

FVD-2

FAILED VOLTAGE DETECTOR

USER MANUAL

MICRO-AIDE

RAIL SIGNAL PRODUCTS

EVENT RECORDERS

SPEED MONITORS

CURRENT SENSORS

ISOLATED MODEMS

BATTERY MONITORS

VOLTAGE MONITORS

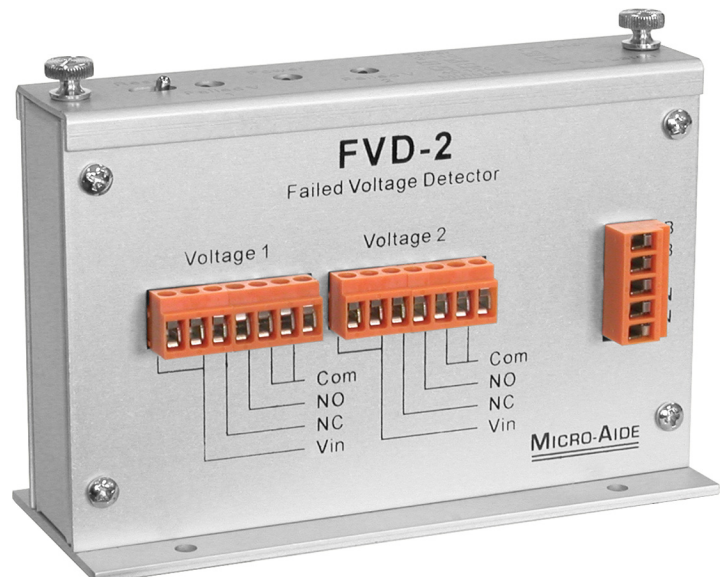
LIGHT OUT DETECTORS

CLOCK SYNCHRONIZERS

WHISTLE DETECTORS

LOCAL CONTROL PANELS

CUSTOM ENGINEERING



FVD-2 FAILED VOLTAGE DETECTOR USER MANUAL

Troublesome battery problems are detected accurately and unambiguously by the FVD-2. Low and high voltage conditions are reported. Validation intervals can be assigned ranging from 2 to 120 minutes.

Description

This document is intended to provide a detailed description of the use and operation of the MICRO-AIDE FVD-2 Failed Voltage Detector.

The FVD-2 is a general purpose voltage monitoring device specifically suited to rail signal applications. It can be used to monitor battery and AC power sources in wayside facilities. It features two independent voltage detectors, each with adjustable limit settings.

The range of operation for each detector is .5 to 48 Vdc or .5 to 36 Vac. The adjustable limit values can be set to any value within the operating range. There are two limit values that can be set for each detector. The upper and lower limit values allow the FVD-2 to indicate insufficient or excessive voltage conditions.

A unique feature of the FVD-2 is its ability to perform a true RMS measurement of the monitored voltage source. If the monitored voltage switches from DC to AC as the result of a power failure, the FVD-2 will continue to operate properly without user intervention. The upper and lower limit values will be instantaneously applied to the AC source.

The FVD-2 includes two fully isolated relay outputs. They will operate whenever the source voltage falls below the lower limit value or exceeds the upper limit value. A pair of form C relays provide normally open and normally closed contacts. A switch setting allows the user to select latching or non-latching relay operation. The failure detection time is also selected by the user. Settings of 2, 10, 40 and 120 minutes are provided. The relay operation and detection time

settings are applied to both detectors. Dual LEDs are used to indicate the status of the monitored inputs. The LEDs feature latching operation. A momentary toggle switch allows the LEDs and relays to be reset.

The FVD-2 can be powered by any source in the range from 8 to 36 Vdc (or 12 to 24 Vac). It requires no more than 150 mA of current at 12 Vdc. All MICRO-AIDE rail signal products are designed to operate over an extended temperature range. A rugged, anodized aluminum chassis is used to house all of the electronic components.

Figure 1 provides a three-sided view of the FVD-2. Figure 2 illustrates the inside of the unit. The last page of this document lists detailed specifications.

Installation

The FVD-2 may be mounted on a shelf or backboard. It may be oriented in either a horizontal or vertical plane. Four mounting holes at the base of the unit are used to secure the unit. It is advisable to mount the unit in such a way that the front panel LEDs are clearly visible.

Three detachable connectors are used to simplify the installation procedure. Wire gauges in the range of 12 to 22 AWG may be used. Each conductor is secured by tightening the set screw associated with each connector terminal. Power should not be applied to the FVD-2 prior to completing the installation work. The unit's silkscreening provides a clear depiction of the connections to be made.

