



SL MD-220

Optical Transmittance Analyzer

SPECIFICATIONS

- ◆ **2 channel digital interface**
- ◆ **Flexible optocoupler digital outputs**
- ◆ **Direct external control**
- ◆ **Minimal power consumption**
- ◆ **Adjustable trigger level impulse duration**
- ◆ **Sensor failure indication**

The Sensor Line MD-220 is a two-channel digital opto-electronic interface for Sensor Line's fiber optic load sensors. This two-channel interface supplies light to two fiber optic sensors, monitors the amount of light transmitted through the sensors and detects small changes caused by loads applied to the sensors. With its advanced circuitry, the interface can detect a load on a sensor for as long as it is applied to the sensor.

The MD-220 incorporates a TI MSP-430 embedded microcontroller, programmable via a JTAG interface. It has a 10-wire screw-clip interface with power supply terminals and four floating optocoupler outputs. It also has a RS-232 interface data transmission and troubleshooting. Direct external control is possible through the use of an 8-way SIL switch, two jumpers and a reset switch. For quicker troubleshooting, six LED status displays show the function of the interface and there are five easily accessible test points for analog measurements.

Power consumption has been minimized by circuitry that operates the transmitter diodes in series while independently controlling the current through each diode. The MD-220 uses near infrared diodes which give each channel a dynamic range of 30 dB.

FEATURES

- ◆ 2 Channel, digital interface
- ◆ Works in stop and go traffic
- ◆ Up to 30dB dynamic range
- ◆ Flexible optocoupler digital outputs (up to 60V)
- ◆ Completely software driven – easily adaptable for custom applications
- ◆ Optimized for toll applications
- ◆ Capable of dual tire detection
- ◆ RS-232 Output for use with Signal Viewer Software and Data Log capabilities
- ◆ 4 triggered outputs (2 for sensors, 1 for dual tire, and 1 for sensor failure)

TECHNICAL DATA

Hardware	
Hardware Version	2.0c STD-1
Number of Channels	2
Size	3.54 x 4.33 x 0.75 in (100 x 110 x 19 mm)
Electrical Connections	10-wire screw terminal block
	RS-232, 3-wire*
	5 test points
Optical connections	SMA 905
LED Peak Output Wavelength	850 nm (NIR)
Maximum Sensor Loss	30 dB (NIR)
Relative Humidity	80% at 77°F (25°C)
Temperature Range	-40 to 185°F (-40 to 85°C)
Supply Voltage	+12 to +24 VDC
Supply Current	< 140 mA
Analog Output at Test Points	0-10 V
Optocoupler Outputs max.	OFF: 50 V/<1 uA
	ON: 5 V/50 mA (250 mW @ 25°C)
RS-232 connector	9-pin DSUB male
Velocity Range	Up to 155 mph (250 km/h)
Feeder Length	Up to 820 ft (250 meters)
Comparative Laser Class	3A (NIR, sensor disconnected)
EMV/EMI	Meets CE-requirements

