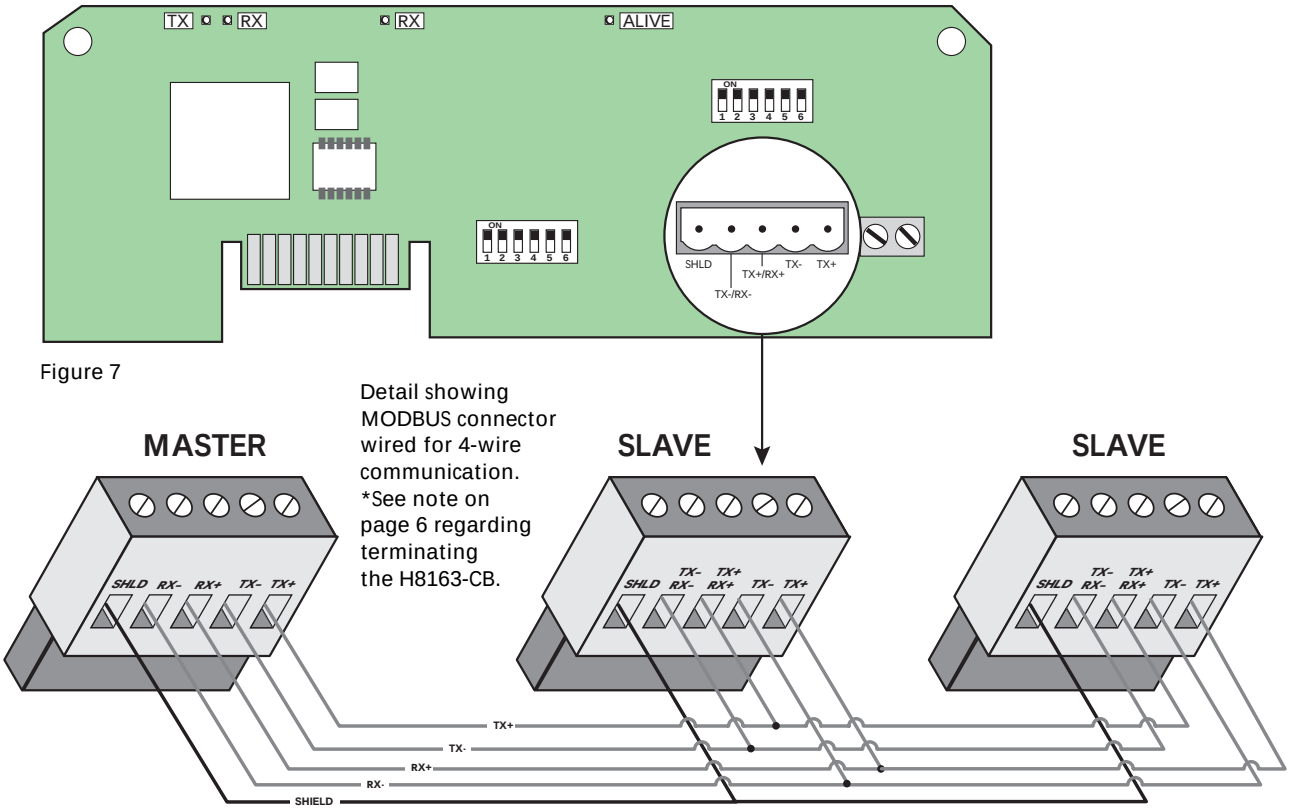


Figure 7

Detail showing MODBUS connector wired for 4-wire communication. *See note on page 6 regarding terminating the H8163-CB.

RS-485 COMMUNICATIONS

Terminating the H8163-CB

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

INSTALLING THE H8163-CB

This section provides information on installing the H8163-CB in the energy meter.

Before you begin this procedure, first set the wiring, baud rate, and parity, using the communication DIP switches; and set the network address, using the Network Address DIP switches.

DANGER

HAZARD OF ELECTRIC SHOCK, BURN, OR EXPLOSION!

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

• Use a properly rated voltage sensing device to confirm that all power is off.

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

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. To turn off power to the energy meter, do this:
   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.
   NOTE: *We recommend using an anti-static or grounding strap until you have completed installation of the H8163-CB.*
3. Slide the H8163-CB into the slot in the energy meter. The sides of the H8163-CB slide down into the channels on either side of the energy meter. When the male connection to the energy meter (see Figure 8) 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.

