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*Instruction Manual*  
Model 8025-2  
(Micro-800)  
Multi-Channel Datalogger

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## **OVERVIEW**

The MICRO-800 Datalogger is designed to support the reading of a large number of Geokon Vibrating Wire Instruments for various unattended data collection applications through the use of an internal Geokon's Model 8032 Multiplexer. Weatherproof packaging allows the unit to be installed in field environments where inhospitable conditions prevail. The Nema 4X enclosure also has provision for locking to limit access to responsible field personnel.

A basic datalogging system consists of the MICRO-800 datalogger and an internal multiplexer. Multiplexers expand the system by increments of 16 or 32 channels depending on the instrument type and configuration. The standard Micro-800 Datalogger can support one (1) Multiplexer.

### **1.0 HARDWARE**

The controller portion of the MICRO-800 datalogger consists of a Campbell Scientific CR800 Measurement and Control Datalogger. To gain an understanding on the workings and capabilities of the CR800 it is necessary to read the Overview section of the CR800 Operator's Manual. For complete specifications on the CR800 Measurement and Control Datalogger see OV6 of the CR800 User Guide supplied with the datalogger.

A Campbell Scientific AVW200 Vibrating Wire Interface provides the required excitation and signal processing for the vibrating wire sensors connected to the Datalogger. The AVW200 uses spectral analysis to find the resonant frequency of the Vibrating Wire Gage. The AVW200 is also used to measure the thermistor used in Geokon's vibrating wire instruments. For complete specifications of the AVW200 see the AVW200 User Guide.

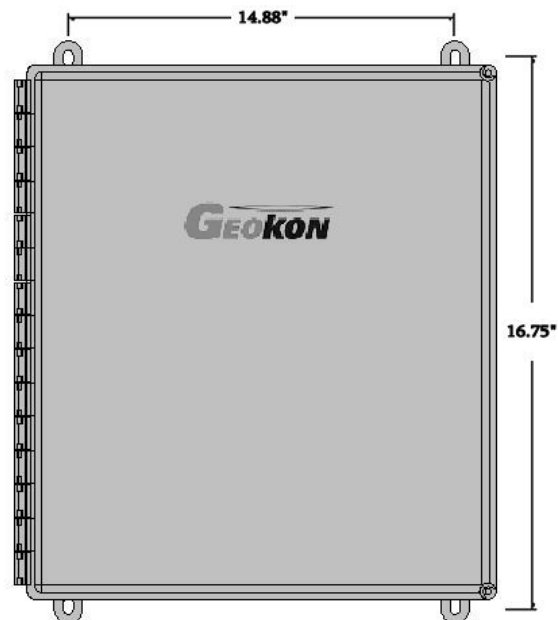
A dual-mode battery charging circuit board is used to provide the charging voltage for proper maintenance of the installed lead acid battery. The circuit board contains fused terminal blocks used to provide a nominal 12VDC supply for devices such as the CR800 and Model 8032 Multiplexer board.

The Model 8032 Multiplexer board expands the number of channels that can be read by the MICRO-800 Datalogger. The channel switching is accomplished by mechanical relays mounted on the underside of the circuit board and the transducer connections are accomplished by friction locking terminals. Power, reset and clocking for the multiplexer are supplied by the MICRO-800. The Model 8032 multiplexer can be configured for 16x4 or 32x2 channels depending on application. For complete specifications on the Geokon Model 8032 multiplexer see the Model 8032 multiplexer instruction manual.

A 12V – 7Ah lead acid battery is used to provide power for the datalogger. The battery is provided to supply operating power for a limited period of time should the AC or solar power, used to maintain the battery, be interrupted. Under normal operating conditions and proper maintenance, the life expectancy of the battery is approximately five (5) years.

## 1.1 INSTALLATION

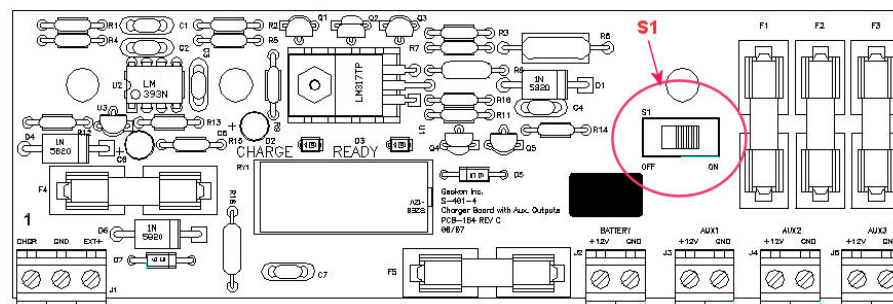
The recommended method of installation involves attaching the enclosure (MICRO-800) to a fixed structure, such as a wall, in an upright position (**Figure 1**). Mounting dimensions shown in inches.



**Figure 1**

## 1.2 Power

After the Datalogger is installed the charger can be plugged into the AC mains and the On/Off switch S1 on the Charge Regulation circuit board switched to the “On” position (**Figure 2**). It is recommended that the charger be left plugged in at all times (**Section 3.1**).



**Figure 2**

## 1.3 Earth Ground

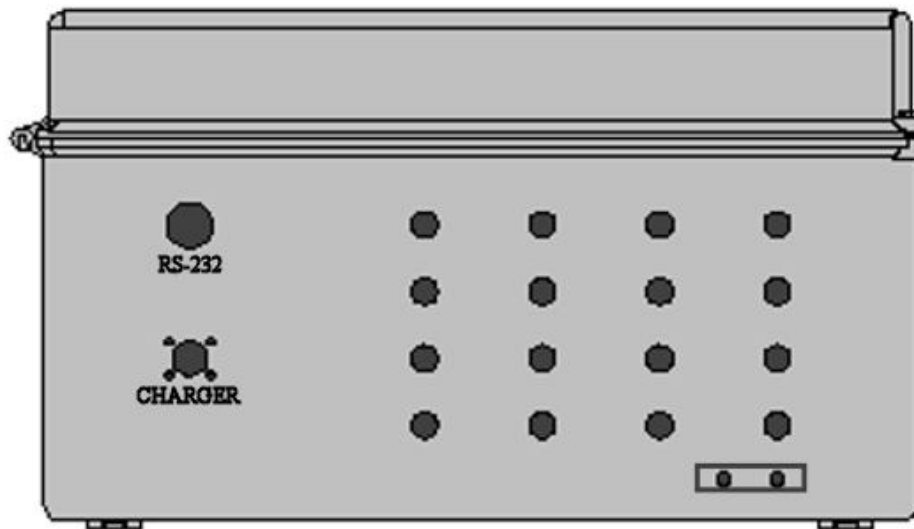
An earth grounding lug is supplied on the exterior of the Micro-800 enclosure to connect the system to earth ground (**Figure 3**). A grounding rod can be driven (or other suitable attachment to earth utilized) to ground the system and provide a path to earth for protection against a lightning strike or other transient voltage. A 6' to 8' copper grounding rod connected to the Dataloggers grounding lug with a large gauge wire (12 AWG or larger) is recommended. The earthing connection should be made as close to the Datalogger as possible.

