



MLTDR_W-50S

AUTOMATED TIME DOMAIN REFLECTOMETRY MONITORING

- ✓ **8 COAXIAL CABLES**
Designed to automate monitoring of up to 8 coaxial cables
- ✓ **VERSATILE**
Vibrating wire interface for 2, 5, or 17 vibrating wire gages
- ✓ **DURABLE**
NEMA 4/12 rated enclosure and 50Ahr battery for reliable operation in demanding environments
- ✓ **NETWORK**
Wireless or wired AirborneM2M Wi-Fi network interface

OVERVIEW

The MLTDR-W-50 is a datalogger designed to **automate monitoring of up to 8 coaxial cables** embedded in a slope or borehole for deformation monitoring. It contains a control module, TDR interface and, optionally, an 8 channel coaxial cable multiplexer.

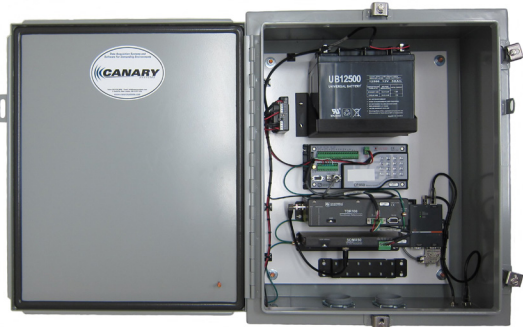
It is equipped with an interface to read **Vibrating Wire** gages. These gages are typically used to monitor pore pressures along the length of the installed TDR cable. The datalogger provides connection for 2 Vibrating Wire gages, a Canary Systems® MicroMux or MiniMux multiplexer may also be installed to expand the measurement capability to 5 or 17 instruments. A 50Ahr lead-acid battery provides power, and is recharged either through a 40W solar panel or an AC power connection.

Communications are possible via a **wireless or wired network** interface. For wireless networks, a high performance ultra wide band log periodic antenna is supplied, including a lightning surge protector. A B+B Smartworx AirborneM2M™ is used for the Wi-Fi network interface.

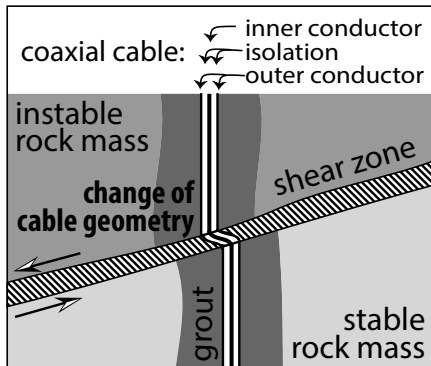
THEORY OF OPERATION

Time Domain Reflectometry (TDR) is increasingly being used in geotechnical applications for deformation monitoring in soils and concrete. It provides accurate location information for faults and can provide indication of the static or dynamic nature of the faults. It is typically used to monitor slope movement of embankments including highway cuts, rail beds, bridge abutments and open pit mines.

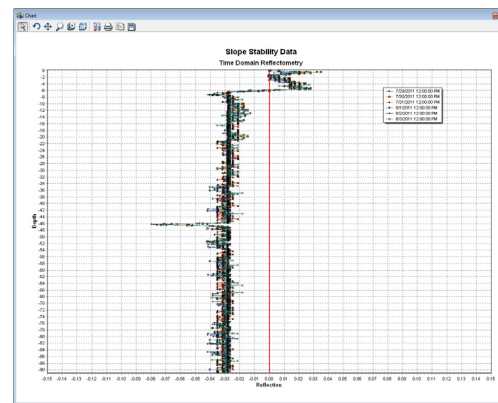
In TDR applications the signal is an electrical pulse broadcast down a coaxial cable, and changes in the impedance of the cable, either inductive or capacitive, cause reflections to be returned to the signal generator. The resultant reflections are measured and presented as a function of time, the **time is translated to distance**



Shear zone



based on the known propagation velocity of the cable being utilized. In geotechnical applications the cable typically takes the form of a rugged coaxial cable with a diameter of 12mm (0.5"). The cable is usually grouted into a borehole drilled into the embankment to be monitored. Any movement of the embankment will crimp the cable, and the reflections indicate approximate magnitude of the crimp and the location. The resolution is related to the number of samples of data being collected.