CAUTION

ESD-SENSITIVE COMPONENTS

Use an anti-static or grounding strap (customer-supplied) to ground yourself and discharge any static charge before installing the EMCB. Static can damage electro-static discharge-sensitive components in the circuit monitor and its accessories.

Failure to follow this instruction can result in equipment damage.

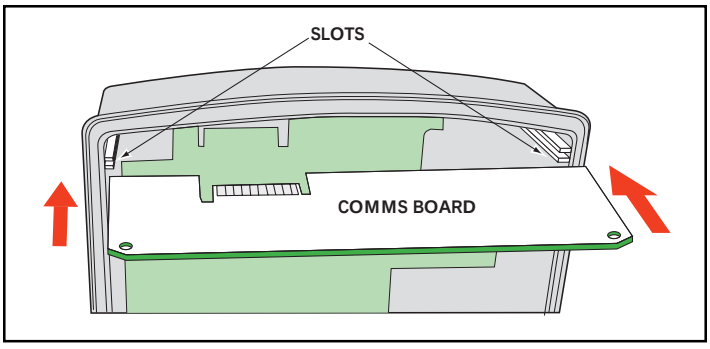


Figure 8 **H8163-CB Installation**

TROUBLESHOOTING

This section covers the solutions for some of the common problems you might encounter with the H8163-CB.

There are five LEDs that indicate various types of communication. Figure 9 indicates the locations of these LEDs. All LEDs will blink when operating normally.

If there is a problem communicating, first be sure that the board is properly seated in its slot on the energy meter. Verify that the sides of the H8163-CB are in the slots on the sides of the energy meter and that the connector has clicked into place in the connection slot of the energy meter.

