

# APPENDIX A – TECHNICAL DATA

Terminal

USB  
Device  
To PC

A1 A2 A3 A4 C B B N N  
Analog NO NC

## SPECIFICATIONS

### Physical

**Size** (with mounting brackets)  
**Length:** 9.5"  
**Height:** 7.7"  
**Depth:** 3.2"  
**Weight:**  
2.6lb.

### 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 backboard, includes mounting brackets

### Construction

**Chassis**  
Fully enclosed, anodized aluminum  
Externally accessible keypad, LEDs and connectors  
**Electrical**  
All components mounted on conformal coated, internal PCBs

### Power

**Voltage**  
**Range:** 9 to 36 Vdc

**Consumption**  
**Maximum:** 3W

### Isolation

**Power**  
**Minimum:** 3800 Vdc from B and N terminals to chassis and inputs

**Digital Inputs**  
**Minimum:** 3800 Vdc to any terminal

**Analog Inputs**  
**Minimum:** 3800 Vdc to any terminal

**Input to Adjacent Input**  
**Digital:** minimum 3800 Vdc  
**Analog:** minimum 3200 Vdc

**Ethernet Port**  
**Minimum:** 3800 Vdc to any terminal

**USB Host and Device Ports**  
**Minimum:** 3800 Vdc to any terminal

### Alarms

**Quantity:** 20 total, appropriate for crossing applications, user-defined  
**Types:** Set, Cleared and periodic Health Check

### Alarms (continued)

**Definitions**  
User-assigned inputs and input states qualify each Alarm

### Transmission

Sent to KCS message processing server via KCS VPN or LAN

### Operating Modes

**Automatic:** messages sent via VPN or LAN using DNS or fixed IP Addressing

**Maintainer Mode:** disables Alarm transmission while crossing is being tested or repaired

### Validation Time

As defined by Alarm Configuration Table, 0 to 99,999 seconds

### Capacities

#### Inputs

**Digital:** 20, all optically isolated  
**Analog:** 4, voltage or current (optional)  
**Virtual:** 8, user-assigned  
**Timer:** 16, user-assigned  
**Train Speed Monitor:** 4, user-assigned

#### Outputs

**Relay:** 1, form C, rated for 2 A at 24 Vdc or 1 A at 125 Vac, maximum switching capacity of 125 VA or 60 W, service life 1 million electrical (typical)

#### Event Storage

**Standard:** 302,084 records  
**Maximum:** 1,269,572 records

#### Liquid Crystal Display

**Characters:** 80 total on 4 lines  
**Viewing Area:** 2.8" by .8"

#### Front Panel Keypad

**Quantity:** 20 keys

### Physical Inputs

#### Input Impedance

**Digital:** minimum 10 KOhms, optically isolated  
**Analog:** minimum 10 MOhms

#### Range

**Digital Input - On:** 9 to 36 Vdc  
**Digital Input - Off:** 0 to 1 Vdc  
**Analog DC Voltage:** 3 scales,  $\pm 25.5$  Vdc, +51.1 Vdc,  $\pm 255$  Vdc  
**Analog AC Voltage:** 2 scales, 25.5 Vac, 255 Vac  
**Analog Current:** 2 scales,  $\pm 25.5$  Adc, 25.5 Aac

#### Event Validation Times

**Digital:** .001 to 32.767 seconds, compatible with fixed rate flashing circuits  
**Analog:** fast and slow filter settings

### Analog Limit Values

#### Voltage

**High and Low Limits:** in multiples of .1 V or 1 V

#### Current

**High and Low Limits:** in multiples of .1 A

### Analog Input Accuracy

**Typical Voltage:**  $\pm .15$  V or  $\pm 1.5$  V  
**Typical Current:**  $\pm .2$  A

### Virtual Inputs

#### Definitions

Any logical association shared by 1 to 4 variables (i.e., Digital, Analog or other Virtual Inputs)  
Assigned by defining the state of the Virtual Input for each combination of variable states

