



Microcom Design, Inc.

# Sensor Interface SI-5



P/N: DL-105

## Features

- 2 Mbytes standard memory
- I/O and RS-232 serial ports
- 13-bit analog to digital conversions
- 16-bit H8S Hitachi Microcontroller with 32-bit internal CPU architecture
- Temperature compensated real-time clock
- Single DAC used for excitation and measurements to give ratio metric measurements
- Gas Discharge Tube (GDT) protected inputs
- Data values stored in tables with a time stamp and record number
- Battery-backed SRAM memory and clock ensuring data, programs, and accurate time are maintained while disconnected from its main power source
- Measures intelligent serial sensors

## Storage Capacity

1 Mbyte of FLASH memory for the Operating System.  
2 Mbytes battery-backed SRAM for CPU usage, program storage, and data storage. Data is stored in a table format. Storage capacity can be increased by using a CompactFlash® card.

**12 Vdc source;** SI-5 typically uses a sealed rechargeable battery that can be float-charged with a solar panel or ac power.

## Datalogger Programming

The onboard, BASIC-like programming language supports data processing and analysis routines. An intuitive GUI is provided for user interface.

## Input Output Terminals

**Analog Inputs:** Eight differential (16 single-ended) channels measure voltage levels. Resolution on the most sensitive range is 0.67  $\mu$ V.

**Pulse counters:** Two pulse channels can count pulses from high level (5 V square wave), switch closure, or low level ac signals.

**Switched voltage excitations:** Three outputs provide precision excitation voltages for resistive bridge measurements.

**Digital I/O ports:** Eight ports are provided for frequency measurements, digital control, and triggering. Three of these ports can also be used to measure SDM devices.

**Switched 12 Volt:** This terminal provides unregulated 12 V that can be switched on and off under program control.

**RS-232 port:** A PC or laptop can be connected to this 9-pin port via an RS-232 cable.

**I/O port:** Data transfer peripherals that require power from the datalogger can be connected to this port via a cable.

**Peripheral Port:** One 40-pin port interfaces with the CompactFlash® module.

**Operational Temperature:** -25° to +50°C; an extended range of -55° to +85°C is available.

## Communications

Compatible telecommunication options include Ethernet, phone modems (land-line and cellular), radios, short haul modems, GTX-1.0 GOES satellite transmitter, and multidrop modems. Real-time and historical data can be displayed on-site using a Palm OS-based PDA (requires PConnect 3.1), or a PC. The PC connects to the SI-5 via an RS-232 cable, or if optical isolation is required, via the I/O port and SC32B interface. Customers can transport programs/data to a PC via CompactFlash® cards.

## Channel Expansion

Synchronous Devices for Measurement (SDMs) are addressable peripherals that expand the SI-5's measurement and control capabilities. For example, SDMs are available to add control ports, analog outputs, pulse count channels, interval timers, or even a CANbus interface to a system. Multiple SDMs, in any combination, can be connected to one SI-5 datalogger.

## Multiplexers

Multiplexers increase the number of sensors that can be measured by a SI-5 by sequentially connecting each sensor to the datalogger. Several multiplexers can be controlled by a single SI-5. The SI-5 is compatible with the AM16/32 and AM25T.

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## Specifications

### ANALOG INPUTS

8 differential or 16 single-ended individually configured. Channel expansion provided by AM16/32 and AM25T multiplexers.

**ACCURACY:**  $\pm(0.07\%$  of reading + offset), 0° to 40°C;  $\pm(0.14\%$  of reading + offset), -25° to 50°C

**INPUT VOLTAGE:**  $\pm 16$  Vdc max.

**INPUT CURRENT:**  $\pm 1$  nA typical,  $\pm 6$  nA max. @ 50°C;  $\pm 90$  nA @ 85°C

**INPUT RESISTANCE:** 20 Gohms typical

**ACCURACY OF BUILT-IN REFERENCE JUNCTION THERMISTOR** (for thermocouple measurements):  $\pm 0.3^\circ\text{C}$ , -25° to 50°C

**ANALOG OUTPUTS:** 3 switched voltage, active only during measurement, one at a time.

**RANGE & RESOLUTION:** Voltage outputs programmable between  $\pm 2.5$  V with 0.67 mV resolution.

**ACCURACY:**  $\pm(0.07\%$  of setting + 0.8 mV), 0° to 40°C;  $\pm(0.14\%$  of setting + 0.8 mV), -25° to 50°C

**CURRENT SOURCING/SINKING:**  $\pm 25$  mA

### RESISTANCE MEASUREMENTS

**MEASUREMENT TYPES:** The SI-5 provides ratiometric measurements of 4- and 6-wire full bridges, and 2-, 3-, and 4-wire half bridges. Precise, dual polarity excitation using any of the 3 switched voltage excitations eliminates DC errors.

