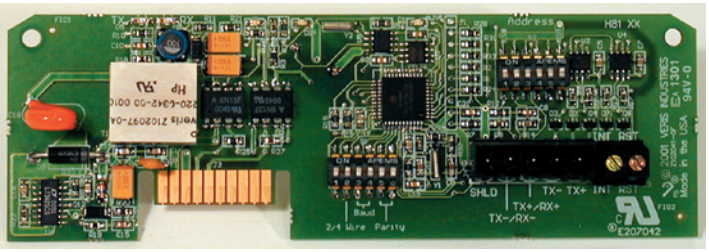
H8126-CB



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

H8126-CB N2 Communication Board

H8126-CB

N2 Communication Board for the H81xx Energy Meter

QUICK INSTALL

Observe handling precautions for static sensitive devices to avoid damage to the circuitry which would not be 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 H8126-CB into the slot in the energy meter until the board clicks into place.
6. Restore power to the meter.

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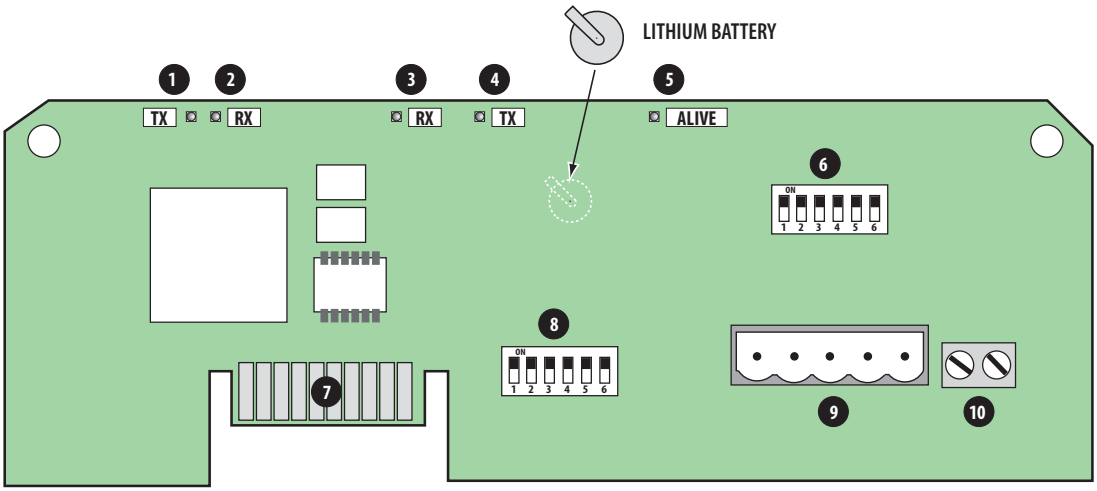
OPERATION

The H8126-CB Energy Meter Communication Board is an optional field-installable board for the H8163 Energy Meter, providing N2 communications capability. The H8126-CB also enables the energy meter to provide true kW & kVAR demand information.

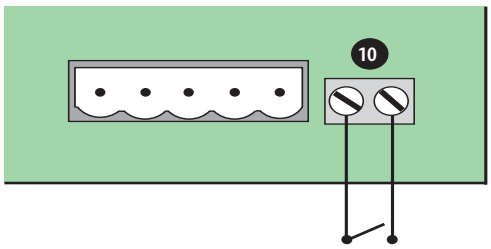
The easy-to-install H8126-CB provides a simple, cost-effective way to network the H8163 Energy Meter on the N2 bus.

PRODUCT DIAGRAM



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.

1. ***RS-485 LED (TX):*** Red LED; blinks to indicate that the H8126-CB is transmitting data to the master.
2. ***RS-485 LED (RX):*** Red LED; blinks to indicate that the H8126-CB is receiving data from the master.
3. ***LED from Main Board (RX):*** Green LED; blinks to indicate that the H8126-CB is receiving data from the main board.
4. ***LED from Main Board (TX):*** Green LED; blinks to indicate that the H8126-CB is transmitting data to the main board.
5. ***"ALIVE" LED:*** Green LED; should blink once per second to indicate normal operation of the H8126-CB.
6. ***N2 Network Address DIP Switches:*** Use these DIP switches to set the network address for the H8126-CB. See the Settings table on page 3 for more information.
7. ***Connection to Energy Meter:*** Install the H8126-CB in the energy meter by inserting this connector into the connection slot at the top of the energy meter.
8. ***Communication DIP Switches:*** N2 factory default
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. ***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. Do not apply voltage to this connection.



