



# IMP-865 DATA ACQUISITION SYSTEM

## FEATURES:

- Direct Sensor Inputs
- Control Outputs
- Internal/External Solid-State Storage
- Phone/Dedicated Line or Radio Telemetry
- Low Power
- Built-in Surge Protection
- MODBUS interface

The IMP-865 is a versatile digital data acquisition system designed for the most demanding environmental monitoring applications. It includes 8 differential or 16 single ended analog inputs, 2 pulse counters and 8 digital I/O ports. It can function as a stand-alone station or be operated via a PC singly or in a network.

Direct sensor interface including the supply of three precision excitation voltages is possible with the IMP-865. The input signals are processed by a custom application program that is factory supplied and may be modified by the user. The standard internal battery-backed SRAM memory stores 500,000 data points and the application program. A 4 Mbyte memory option provides a storage capacity of 2,000,000 data point. A removable solid-state storage module or CompactFlash® memory is also available to further increase storage capacity, transport data and/or download a new application program.

Programming of the IMP-865 is easily done with a PC and the support software or an optional, portable keyboard/display unit. A comprehensive on board instruction set is included, which can be programmed to perform calculations on any desired channel including interactions between channels.

The basic IMP-865 (P/N 102654-G0-H0) consists of a P/N 102655 data logger mounted in a 16 x 14 x 6 inch, NEMA-4X enclosure. The G1 option provides an enclosure size of 18 x 16 x 8 inches and the G2 option is 24 x 24 x 8 inches. The H1 option adds 2 Mbyte of internal memory. A rack mountable version of the IMP-865 is also available (P/N 102658-G0-H0) which uses only 5-1/4 x 19 inches of panel space.

The IMP-865 requires a 12-volt DC power source such as our P/N 101139 battery backup power supply. When battery backup is not required, our P/N 100519 power supply is provided.

A large selection of communications, storage, measurement and control peripherals are available. Contact Climatronics for a system quotation based on your specific requirements.



# SPECIFICATIONS

Electrical specifications are valid over a -25° to +50°C range unless otherwise specified; non-condensing environment required. To maintain electrical specifications, yearly calibrations are recommended.

## PROGRAM EXECUTION RATE

10 ms to 30 min. @ 10 ms increments

## ANALOG INPUTS

NUMBER OF CHANNELS: 8 differential or 16 single-ended, individually configured. Channel expansion provided by CAM416 Relay Multiplexers and CAM25T Thermocouple Multiplexers.

ACCURACY:  $\pm 0.2\%$  of FSR (-25° to 50°C);  $\pm 0.1\%$  of FSR (0° to 40°C);  
e.g.,  $\pm 0.1\%$  FSR =  $\pm 5.0$  mV for  $\pm 2500$  mV range

## RANGE AND RESOLUTION

Basic resolution (Basic Res) is the A/D resolution of a single conversion. Resolution of DF measurements with input reversal is half the Basic Res. Noise values are for DF measurements with input reversal; noise is greater with SE measurements.

Input Range (mV)	Basic Res (mV)	250 ms Int. (mV RMS)	50/60 Hz Int. ( $\mu$ V RMS)
$\pm 5000$	1330	385	192
$\pm 2500$	667	192	95.9
$\pm 250$	66.7	19.2	19.2
$\pm 25$	6.7	2.3	1.9
$\pm 7.5$	2	0.62	0.58
$\pm 2.5$	0.67	0.34	0.19

Offset for DF measurement w/input reversal = Basic Res/2 + 0.5  $\mu$ V  
Offset for DF measurement w/o input reversal = Basic Res + 1.0  $\mu$ V  
Offset for SE measurement = Basic Res + 2  $\mu$ V  
Offset for SE measurement = Basic Res + 2  $\mu$ V

## MINIMUM TIME BETWEEN VOLTAGE

MEASUREMENTS: Includes the measurement time and conversion to engineering units. For voltage measurements, the imp-865 integrates the input signal for 0.25 ms or a full 16.66 ms or 20 ms line cycle for 50/60 Hz noise rejection. Differential measurements with input reversal incorporate two integrations with reversed input polarities to reduce thermal offset and common mode errors and therefore take twice as long.

250  $\mu$ s Analog Integration:  $\sim 1$  ms single ended  
1/60 Hz Analog Integration:  $\sim 20$  ms Single ended  
1/50 Hz Analog Integration:  $\sim 25$  ms single ended

## INPUT NOISE VOLTAGE (for $\pm 2.5$ mV range):

Fast differential: 0.82  $\mu$ V rms  
Slow differential: 0.25  $\mu$ V rms  
Differential with 60 Hz rejection: 0.18  $\mu$ V RMS

COMMON MODE RANGE:  $\pm 5.0$  V

DC COMMON MODE REJECTION:  $> 100$  dB

NORMAL MODE REJECTION: 70 dB @ 60 Hz when using 60 Hz rejection

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

INPUT RESISTANCE: 20 Gohms typical

## ANALOG OUTPUTS

DESCRIPTION: 3 switched voltage, active only during measurement, one at a time.

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

ACCURACY:  $\pm 5$  mV;  $\pm 2.5$  mV (0° to 40°C);

CURRENT SOURCING: 25 mA

CURRENT SINKING: 25 mA

FREQUENCY SWEEP FUNCTION: The switched outputs provide a programmable swept frequency, 0 to 2.5 V square wave for exciting vibrating wire transducers.