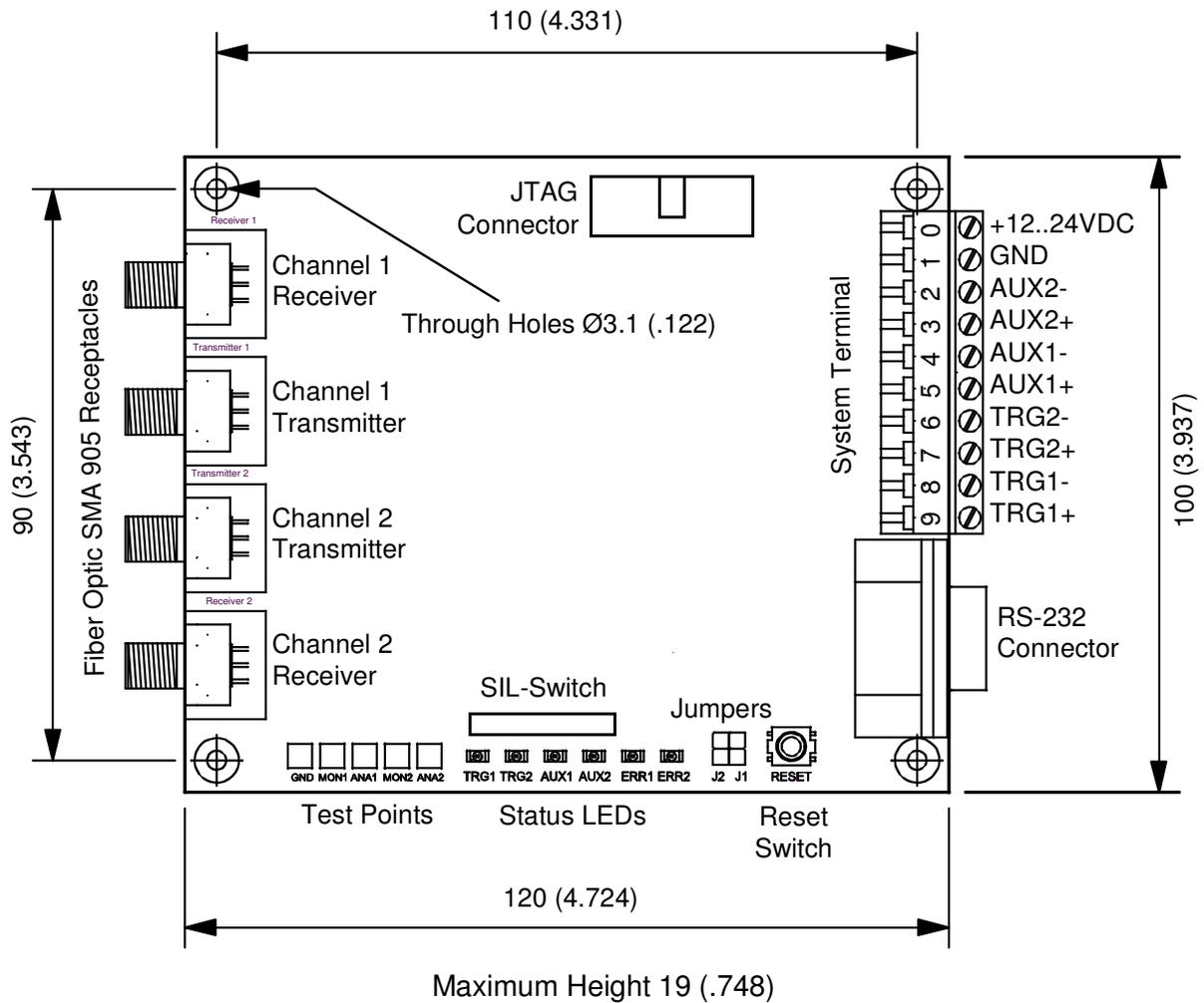
* selectable with SIL switch

Software		
Program Name	MD220STD	
Program Version	1.3	
Program cycle time	500 µs ± 5%	
Watchdog expiration time	4 ms	
Triggering	Thresholds	0.2%, 0.4%, 0.8%, 1.6% change of light transmittance*
	Adaptive Threshold	0%, 6.25%, 12.5%, 25%, 50% of load signal*
	Hysteresis	± 2 digits
	Minimum input ON time	3 program cycles (1.5 ms)
	Minimum output ON time	3 program cycles (1.5 ms) / 40 program cycles (20 ms)** 80 program cycles (40 ms)**
	Maximum output ON time	30 s
RS-232	Baud Rate	9600 / 19200 / 115200 Baud*
	Data Bits	8
	Stop Bits	1
	Parity	N (no parity)

* selectable with SIL switch

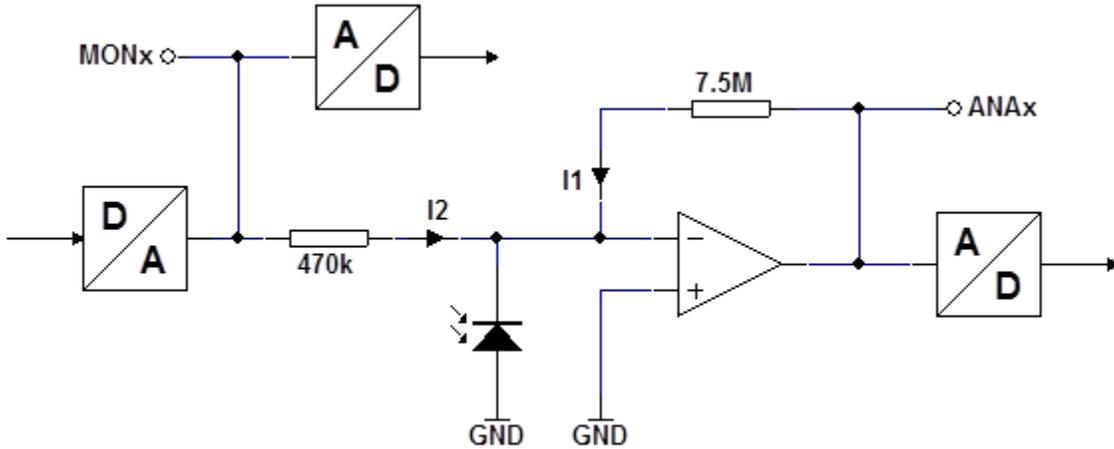
** selectable with jumper J1

MECHANICAL DIMENSIONS in mm (in)



Model Number	Part Number	Laser
SL MD-200-IR	1007062-2	IR

PRINCIPLES OF OPERATION



The drawing above is a simple circuit diagram of one channel. When the photodiode is illuminated with light from the sensor it proportionally sinks a current to the incoming light power. This causes the output of the OPAMP to go high so the current is supplied across the 7.5 MΩ resistor. When the light becomes too bright the OPAMP output is clipped, and the controller supplies additional current via the DAC and the 470 k resistor until the OPAMP output is “unclipped.”

Small changes of photo current are amplified by the OPAMP by a factor of 7.5 MΩ (7.5 V/μA). The controller measures this voltage (“Analog Voltage” or VANAx) as well as the voltage produced by the A-D converter (“Monitor Voltage” or VMONx) with a resolution of 12 Bits. An additional A-D converter controls the light power fed into the sensor

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