The two connector terminals labeled "Vin" are insensitive to polarity. If a DC source is connected to the "Vin" terminals either positive or negative voltage can be connected to the first terminal.

The FVD-2 is powered by the voltage source attached to the “B” and “N” terminals. Either AC or DC power can be used. The power source is not monitored by either of the voltage detectors.

Setup and Operation

The operation of the FVD-2 is fully automatic once the limit values are adjusted and mode of operation is selected. All of the electronic circuitry is designed to be stable over a wide range of operating temperatures. All of the FVD-2 features are consistent with a desire for “set and forget” operation.

To adjust the limit values remove the cover plate. Verify that power has been applied to the unit. The green power LED should be flashing. Locate the green test point and one of the red test points. Refer to Figure 2. Connect a Digital Volt Meter (DVM) across the two test points. The positive lead of the DVM must be connected to the red test point. Adjust the appropriate potentiometer until it reads 1/10th the desired limit value. As an example, if 11.5 V is required adjust the appropriate potentiometer until a reading of 1.15 V is measured. Adjust the remaining upper and lower limit values using the same procedure.

Note - The FVD-2 is factory adjusted with upper and lower limit values of 10.5 and 20.0 V, respectively. The limit values should only be adjusted if these settings are not suitable for the intended installation.

The detection time is controlled by the dual switch assembly located towards the left-hand side of the unit. The silkscreen legend on the cover plate identifies the four possible detection time values. The black square indicates the position the switch lever must assume.

Enable or disable the relay’s latching operation. The first switch position of the switch assembly located at the right-hand side of the unit determines the operation of the relays. The second position of this switch assembly must be left in the down position.

Note - The factory default detection time setting is 10 minutes. The relays are set for latching operation.

After the cover plate is reattached the FVD-2 is ready for use. Voltage conditions that fall outside the range determined by the upper and lower limit values and that persist for a period exceeding the detection time will illuminate the red LED for that detector. The relay will operate for the duration of the failure condition or stay latched in accordance with the appropriate switch setting. Pressing the reset switch will restore the LED and relay to their no-failure state.

Maintenance and Trouble-shooting

The FVD-2 is designed to be completely maintenance free. It contains no consumable materials or serviceable components. It is equipped with an internal 1 A fuse for protection. The fuse can be replaced by the user. It can be found inside the twist-to-open fuse holder mounted on the PCB. Remove the front cover to access the holder.

If the fuse blows repeatedly or the unit fails to power-up for some other reason (as indicated by the green power LED not flashing) the unit should be returned to MICRO-AIDE for repair.

The FVD-2 is protected by a five-year limited warranty. Telephone numbers and a shipping address are listed below.

MICRO-AIDE CORPORATION
685 Arrow Grand Circle
Covina, CA 91722
Tel: 626-915-5502
Fax: 626-331-9484
E-mail: support@micro-aide.com