## RESISTANCE MEASUREMENTS

MEASUREMENT TYPES: The IMP-865 provides ratiometric bridge measurements of 4- and 6-wire full bridge, and 2-, 3-, and 4-wire half bridges. Precise dual polarity excitation using any of the switched outputs eliminates dc errors.

ACCURACY:  $\pm 0.02\%$  of FSR plus bridge resistor error.

## PERIOD AVERAGING MEASUREMENTS

DEFINITION: The average period for a single cycle is determined by measuring the duration of a specified number of cycles. Any of the 16 single-ended analog input channels can be used. Signal attenuation and AC coupling are typically required.

## INPUT FREQUENCY RANGE & SPECIFICATION:

Input Range (mV)	Input Signal (Min) <sup>2</sup> Peak to Peak	Input Signal (Max) <sup>2</sup> Peak to Peak	Pulse Width (Min)	Frequency (Max) <sup>3</sup>
$\pm 2500$ mV	500 mV	10 V	2.5 ms	200 kHz
$\pm 250$ mV	10 mV	2 V	10 ms	50 kHz
$\pm 25$ mV	5 mV	2 V	62 ms	8 kHz
$\pm 2.5$ mV	2 mV	2 V	100 ms	5 kHz

<sup>2</sup>-Maximum signal must be centered at data logger ground.

<sup>3</sup>-Maximum frequency equals 1/(Twice Minimum Pulse Width) for 50 % duty cycle signals.

ACCURACY:  $\pm 0.01\%$  of reading + resolution

## PULSE COUNTERS

NUMBER OF PULSE COUNTER CHANNELS: 2 24-bit; software selectable as switch closure, high frequency pulse, and low level AC.

MAXIMUM COUNTS PER SCAN:  $16.7 \times 10^6$

## SWITCH CLOSURE MODE

Minimum Switch Closed Time: 5 ms  
Minimum Switch Open Time: 6 ms  
Maximum Bounce Time: 1 ms open without being counted

## HIGH FREQUENCY PULSE MODE

Maximum Input Frequency: 250 kHz  
Voltage Thresholds: Count upon transition from below 0.9 V to above 2.2 V after input filter with 1.2  $\mu$ s time constant.  
Maximum Input Voltage:  $\pm 20$  V

## LOW LEVEL AC MODE

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
200	0.5 to 200
2000	0.3 to 10,000
5000	0.3 to 20,000

## DIGITAL I/O PORTS

DESCRIPTION: 8 ports selectable, under program control, as binary inputs or control outputs. C1-C8 also have multiple function capability, which include edge timing, subroutine interrupts/wake up, switch closure pulse counting, high frequency pulse counting, asynchronous communication port (UART), SDI-12 communication port, and SDM communication port.

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

OUTPUT RESISTANCE: 330 ohms

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

INPUT RESISTANCE: 100 kohms

INPUT HYSTERESIS: 1.4 V

## SDI-12 INTERFACE STANDARD

DESCRIPTION: Control Ports 1, 3, 5, and 7 may be configured for SDI-12 asynchronous communication. Up to ten SDI-12 sensors are supported per port. It meets SDI-12 Standard version 1.3 for data logger mode.

## IMP-865 TCR THERMOCOUPLE REFERENCE

POLYNOMIAL LINEARIZATION ERROR: Typically  $< \pm 0.5^\circ\text{C}$  (-35° to +50°C),  $< \pm 0.1^\circ\text{C}$  (-24° to +45°C).

INTERCHANGEABILITY ERROR: Typically  $< \pm 0.2^\circ\text{C}$  (0° to +60°C) increasing to  $\pm 0.4^\circ\text{C}$  (at -35°C).

## CE COMPLIANCE

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

## CPU AND INTERFACE

PROCESSOR: Hitachi H8S 2322

PROGRAM STORAGE: Up to 16 Kbytes for active program.

DATA STORAGE: 1 Mbytes SRAM standard (approximately 1,000,000 data values). Additional 2 Mbytes SRAM available as an option.

OPTIONAL KEYBOARD DISPLAY: 8-digit LCD (0.5" digits)

SERIAL INTERFACES: COM1 (CS I/O, used to interface with IMP data logger peripherals), COM2 (Standard RS-232 communication port)

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

CLOCK ACCURACY:  $\pm 3$  minute per year (-30° to 85°C)  
 $\pm 15$  minute per year (-55° to 85°C, extended temperature range)

## SYSTEM POWER REQUIREMENTS

VOLTAGE: 9.6 to 16 Vdc

Sleep Mode:  $-0.5$  mA  
1 Hz Sample Rate (one fast SE measurement):  $-0.6$  mA  
100 Hz Sample Rate (one fast SE measurement):  $-7.0$  mA  
100 Hz Sample Rate (one fast SE measurement  $-20.0$  mA w/RS-232 communication):

BATTERIES: Any 12 V battery can be connected as a primary power source. Several power supply options are available.

The Model CR2430 lithium battery for clock and SRAM backup has a capacity of 270 mAh.

## PHYSICAL SPECIFICATIONS

SIZE: 8.5" x 3.9" x 0.85" - Measurement & Control Module; 9.4" x 4.0" x 2.4" - with Wiring Panel. Additional clearance required for serial cable and sensor leads.

WEIGHT: 2 lbs

## WARRANTY

Three years against defects in materials and workmanship.



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