

H662 Series (E)

*Networked (N2BUS) Split-Core Branch Current Monitor
Compatible with Johnson Controls, Inc.,
Metasys & Companion Systems*



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.

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.

Easy Installation

- First split-core solution for branch current monitoring in the industry!
- Monitor up to 42 (breakers) poles with one product
- Split-core CT's provide quick and easy installation...ideal for retrofit
- Simple two wire 120 VAC power connection*

Network Ready RS485 Output

- Retrieve amperage information from up to 42 circuits with one RS485 N2 drop... easy wiring
- Global alarm register for instant alarm and warning notification
- Integrates to available network display for local indication
- Easy to use configuration software simplifies setup and provides flexibility to customize the configuration to meet the application

OPERATION

Designed for the critical load monitoring such as Co-location Data Centers and lighting panels, the H662 Series monitors current on up to 42 branch circuits in a 120/208/230 VAC electrical panel. By individually reporting current draw and initiating capacity warnings and alarms, the H662 series allows the user to manage loading and eliminate power disturbances caused by overloaded breakers.

The H662 series consists of a data acquisition system board and up to 42 individual split-core current transformers (CTs). The acquisition board should be mounted inside the electrical panel, or in an enclosure mounted near enough for the CT output leads to reach the acquisition board connectors. The CTs are clipped onto each of the branch circuit conductors. These CTs transmit amperage data from each monitored circuit to the acquisition system for processing. The CTs are voltage output limited for safe installation while the circuit is under power.

Current and alarm information is transmitted to the user's Control Data Acquisition system over an RS485 drop using the N2 protocol.

An included PC-based software tool simplifies configuration of the H662 series. The software sets circuit breaker trip points, and warning and alarm levels globally for the entire panel, or circuit by circuit.

*For 208/230VAC Power connection versions, order catalog number H662SM-xxE.