## 1.4 Gages

At this time the vibrating wire sensors can be connected to the multiplexer. Please refer to the Multiplexer instruction manual for the appropriate connection description.

## 1.5 Communications

Standard communications with the Datalogger is established by connecting the supplied serial cable to the RS232 port (**Figure 3**) and the COM port on a computer, or a USB port on the computer by using the provided USB to Serial converter cable.



**Figure 3**

## 2. SOFTWARE

The Micro-800 Datalogger is operated by download file that is generated by a software program. The software package the MICRO-800 Datalogger may be supplied with is either MultiLogger software (developed by Canary Systems, Inc, New London, NH) or LoggerNet software (developed by Campbell Scientific, Logan, Utah). Please refer to the manual supplied with the software for instructions on installing the software and creating required download file Datalogger operation.

### 3. BATTERY MAINTENANCE

#### 3.1 AC Power

The MICRO-800 is supplied with an external AC to DC power supply for maintaining the charge of the battery and providing power to the Datalogger and peripherals. It is imperative that the power supply remain connected to the Datalogger as the battery installed in the Datalogger is only provided as a temporary source of power should the power supply be disconnected or mains power interrupted. Actual run time solely on battery power will vary for each datalogging system, depending on the hardware configuration and sensor scan interval. If the battery voltage drops below 9.6 volts operation of the Datalogger will become erratic as evidenced by communication problems and possible improper measurements.

#### 3.2 Solar Power

If AC mains power is not available, a properly sized solar panel can be used to provide power to maintain the charge state of the battery and provide power to the Datalogger and peripherals. The size of the solar panel is determined by geographic location of the Datalogger, hardware configuration, and the sensor scan interval.

#### 3.3 External Battery

Additionally, a large external battery, such as a deep cycle marine battery, may be connected to the Datalogger via the supplied external power cable to provide power to the Datalogger and peripherals. When this type of battery is connected to the Datalogger the internal Datalogger battery is automatically disconnected from the system to prevent parasitic drain on the external battery.

#### 3.4 Battery Replacement

If the internal Lead Acid Battery has failed it is recommend that the unit be returned to the factory for service by Geokon personnel. However, with skilled personnel and appropriate tools, it is possible for the user to replace the battery. **Consult the factory for information.**

#### 3.5 Fuses

There are five fuses on the dual mode charger board of the MICRO-800 (**Figure 2**). Once removed and with the power switch off, a fuse can be checked visually and with an ohmmeter. A gap may be evident (with some discoloration) if the fuse needs replacing. This can be verified by a high resistance measurement (mega-ohms) with an ohmmeter. If fuse needs replacing, insert one of the supplied replacement fuses. If there are no replacement fuses available, consult the factory or they can be purchased from an electrical supply house. All five fuses are 2 amp SLO-BLO 5x20mm. Consult Appendix D.3. for fuse assignments.

### 4. Troubleshooting

This section will NOT attempt to cover all possible problems that could be encountered in the course of Datalogger operations. Consult the factory if other problems arise or remain unresolved.

- **Cannot communicate with the Datalogger.**

Suggestions:

1. The wrong communication cables are being used or the cables in use are defective. Consult Appendix D.1.2 to verify cable pinout. Consult the factory for interfacing information.
2. The internal battery could be dead. Charge overnight and try again. If it still doesn't work check the voltage across the terminals of the battery. If the voltage is still below 10 volts the battery may need to be replaced.
3. The wrong communication port is being used on the host computer (default is COM1). Consult the appropriate software manual for instructions on changing the communication port.
4. The communication port on the host computer is defective. Verify the functioning and configuration of the COM port by using it with another RS-232 device, such as a modem or serial printer.
5. The Datalogger Auxiliary Fuse on the Dual-Mode Charger board is blown. Refer to Appendix D.3 for proper fuse replacement.

- **The system battery voltage and panel temperature read odd numbers.**

Suggestions:

1. The system battery could be low. Charge and check again (see previous section).
2. A disruptive current loop may be operating as a result of improper grounding or excessive noise. Consult the factory for more information.

- **The internal battery measurement does not increase and charging LED (Yellow = Charging and Green = Charged) does not light when the AC adaptor is plugged in.**

Suggestions:

1. The adaptor may be damaged. Check the output pins of the adaptor with a voltmeter.
2. The charger fuse is blown. Consult Section 3.5 for checking and/or replacement.
3. The internal battery is no good. Consult the factory.

- **The Datalogger will not operate on external power.**

Suggestions:

1. The external voltage supply is below operating limits. If the external source is a battery, charge it. If it's a power supply, check the output with a voltmeter.
  2. The external power or battery fuse is blown (**Section 3.5**).
- **Loss of CR800 program and/or data.**

Suggestions:

1. The system has experienced a voltage dropout or surge which disrupted operations.
  2. The surge originated as a result of lightning. Install appropriate grounding. Install lightning protection devices on all incoming and outgoing lines (consult factory).
- **Sensor readings show -99999 or are unstable.**

Suggestions:

1. The wrong sensor type has been selected. Check the model number of the sensor against the software setting (**Section E.1**).
  2. The cable(s) to the sensor(s) have been damaged permitting moisture and debris to enter the jacket. Wires may be shorted together. Inspect the cable.
  3. If all sensors on a particular multiplexer are erratic or returning “-99999” perhaps the multiplexer or interface cable has been damaged / unplugged.
  4. The sensor(s) have been damaged. For example, overrange on a vibrating wire sensor can cause erratic readings.
  5. There is an electrical noise source nearby. Move the sensor, cables, and Datalogger away from the noise source. Install grounding devices. Consult the factory.
- **The sensor readings show OVERRANGE all the time.**

Suggestions

1. The “Sensor Type” selected for that particular channel is “None”. This is applicable for users of MultiLogger (**Section E.1**). Please refer to the MultiLogger manual.
2. A scan has not been initiated yet because of the “Start Time” setting (MultiLogger users only).
3. “Update” has not been run (MultiLogger users only).