INSTALLATION

This section describes the communications settings you must make to the H8126-CB. When daisy-chaining N2 devices, follow these guidelines:

- Connect up to 63 H8126-CB devices on a single daisy chain.
- Each H8126-CB device on the daisy chain must have a unique address. Before connecting the H8126-CB to the RS-485 communication wires, set the address according to directions on this page.
- For RS-485 cables, use shielded, twisted-pair wire (Belden Cable 1120A or equivalent).
- Terminate the last device on the daisy chain. If the H8126-CB is the last device in a daisy chain, terminate it to ensure reliable communication per the RS-485 standard (120Ω nominal impedence).

Selecting The Network Address – DIP Switches

Use the Network Address DIP switches to select the network address. Each H8126-CB on a daisy chain must have a unique network address (from 1 to 63). Devices with the same address will be unable to communicate.

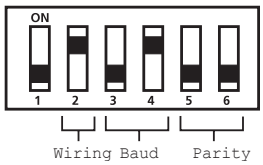
Always set the address before you install the H8126-CB in the energy meter and before you connect the energy meter to the daisy chain.

Each of the six DIP switches has a unique address value. The N2 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

Setting the Communication DIP Switches



The wiring type, baud rate, and parity-communication DIP switches are factory set to N2 specifications (9600 baud, no parity, 2-wire communication).

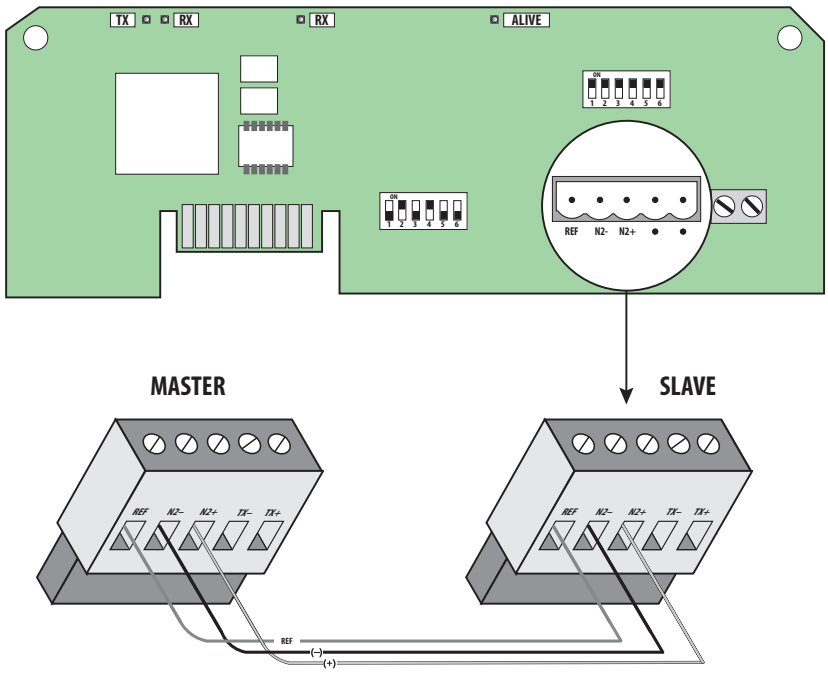
RS-485 COMMUNICATIONS SETUP

Wiring the Connector

1. Remove the 5-pin connector from the RS-485 communication terminals of the H8126-CB.
2. Wire the communications connector as shown on page 4 (2-wire communication).
3. Use a small, flat-blade screwdriver to tighten the connector screws.
4. Replace the connector on the RS-485 communication terminals of the H8126-CB.
5. If the H8126-CB is the last device in a daisy chain, terminate it to ensure reliable communication per the RS-485 standard (120Ω nominal impedence).