INSTALLATION

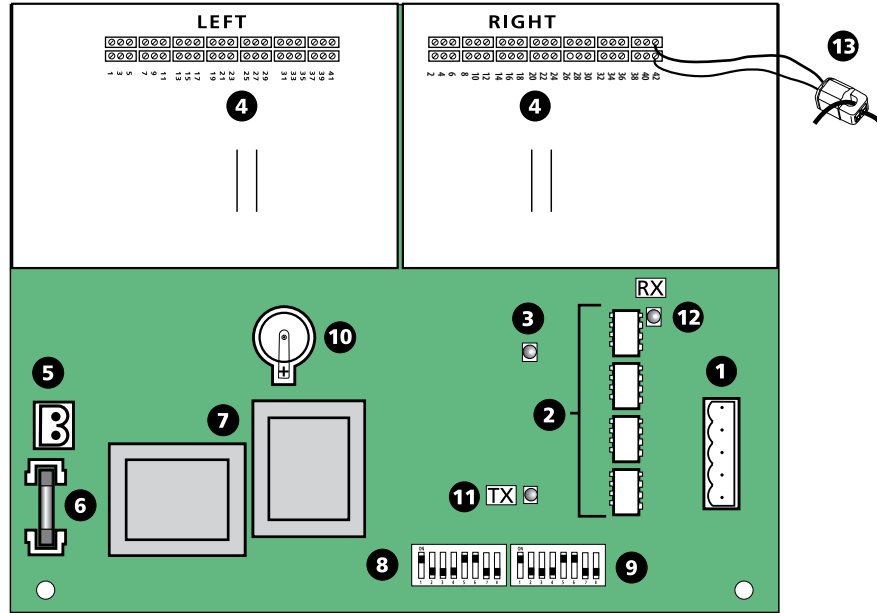



Figure 1

- 1 RS 485 2-Wire Connection**
Daisy chain multiple H662's using a 2-wire N2 network. Refer to Figure 4 on page 7.
- 2 Optical Communications Isolation**
Optical isolators are used to separate 120 VAC portions of the circuit from the RS485 network.
- 3 Alive LED**
Flashes once per second to indicate correct operation. If steadily lit or out, indicates internal failure.
- 4 Current Transformer (CT) Connectors (Interconnection Boards)**
Numbered terminals correspond to the input channels of the acquisition board. Fasten the current transformer connectors into the terminals as shown in figure 3 on page 3.
- 5 Control (Mains) Power Connection***
Easy 2-wire 120 VAC line to neutral 50/60 Hz.
- 6 250 VAC 100mA Time Delay Fuse**
Fused power connection for circuit protection.
- 7 Power Transformers**
Linear power supply for reliability and low noise
- 8 Baud Rate & Parity Selection Switches**
Field selectable RS-485 serial interface control. (See Chart 1 on page 5)
- 9 N2 Address Dip Switches**
Each N2 device must have a unique address. These switches must be set to assign an individual address before the device is connected to the network. (See page 5)
- 10 Lithium Battery (if present)**
 **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.**
- 11 TX LED**
Indicates transmission of information over the N2 network.
- 12 RX LED**
Indicates data received on the N2 network
- 13 Current Sensors**
Each current sensor is capable of monitoring conductors carrying up to a maximum of 50 amps.

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INSTALLATION

Physical Installation

1. Snap split-core CT's on branch circuit wires. (CT's may need to be staggered).
2. Prepare 120VAC* 50/60Hz power leads and connect to line and neutral terminals of the acquisition board. Allow wiring length to fit when board is installed. **DO NOT CONNECT LINE VOLTAGE UNTIL LAST STEP!**
3. Connect current transformers to interconnection board terminals as shown in Figure 3.
4. Acquisition Board Installation (see Figure 2)
Find screw holes under panel board in side of chassis or panel. Attach Data Acquisition Board.

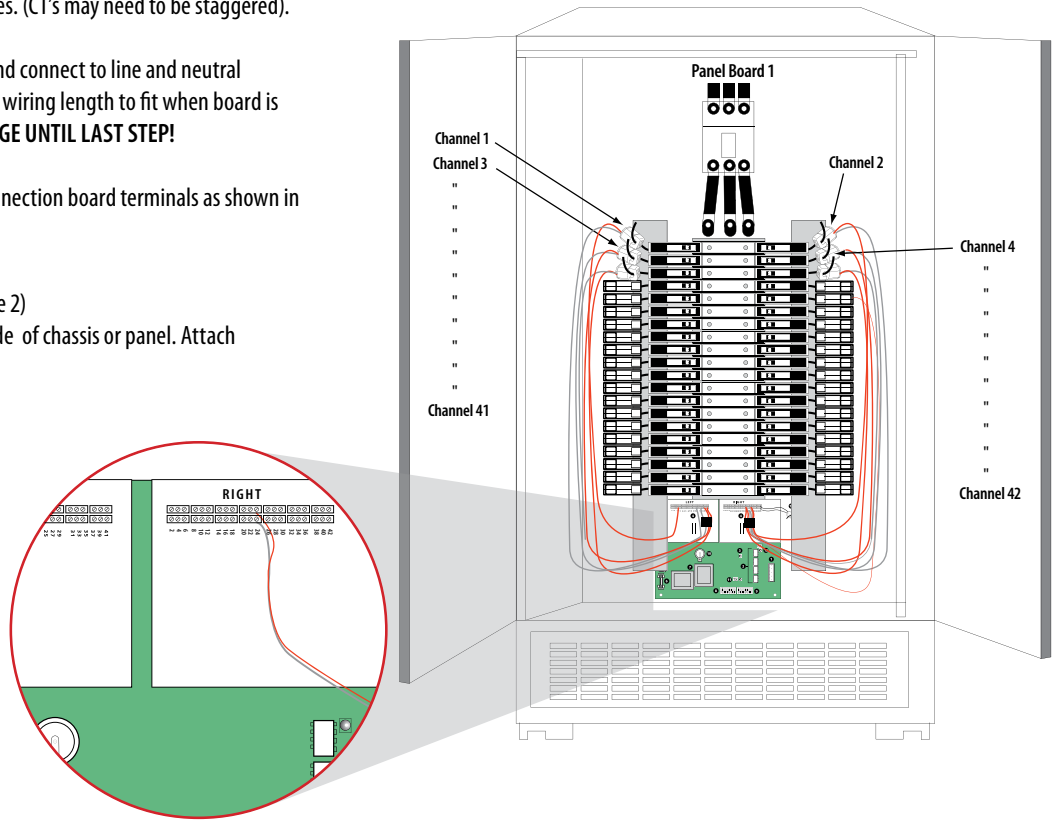


Figure 2



DANGER: Beware of exposed busbars on back of panelboard when installing circuit board assembly/mounting bracket. Assure adequate clearance between live parts and this product.