## **APPENDIX A - SPECIFICATIONS**

### **A.1 CR800 Measurement and Control Module**

Power requirements: 9.6 to 16 VDC

Analog measurement current drain: 27.6 mA

Processing current drain: 16.2 mA

Quiescent current drain: .6 mA

Operating temperature: -25° to +50° C

Processor: Hitachi H8S 2322

Memory: 2Mb ROM, 4Mb RAM

Storage capacity: 2,000,000 Final Storage Locations

Real time clock accuracy: ±3 minutes per year

Expansion capability: up to 2x 32 channel multiplexers (single ended)

System battery: 12 V, 7 Ahr lead acid

Communication: RS-232 115200 baud, 8 data bits, no parity, 1 stop bits

#### **A.1.1 Analog Inputs**

Configuration: 3 differential or 6 single-ended

Voltage measurement accuracy: 0.06% of FSR for 0° to 40°C

Voltage measurement ranges and resolution:

Range	Resolution
±5.0 V	1330 μV
±2.5 V	667 μV
±250 mV	66.7 μV
±25 mV	6.7 μV
±7.5 mV	2 μV
±2.5 mV	.67 μV

Common mode range: ±5 VDC

DC common mode rejection (CMRR): >100 dB

Maximum input voltage: 16 VDC

#### **A.1.2 Excitation Outputs**

Configuration: 2 switched output channels

Excitation range: ±2.5 V

Excitation resolution: 0.67 mV

Excitation accuracy: 0.06% of FSR for 0°C to 40°C

Output current: 25 mA @ 2.5 VDC

#### **A.1.3 Pulse Inputs**

Configuration: two 24 bit

Maximum count rate:  $16.7 \times 10^6$

Maximum input voltage: +/-20 VDC

Modes: Switch closure, high frequency pulse, low level AC

**A.1.4 Control Ports**

Configuration: 4 digital I/O ports

Input/output resistance: 100k $\Omega$ /330 $\Omega$ , respectively

Input "high" level: 3.8 V to 5.3 V

Input "low" level: -0.3 V to 1.2 V

Output "high" level: 5 V  $\pm$ 0.1 V

Output "low" level: <0.1 V

**A.1.5 Model 8032 Multiplexer (See the Appendix F complete specifications)****A.1.6 AVW200 Vibrating Wire Interface (See AVW200 Manual for complete specifications)**

Power requirements: 9.6-16 VDC

Vibrating Wire measurement current: 25 mA

Quiescent current: .3 mA

## **APPENDIX B - SHIP LIST**

### **B.1 Hardware**

The following equipment is included with the system:

- External Power cable
- DB-9 to 10 pin Bendix RS-232 Cable
- USB to RS-232 Adapter
- Small regular screwdriver
- Spare slo-blo fuses (5), 2 amp
- AC Adaptor (110 VAC or 220 VAC)

The following manuals are included:

- MICRO-800 Instruction Manual
- Campbell Scientific Resource disk

Optional accessories:

- COM220 Landline Phone Modem with manual (access Datalogger via phone line)
- Cellular Phone Modem with manual
- Short Haul Modems with manual (current loop communication device)
- MD-9 Multidrop Interface with manual (Datalogger networking)
- Solar Panel with mounting hardware, charger, and manuals
- RF Modem with manuals (wireless Datalogger communication)

Consult the factory for additional information on any of the optional accessories.

## APPENDIX C – DATA STORAGE

### C.1 Input Locations

Default explanations for the Input/Final Storage location usage in MultiLogger unless user configured;

<b>Input Storage #</b>	<b>Label</b>	<b>Explanation</b>
1	Logger ID	Datalogger ID 1-9999
2	Year	Year when last readings taken
3	JulianDay	Julian Day (1-365) when last readings taken
4	Time-HHMM	Time (24 hour) when last readings taken
5	Seconds	Seconds when last readings taken
6	DecimlDay	Decimal Day when last readings taken
7	ElapsdHr	Elapsed Hours from “Start” (if “Log” selected as “Scan Interval”)
8	ElapsdMin	Elapsed Minutes from “Start” (if “Log” selected as “Scan Interval”)
9	ElapsdSec	Elapsed Seconds from “Start” (if “Log” selected as “Scan Interval”)
10	Battery	Datalogger battery voltage
11	PanelTemp	Datalogger panel temperature (°C)
47-78	Mx1	Readings from Gages on Mux #1

## C.2 Data Storage

Total Arrays of Data that can be stored per 16 Channel Multiplexer. Each array contains all Data stored at each read interval.

	<b>Total Arrays</b>
<b>1 Multiplexer Array Storage</b>	20,700

## C.3 Data Storage Example

If data is stored once a minute:

	<b>Minutes</b>	<b>Hours</b>	<b>Days</b>	<b>Total Arrays</b>
<b>1 Multiplexer Overwrite Time:</b>	20,685	344.8	14.4	20,700

If data is stored once an hour:

	<b>Minutes</b>	<b>Hours</b>	<b>Days</b>	<b>Total Arrays</b>
<b>1 Multiplexer Overwrite Time:</b>	1,241,454	20,690.9	862.1	20,700

If data is stored once a day:

	<b>Minutes</b>	<b>Hours</b>	<b>Days</b>	<b>Total Arrays</b>
<b>1 Multiplexer Overwrite Time:</b>	29,795,034	496,583.9	20,691.0	20,700

## APPENDIX D – SYSTEM WIRING

### D.1 CR800 Wiring

CR800 Connections	MUX Interface Cable	AVW200 SDI-12 Interface Cable	CR800 Power Cable	Description
AG	Green	NC	NC	Analog Ground
12V	Blue	NC	NC	12 VDC Output
G	Violet/ Black	Blue's Black	NC	Ground
C1	Gray	NC	NC	Digital I/O Port 1 / RESET
C3	NC	Blue	NC	Digital I/O Port 3 / SDI-12 Communication
C4	White	NC	NC	Digital I/O Port 1 / Clock
PWR In +12V	NC	NC	Red	+12VDC Power
PWR in G	NC	NC	Black	Power Ground

#### D.1.1 AVW200 Wiring

AVW200 Connections	Color	MUX Interface Ribbon Cable	CR800 Datalogger	Description
1V +	Brown	Conductor 1	NC	Vibrating Wire +
1V -	Red	Conductor 2	NC	Vibrating Wire -
1T+	Orange	Conductor 3	NC	Thermistor +
1T-	Yellow	Conductor 4	NC	Thermistor -
SCI12	Blue	NC	C3	SDI-12 Communications
G	Blue's Black	NC	G	Ground