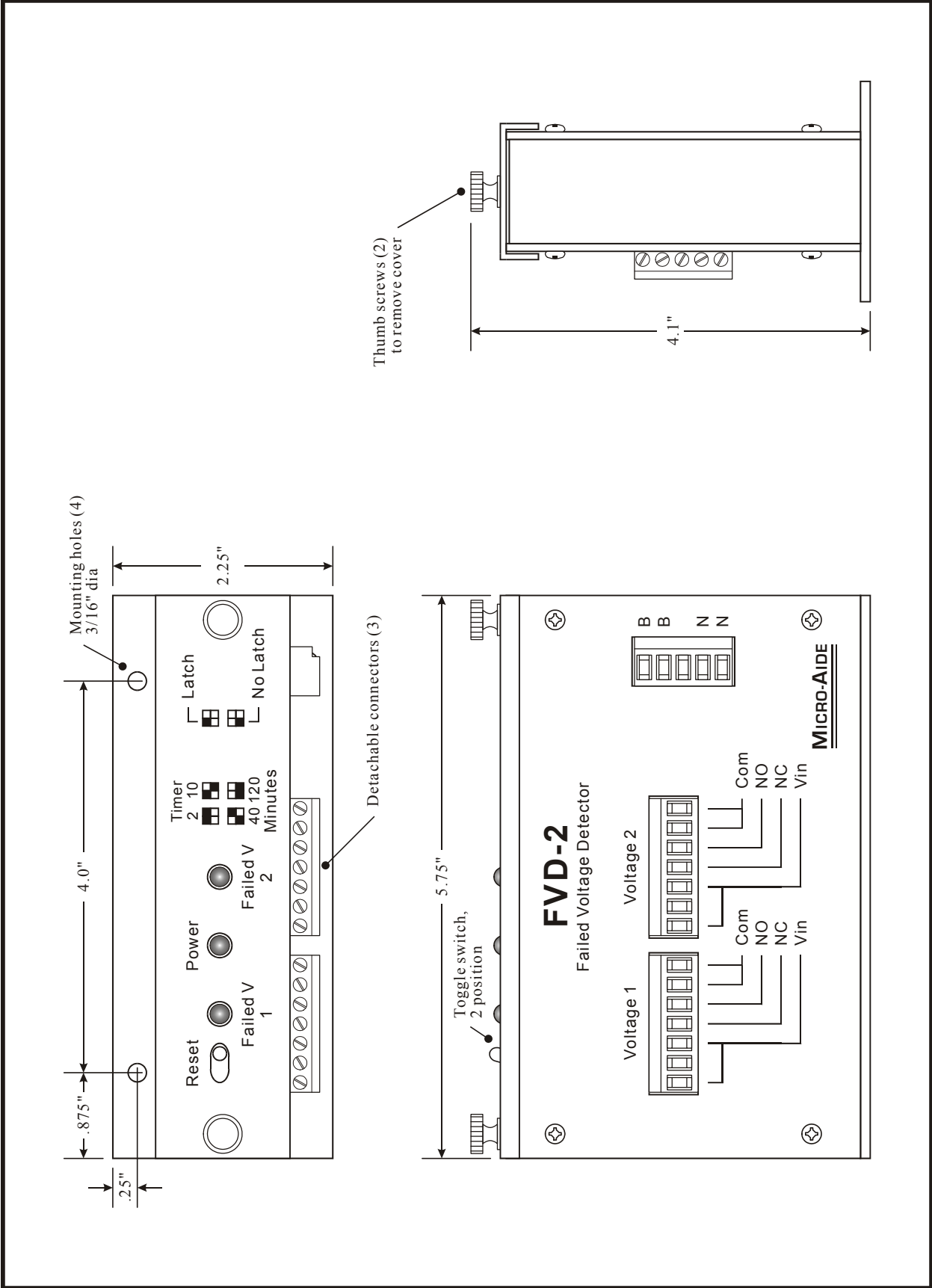


Figure 1 – Three-sided view

Inside View with Cover Removed

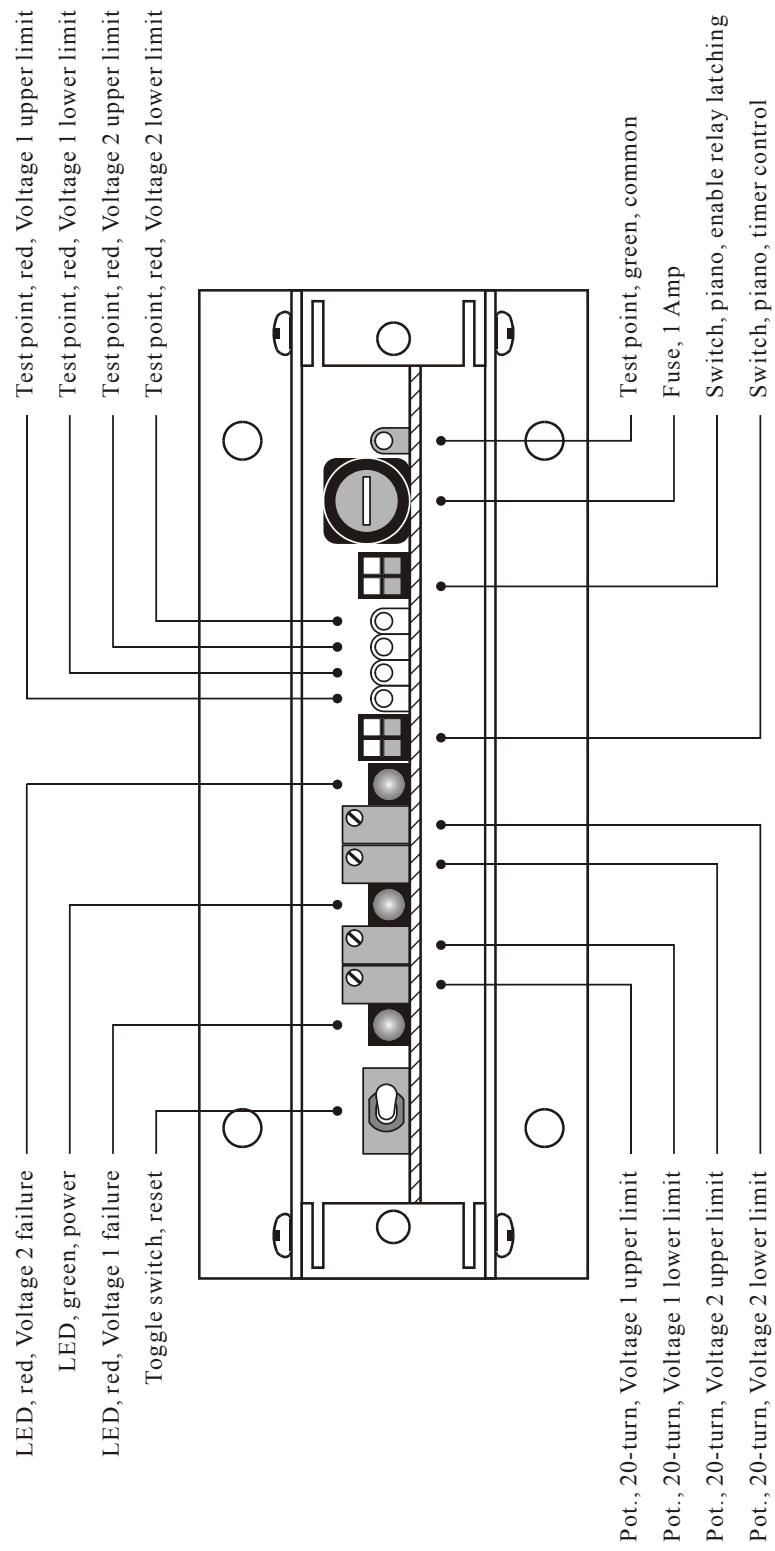


Figure 2 - Inside view

FVD-2

FAILED VOLTAGE DETECTOR

SPECIFICATIONS

Physical

Size

Length: 5.75"

Width: 2.25"

Height: 4.1"

Weight

14 oz.

Environmental

Storage

Temperature: -50°C to +85°C

Humidity: 0% to 95%, non-condensing

Operating

Temperature: -40°C to +72°C

Humidity: 0% to 95%, non-condensing

Mounting

Shelf or desktop

Construction

Chassis

Fully enclosed, anodized aluminum, removable screws allow access inside

Externally accessible connectors, controls and LEDs

Electrical

Single printed circuit board inside chassis

Power

Voltage

Input: 8 to 36 Vdc (12 to 24 Vac)

Consumption

150 mA at 12 Vdc (less than 2 W typical)

Fuse

1 A (3 AG), secured in twist-off holder mounted on PCB, accessible with cover removed

Protection

Isolation

Minimum 4,000 Vdc to ground, infinite duration

Minimum 2,500 Vdc Vin to power inputs, infinite duration

Input Impedance

Minimum 12 Mohm Vin to power inputs

Minimum 100 Kohm across Vin inputs

Infinite from Vin to all other terminals

Capacity

Dual voltage detectors, form C relay per voltage detector

Separately adjustable upper and lower limits per detector

Range

Voltage Inputs (Vin)

.5 to 48 Vdc, .5 to 36 Vac

Limit Values

Same as Vin range

Detection Time

2, 10, 40 or 120 minutes

Value of Vin must persist for detection time before a change in failure status is reported