**RATIO ACCURACY:** Assuming excitation voltage of at least 1000 mV, not including bridge resistor error:  $\pm(0.04\%$  of reading + Offset/V<sub>ex</sub>)

### PULSE COUNTERS

Two 24-bit inputs selectable for switch closure, high frequency pulse, or low-level ac.

**MAXIMUM COUNTS PER SCAN:** 16.7x10<sup>6</sup>

#### SWITCH CLOSURE MODE:

Minimum Switch Closed Time: 5 ms

Minimum Switch Open Time: 6 ms

Max. Bounce Time: 1 ms open w/o being counted

#### HIGH FREQUENCY PULSE MODE:

Maximum Input Frequency: 250 kHz

Maximum Input Voltage:  $\pm 20$  V

**Voltage Thresholds:** Count upon transition from below 0.9 V to above 2.2 V after input filter with 1.2  $\mu\text{s}$  time constant.

**LOW LEVEL AC MODE:** Internal ac coupling removes dc offsets up to  $\pm 0.5$  V.

**Input Hysteresis:** 16 mV @ 1 Hz

**Maximum ac Input Voltage:**  $\pm 20$  V

**Minimum ac Input Voltage:** Sine wave (mV RMS) Range (Hz) 20 - 1.0 to 20 up to 5000 - 0.3 to 20,000

### DIGITAL I/O PORTS

8 ports software selectable, as binary inputs or control outputs. C1-C8 also provide edge timing, subroutine interrupts/wake up, switch closure pulse counting, high frequency pulse counting, asynchronous communications (UART), SDI-12 communications, and SDM communications.

**HIGH FREQUENCY MAX:** 400 kHz

**SWITCH CLOSURE FREQUENCY MAX:** 150 Hz

**OUTPUT VOLTAGES (no load):** high 5.0 V  $\pm 0.1$  V; low  $< 0.1$

**OUTPUT RESISTANCE:** 330 ohms

**INPUT STATE:** high 3.8 to 5.3 V; low -0.3 to 1.2 V

**INPUT HYSTERESIS:** 1.4 V

**INPUT RESISTANCE:** 100 kohms

### SDI-12 INTERFACE SUPPORT

Control ports 1, 3, 5, and 7 may be configured for SDI-12 asynchronous communications. Up to ten SDI-12 sensors are supported per port. Meets

SDI-12 Standard ver 1.3 for datalogger mode.

### CE COMPLIANCE

STANDARD(S) TO WHICH CONFORMITY IS DECLARED: BS EN61326:2002

### CPU & INTERFACE

**PROCESSOR:** Hitachi H8S 2322 (16-bit CPU with 32-bit internal core)

**MEMORY:** Battery-backed SRAM; 2 Mbytes, 16 kbytes for program storage

### SERIAL INTERFACES

**COM1** (I/O, used to interface with peripherals),

**COM2** (standard RS-232 communication port)

**PARALLEL INTERFACE:** 40-pin interface for attaching data storage or communication peripherals such as the CFM100 module

**BAUD RATES:** Selectable from 300 to 115.2 kbps. ASCII protocol is one start bit, one stop bit, eight data bits, and no parity.

**CLOCK ACCURACY:**  $\pm 3$  min. per year (-30° to 85°C);

### SYSTEM POWER REQUIREMENTS

**VOLTAGE:** 9.6 to 16 Vdc

**TYPICAL CURRENT DRAIN:** Sleep Mode:  $\sim 0.5$  mA up to  $< 7$  mA w/RS-232 communications and 100 Hz Sample Rate (one fast SE meas.)

**EXTERNAL BATTERIES:** 12 Vdc nominal; reverse polarity protected.

### PHYSICAL SPECIFICATIONS

**Dimensions:** 9.4" x 4" x 2.4" (23.9 x 10.2 x 6.1 cm)

**WEIGHT:** 2.1 lbs (1 kg)

**WARRANTY:** Three years against defects in materials and workmanship.



SI-5 with  
GTX-1.0  
Satellite  
Transmitter