#### D.1.2 RS-232 Connector Wiring

10-Pin Bendix	Color	Description
A	White	Ground
B	Green	Transmit
C	Orange	Receive
D	Yellow	RTS
E	Blue	CTS
G	Violet	DTR

### D.1.3 Charger Wiring

Pin	Description	Wire Color
A	Charger + (14-22 VDC Input)	Grey
B	Ground	Blue
C	Battery + (12 VDC Output)	Violet

## D.2 Cables

### D.2.1 AC Charger (110VAC/220VAC)

Pin	Description	Condor - Wire Color
A	Charger + (14-22 VDC Input)	Black with White Stripe
B	Ground	Black

### D.2.2 External Power Cable

Pin	Description	Wire Color	Clip
A	No Connection	No Connection	No Connection
B	Ground	Black	Black
C	Battery + (12 VDC)	Black w/White Stripe	Red

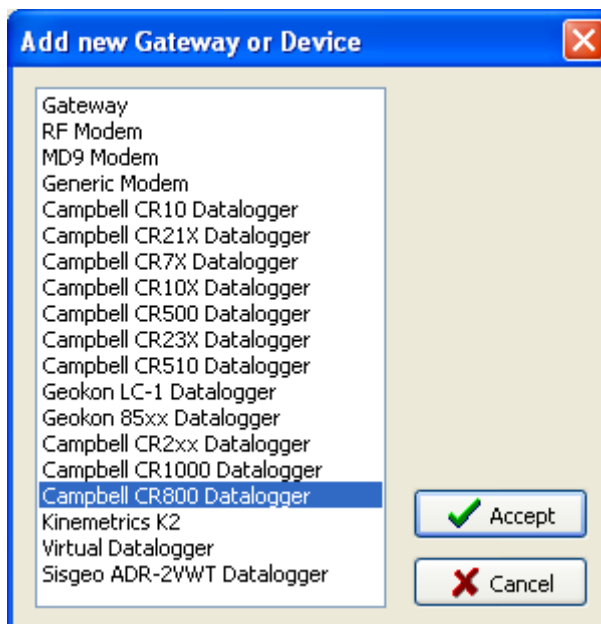
## D.3 Fuses

Fuse	Description
F1	12VDC Auxiliary 1
F2	12VDC Auxiliary 2
F3	12VDC Auxiliary 3
F4	External Battery
F5	Battery

## APPENDIX E – MULTILogger START GUIDE

### MultiLogger Quick Start for Geokon Vibrating Wire Gages

The “Device Type” attached to the COM Port or Modem is a CR800 Datalogger.

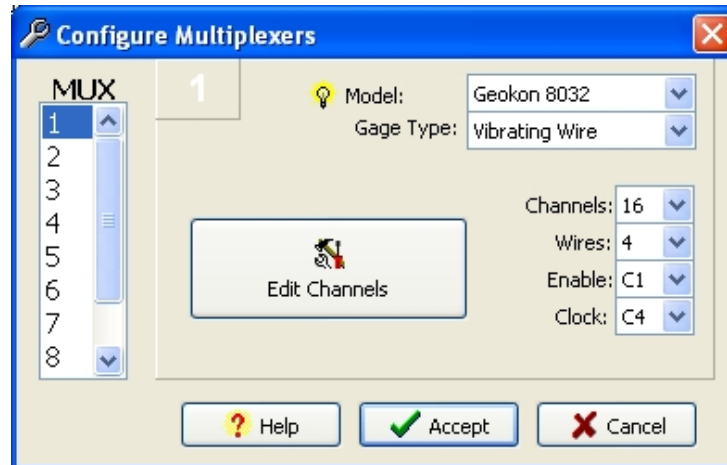


When adding/saving the CR800 Datalogger to the Network Configuration The user will be prompted for a Logger Configuration File; Select Assign a new Configuration File.

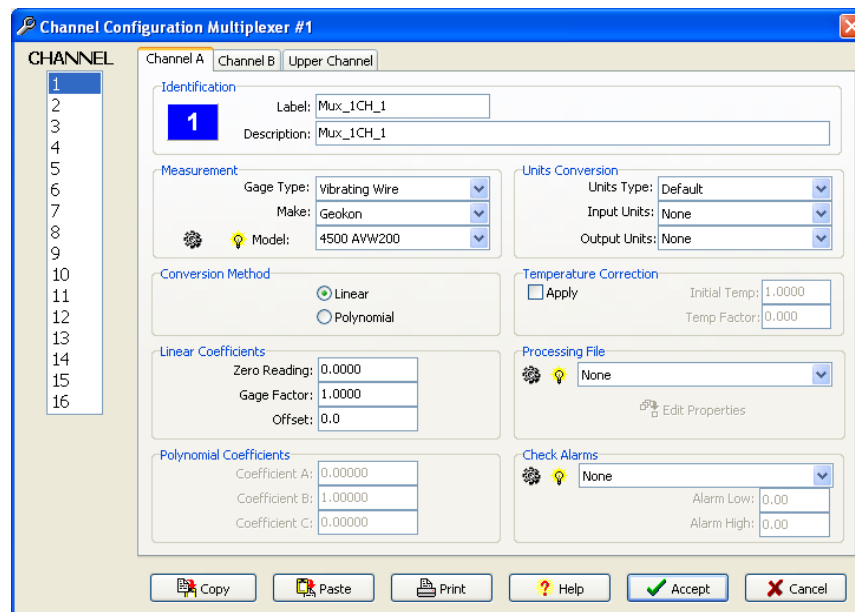


After pressing the *Accept* button above, the Logger Configuration form will display. This form allows the user to set-up the various parameters for the datalogger operation, including the scan interval, collection options, graphing, and the gage parameters for each multiplexer channel.

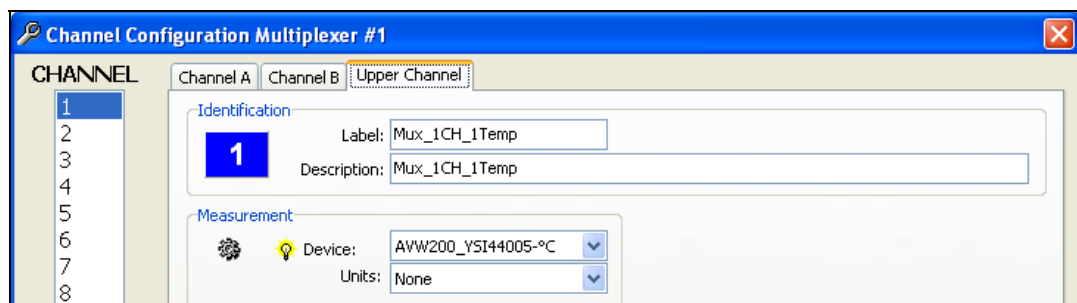
When configuring the Multiplexer the user must use the settings as shown below; note that the *Clock* must be set to C4:



Use the Edit Channels button to configure each channel of the Multiplexer. The Model will be the Geokon Gage Model and AVW200.



