1. General Description

Dataprobe's Model T-APS Automatic Protection Switch allows for protection of T1 or E1 circuits and equipment. The Model T-APS can be used for protecting switch full or fractional services, as well as single ended applications. The unit can be configured for use in Framed or unframed network protocol applications. It is designed for use with redundant circuits and automatically switches paths in order to maintain service. It can also be used to enable redundant CPE services from a single line. The T-APS provides both serial and Ethernet connectivity for remote access and is SNMP compatible. Local and remote alarm notifications are provided for circuit failures.

2. Features

- T1 or E1 interface selectable
- 1+1, 1:1 or Blind automatic switching.
- Selectable alarm threshold and switching activation thresholds.
- Configurable via front panel, RS-232 serial port or Ethernet Network.
- SNMP Management
- Both active and standby line status monitoring.
- T1/E1 circuit failure alarm output.
- Power-Fail cutout circuit
- Local and remote control of switching functions.
- End to end or end to C.O. auto-switching capability.
- Single Line to Redundant CPE capability
- 2 ×24 LCD display panel
- Dual Power Inputs -48 VDC and 90 ~ 250 VAC power input (DC Priority)
3. Table of Contents

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4. Typical Applications

The T-APS can be used in end-to-end or customer premise to C.O. configurations.

**CO to CPE**

![Diagram of CO to CPE configuration]

**CPE to CPE**

![Diagram of CPE to CPE configuration]

**CO to Dual CPE**

![Diagram of CO to Dual CPE configuration]
5. Installation

### RJ45 PIN Assignments:

#### CPE, L1, and L2

- **CPE:** Customer Premise Equipment
- **L1:** Line 1, Active Path
- **L2:** Line 2, Protection Path

<table>
<thead>
<tr>
<th>Pin</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Receive Data</td>
</tr>
<tr>
<td>2</td>
<td>Receive Data</td>
</tr>
<tr>
<td>3</td>
<td>No Connection</td>
</tr>
<tr>
<td>4</td>
<td>Transmit Data</td>
</tr>
<tr>
<td>5</td>
<td>Transmit Data</td>
</tr>
<tr>
<td>6</td>
<td>No Connection</td>
</tr>
<tr>
<td>7</td>
<td>No Connection</td>
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<tr>
<td>8</td>
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</table>

#### RS232 Serial Port

<table>
<thead>
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<th>Assignment</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>No Connection</td>
</tr>
<tr>
<td>2</td>
<td>No Connection</td>
</tr>
<tr>
<td>3</td>
<td>No Connection</td>
</tr>
<tr>
<td>4</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>5</td>
<td>Receive Data</td>
</tr>
<tr>
<td>6</td>
<td>Transmit Data</td>
</tr>
<tr>
<td>7</td>
<td>No Connection</td>
</tr>
<tr>
<td>8</td>
<td>No Connection</td>
</tr>
</tbody>
</table>
6. LED Indicators:

**RUN LED:** While running properly, the RUN display light should be blinking.

**1:1 LED:** The 1:1 light will be on when the units are set in the 1:1 mode. The 1:1 light is off when the units are set in the 1+1 or Blind modes. While the LOOK IN function setting is ON, the 1:1 LED will be blinking when the CPE side had a fault.

**E1 LED:** It will be on in the E1 setting.

**T1 LED:** It will be on in the T1 setting.

**L1 LED:** It will be on if L1 is on active path.

**L2 LED:** It will be on if L2 is on active path.

**Blinking events:**

First setting the L1 as the active and L2 as protection path, the L1 light will be on and L2 light will be off. In the event of automatic switch to L2, the L2 light will flash quickly before L1 light turns off. The L2 light will then be on and L1 light off if switching succeeds.

In the event of fault from CPE side in L1 active and L2 protection path setting, the LOOK IN Function will apply (see Setup, Selection B LOOK IN). Setting the LOOK IN Function On will indicate the CPE side fault by showing L1 light on and 1:1 LED light blinking.

In the event of L2 protection path fault, the fault is also indicated as L1 light on and L2 light blinking. The fault from CPE failure or L2 fault can be easily distinguished by MEASURE ERROR RATIO function.