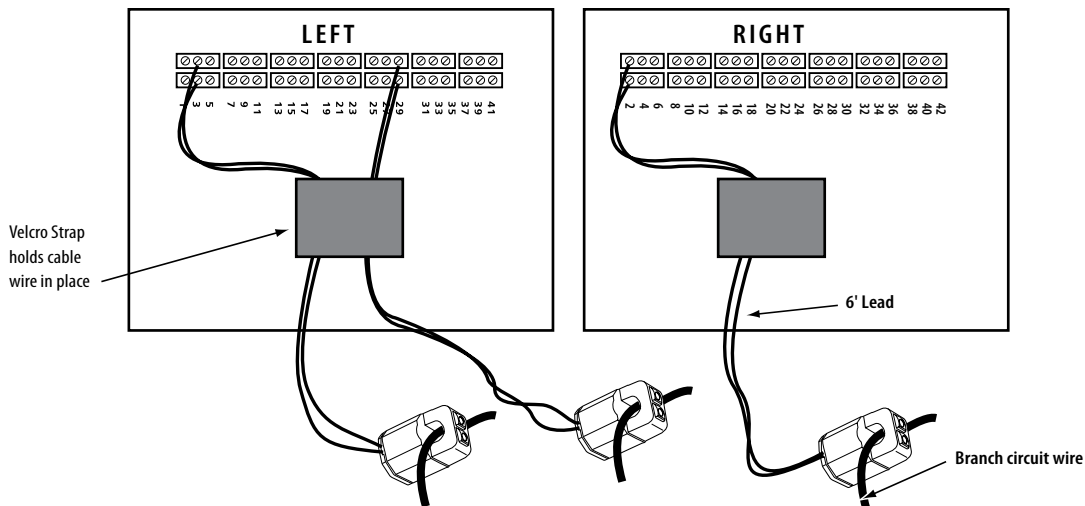


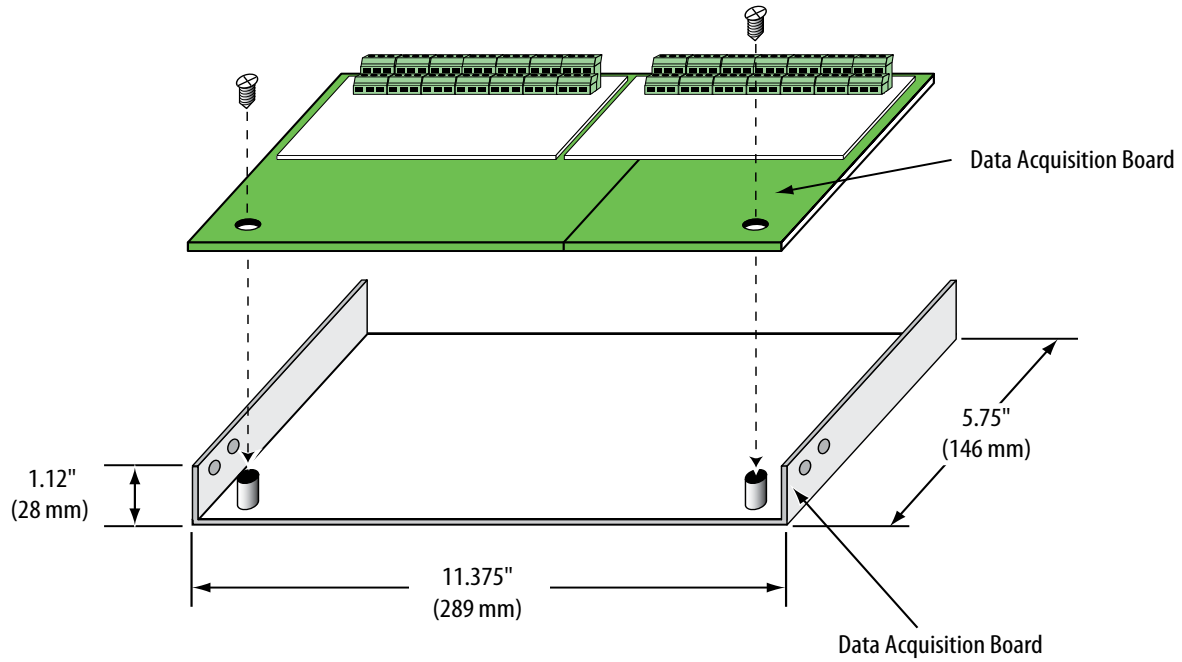
Figure 3

*For 208/230VAC Power connection versions, order catalog number H662SM-xxE.

INSTALLATION

Mounting Bracket Kit

Acquisition and interconnection boards are mounted to the bracket at the factory.



CONFIGURATION

Output Configuration

1. Communications Configuration

Communications parameters for the H662 series are field selectable for your convenience. Please see Figure 1 (page 2, #8) for selector location. The following parameters are configurable: Standard N2 configuration is underlined.

- Parity: Odd, even or none
- Wiring: Two
- Baud Rate: 2400, 4800, 9600 or 19200



Standard N2 Configuration: X=unused. 2-wire 9600 Baud No Parity (Default Only)

2. Address Configuration

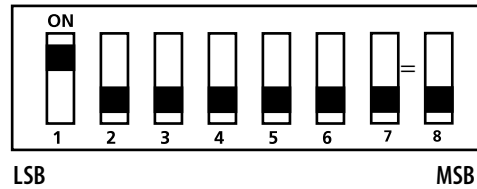
Each N2 device on a single network must have a unique address. The switch block must be set to assign a unique address before the device is connected to the N2 RS485 network. If an address is selected which conflicts with another device, neither device will be able to communicate.

