MODEL **520603-2V150** VOLTAGE MONITOR

The Cragg Railcharger® Battery Voltage Monitor is a free standing unit that features the ability to monitor two DC voltage sources and has optional temperature and current monitoring ability.

CRAGG RAILCHARGER®

Instruction Manual for Digital Voltage Monitor

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1.0 WARNINGS, CAUTIONS, AND NOTES

Please read the entire instruction manual before using the voltage monitor.

Also, read the warnings, cautions, and notes in Table 1. Failure to observe the warnings and cautions can lead to equipment damage or personal injury.

If you have any questions concerning the manufacture, design, function, installation, operation or maintenance, contact Railway Equipment Company before proceeding.

Table 1. Warnings, Cautions, and Notes

Symbol	Description
	WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate personal injury. It may also be used to alert against unsafe practices.
NOTE	NOTE indicates explanatory information that applies to the next step in the procedure. It is used to clarify and expand upon the importance of the procedural step when needed.
	If incorrectly wired, monitor can be damaged. Be sure to observe correct polarity on all DC wire connections, check the AC wiring instructions, and connect the ground wire.

2.0 OPERATION

The model 520603-2V150 voltage monitor is equipped to monitor up to two DC voltage sources. The unit is powered by the voltage source that it monitors on channel one. The channel one voltage range is 10 to 48 VDC. Because the unit is powered by the voltage it monitors on channel one, the display will not illuminate until a voltage source is applied across pins one (+) and two (-). The unit power usage is a constant 2.5 Watts. The unit is reverse polarity protected, and the input power is protected by an internal resettable fuse.

Channel two has a voltage range of 1 to 150 VDC, but is only available for use if channel one is powered. There is 2,500 volts isolation between channels.

The monitor has easy front panel access for set up and wiring. There are form C relay outputs that are over current protected with replaceable blade type automotive fuses.

To get started, power from the source to be monitored (10 to 48 VDC range) should be applied across WAGO pins 1(+) and 2(-) using 18 to 14 gauge wire. This provides power to channel one.

The display idle screen will show voltage. If the applied voltage is between the high and low voltage parameters, the Channel 1 OK LED will be on, and the channel one relay will be powered.

2.1 Front Panel Features and Components

This section describes the features and components that are on the front panel of the voltage monitor (see Figure 1).

2.1.1 Figure 1. Front Panel of Voltage Monitor

2.1.2 Digital Display

The idle screen displays the input voltage. If only channel one has input voltage, only channel one will be displayed. If both channels are monitoring voltage sources, both will be displayed. If the optional current or temperature probes are being used, the lower screen will alternate between displaying channel two voltage, temperature, and current. With only channel one powered, the following screens will be scrolled through when the **MODE** button is depressed:

PASSWORD ___- The password to adjust parameters is 5. It is entered by pressing the **INCREASE** button until 5 appears in the parameter field.

MAX VCH1
SET __._ - This displays the high voltage setpoint parameter for channel one. It can be adjusted from 0 to 50.0 VDC by use of the **INCREASE** or **DECREASE** push buttons. If the input voltage rises above the setpoint, the channel one output relay will change state and the channel one **CHANNEL OK** LED will go out. Factory default is 50.0 VDC.

LOW VCH1
SET __._ - Low voltage setpoint for channel one, adjustable from 0 to 50.0 VDC. If the input voltage falls below the setpoint, the output relay will change state and the **CHANNEL OK** LED will go out. Factory default is 0 VDC.

DELAY CH1
SET ___ - Delay time in seconds before a voltage falling outside the parameters will trigger a fault. This parameter is adjustable from 1 to 600 seconds. Factory default is 10 seconds.

If a voltage input is added on channel two, in addition to the input on channel one, the following additional screens to appear as the **MODE** button is used:

MAX VCH2
SET __._ - High voltage setpoint for channel two. Voltage range is 0 to 150.0 VDC Factory default is 150.0 VDC.

LOW VCH2
SET __._ - Low voltage setpoint for channel two. Voltage range is 0 to 150.0 VDC. Factory default is 0 VDC.

DELAY CH2
SET ___ - Delay time in seconds for channel two. Range is 0 to 600 seconds. Factory default is 10 seconds.

There is an optional amp probe available which can be set up to trip the same relay as a voltage fault will trip on Channel two. The addition of the current probe will cause the following additional screens to appear:

HIGH AMP
SET ___ **-** Parameter for amp setting above which channel two will change relay State. Amp range is -120 to +120 amps. Factory default is +120 amps.

LOW AMP
SET ___ **-** Amp setting below which channel two will trip. Amp range is -120 to +120 amps. Factory default is -120 amps.

There is also an optional temperature probe that can control the channel two output. If the probe is used, the temperature can be displayed as Fahrenheit or Celsius. To select either Fahrenheit or Celsius, enter 10 on the **PASSWORD** screen. With 10 as your password, two additional screens will show up as the parameter screens are toggled through. One screen is: **F OR C _____.** The **INCREASE** or **DECREASE** buttons can be used to select which temperature scale will be displayed. The next screen will be **REV. LEV _____.** This screen will display the software revision level installed on the monitor. The addition of the temp probe adds the following screens:

HIGH TEMP
SET ___ **-** Temperature setting above which channel two relay will change state. Available temperature range is -40 to +300 degrees F (-40 to 148.9 degrees C). Factory default is +300 F (148.9 C).