**LOS LED:** Loss Of Signal light will be on if the connection is lost of signals.

**OOF LED:** Out of Frame light will be on if the connection is out of frame.

**AIS LED:** Alarm Indication Signal light will be on when alarm signal received.

**RAI LED:** Remote Alarm Indication light will be on when remote unit fault received

**Fail LED:** Failure Light will be on if a system fault or a circuit failure occurs.

**1:1 CHK** Light on indicates a failure for the units to communicate in the 1:1 mode.

**ACO LED:** The ACO button on the control panel can turn off the Buzzer noise and ACO LED light will be on. Please note: the ACO button does not cancel the ALARM signal. When the ALARM signal is gone, the ACO LED light will be off.
Connect a 110-240 VAC or 48 VDC power source to the unit and turn on the power switch.

### 7. Setup

#### 7.1. Entering Password and Selecting Setup Functions

The T-APS can be configured using the front panel pushbuttons or accessed thru the RS232 serial port.

**(Factory Password = PASS)**

#### 7.2. Front Panel Selections

Each setting is made using the arrow keys to the right of the display. The display will read “Dataprobe Inc. T-APS” when first powering up the unit or any time the unit has been idle for 2 minutes. Touching a front panel button will restore the display.

To enter the password use the **UP** and **Down** arrow buttons to select the required character. After locating the desired character use the **Left** and **Right** arrow buttons to move the cursor the next character position. When the full password is complete press the Enter button.

After entering the correct password, Setup Menu appears.

Scroll up or down to the desired feature and press Enter to select.

The Asterisk (*) indicates the currently selected option. To change options, use the left or right arrow then press Enter.

To return to the Setup Menu again, press Escape.
1: SET T1/E1 MODE

After selecting T1, T1 Light will be on.

After selecting E1, E1 Light will be on.

Selections for Line Format and Line Code depend are different if T-1 or E-1 is selected here.

[ITALIC] = Recommended Settings

2: SET WORK MODE

1+1 End to End or Single Ended, Full T Service application. Data sent on both Active and Protection Path. T-APS duplicates CPE Tx data on both lines and the better quality path is selected on each end regardless of the other end. Monitors for loss or degradation of either path.

1:1 End to End Fractional T Service application. CPE Data sent on Active path only. Protection path used for circuit performance and communication between T-APS units. Units use the same line at each end. Monitors for loss or degradation of either path.

Blind 1 Independent operation. No communication between T-APS units and equipment at remote site. CPE Data on both paths. Can be used with other APS type devices. Monitor for loss of CO signals on Active line and transfers to Protection path. Provides Protection path status from LOS only when the path is not in use.

Blind 2 Independent operation. No communication between T-APS unit or equipment at remote site. CPE Data sent on Active Path only. Can be used with other APS type devices. Monitors for loss of CO signals on Active line and transfers to Protection Path. Does not monitor condition of Protective Path when not in use.

7.3. T1/E1 Auto Protection Switch 1+1, 1:1 or Blind

Comparison Chart

<table>
<thead>
<tr>
<th>Item</th>
<th>Function</th>
<th>1+1</th>
<th>1:1</th>
<th>Blind 1</th>
<th>Blind 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Switching Time (within)</td>
<td>12ms</td>
<td>25ms</td>
<td>12ms</td>
<td>12ms</td>
</tr>
<tr>
<td>2</td>
<td>Ability to retrieve protection path status (Good or Bad) from CO or CPE.</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>Ability to provide protection path status (Good or Bad) from LOS only</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>Manual switching to working path on both ends (CO or CPE)</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>Single Ended Application</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>6</td>
<td>Duplicate CPE Signal in both Active and Protective Path</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Note: Referring T-APS installed in both CO to CPE sides

CO: Central Office
CPE: Customer Premises Equipment
Redundant CPE Applications

The T-APS can be used for switching a T1/EI circuit between two sets of CPE for redundant equipment operation. The Working Mode selection can be either 1+1, Blind 1 or Blind 2.

In the 1+1 and Blind 1 modes, TX signals from the CO will be present at each of the two CPE devices.