Baud Rate and Parity Switch Settings

| Switch # | | | | | | | | Wiring, Baud Rate, Parity | | |
|----------|-----|-----|-----|-----|-----|---|---|---------------------------|-----------------------------|--------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Wiring | DESIRED RESULT Baud Rate | Parity |
| X | On | | | | | X | X | 2 wire | | |
| X | Off | | | | | X | X | 4 wire | | |
| X | | Off | Off | | | X | X | | 2400 Baud | |
| X | | On | Off | | | X | X | | 4800 Baud | |
| X | | Off | On | | | X | X | | <u>9600 Baud</u> | |
| X | | On | On | | | X | X | | 19200 Baud | |
| | | | | Off | Off | | | | | None |
| | | | | On | Off | | | | | Even |
| | | | | Off | On | | | | | Odd |

Chart 1

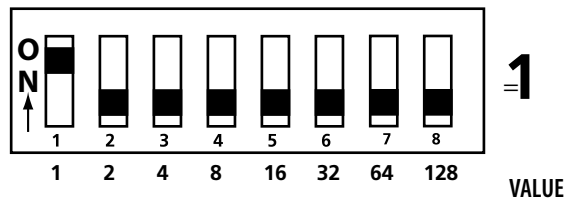
H662 series can be addressed as any whole number between and including 1-247. Each unit is equipped with a set of 8 dip switches for addressing. See below.



The values of each dip switch are as follows:

- 1=1
- 2=2
- 3=4
- 4=8
- 5=16
- 6=32
- 7=64
- 8=128

or



To determine an address you simply add the values of any switch that is on.