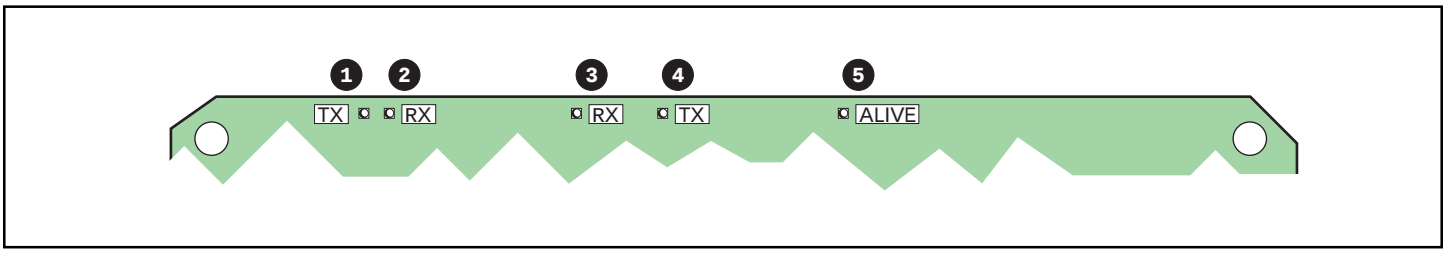
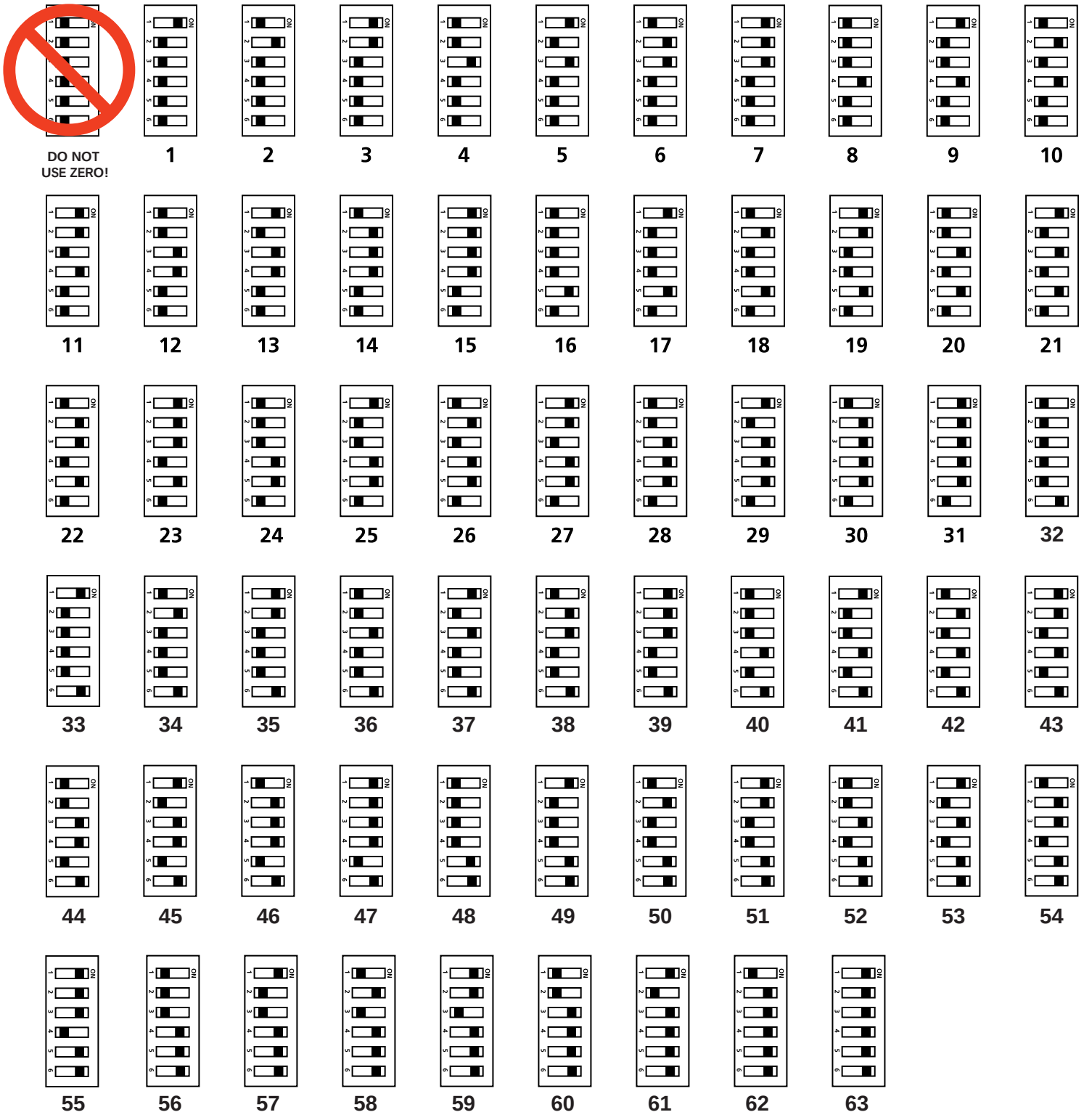


Figure 9 **LED Positions on the H8163-CB**

Number	LED	Abnormal Operation	Solution
1	RS-485 LED (TX)	Not Blinking	There is 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	There is no communication from the master. The RX+ and RX- wires are reversed. Correct the wiring.
3	From main board (RX)	Not blinking	The main board is not responding. Contact the factory for support.
4	From main board (TX)	Not blinking but "Alive" LED is blinking	There is an internal communications board error. Contact the factory.
5	"Alive" status	Steadily lit	There is an internal communications board error. Contact the factory for support.

MODBUS DIP SWITCH SETTINGS

The figure below illustrates the switch settings, using the Network Address DIP switches, for each Network address. See "Selecting the network Address– NETWORK ADDRESS DIP SWITCHES" on page 3 for instructions on setting the switches.