Connectors

Power

Detachable, screw-down with 5 terminals, 12 to 22 AWG

Terminals 1 & 2: battery B voltage

Terminal 2: no connection

Terminals 4 & 5: battery N voltage

Input / Output (2)

Detachable, screw-down with 7 terminals, 12 to 22 AWG

Terminals 1 & 3: Vin

Terminal 2: no connection

Terminal 4: relay N.C. contact

Terminal 5: relay N.O. contact

Terminals 6 & 7: relay common

Alarm Relays

Type

Form C, one per detector

Operation

Latching or non-latching, user selected

Contact Ratings

Rated Load: 1 A at 24 Vdc, .5 A at 125 Vac

Minimum Load: 1 mA at 5 Vdc

Maximum Operating Voltage: 60 Vdc, 125 Vac

Maximum Switching Capacity: 62.5 VA, 30 W

Service Life: 5 million mechanical (minimum), 1 million electrical (typical)

Controls

Internal

Potentiometers: 20-turn, 2 per voltage detector, used to adjust upper and lower limit values

Test points: red, 2 per voltage detector plus a common (green), used to measure limit values during adjustment

Piano switches: 2 total, 2 positions each, one used to set detection time, second used to enable relay latching

External

Reset switch: clears pending failure indication

LED Indicators

Voltage Status

Red, 1 per detector, illuminates when Vin is below lower limit or above upper limit, duration exceeding detection time

Power

Green, flashes to indicate power is applied and unit is operating

Accuracy

The greater of $\pm 1.5\%$ or .5 V (typical)