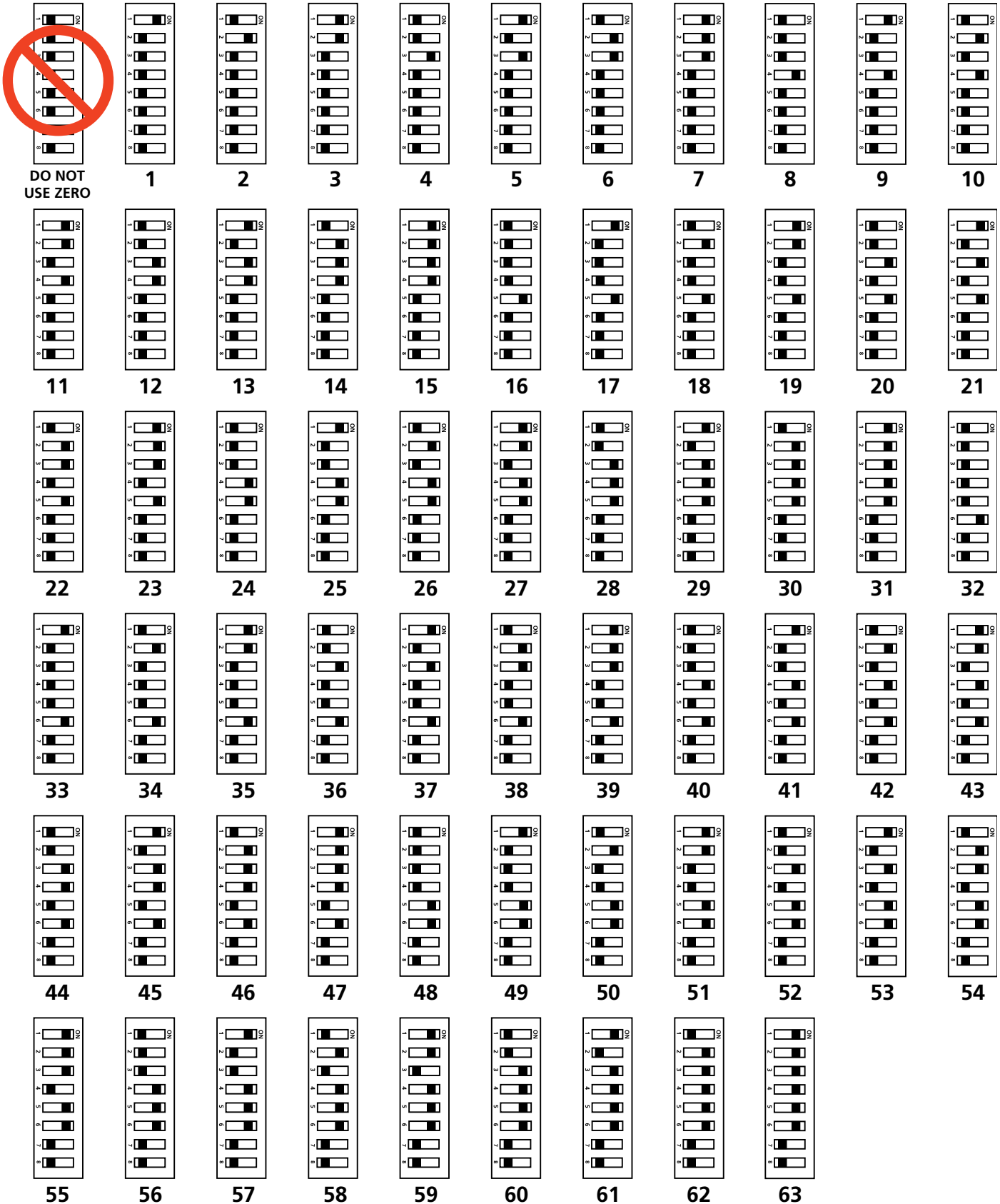
For example:



Switch number 4 has an ON Value of 8 and switch number 6 has an ON Value of 32. (8+32 = 40)

See Chart 2 on the following page for a pictorial listing of the first 63 switch positions.