MODBUS POINT MAP

Int	Float	R/W	N/V	Model	Description
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. Both 257/258 and 259/260 have the same floating point value.
3	261/262	R			Real Power, kW
4	263/264	R			Reactive Power, kVar
5	265/266	R			Apparent Power, kVa
6	267/268	R			Total Power Factor
7	269/270	R		-1 -2 -3	Not Applicable; reads 0xFFFF/NaN (int/float) Avg Voltage, L-L, average of 1 Avg Voltage, L-N, average of 3
8	271/272	R R R		-1 -2 -3	Avg Voltage, L-N, average of 1 Avg Voltage, L-N, average of 2 Avg Voltage, L-N, average of 3
9	273/274	R R R		-1 -2 -3	Avg Current, average of 1 Avg Current, average of 2 Avg Current, average of 3
10	275/276	R		-1 -2/-3	Real Power, phase A (same as Real Power, kW (3) Real Power, phase A
11	277/278	R		-1 -2/-3	Not Applicable; reads as 0xFFFF/NaN (int/float) Real Power, phase B
12	279/280	R		-1/-2 -3	Not Applicable; reads as 0xFFFF/NaN (int/float) Real Power, phase C
13	281/282	R		-1 -2/-3	Power Factor, phase A (Same as Total PF (6) Power Factor, phase A
14	283/284	R		-1 -2/-3	Not Applicable; reads as 0xFFFF/NaN (int/float) Power Factor, phase B
15	285/286	R		-1/-2 -3	Not Applicable; reads as 0xFFFF/NaN (int/float) Power Factor, phase C
16	287/288	R		-1 -2/-3	Not Applicable; reads as 0xFFFF/NaN (int/float) Voltage, phase A-B
17	289/290	R		-1/-2 -3	Not Applicable; reads as 0xFFFF/NaN (int/float) Voltage, phase B-C
18	291/292	R		-1/-2 -3	Not Applicable; reads as 0xFFFF/NaN (int/float) Voltage, phase A-C
19	293/294	R		-1 -2/-3	Voltage, phase A-N (Same as Avg. L-N (8) Voltage, phase A-N
20	295/296	R		-1 -2/-3	Not Applicable; reads as 0xFFFF/NaN (int/float) Voltage, phase B-N
21	297/298	R		-1/-2 -3	Not Applicable; reads as 0xFFFF/NaN (int/float) Voltage, phase C-N
22	299/300	R		-1 -2/-3	Current, phase A (Same as Avg. Current (9)) Current, phase A
23	301/302	R		-1 -2/-3	Not Applicable; reads as 0xFFFF/NaN (int/float) Current, phase B
24	303/304	R		-1/-2 -3	Not Applicable; reads as 0xFFFF/NaN (int/float) Current, phase C

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

MODBUS POINT MAP

Int	Float	R/W	N/V	Model	Description
25	305/306	R			Present Demand Sub-Interval. This is the currently accumulating Sub-Interval demand, which is constantly changing.
26	307/308	R			Present Demand (kW). This is the present demand, which is updated at the end of every Sub-Interval. This value is the average of the previous N subintervals, where N is the number of sub intervals (register 37).
27	309/310	R	NV		The peak demand is the highest demand value (register 26) that has occurred. Note: This value is also displayed on LCD for MAX kW when the comms board is present.
28	311/312	R			Present kVAR Sub-Interval. This is the currently accumulating Sub-Interval KVAR, which is constantly changing.
29	313/314	R			Present kVAR. This is the present kVar, which is 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 peak kVar is the highest kVar value (register 28) that has occurred.
31		R	NV		Count of KWh resets. The number of times the peak demand (register 27) has been reset. This value 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 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 will roll over from 65535 to zero.
34		R			Count of Elapsed Sub Intervals. This counts the number of sub-intervals that have elapsed. Because the demand (register 28) is updated every sub-interval, this register may be read to determine if 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. This value indicates the number of readings that are represented by the present sub-interval (register 25). this register acts as an unsigned integer. Values larger than 32767 should not be “trusted”. See below for explanation of sub-interval reading count overflow. This register will increment every 200 ms (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, for example, 4500 is 15 minutes. For sync-to-comms, or sync-to-demand-reset-input (hardware signal), set this to zero.
37		R	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.