In Blind 2 mode only the current selected working path will see the TX signals. The alternate path will not provide TX to it’s associated CPE while the Protective Path is working.

3: SET LINE FORMAT

T1 Setting Selections: [ UNFRAMD SF ESF ]
E1 Setting Selections: [ UNFRAMD CAS CCS CAS&C CCS&C ]

4: SET LINE CODE

T1 Setting: Selections - [ B8ZS AMI ]
E1 Setting: Selections - [ HDB3 AMI ]

5: RX SENSITIVITY (NETWORK)

Selections – [ LONG SHORT ]

LONG: T1 Setting Sensitivity is –36 dB.
     E1 Setting Sensitivity is –43 dB.
SHORT: T1 Setting Sensitivity is –15 dB.
     E1 Setting Sensitivity is –10 dB

6: SET BUILDOUT (NETWORK)

T1 Setting Selections: [ DSX1-1 DSX1-2 DSX1-3 DSX1-4 DSX1-5 -7.5dB -15dB -22dB ]

DSX1-10 to 133 feet
DSX1-2133 to 266 feet
DSX1-3266 to 399 feet
DSX1-4399 to 533 feet
DSX1-5533 to 655 feet
-7.5dB CSU
-15dB CSU
-22dB CSU

E1 Setting Selections : [ 120Nor 120Hi ]
120 Nor: 120 Ω Normal Return Loss.
120 Hi: 120 Ω High Return Loss.

7: RX SENSITIVITY (USER)

Selections - [ LONG SHORT ]

LONG: T1 Setting Sensitivity is –36 dB.
     E1 Setting Sensitivity is –43 dB.
SHORT: T1 Setting Sensitivity is –15 dB.
     E1 Setting Sensitivity is –12 dB.
8: SET BUILDOUT (USER)

T1 Setting Selections: [DSX1-1 DSX1-2 DSX1-3 DSX1-4 DSX1-5 -7.5dB -15dB -22dB ]

DSX1-1: 0 to 133 feet
DSX1-2: 133 to 266 feet
DSX1-3: 266 to 399 feet
DSX1-4: 399 to 533 feet
DSX1-5: 533 to 655 feet
-7.5dB CSU
-15dB CSU
-22dB CSU

E1 Setting Selections: [120Nor 120Hi ]
120 Nor: 120 Ω Normal Return Loss.
120 Hi: 120 Ω High Return Loss.

9: SET AUTOMATIC / MANUAL SWITCHING

Selections - [AUTO MANUAL ]

AUTO: Once the bit error exceeds the preset threshold value or other connection failures, the system will automatically switch from Active path to Protection path.

MANUAL: No automatic switching will occur. Use the selection 5 to perform switching

A: SELECT ACTIVE PATH

Selections - [PATH-1 PATH-2 ]

B: ENABLE LOOK-IN MODE

Selections [ENABLE DISABLE ]

T-APS Master and Slave unit will do a checking function to the CPE signal before switching from active path to the protection path.

Enable: T-APS will be enabled to check CPE signals. In the event of excessive bit errors from the CPE side to T-APS, T-APS will not perform switching. Enable Look-In may increase a few millisecond to the switching time.

Disable: T-APS will be disabled to check CPE signals. In the event of excessive bit errors from the CPE to T-APS, T-APS will perform switching in all events including excessive bit errors from CPE side.

C: SET LCV ALARM RATIO

Set Line Code Violation Error Ratio

Selections:
1E-7 = 1 x 10^-7
5E-6 = 5 x 10^-6
1E-5 = 1 x 10^-5
1E-4 = 1 x 10^-4
Once the Line Code Violation Error Ratio exceeds the preset threshold value, it will then switch the ACTIVE PATH to the PROTECTION PATH.

**D: SET LCV CLEAR RATIO**

Set Line Code Violation Error Ratio

Selections:
- \(1E-9 = 1 \times 10^{-9}\)
- \(1E-8 = 1 \times 10^{-8}\)
- \(1E-7 = 1 \times 10^{-7}\)
- \(1E-6 = 1 \times 10^{-6}\)
- \(1E-5 = 1 \times 10^{-5}\)

Once the Line Code Violation Clear Ratio achieves the preset threshold value, it will then switch back from PROTECTION PATH to the ACTIVE PATH.