The Upper Channel (Thermistor) will be AVW200-YSI44005-°C for an output of Celsius or AVW200-YSI44005-°F for an output of Fahrenheit.



Please see the MultiLogger instruction manual for more specific details regarding the complete programming of a Datalogger and the associated configuration files.

## **APPENDIX F –8032 MULTIPLEXER Manual**

The following Appendix includes excerpts from the Model 8032 Multiplexer manual that apply to the Micro-800. A complete version of the Model 8032 Multiplexer Manual can be found at [WWW.GEOKON.COM](http://WWW.GEOKON.COM).

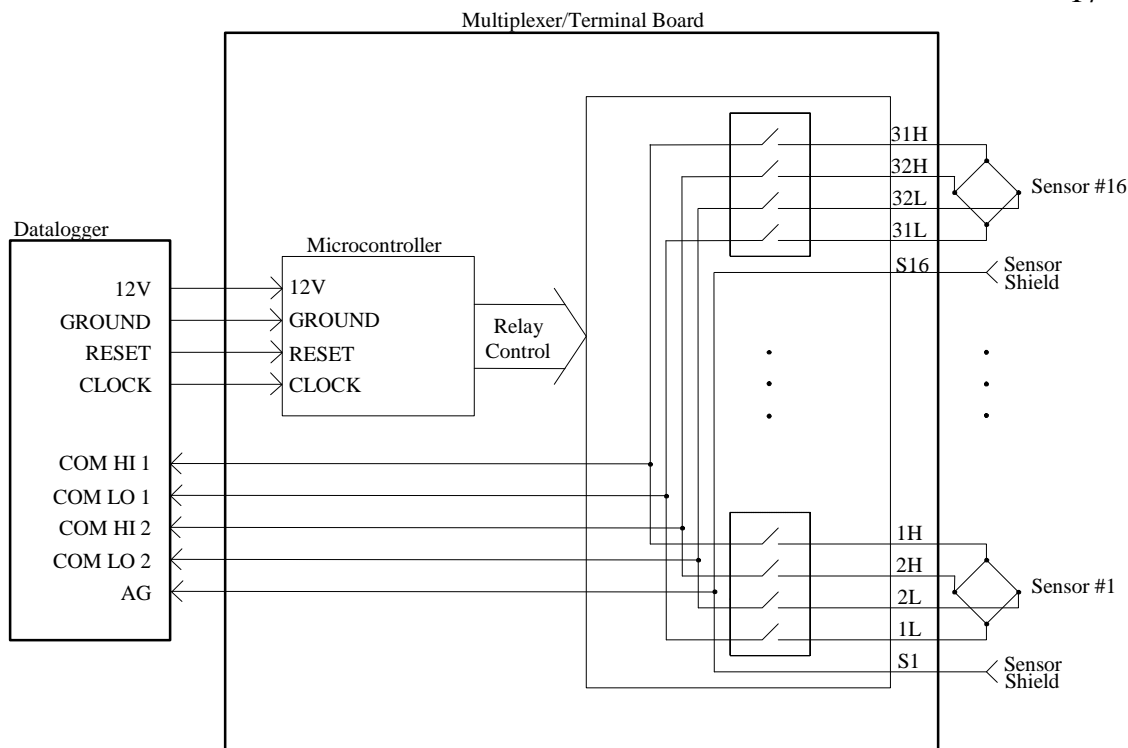
### **1. THEORY OF OPERATION**

The Model 8032 Multiplexer expands the number of channels that can be read by the MICRO-1000 / 800 Datalogger. The channel switching is accomplished by mechanical relays mounted on the underside of the circuit board and the transducer connections are accomplished by spring locking terminals mounted on the top side of the circuit board.

Two switching configurations are supported, 16 channels of 4 conductors or 32 channels of 2 conductors. These configurations are set by a DipSwitch on the top side of the circuit board.

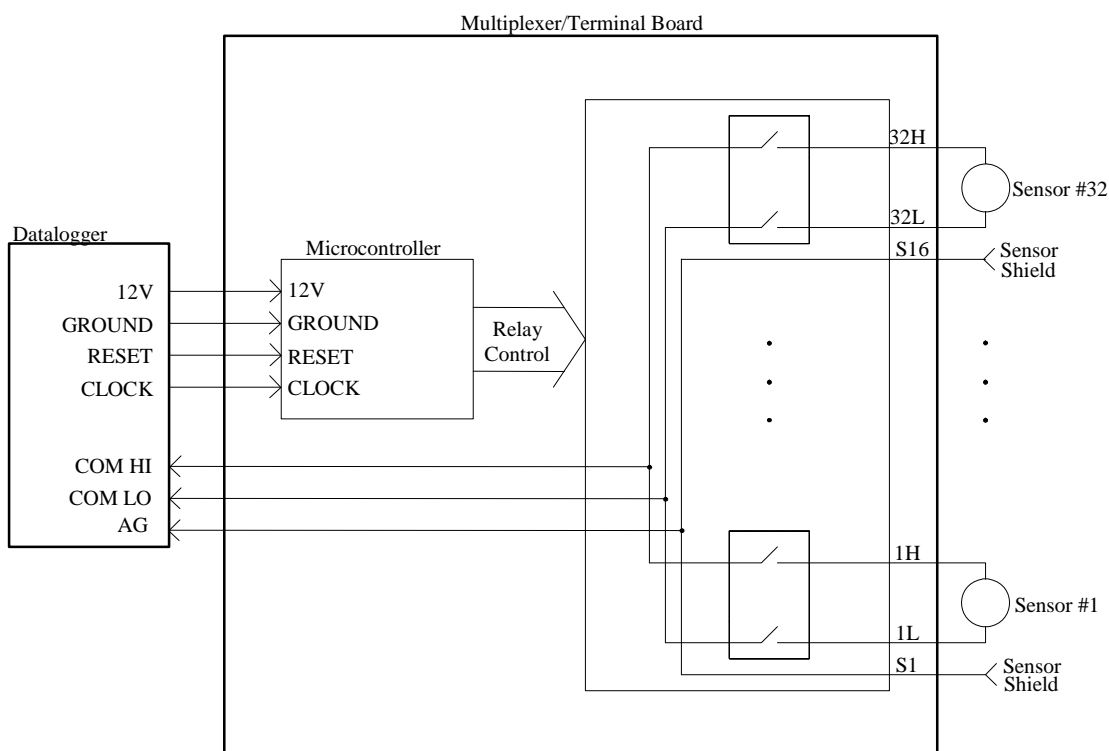
To protect against lightning or EMI/RFI induced transients, each channel is protected with 230V tripolar plasma surge arrestors while the shield connections are outfitted with 300V bipolar surge arrestors. See Appendix A for complete specifications on these components.