ADDRESS SELECTION EXAMPLES

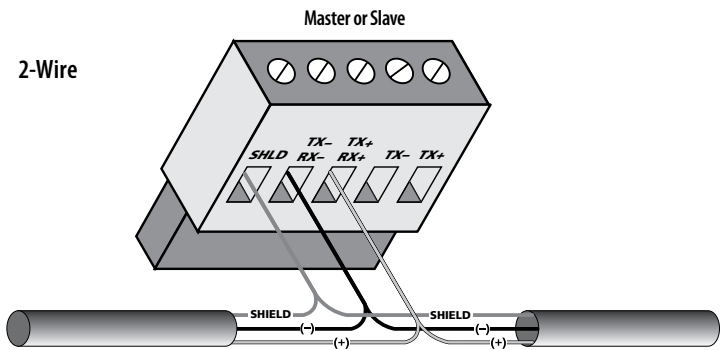


INSTALLATION

1. Connect 2-wire N2 RS485 network (see Figure 4).

NOTES

- A. The N2 cable should be mechanically secured where it enters the electrical panel.
- B. All N2 devices should be connected together in a daisy-chain fashion, and properly terminated.
- C. The N2 cable should be shielded twisted pair wire such as Belden 1120A. The cable must be voltage rated for the installation.



WARNING: After wiring the N2 cable, remove all scraps of wire or foil shield from the electrical panel. This could be **DANGEROUS** if wire scraps come into contact with high voltage conductors!

2. Use Software Configuration Tool to set up breaker size, warning levels, and alarm levels.

3. Power Connection



Disconnect and lock out power source before making any connections. Connect 2-wire 120 VAC power to power terminals. (see #5 on page 2 for location) Observe polarity.

SERVICE

Changing the Lithium Battery

1. Normal life expectancy is approximately 5 years.
2. Disconnect and lock out power to panel.
3. Disconnect and lock out 120VAC power source to Data Acquisition Board.
4. Remove old lithium battery. Take care not to short battery terminals.
5. Replace with new lithium battery. (See specifications for battery type)
6. Reconnect 120VAC power source to Data Acquisition Board.
7. Reconnect power to panel.

Note: Do not dispose of lithium battery in fire. Use local recycling facility to dispose of lithium batteries.

Changing the Fuse

1. Disconnect and lock out power to panel.
2. Disconnect and lock out 120V power source to Data Acquisition Board.
3. Remove old fuse.
4. Replace with new fuse (see specifications for fuse type).
5. Reconnect 120V* power source to Data Acquisition Board.
6. Reconnect power to panel.
7. Check "Alive" LED for proper function (See Figure 1, #3 on page 2 for location).

*For 208/230VAC Power connection versions, order catalog number H662SM-xxE.

POINT MAP FOR

Johnson Controls N2 OPEN, "VND" TYPE

| NPT | NPA | OR | WR | UNITS | RANGE/VALUES | POINT DESCRIPTION | NOTES |
|-----|-----|----|----|-------|--------------|---------------------|-------|
| AI | 1 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 1 | |
| AI | 2 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 2 | |
| AI | 3 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 3 | |
| AI | 4 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 4 | |
| AI | 5 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 5 | |
| AI | 6 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 6 | |
| AI | 7 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 7 | |
| AI | 8 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 8 | |
| AI | 9 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 9 | |
| AI | 10 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 10 | |
| AI | 11 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 11 | |
| AI | 12 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 12 | |
| AI | 13 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 13 | |
| AI | 14 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 14 | |
| AI | 15 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 15 | |
| AI | 16 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 16 | |
| AI | 17 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 17 | |
| AI | 18 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 18 | |
| AI | 19 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 19 | |
| AI | 20 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 20 | |
| AI | 21 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 21 | |
| AI | 22 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 22 | |
| AI | 23 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 23 | |
| AI | 24 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 24 | |
| AI | 25 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 25 | |
| AI | 26 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 26 | |
| AI | 27 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 27 | |
| AI | 28 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 28 | |
| AI | 29 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 29 | |
| AI | 30 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 30 | |
| AI | 31 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 31 | |
| AI | 32 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 32 | |
| AI | 33 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 33 | |
| AI | 34 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 34 | |
| AI | 35 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 35 | |
| AI | 36 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 36 | |
| AI | 37 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 37 | |
| AI | 38 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 38 | |
| AI | 39 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 39 | |
| AI | 40 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 40 | |
| AI | 41 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 41 | |
| AI | 42 | Y | Y | AMPS | 0-65.535 | CURRENT, CHANNEL 42 | |