WIRING DIAGRAM

*2-Wire Communications **



** If the H8126-CB is the last device in a daisy chain, terminate it to ensure reliable communication per the RS-485 standard (120Ω nominal impedence).*

INSTALLING THE CB IN THE H8163 ENERGY METER

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

The H8126-CB is designed as a plug-and-play accessory for the H8163 energy meter. Follow these instructions to install the H8126-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.

   NOTE: We recommend using an anti-static or grounding strap until you have completed installation of the H8126-CB.

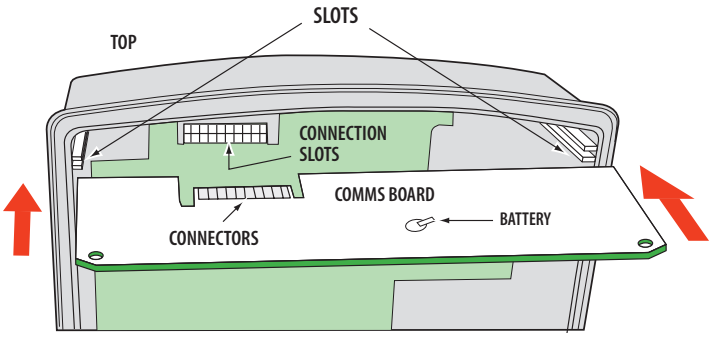
3. Slide the H8126-CB into the slot in the energy meter. The sides of the H8126-CB slide down into the channels on either side of the energy meter. When the male connection to the energy meter clicks into place, the H8126-CB is properly installed.

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.

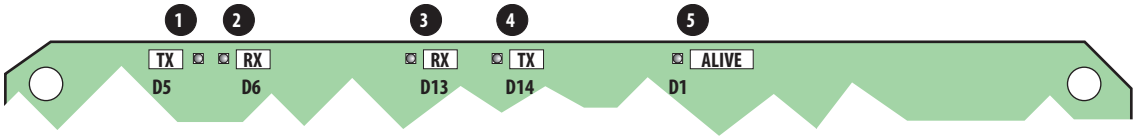
Observe handling precautions for static sensitive devices to avoid damage to the circuitry which would not be covered under the factory warranty.



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.