#### Alarm Usage

Can be used to Set or Clear an Alarm as defined within the Alarm Configuration Table

#### Recording Usage

Creates standard Event Records

Relay can be controlled by each Virtual Input

### Timer Inputs

#### Programming

Any input can be assigned as a trigger or terminating source

On or Off events can be assigned as a trigger or terminating source

#### Limit Values

**High and Low Limits:** in multiples of .1 seconds

**Range:** 0.0 to 999.9 seconds

#### Reporting

Measured Time is reported in each Timer Input Event Record

Violation of Limit Values are also reported

### Temperature Sensing

**Usage:** measures and reports internal temperature of Reporter

**High and Low Limits:** -67 °F to 257 °F

### Train Speed Monitor

#### Operation

Reports excessive train speed

Logs standard Event Record

#### Sensors

**Digital Inputs:** 2 required

**Distance:** 36" to 99" or 8' to 5280'

#### Limit Values

5 to 99 mph or 5 to 180 mph

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**Memory**

**Type**

Non-volatile, Event Records and Setup Database are stored in flash memory chip

Newest data over-writes oldest data, 129th day over-writes first day

**Storage Longevity**

Infinite with power off  
Rated for 100,000 write operations

**Ports**

**RS-232**

**Quantity:** 1, for use with a PC

**Terminal Emulation:** ANSI

**Baud Rates:** 300, 600, 1200, 2400, 4800, 9600, 19,200, 38,400, 57,600, 115,200

**Bit Format:** 8-N-1

**USB Host**

Compatible with any FAT-32 formatted flash drive  
Can create a text file of Event Record data from any time span  
Can be used to update firmware

**USB Device**

Eliminates need for serial comm port  
Data transfer rates of 4.71Mbps

**Ethernet**

**Type:** 10/100 Base-T, typically connected to cellular modem or directly to LAN

**Protocols:** HTTP-Get, TCP/IP, Telnet, SNTP-Unicast, SNTP-Multicast

**User Interface:** provides remote or local access via TCP/IP connection

**Settings:** user-assignable IP Address, port, subnet mask, dual IP Addresses for time server

**Connectors**

**Power**

Detachable, screw-down, 4-position, 12 to 22 AWG

Dual B and N terminals

**Digital Inputs**

Detachable, screw-down, 10-position, 12 to 22 AWG

**Connectors (continued)**

**Analog Inputs**

Detachable, screw-down, 8-position, 12 to 22 AWG

**Relay**

Detachable, screw-down, 3-position, 12 to 22 AWG

Normally open, normally closed and common terminals

**Terminal Port**

DE-9 male, configured as modified DCE

Can also serve as Terminal Port to alternate device

**USB Host Port**

USB Type A female

**USB Device Port**

USB Type B female

**Ethernet Port**

RJ-45 female

**Indicators**

**LCD Panel**

Includes LED back lighting for enhanced visibility  
Displays numerous command menus for configuring the Reporter and retrieving data

**Front Panel LEDs (3)**

**Active Alarm:** red, illuminates when one or more Alarms are active

**Message Sent:** green, illuminates for 5 seconds when message is sent

**Terminal:** green, flashes with send and receive data

**Ethernet Port LEDs (2)**

**Green:** link established

**Yellow:** data activity

**Controls**

**Keypad**

Located on front panel, below LCD

**Keys:** 0-9, Browse, Alpha, Setup, Esc/Maintainer Mode, Enter, Save/., left, right, up, down/-

**LCD Contrast Adjust**

Single-turn pot., accessible from front panel

**Internal Clock**

**Accuracy**

**Typical:** ±8 seconds per month (3ppm) when not synchronized

**Volatility:** maintains accuracy for minimum of 30 days with loss of power

**Resolution:** .001 seconds for all Event Records

**Sync**

**SNTP-Unicast:** via primary or secondary time servers, once per day at 00:05:00

**SNTP-Multicast:** per time server schedule

**Operation**

**Time Zones:** selectable from 7 different North American settings

**Daylight Saving Time:** enable or disable automatic adjustment

**Leap Year:** automatically adjusted

**Password Protection**

**Administrative Level**

**Access:** unrestricted to all functions

**Length:** 8 characters

**Restricted Level**

**Access:** modifications restricted to site-specific parameters of Setup Database, unrestricted viewing of all data and Setup Database parameters