| NPT | NPA | OR | WR | UNITS | RANGE/VALUES | POINT DESCRIPTION | NOTES |
|-----|-----|----|----|---------|---|--------------------|--|
| ADI | 1 | N | N | N/A | 0-65535 bit 0: NV Ram error bits 1-15: Reserved | ERROR FLAGS | This object reports internal errors detected by the microcontroller. The ALIVE LED will be steadily lit if any errors are detected. |
| ADI | 2 | N | N | N/A | 0-65535 | FIRMWARE REVISION | |
| ADI | 3 | N | N | N/A | 0-65535 | FIRMWARE REVISION | |
| ADI | 4 | N | N | N/A | 0-65535 | SERIAL NUMBER MSW | most significant 16 bits |
| ADI | 5 | N | N | N/A | 0-65535 | SERIAL NUMBER LSW | least significant 16 bits |
| ADI | 6 | Y | N | Seconds | 0-65535 | High Alarm Delay | The following ADI Objects set the minimum time the measured current for a channel must remain in the alarm/warning window before the alarm/warning state is changed. |
| ADI | 7 | Y | N | Seconds | 0-65535 | High Warning Delay | |
| ADI | 8 | Y | N | Seconds | 0-65535 | Low Warning Delay | |
| ADI | 9 | Y | N | Seconds | 0-65535 | Low Alarm Delay | |

LEGEND:

AI= Analog Input OR = Object can be overridden
 ADI=Analog Data Integer WR = Object can be written
 NPT=Network Point Type
 NPA=Network Point Address

Supported N2 Commands (Command/Subcommand):

| | | | | | |
|-----|---|----------------------------------|--------|---|---|
| 0/0 | - | Time Update message | 7/2/01 | - | Override AI command |
| 0/4 | - | Poll without acknowledge message | 7/2/06 | - | Override ADI command (ADI6-ADI9 only) |
| 0/5 | - | Poll with acknowledge message | 7/3/01 | - | Override Release request (AI points only) |
| 1/1 | - | Read AI command | F | - | Identify device type command |
| 1/6 | - | Read ADI command | | | |
| 2/1 | - | Write AI command | | | |

SPECIFICATIONS

General

Operating Temp. Range 0 to 60°C (<95%RH, non-condensing)
 Storage Temp. Range -40°C to 70°C
 Control (Mains) Power Source 120 VAC, line-to-neutral, 50/60 Hz. (208/230VAC for H662SM-xxE) (+10/-25%) Input Current <75mA
 Primary Fusing 250VAC/100mA, (T) 5x20mm, (if equipped)Littlefuse 218 series or equivalent
 Altitude of Operation 3km max.

Measured Current Inputs

Number of Channels..... 42
 Frequency 50/60 Hz.
 Sample Frequency..... 1280 Hz.
 Update Rate 1.2 sec
 Accuracy..... ±5% from 5A to 50A
 Connection to Conductor Inductive split-core CT
 Measured Currents..... Current Range 0-50A (Maximum conductor size is AW6 THHN)

Network Communications

Type..... N2
 Connection..... 2-wire plus SHIELD
 Address DIP switch-selectable address 1 to 247
 Baud Rate..... 9600
 Parity..... NONE
 Communication Format 8-data-bits, 1-start-bit, 1-stop-bit
 Termination..... 5-position depluggable connector

Defaults

Warning Register 60% of current sensor max. (configurable)
 Alarm Register 70% of current sensor max. (configurable)
 Breaker Size Register..... 20A

Dimensions

Circuit Board(L x W) 19.5" x 1.0"
 Mainboard (L x W) 7.25" x 5.75"
 Brackets Only (Strips L x W)..... 20.31" x 0.75"
 Sensor Spacing 0.75" on center

Safety

UL Listed under standard 508 as an "open type device".
 Critical components evaluated to UL 1950 as well
 Lithium Battery Life 5 years (Replace with type CRF 1220 or equiv.)



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Installation Category: Cat II or Cat III



EN 61010-1:2001