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

MODBUS POINT MAP

Int	Float	R/W	N/V	Model	Description
40		R	N/V		CT Number. The number of CTs that are connected, 1,2, or 3.
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 should be written as zeros to avoid activating any additional commands that may be added in future revisions.
42		R/W	N/V		Phase Loss, Latching Register (bit mapped): bit 0 = phase A (unpredictable results, phase A) bit 1 = phase B bit 2 = phase C bits 3 to 15 should be written as zeros. This Latching register should be cleared by user.
43		R	N/V		Count of Phase Losses The number of times a phase loss has occurred on any phase. This value will roll over from 65535 to zero.
44		R/W	N/V		Date/Time Month 1-12(LSB) Day 1-31 (MSB)
45		R/W	N/V		Date/Time Year 0-99(LSB) Hour 0-23 (MSB)
46		R/W	N/V		Date/Time Minutes 0-59 (LSB) Second 0-59 (MSB)
47		R	N/V		Phase Loss Timestamp, Month 1-12 (LSB) Day 1-31 (MSB)
48		R	N/V		Phase Loss Timestamp, Year 0-99, Hour 0-23 (MSB)
49		R	N/V		Phase Loss Timestamp, Minutes 0-59 (LSB) Seconds 0-59 (MSB)
50		R	N/V		Last Restart Timestamp, Month 1-12 (LSB) Day 1-31 (MSB)
51		R	N/V		Last Restart Timestamp, Year 0-99, Hour 0-23 (MSB)
52		R	N/V		Last Restart Timestamp, Minutes 0-59 (LSB), Seconds 0-59 (MSB)
53		R	N/V		Last kWh Reset Timestamp, Month 1-12 (LSB) Day 1-31 (MSB)
54		R	N/V		Last kWh Reset Timestamp, Year 0-99 (LSB) Hour 0-23 (MSB)
55		R	N/V		Last kWh Reset Timestamp, Minutes 0-59 (LSB) Seconds 0-59 (MSB)

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/ DESCRIP.	100A	200A	300/400A	800A	1600A	2400A
1	kwh	0.007813	0.015625	0.03125	0.0625	0.125	0.25
2	kwh	0.007813	0.015625	0.03125	0.0625	0.125	0.25
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	0.007813	0.015625	0.03125	0.0625	0.125
23	amps_b	0.003906	0.007813	0.015625	0.03125	0.0625	0.125
24	amps_c	0.003906	0.007813	0.015625	0.03125	0.0625	0.125
25	kwd	0.004	0.08	0.016	0.032	0.064	0.128
26	kwd	0.004	0.08	0.016	0.032	0.064	0.128
27	kwd	0.004	0.08	0.016	0.032	0.064	0.128
28	kvard	0.004	0.08	0.016	0.032	0.064	0.128
29	kvard	0.004	0.08	0.016	0.032	0.064	0.128
30	kvard	0.004	0.08	0.016	0.032	0.064	0.128

DIVISOR TABLE

MB POINT	UNIT/ DESCRIP.	100A	200A	300/400A	800A	1600A	2400A
1	kwh	128	64	32	16	8	4
2	kwh	128	64	32	16	8	4
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	31.25
11	kw_b	1000	500	250	125	62.5	31.25
12	kw_c	1000	500	250	125	62.5	31.25
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

MODBUS POINT MAP NOTES

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 can be difficult to use for the measured data, as a multiplier must be used for each one to get 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 will compute average kW/kVar, by accumulating every kW/kVar reading and keeping a count of the number of kW/kVar readings accumulated. This will occur every 200 ms (5 Hz). The accumulated value, divided by the number of kW/kVar readings, will be the present subinterval demand (kW/kVar), which may be read at registers 25 (kW) and 28 (kVar).

A subinterval may be terminated in three ways.
1. If a write to the command register has bit #0 set, it will cause the present subinterval to end.

2. If the Hardware signal (interval reset) is detected.

3. If the subinterval length (register 36) has been set to a nonzero level, and the count of the number of kW readings equals or exceeds the nonzero subinterval length.

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

The maximum legal subinterval length is 65535 readings, which corresponds to 3 hours, 38 minutes, 27.2 seconds. When the 65535th reading is taken, the subinterval reading counter will overflow. This condition is detected and causes the subinterval to end. The next subinterval will begin on the next reading. In normal operation, it is expected that a subinterval should not last longer than 1 hour.

When a subinterval ends, the average kW/kVar during that subinterval (which is 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 subintervals. The kW/kVar accumulator and count of kW/kVar readings are cleared to zero, to begin a new subinterval. The count of subintervals (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 which are not available for the particular model will read "0xFFFF" for integer points and "NAN" for floating point registers. The kW accumulator may be reset by writing to the command register with bit #1 set. This will clear the kWH accumulator to zero. Any writes to the kWH points will be 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.