Note Figures 1 and 2 depicting the supported switching arrangements.



**Figure 1 - 16 Channel Switching Block Diagram**

The 16 channel 4 wire switching configuration is typically used to multiplex 4 wire sensors such as resistance strain gage load cells. It is also used to switch connections for instruments which have more than one sensor integral to them, such as vibrating wire pressure transducers with an integral thermistor for measuring temperature.



**Figure 2 - 32 Channel Switching Block Diagram**

The 32 channel 2 wire switching configuration is typically used to multiplex 2 wire sensors such as a vibrating wire pressure transducers, thermistors or thermocouples.

The multiplexer is powered by a nominal 12 VDC supply. Two control lines (RESET and CLOCK) determine how channel selection is accomplished.

Figure 3 illustrates the DIP switch SW1 position 1 for switching between 16 and 32 channel operation. SW-1 switch 1 ON = 32 channel, OFF = 16 channel. In Figure 3, 32 channel mode is selected:

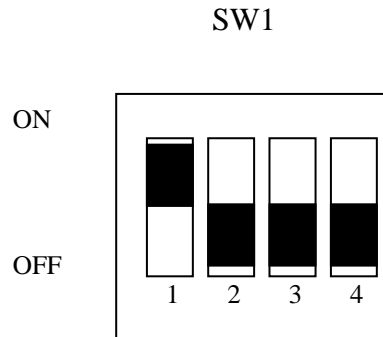


Figure 3 - 16 or 32 Channel Selection

## 1.1 MICRO-1000 / 800 (CR1000 / CR800) Mode of Operation

The MICRO-1000 / 800 (which utilizes a CR1000 / CR800 controllers, manufactured by Campbell Scientific, Inc. of Logan, Utah) mode of operation uses two control lines to operate the multiplexer. The RESET line enables the multiplexer and activates the MICRO-1000 / 800 mode of clocking. Pulses received on the CLOCK line sequentially increment the channels while the RESET line is held high. See the timing diagram below:

The CLOCK line sequentially advances the channels beginning with channel 1. Note the timing diagrams below for 16 and 32 channel switching, respectively.

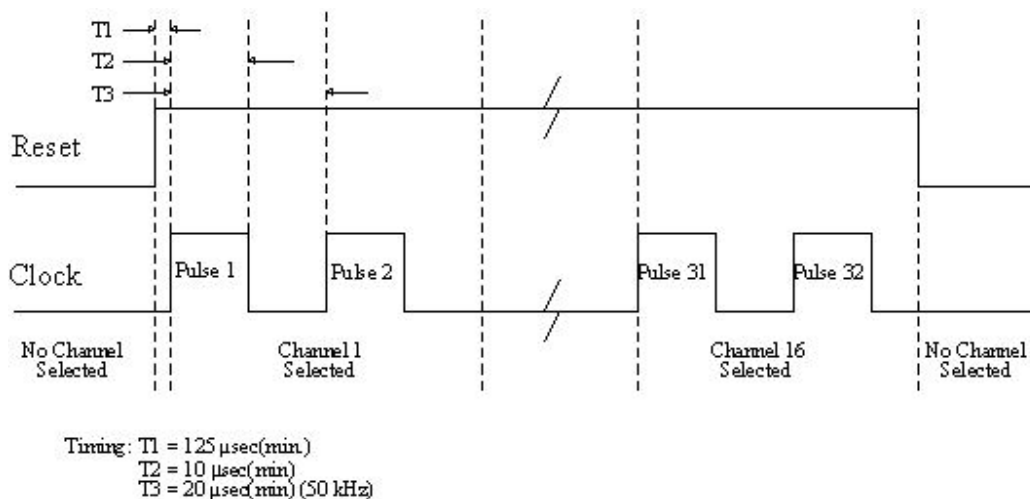


Figure 6 - 16 Channel MICRO-1000 / 800 Channel Selection Timing

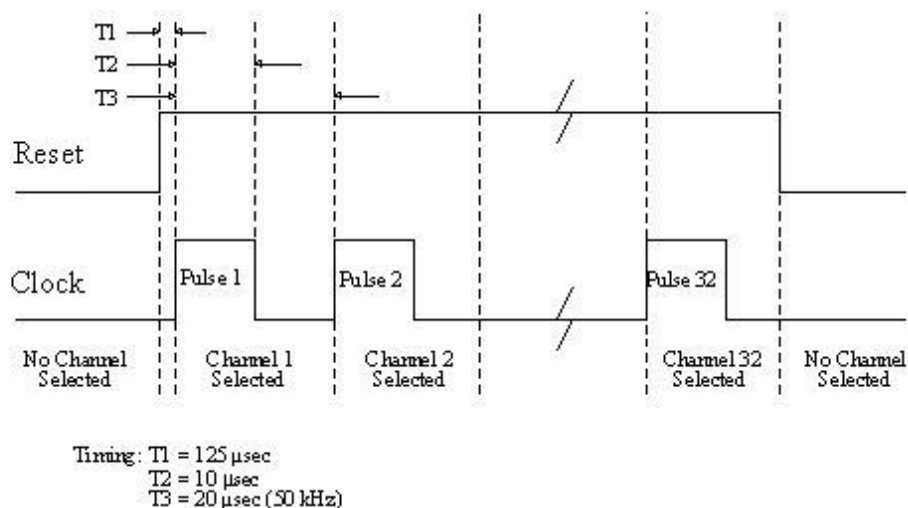


Figure 7 - 32 Channel MICRO-1000 / 800 Channel Selection Timing

## 2. WIRING

Actual gage connections to the terminal board will vary depending on the instrument type and cable used. Note the following tables to get the general idea.