LOW TEMP
SET ___ **-** Temperature setting below which channel two relay will change state. Available temperature range is -40 to +300 degrees F (-40 to 148.9 degrees C). Factory default is -40 F (-40 C).

The following **Fault Counter Screens** will appear only if the fault count in each is Greater than 0:

CH 1 HI V
COUNT ___ **-** Number of high voltage incidents on Channel 1. Press **DECREASE** to clear.

CH 1 LO V
COUNT ___ **-**Low voltage incidents on Channel 1. Press **DECREASE** to clear.

CH 2 HI V
COUNT ___ **-** High voltage incidents on Channel 2. Press **DECREASE** to clear.

CH 2 LO V
COUNT ___ **-** Low voltage incidents on Channel 2. Press **DECREASE** to clear.

HI TEMP
COUNT ___ **-** High temperature incidents on Channel 2. Press **DECREASE** to clear.

LOW TEMP
COUNT ___ **-** Low temperature incidents on Channel 2. Press **DECREASE** to

clear.

HI AMP
COUNT ___ **-** High amperage incidents on Channel 2. Press **DECREASE** to Clear.

LOW AMP
COUNT ___ **-** Low amperage incidents on Channel 2. Press **DECREASE** to clear.

2.1.3 Push Buttons

Below the digital display are three control push buttons:

INCREASE – This is used to increase the value of the displayed parameter, if enabled.

DECREASE – This button will decrease the value of the displayed parameter, if enabled.

MODE – This control is used to increment through the available screens.

2.1.4 LED Status Indicators

Two LEDs are used to indicate Channel OK, one for each input channel.

2.1.5 External Wiring Connector

Near the bottom of the front panel there is a twelve position socket with a removable connector for external wiring. The connection locations are shown below:

PIN	CONNECTION	INPUT NUMBER
1	INPUT 10-48 VDC	# 1 +VOLTAGE
2	COM 0V	# 1 -VOLTAGE
3	NORMALLY CLOSED	# 1 OUTPUT RELAY
4	FUSED COMMON	# 1 OUTPUT RELAY
5	NORMALLY OPEN	# 1 OUTPUT RELAY
6	NO CONNECTION	
7	NO CONNECTION	
8	INPUT 1-150 VDC	# 2 + VOLTAGE
9	COM 0V	# 2 – VOLTAGE
10	NORMALLY CLOSED	# 2 OUTPUT RELAY
11	FUSED COMMON	# 2 OUTPUT RELAY
12	NORMALLY OPEN	# 2 OUTPUT RELAY

2.1.6 CURRENT SENSOR

The current sensor connector is located on the right center of the front panel. The sensor is optional, consisting of a plug end wired to a split current coil that can monitor the current level of a circuit monitored by channel two. By setting the current parameters, the current level can be used to trigger a fault condition on channel two, either independently, or in conjunction with channel two voltage, and/or with the temperature sensor described in 2.1.7.

2.1.7 TEMPERATURE SENSOR

On the top of the monitor case is a temperature sensor jack. The temp sensor is An optional thermocouple that can be placed to monitor battery, equipment, or air temperature. By setting the temp parameters, the temperature level can be used to trigger a fault condition on channel two, either independently, or in conjunction with channel two voltage, and/or with the current sensor described in 2.1.6.

3.0 STANDARD FEATURES

The standard features of the Voltage Monitor are listed as follows:

- Two Channel Battery Voltage Monitor with Relay Outputs
- For Lead Acid and NiCad Batteries
- Programmable Voltage Parameters
- LED Status Indicators
- Digital Amperage Meter (when optional Amp Probe is used)
- Digital Voltage Meter
- Digital Temperature Meter (when optional Temp Probe is used)
- Programmable High and Low Relay Trip Limits for Voltage, Current, and Temperature
- Meets or Exceeds AAR/AREMA Specifications
- Panel Mount Ready
- 2-Year Warranty

4.0 SPECIFICATIONS

- Two channels with over and under absolute set points.
- Input power is 8 to 48 VDC @ 2.5 Watts. Input power is channel 1 sense input.
- The monitor has 2500 Volt isolation between channels.
- Channel 2 voltage range is 1 to 150 VDC.
- Channel 1 and 2 sensitivity is 100 MV per step.
- The inputs are protected against reverse polarity.
- The input power is protected by an internal resettable fuse.
- The monitor outputs are form C relay with blade type fuse connected to a removable Wago terminal for each channel.
- Input and output connections are on the removable connector on the bottom front of the monitor.
- The digital display is a 2 line by 8 character unit.
- An optional temperature sensor with 25 foot cable is available.
- An optional current sensor with a range of -120 to +120 Amps is available.