**Length:** 8 characters

**Passcode**

**Access:** limited modifications to Setup Database via front panel

**Length:** 8 digits

*MICRO-AIDE reserves the right to make changes, at its sole discretion, to any specification listed herein.*

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**TRANSFER RATES**

Table 15 on page 106 lists typical bit transfer rates for each of the CAR-24AK's user-accessible ports. In each case the same 20,000 Event Records with no-detail formatting were either dumped to a PC file or saved directly to a flash drive. The times listed are normalized relative to 1,000 Event Records. If speed is a concern, using the USB Device Port is highly recommended.

Port	Time to transfer 1,000 Event Records (sec)	Actual transfer rate (bps)	Relative speed compared to 38,400
Terminal Port (38,400)	19.0	38,396	Used as reference
Terminal Port (115,200)	6.4	114,845	3.0 times faster
USB Host	2.8	n/a	6.7 times faster
Ethernet Port	.2	4,704,075	122.5 times faster
USB Device Port	.2	4,714,063	122.8 times faster

Table 15: Bit Transfer Rates by Port

# TERMINAL PORT CABLE

The following cable is included with every CAR-24AK.

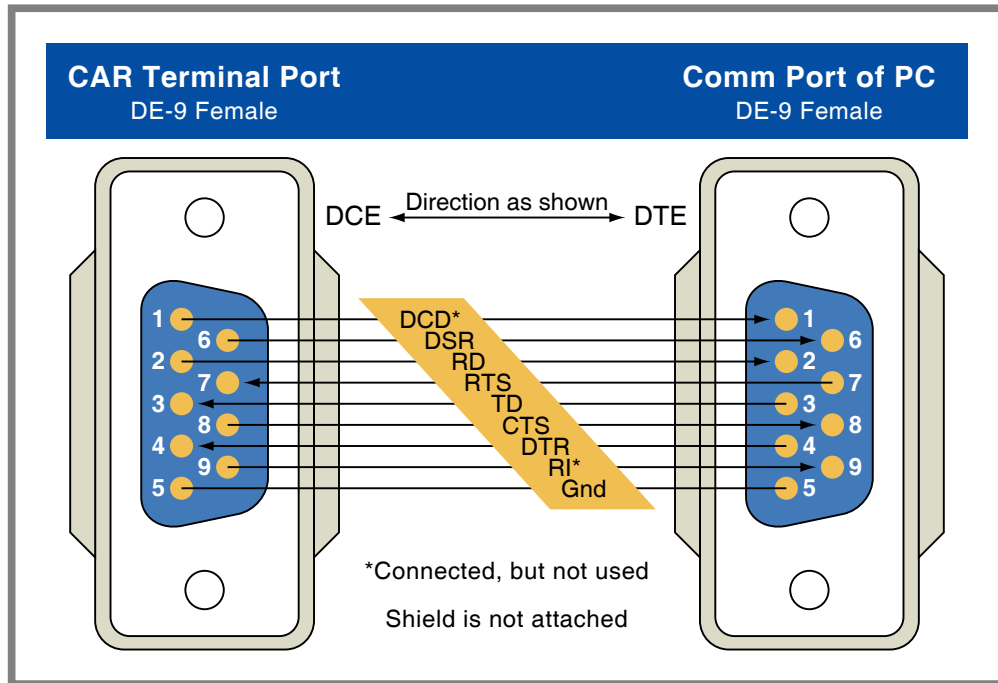


Figure 10: Terminal Port Cable - Wiring Diagram

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