<b>Terminal Board</b>	<b>Vibrating Wire with Thermistor</b>	<b>Resistance Strain Gage Bridge</b>	<b>Linear Potentiometer (with Remote Sense)</b>
1H	VW Sensor #1	S+ from Bridge #1	Excitation Pot #1
1L	VW Sensor #1	S- from Bridge #1	Wiper Output Pot #1
2H	Thermistor #1	P+ to Bridge #1	Remote Sense Pot #1
2L	Thermistor #1	P- to Bridge #1	Ground Pot #1
S1	Shield Drain Wire from Sensor #1	Shield Drain Wire from Bridge #1	Shield Drain Wire from Pot #1
3H	VW Sensor #2	S+ from Bridge #2	Excitation Pot #2
3L	VW Sensor #2	S- from Bridge #2	Wiper Output Pot #2
4H	Thermistor #2	P+ to Bridge #2	Remote Sense Pot #2
4L	Thermistor #2	P- to Bridge #2	Ground Pot #2
S2	Shield Drain Wire from Sensor #2	Shield Drain Wire from Bridge #2	Shield Drain Wire from Pot #2
•	•	•	•
•	•	•	•
•	•	•	•
31H	VW Sensor #16	S+ from Bridge #16	Excitation Pot #16
31L	VW Sensor #16	S- from Bridge #16	Wiper Output Pot #16
32H	Thermistor #16	P+ to Bridge #16	Remote Sense Pot #16
32L	Thermistor #16	P- to Bridge #16	Ground Pot #16
S16	Shield Drain Wire from Sensor #16	Shield Drain Wire from Bridge #16	Shield Drain Wire from Pot #16

Table 1 - 16 Channel Multiplexer/Terminal Board Wiring

<b>Terminal Board</b>	<b>Vibrating Wire</b>	<b>Thermistor</b>	<b>Thermocouple</b>
1H	VW Sensor #1	Thermistor #1	Thermocouple #1
1L	VW Sensor #1	Thermistor #1	Thermocouple #1
2H	VW Sensor #2	Thermistor #2	Thermocouple #2
2L	VW Sensor #2	Thermistor #2	Thermocouple #2
S1	Shield Drain Wires from Sensors 1&2	Shield Drain Wires from Thermistors 1&2	
3H	VW Sensor #3	Thermistor #3	Thermocouple #3
3L	VW Sensor #3	Thermistor #3	Thermocouple #3
4H	VW Sensor #4	Thermistor #4	Thermocouple #4
4L	VW Sensor #4	Thermistor #4	Thermocouple #4
S2	Shield Drain Wires from Sensors 3&4	Shield Drain Wires from Thermistors 3&4	
•	•	•	•
•	•	•	•
•	•	•	•
31H	VW Sensor #31	Thermistor #31	Thermocouple #31
31L	VW Sensor #31	Thermistor #31	Thermocouple #31
32H	VW Sensor #32	Thermistor #32	Thermocouple #32
32L	VW Sensor #32	Thermistor #32	Thermocouple #32
S16	Shield Drain Wires from Sensors 31&32	Shield Drain Wires from Thermistors 31&32	

Table 2 - 32 Channel Multiplexer/Terminal Board Wiring

Figure 10 depicts the Model 8032 board to which gage connections are made.

The components labeled "SA" are Tripolar Surge Arrestors (see Appendix A.3 for specifications). Components labeled "SG" are Bipolar Surge Arrestors (optional, see Appendix A.4 for specifications). Surge Arrestors not shown in Figure 10

Terminal strips T1 to T16 are for the gage connections.

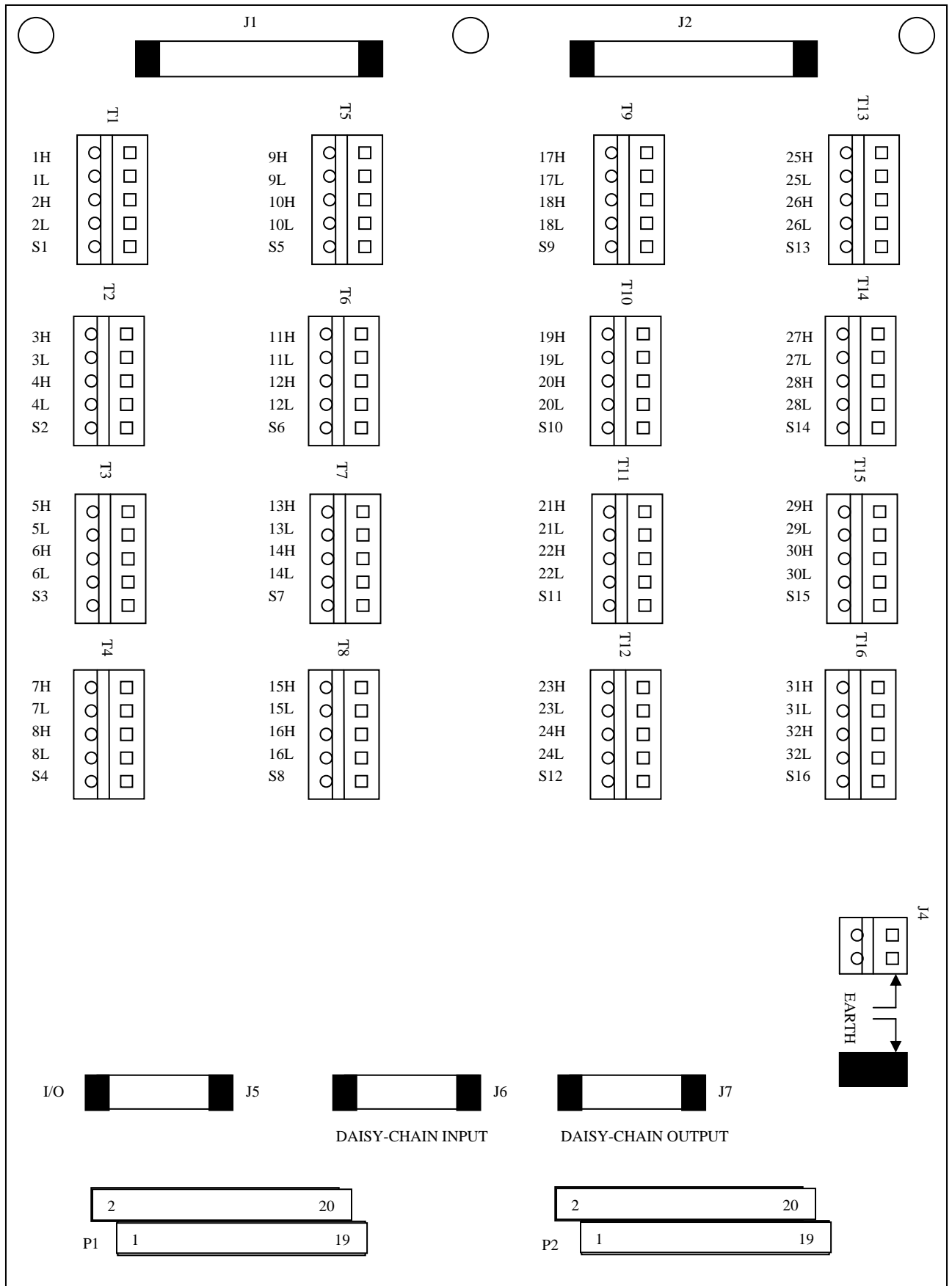


Figure 10- Terminal Board Layout

## **TROUBLESHOOTING**

Below are some commonly experienced problems along with possible remedial action. Contact the factory if any problem remains unresolved or additional help is required.