**E: SET FRAME ALARM RATIO**

Selections:
- \(1E-5 = 1 \times 10^{-5}\)
- \(1E-4 = 1 \times 10^{-4}\)
- \(1E-3 = 1 \times 10^{-3}\)
- \(1E-2 = 1 \times 10^{-2}\)
- \(1E-1 = 1 \times 10^{-1}\)

Once the Line Code Violation Error Ratio exceeds the preset threshold value, it will then switch the ACTIVE PATH to the PROTECTION PATH.

**F: SET FRAME CLEAR RATIO**

Selections:
- \(1E-7 = 1 \times 10^{-7}\)
- \(5E-6 = 5 \times 10^{-6}\)
- \(1E-5 = 1 \times 10^{-5}\)
- \(1E-4 = 1 \times 10^{-4}\)
- \(1E-3 = 1 \times 10^{-3}\)

Once the Line Code Violation Clear Ratio achieves the preset threshold value, it will then switch back from PROTECTION PATH to the ACTIVE PATH.
G: SET CRC ALARM RATIO

Set Critical Redundancy Check error ratio

Selections:
- 1E-5 = 1 x 10^-5
- 1E-4 = 1 x 10^-4
- 1E-3 = 1 x 10^-3
- 1E-2 = 1 x 10^-2
- 1E-1 = 1 x 10^-1

Once the Line Code Violation Error Ratio exceeds the preset threshold value, it will then switch the ACTIVE PATH to the PROTECTION PATH.

H: SET CRC CLEAR RATIO

(1) Set Critical Redundancy Check error ratio

Selections:
- 1E-7 = 1 x 10^-7
- 5E-6 = 5 x 10^-6
- 1E-5 = 1 x 10^-5
- 1E-4 = 1 x 10^-4
- 1E-3 = 1 x 10^-3

Once the Line Code Violation Clear Ratio achieves the preset threshold value, it will then switch back from PROTECTION PATH to the ACTIVE PATH.

I: MEASURE ERROR RATIO

MEASURE ERROR RATIO will measure and display Line Code Violation (LCV), Critical Redundancy Check (CRC), and Frame (FRME).

J: SET BUZZER ON/OFF

Selections [ ON OFF ]
Setting BUZZER ON, the LED and the BUZZER will alarm in the event of receiving bit errors (LOS OOF AIS RAI). Pressing the [ACO] bottom on the display will stop the BUZZER.
Setting BUZZER OFF will disable the BUZZER function.

K: SET RECOVERY TIME

Selections - [ 00 to 99 MINUTES ]
Setting the time interval to recover from protection path to the active path.

Setting Recovery at 00 Minutes – The Protection Path will immediately (00 Minutes) switch back to Active Path when Active Path is in a good condition.

Setting Recovery at XX (01 to 98) Minutes – The Protection Path will switch back to Active Path after Active Path stays in good condition for X Minutes.

Setting Recovery at 99 Minutes – While setting Recovery at 99 Minutes, the Protection Path will not switch back to Active Path. The Protection Path will only switch back to Active Path when experiencing excessive bit errors or lost of signals.

L: SET GATEWAY ADDRESS

Assign T-APS Gateway Address. Default: 192.168.000.254

M: SET SUBNET MASK

Assign T-APS Subnet Mask. Default: 255.255.255.000

N: SET SOURCE IP ADDRESS

Assign T-APS Source IP Address. Default: 192.168.000.073
O: SET TRAP IP ADDRESS
Assign T-APS SNMP TRAP alarm IP Address.
Selections [ #1TRAP    #2TRAP ]
    #1TRAP Default: 192.168.000.069
    #2TRAP Default: 000.000.000.000

P: SET COMMUNITY STRING
Assign T-APS SNMP Community String (Password)
Selections [ GET   SET   TRAP ]
        GET Default: Public
        SET Default: Private
        TRAP Default: Public

Q: SET CURRENT DATE
MM/DD/YY: Month / Day / Year

R: SET CURRENT TIME
HH/MM/SS: Hour / Minute / Second

S: SET PASSWORD
Default Password – PASS

T: USE FACTORY DEFAULTS
Selections [ YES NO ]

U: SHOW CURRENT LINE
Displays either Line 1 or Line 2 current selected by T-APS.