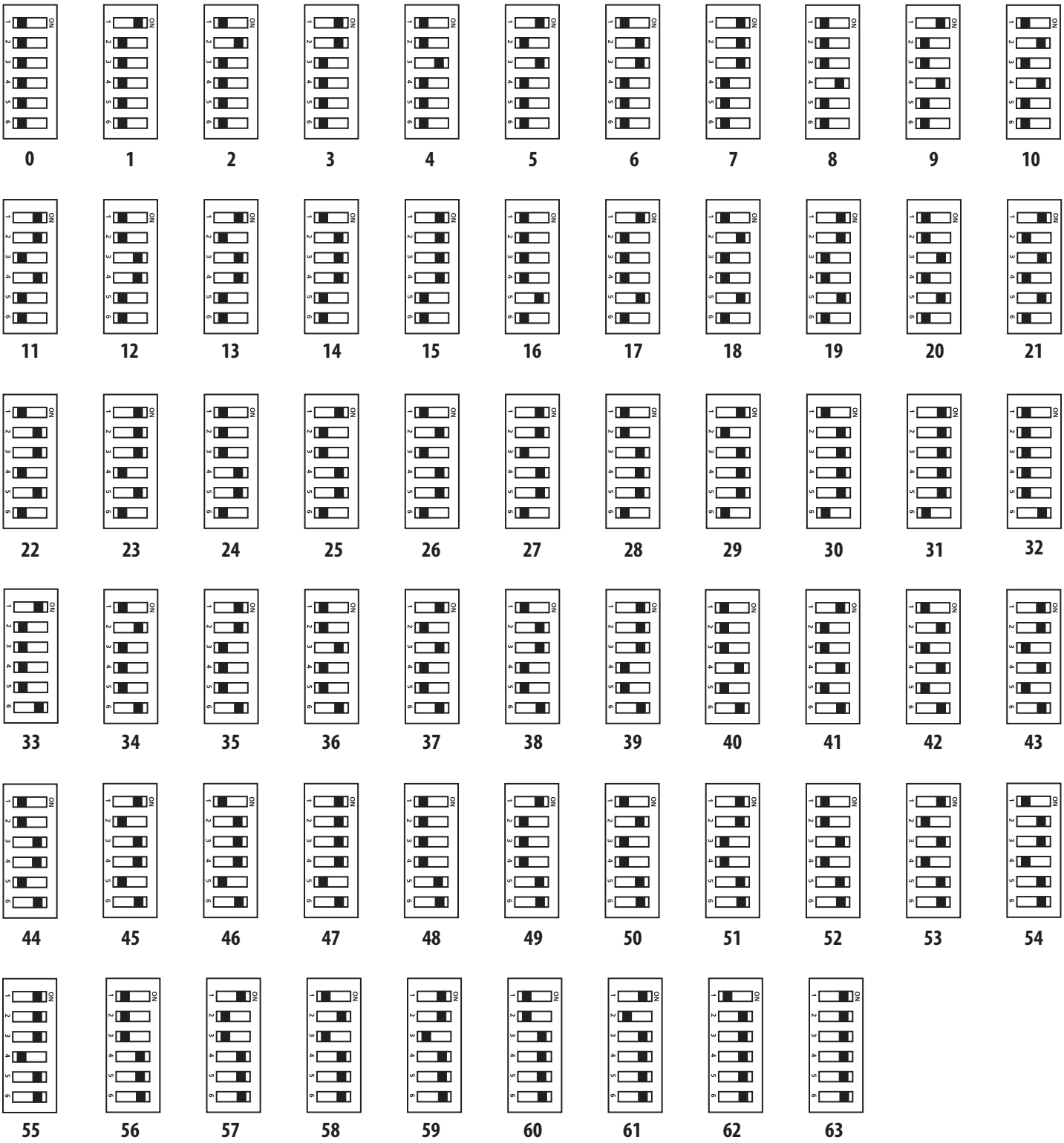


During normal operation, all five LEDs will blink regularly. When an error occurs, the abnormal LED will help determine where that error is.

LED Number	LED Description	Abnormal Operation	Solution
1	RS-485 (TX)	Not blinking	No communication from the H8163 to the master. · Check the wiring; N2- and N2+ 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. N2- and N2+ 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 error. Contact customer support for assistance.
5	"Alive" status	Steadily lit	Internal communications board error. Contact customer support for assistance.

N2 ADDRESSING

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.



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N2 OBJECTS

NPT	NPA	OR	WR	Units	Range	Description
AI	1	Y	Y	kWh	0-33554432	Consumption
AI	2	Y	Y	kW	0-100.6	Power
AI	3	Y	Y	kVAR	0-100.6	Reactive Power
AI	4	Y	Y	kVA	0-100.6	Apparent Power
AI	5	Y	Y	Volts	0-1.0	Total Power Factor
AI	6	Y	Y	Volts	5-528	Average Voltage L-L
AI	7	Y	Y	Amps	3-305	Average Voltage L-N
AI	8	Y	Y	kW	1-110	Average Current
AI	9	Y	Y	kW	0-33.5	Real Power, Phase A
AI	10	Y	Y	kW	0-33.5	Real Power, Phase B
AI	11	Y	Y	kW	0-33.5	Real Power, Phase C
AI	12	Y	Y		0-1.0	Power Factor, phase A
AI	13	Y	Y		0-1.0	Power Factor, phase B
AI	14	Y	Y		0-1.0	Power Factor, phase C
AI	15	Y	Y	Volts	5-528	Voltage, phase A-B
AI	16	Y	Y	Volts	5-528	Voltage, phase B-C
AI	17	Y	Y	Volts	5-528	Voltage, phase A-C
AI	18	Y	Y	Volts	3-305	Voltage, phase A-N
AI	19	Y	Y	Volts	3-305	Voltage, phase B-N
AI	20	Y	Y	Volts	3-305	Voltage, phase C-N
AI	21	Y	Y	Amps	1-110	Current, phase A
AI	22	Y	Y	Amps	1-110	Current, phase B
AI	23	Y	Y	Amps	1-110	Current, phase C
AI	24	Y	Y	kW Demand	0-100.6	Present Demand Subinterval (the currently accumulating subinterval demand; constantly changing)
AI	25	Y	Y	kW Demand	0-100.6	Present Demand (updated at the end of every subinterval; the average of the previous N subintervals [ADI 17])
AI	26	Y	Y	kW Demand	0-100.6	Peak Demand (highest demand value [AI 25] that has occured; a nonvolatile point)
AI	27	Y	Y	kVAR Demand	0-100.6	Present kVAR Subinterval (the currently accumulating subinterval kVAR; constantly changing)
AI	28	Y	Y	kVAR Demand	0-100.6	Present kVAR (updated at the end of every subinterval; the average of the previous N subintervals [ADI 17])
AI	29	Y	Y	kVAR Demand	0-3072	Peak kVAR (highest kVAR value [ADI 28] that has occured; a nonvolatile point)
BI	1	Y	N	kWh	100A:0.0078125/count 200A:0.015625/count 800A:0.0625/count 1600:0.125/count 300A:0.03125/count 400A:0.03125/count 2400A:0.25/count	Intended as an accumulator (ACM) type. Do not read as binary status.