### **A particular channel on the multiplexer appears to be malfunctioning.**

- Check sensor connections on the terminal board. Clean if corrosion exists.
- Try moving the sensor wired to the suspect channel to another channel to verify the malfunctioning of the channel (as opposed to the sensor).

### **No channels are working.**

- Inspect circuit board for shorts, opens, or other damage.
- Is moisture present on circuit board? If so, install desiccant to absorb.

### **Channel selection appears to be random.**

- Has corrosion built up on the circuit board? Clean if necessary.
- Is there a source of electrical noise nearby? Move multiplexer or noise source if possible.

## **APPENDIX A - SPECIFICATIONS**

### **A.1 General**

Power Requirements: 10-16 VDC (unregulated)

Quiescent Current (MICRO-1000 / 800 mode): 80  $\mu$ A (16CH mode), 130 $\mu$ A (32CH mode)

Channel Activated Current: 30 mA

Control Line Input Impedance: 26 k $\Omega$  (CLOCK), 13.9 k $\Omega$  (RESET)

Control Line Input Levels: TTL, 5V CMOS or RS-232 ( $\pm$ 9 VDC)

Operating Temperature:  $-20$  to  $+80^{\circ}$  C

### **A.2 Relays**

Type: NAIS TXS2SA-4.5V DPDT non-latching

Power: 11.1 mA @ 5VDC (55.5 mW)

Contact Type: Gold clad silver alloy

On Resistance: 100 M $\Omega$

Coil Resistance: 405  $\Omega$

Maximum Switching Power: 30W (resistive)

Maximum Switching Voltage: 110 VDC

Maximum Switching Current: 1 A

Operate Time:  $\approx$ 5 msec Max.

Release Time:  $\approx$ 5 msec

Switching Life:  $5 \times 10^7$  operations (mechanical)

$2 \times 10^5$  operations (electrical @ 30W)

### **A.3 Tripolar Plasma Surge Arrestor**

Nominal DC Breakdown Voltage: 230V

Surge Life: 400 (10/1000 ms pulse @ 500 A)

Maximum Surge Current: 10 kA per side (8/20  $\mu$ s pulse)

Insulation Resistance: 10000 M $\Omega$

### **A.4 Bipolar Plasma Surge Arrestor**

Nominal DC Breakdown Voltage: 300V

Surge Life: 1000 (10/1000  $\mu$ s pulse @ 500 A)

Maximum Surge Current: 20 kA (8/20  $\mu$ s pulse)

Insulation Resistance: 10000 M $\Omega$

### **A.5 Transducer Connection Maximum Operating Voltage Levels:**

Common-mode Voltage/Earth Ground: 16V(max)

Differential-mode Voltage (Channel # 'H' – Channel # 'L'): 16V(max)

### **A.6 Reset and Clock Maximum Operating Voltage Levels:**

Single-ended Control Voltage/System Ground: 16V(max)

**APPENDIX B - CONNECTOR AND CABLE WIRING**

<b>J5</b>	<b>Inside Color</b>	<b>10 Pin Bendix</b>	<b>Description</b>	<b>Tan Cable Wire Color</b>
1	Brown	A	COM HI 1	White
2	Red	B	COM LO 1	White's Black
3	Orange	C	COM HI 2 (16 channel)	Red
4	Yellow	D	COM LO 2 (16 channel)	Red's Black
5	Green	E	Analog Ground	Shield Drain Wires from White & Red's pair plus Overall
6	Blue	F	+12 Volt Power	Yellow
7	Violet	G	Power Ground	Yellow's Black
8	Grey	H	RESET (CR1000 / CR800)	Green
9	White	J	CLOCK	Green's Black
10	Blk	K	No Fuction	Blue

Table B.1 – J5 (I/O) Connector

<b>P1 Pin Number</b>	<b>Description</b>
1,2	SHIELD
3,4	SHIELD
5,6	COM HI 1
7,8	COM LO 1
9,10	COM HI 2 (16 channel)
11,12	COM LO 2 (16 channel)
13,14	SHIELD
15,16	RS-485 +12 Volt Power
17,18	RS-485 Power Ground
19,20	RESET
21,22	CLOCK
23,24	SHIELD

Table B.3 – P1 (I/O) Connector

<b>J1</b>	<b>Terminal Strips</b>	<b>J2</b>	<b>Terminal Strips</b>
1	T1 - 1H	1	T3 - 17H
2	T1 - 1L	2	T3 - 17L
3	T1 - 2H	3	T3 - 18H
4	T1 - 2L	4	T3 - 18L
5	T5 - 3H	5	T7 - 19H
6	T5 - 3L	6	T7 - 19L
7	T5 - 4H	7	T7 - 20H
8	T5 - 4L	8	T7 - 20L
9	T9 - 5H	9	T11 - 21H
10	T9 - 5L	10	T11 - 21L
11	T9 - 6H	11	T11 - 22H
12	T9 - 6L	12	T11 - 22L
13	T13 - 7H	13	T15 - 23H
14	T13 - 7L	14	T15 - 23L
15	T13 - 8H	15	T15 - 24H
16	T13 - 8L	16	T15 - 24L
17	T14 - 16L	17	T16 - 32L
18	T14 - 16H	18	T16 - 32H
19	T14 - 15L	19	T16 - 31L
20	T14 - 15H	20	T16 - 31H
21	T10 - 14L	21	T12 - 30L
22	T10 - 14H	22	T12 - 30H
23	T10 - 13L	23	T12 - 29L
24	T10 - 13H	24	T12 - 29H
25	T6 - 12L	25	T8 - 28L
26	T6 - 12H	26	T8 - 28H
27	T6 - 11L	27	T8 - 27L
28	T6 - 11H	28	T8 - 27H
29	T2 - 10L	29	T4 - 26L
30	T2 - 10H	30	T4 - 26H
31	T2 - 9L	31	T4 - 25L
32	T2 - 9H	32	T4 - 25H
33	Shield	33	Shield
34	Shield	34	Shield

Table B.5 – J1/J2 (Terminal Board) Connectors