V: SHOW MAC ADDRESS
Displays the programmed MAC address of the unit.

W: EXIT
Exit T-APS setup configuration.
T-APS requires a PC using the RS-232 CONSOL PORT to change password.
Selections [ YES NO ]
Selecting YES will logout T-APS setup, and it will require a password to enter.
Selecting LOGOUT NO will exit this function.
8. Alarm Contacts

The Alarm relay Contact definition:

**NC Contact - Closed conditions:**
1. Power supply OFF.
2. Circuited error detected, and T-APS switches from working path to protection path. Failure LED will be also ON. Once all errors have been cleared, T-APS will switch back to working path, and the NC contacts will return to an open state and the Failure LED will then be OFF.

**NC Contact - Open conditions:**
1. Power supply ON.
2. T-APS operating normally in working path.

There is a self-diagnostic test feature built into the T-APS which will change the contacts in the event of T-APS unit failure.
RS-232 Setup Port

The Setup Port can be used to set the parameters of the T-APS. It includes all the functions of the front panel display setup with the addition of Function M: Set Password.

You can access the Setup Port using a VT100 terminal, or PC running terminal emulation software (like Hyperterminal).

The RS-232 port settings are: 9600bps, 8 Data Bits, 1 Stop Bit, No Parity (9600 N 8 1) Once you connect to the T-APS, press the Escape Key (Esc) to display the password prompt. Enter the Password and press Enter. The setup menu is displayed.

Factory preset password: PASS

Enter the # of the settings or features you wish to change. When all setup is completed, you may select 9 to Logout. A Current Settings screen will be displayed with a confirmation for exiting.
8.1. Current Settings

The following settings screen will be displayed showing the current configuration. This will require the password to be re-entered when next accessing the setup.
8.2. **SNMP Ethernet Port**

The system can be managed by SNMP through standard management software. Dataprobe provides a private MIB which is available on our web site at: [http://www.dataprobe.com/files/switch/taps/taps.mib](http://www.dataprobe.com/files/switch/taps/taps.mib)

8.3. **Setting I/P Address**

The T-APS comes with factory installed IP address **192.168.1.254**. In most cases this will need to be changed.

Consult your Network Administrator to determine the appropriate IP address. There are two methods to change the IP address.

- Front Panel Switches
- Serial Port

To set the IP address, the hardware (MAC) address must be known. This address is located on a label on the bottom of the unit or can be accessed through serial port or the front panel display. The syntax for the MAC address is: nn-nn-nn-nn-nn-nn

**IP Address, Subnet Mask and Gateway:** Enter the appropriate information in dotted decimal format (xxx.xxx.xxx.xxx). If you are unsure of the entries, consult your network administrator.

**Example of MIB Walk**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>.0</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sysDescr</td>
<td>DisplayString</td>
<td>Dataprobe T-APS #V3.4</td>
<td></td>
</tr>
<tr>
<td>sysObjectID</td>
<td>ObjectIdentifier</td>
<td>1.3.6.1.4.1.17183.608</td>
<td></td>
</tr>
<tr>
<td>sysUpTime</td>
<td>TimeTicks</td>
<td>0:0:47:30.0</td>
<td></td>
</tr>
<tr>
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<td>DisplayString</td>
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<td>11 Park Place / Paramus New Jersey 076552</td>
<td></td>
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<td></td>
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<td>Enum</td>
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<td>Enum</td>
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<td></td>
</tr>
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<td>Enum</td>
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<td>lineCode</td>
<td>Enum</td>
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<td>equipmentHaul</td>
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<td>(7) is not in the MIB!</td>
<td></td>
</tr>
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<td>Enum</td>
<td>t1-DSX1 (1)</td>
<td></td>
</tr>
<tr>
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<td>Enum</td>
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</tr>
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<td>facilityBuildOut</td>
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<td>recoveryTime</td>
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</tr>
<tr>
<td>currentPath</td>
<td>INTEGER</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
9. Specifications