NPT	NPA	OR	WR	Units	Range	Description
ADI	1	Y	N	kWh	0-65535	LSW of kWh accumulator. Lower 16 bits of kWh.
ADI	2	Y	N	kWh	0-65535	MSW of kWh accumulator. Upper 16 bits of kWh.
ADI	3	Y	N		0-65535	Phase Loss. Latching Register (bit mapped): Bit 0: phase A (unpredictable results on phase A) Bit 1: phase B Bit 2: phase C
ADI	4	Y	N		0-65535	Date/Time Month 1-12 (LSB) Day 1-31 (MSB)
ADI	5	Y	N		0-65535	Date/Time Year 0-1999 (LSB) Hour 0-23 (MSB)
ADI	6	Y	N		0-65535	Date/Time Minutes 0-59 (LSB) Seconds 0-59 (MSB)
ADI	7	Y	N	Secs	0-65535	High Alarm Delay: sets the minimum time a signal must remain in state before the alarm is set (default is 30 sec)
ADI	8	Y	N	Secs	0-65535	High Warning Delay: sets the minimum time a signal must remain in state before the warning is set (default is 30 sec)
ADI	9	Y	N	Secs	0-65535	Low Warning Delay: sets the minimum time a signal must remain in state before the warning is set (default is 30 sec)
ADI	10	Y	N	Secs	0-65535	Low Alarm Delay: sets the minimum time a signal must remain in state before the alarm is set (default is 30 sec)
ADI	11	Y	N		0-65535	Count of kWh resets: the number of times the kWh accumulator has been reset (rolls over at 65535)
ADI	12	Y	N		0-65535	Count of Peak Demand Resets: the number of times the peak demand (ADI 26) has been reset (rolls over at 65535)
ADI	13	Y	N		0-65535	Count of Peak kVAR Resets: the number of times the kVAR (ADI 29) has been reset (rolls over at 65535)
ADI	14	Y	N		0-65535	Count of Elapsed Subintervals: the number of subintervals that have elapsed. Since the demand (AI 25) is updated every subinterval, this register indicates whether an identical value in AI 25 is actually the same demand interval or a new interval with a steady load.
ADI	15	Y	N		0-65535	Number of Readings in Present Subinterval: the number of readings taken in the present subinterval (AI 24 and AI 27). This register acts as an unsigned integer and will increment every 200 msec (5 times per sec).
ADI	16	Y	N		0-65535	Subinterval Length: sets the length of a subinterval. Value = num. of seconds * 5. For sync-to-comms or sync-to-demand-reset-input (hardware signal), set this to zero.
ADI	17	Y	N		1-6	Number of Subintervals per Demand Interval: sets the number of subintervals that make a single demand interval. Valid values are 1 to 6. For block demand, set this to 1. Default is 6.
ADI	18	Y	N		100-2400	CT Size
ADI	19	Y	N		1-3	CT Number
ADI	20	Y	N		0-65535	Count of Phase Losses: number of phase losses on any phase (rolls over at 65535)
ADI	21	Y	N		0-65535	Phase Loss Timestamp, Month 1-12 (LSB) Day 1-31 (MSB)
ADI	22	Y	N		0-65535	Phase Loss Timestamp, Year 0-199 (LSB) Hour 1-24 (MSB)
ADI	23	Y	N		0-65535	Phase Loss Timestamp, Minutes 0-59 (LSB) Seconds 0-59 (MSB)
ADI	24	Y	N		0-65535	Last Restart Timestamp, Month 1-12 (LSB) Day 1-31 (MSB)
ADI	25	Y	N		0-65535	Last Restart Timestamp, Year 0-199 (LSB) Hour 1-24 (MSB)
ADI	26	Y	N		0-65535	Last Restart Timestamp, Minutes 0-59 (LSB) Seconds 0-59 (MSB)
ADI	27	Y	N		0-65535	Last kWh Reset Timestamp, Month 1-12 (LSB) Day 1-31 (MSB)
ADI	28	Y	N		0-65535	Last kWh Reset Timestamp, Year 0-199 (LSB) Hour 1-24 (MSB)
ADI	29	Y	N		0-65535	Last kWh Reset Timestamp, Minutes 0-59 (LSB) Seconds 0-59 (MSB)