Slope Stability - TDR chart with a decrease in the reflection coefficient indicating a potential deformation location

Specifications MLTDR-W-50S

Datalogger CR6

- Universal Channels: 12
- Input Voltage Range: +/-5V
- Digital Ports: 16
- Communications: Ethernet, USB, CS I/O, RS-232, CPI, RS-485, SDI-12
- Power Consumption: <1mA – ~67mA
- Data Memory: 4MB SRAM
- Program Memory: 72 MB flash
- OS Memory: 128 MB Flash

AC Adaptor

- Output Voltage: 18VDC
- Output Power: 1A maximum

Solar Panel

- Output Voltage: 18VDC max (loaded)
- Output Power: 2.25A max (40W)

Solar Power

- Battery: 12V 50Ahr sealed lead-acid

Antenna (or wireless applications):

- Type: HP ultra wide band log periodic
- Frequency: 2300-6500 MHz
- Gain: 8 dBi
- Horizontal Beam Width: 80 degrees
- Vertical Beam Width: 60 degrees
- Impedance: 50 Ohm
- Max. Input Power: 50 Watts

Coaxial Cable Multiplexer (optional)

- Model: SDM8X50 8-Channel
- Operating Power: 90mA maximum
- Standby Power: <1mA

Physical

- Operating Temperature: -40 to +70° C (-40 to +160° F)
- Enclosure: Hammond Painted steel
- Enclosure Rating: NEMA 4/12
- Enclosure Size (L x W x H): 61 x 51 x 25cm (24" x 20" x 10")
- Enclosure Mounting (L x W): 64 x 35/5cm (25.25" x 14")
- Weight: 45.3kg (100 lbs)

Coaxial Cable Interface

- Points Range: 20-10112
- Waveform Averaging: 1-128
- Output impedance: 50 Ω ±1%
- Pulse Output: 250mV @ 25.5µS
- Maximum Cable Length: 3800m (12400')
- Operating Power: 150mA maximum
- Standby Power: 1mA

Wireless Interface

- Model: B+B Smartworx AirborneM2M
- Dual Band 2.4/5GHz
- Power: 5-36VDC
- Power (quiescent): 60mA max
- Power (transmit): 500mA max
- Communications Ports: 2
- Communications: RS-232, RS-422, RS-485
- Interface: 802.11b/g or 10/100 Ethernet
- Standards: TCP/IP, ARP, ICMP, DHCP, DNS, UDAP, TFTP, UDP, PING, HTTP, FTP
- Encryption: WEP 64/128-bit, WPA(TKIP), WPA(AES), WPA2(AES), 802.1x(EAP) supplicant, 802.11i, WPA & WPA2 enterprise supplicants, EAPTTLS

Multiplexer (optional)

- Model: Canary Systems MicroMux
- Channels: (4) 4-channel or (8) 2-channel (switch selectable)
- Control Inputs: 2
- Control Input Range: 5-16V
- Power: 9-16VDC
- Power Consumption (quiescent): <0.1µA
- Power Consumption (active): ~42mA
- Relay Contacts: Gold clad silver alloy
- Contact Resistance: 50mΩ
- Contact Isolation: 1028Ω
- Relay Operate Time: ~2ms
- Relay Release Time: ~1ms
- Relay Max Voltage: 125VAC, 110VDC
- Relay Max Switching: 2A
- Relay Life (minimum): 10⁸ Cycles
- Model: Canary Systems MiniMux
- Channels: (16) 4-channel or (32) 2-channel (switch selectable)
- Control Inputs: 2
- Control Input Range: 5-16V
- Power: 10-16VDC
- Power Consumption (quiescent): <0.1µA
- Power Consumption (active): ~42mA
- Relay Contacts: Gold clad silver alloy
- Contact Resistance: 75mΩ
- Contact Isolation: 1500V
- Coil Resistance: 1028Ω
- Relay Operate Time: ~2ms
- Relay Release Time: ~1ms
- Relay Max Voltage: 125VAC, 110VDC
- Relay Max Switching: 2A
- Relay Life (minimum): 10⁸ Cycles
- Transient Protection Threshold: 75V
- Transient Current Limit: 1kA

Model	MCU	Enclosure Type	Size (LxWxH)	Weight (lbs)	Battery	Solar	Receiving	Transmitting	Coax Support	Options
MLTDR-W-50S	CR6	Steel	24x20x10	100	50Ahr	40W	RS-232	WiFi	TDR200	MicroMux MiniMux SDM8X-50