T1 Interface

- Bit Rate: 1.544 M b/s
- Line Code: AMI B8ZS
- Frame Format: SF, ESF, Unframed
- Bit Rate: 1.544 M b/s
- Impedance: 100 Ohms Resistive Balanced
- Input Level: 0-36 dB
- Output Level: 6V p-p
- Line Build Out: 0-655 feet

E1 Interface

- Bit Rate: 2.048 M b/s
- Line Code: AMI HDB3
- Frame Format: CCS, CAS, CCS+CRC, CAS+CRC, Unframed
- Impedance: 120 Ohms Resistive Balanced
- Input Level: 0-43 dB
- Output Level: 6V p-p
- Line Build Out: 0-655 feet

LED Status Display

RUN 1:1 T1 or E1 Line 1 and Line2 LOS OOF AIS RAI Fail ACO

ALARM Contacts

- Form C relay 0.5A 30VDC MAX

Automatic Switching Parameter Programmable

- Code Violation: 10-3, 10-6
- CRC Error: 10-1, 10-3
- Frame Error: 10-1, 10-3
- AIS: Unframed or Framed
- Loss of Signal
- Fault Duration: 500 ms, 1000 ms, 1500 ms, 2000 ms
- Recovery Interval: 0 Minute, 1~98 Minutes, 99 Minutes (Toggle)

Console Port: RS-232 VT-100
Network: 10BaseT Ethernet
Power: 90-250V AC 47-63Hz and -48V±5V DC
Weight: 1.1 KG
Dimension: 200mm W×70 mm H × 240 mm D
Operating Temperature: 0ºC ~ 50ºC
Relative Humidity: 5% 90%, Non-condensing
Regulatory Compliance: FCC Part 15 Class A
Reliability: MTBF 44,000 hrs
Seller warrants this product, if used in accordance with all applicable instructions, to be free from original defects in material and workmanship for a period of **Three Years** from the date of initial purchase. If the product should prove defective within that period, Seller will repair or replace the product, at its sole discretion. Repairs may be made with new or refurbished components and replacements may be new or refurbished at the Seller’s sole discretion. Repaired or replaced units shall be warranteed for the balance of the original warranty, or 90 days, whichever is greater.

**If Purchased from Dataprobe Inc.:** Service under this Warranty is obtained by shipping the product (with all charges prepaid) to the address below. Seller will pay return shipping charges within the United States. Call Dataprobe Technical Service to receive a Return Materials Authorization (RMA) Number prior to sending any equipment back for repair. Include all cables, power supplies, accessories and proof of purchase with shipment.

**If purchased from an Authorized Dataprobe Reseller:** Service under this Warranty is obtained by contacting your Authorized Dataprobe Reseller.

**THIS WARRANTY DOES NOT APPLY TO NORMAL WEAR OR TO DAMAGE RESULTING FROM ACCIDENT, MISUSE, ABUSE OR NEGLECT.** SELLER MAKES NO EXPRESS WARRANTIES OTHER THAN THE WARRANTY EXPRESSLY SET FORTH HEREIN. EXCEPT TO THE EXTENT PROHIBITED BY LAW, ALL IMPLIED WARRANTIES, INCLUDING ALL WARRANTIES OF MERCHANT ABILITY OR FITNESS FOR ANY PURPOSE ARE LIMITED TO THE WARRANTY PERIOD SET FORTH ABOVE; AND THIS WARRANTY EXPRESSLY EXCLUDES ALL INCIDENTAL AND CONSEQUENTIAL DAMAGES.

Some states do not allow limitations on how long an implied warranty lasts, and some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights, and you may have other rights which vary from jurisdictions to jurisdiction.

**WARNING:** The individual user should take care to determine prior to use whether this device is suitable, adequate or safe for the use intended. Since individual applications are subject to great variation, the manufacturer makes no representation or warranty as to the suitability of fitness for any specific application.

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