NPT	NPA	OR	WR	Units	Range	Description
ADI	30	Y	N		0-65535	Firmware Version
ADI	31	Y	N		0-65535	Firmware Revision
ADI	32	Y	N		0-65535	Serial Number LSW
ADI	33	Y	N		0-65535	Serial Number MSW
BO	1	Y	N		0=NA 1=Reset kWh accumulator	
BO	2	Y	N		0=NA 1=Reset peak demand	
BO	3	Y	N		0=NA 1=Reset peak kVAR	
BO	4	Y	N		0=NA 1=Begin new demand subinterval	
BO	5	Y	N		0=NA 1=Reset phase loss register	

Legend

OR	Object can be overwritten
WR	Object can be written
Range	The AI ranges are based on a 3-phase 480V system with 100A CTs
NPT	Network point type
NPA	Network point address
Units	Engineering units
Description	Point description

Supported N2 Commands

0/0	Time update message
0/4	Poll without acknowledge message
0/5	Poll with acknowledge message
1/1	Read AI command
1/6	Read ADI command
1/2	Read BI command
1/4	Read BO command
2/1	Write AI command
2/2	Write BI command
2/4	Write BO command
7/2/01	Override AI command
7/2/06	Override ADI command
7/2/04	Override BO command
7/3/01	Override release AI request
7/3/06	Override release ADI request
7/3/02	Override release BI request
7/3/04	Override release BO request
F	Identify device type command

DEMAND COMPUTATION, INTERNAL ALGORITHM

The H8163 energy meter records every kW/kVAR reading, as well as a count of the number of these readings. These readings are recorded every 200 msec (5 Hz). The meter then computes the present subinterval demand as:

Average kW/kVAR = accumulated kW/kVAR / number of readings

This present subinterval demand can be read at registers AI 25 (kW) and AI 28 (kVAR).

A subinterval may be terminated in three ways:

1. Write to BO.
2. Detection of the hardware signal (interval reset).
3. Set the subinterval length (register ADI 16) to a nonzero value. The subinterval will end if the count of the number of kW readings equals or exceeds the nonzero subinterval length.

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

The maximum valid subinterval length is 65535 readings, which corresponds to 3 hours, 38 minutes, 27.2 seconds. When the device records the 65536th reading, the subinterval reading counter will roll over. This condition is detected and causes the subinterval to end. The next subinterval will begin on the next reading. In normal operation, a subinterval should not last longer than 1 hour.

When a subinterval ends, the average kW/kVAR during that subinterval (accumulated kW/kVAR readings divided by the number of readings) is added to a 6 value fifo list of the 6 most recent subintervals. The kW/kVAR accumulator and count of kW/kVAR readings are cleared to zero, a new subinterval begins, and the count of subintervals (ADI 14) increments. The present demand is recomputed by averaging the first N elements of the fifo, where N is the value in register ADI 17. If the new present demand is higher than the stored peak demand, then the peak demand is updated to the new present demand.