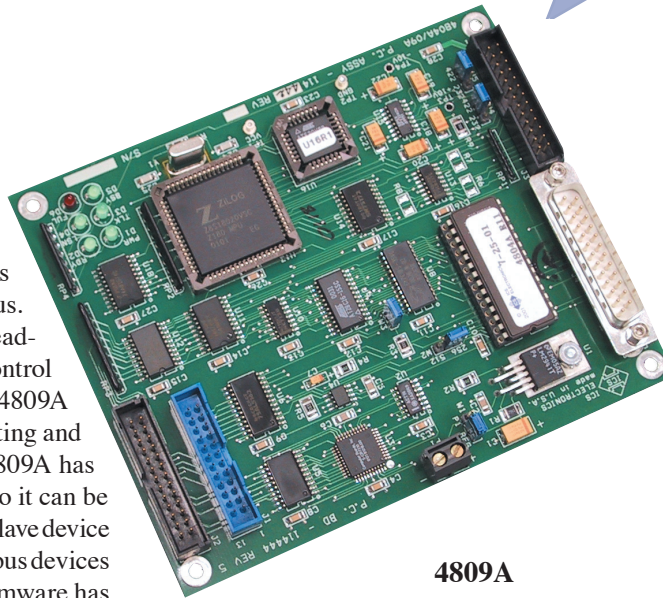# 4809A

GPIB<->MODBUS INTERFACE BOARD

4809A

DESCRIPTION

ICS's 4809A GPIB<->Modbus Interface is an IEEE 488.2/GPIB to Serial Interface that easily adapts Modbus slave devices to the GPIB or HP-IB bus. The 4809A lets the user send simple read-write messages on the GPIB bus to control and query Modbus slave devices. The 4809A does all of the Modbus packet formatting and verifies the response packets. The 4809A has both RS-232 and RS-485 interfaces so it can be connected directly to a single Modbus slave device or it can be connected to multiple Modbus devices on a RS-485 network. The 4809A firmware has an expanded Modbus command set and includes 32-bit floating point commands so it can control devices with floating point variables. Typical applications are controlling temperature chamber controllers and other modbus RTU devices.

The 4809A is a small 4.5 x 5.5 inch board that is normally mounted inside the host chassis with the Modbus device. The 4809A is powered by +5 to +15 volts so, in most cases, it can be connected an existing power supply. GPIB signal connections are made with flat ribbon cables that plug into headers on the 4809A. One header is for direct connection to a panel mounted GPIB connector and a second header includes switch lines for ICS's GPIB Connector/Address Switch Cable Assemblies. The GPIB Connector/Address Switch Assemblies mount to the host's rear panel and have an 8-bit rocker switch for externally setting the 4809A's GPIB address. Serial connections can be done with a flat ribbon cable to a 26-pin header or by plugging into the DB-25P connector.

Operation

The user sends GPIB commands to the 4809A that sets the Modbus device address, specifies the register to be read or written to and the data value. The 4809A converts these commands into the Modbus RTU format, adds the CRC checksum and transmits the message packets to the Modbus device. Response packets are verified and the responses to queries are outputted to the GPIB bus when the 4809A is next addressed to talk.

Modbus communication faults, exception messages and other errors are reported to the user through a Modbus error register in the 4809A's 488.2 Status Structure. The user can set up the 4809A's Status Structure to generate a SRQ on an error or simply read the Modbus Error register if a problem occurs. Application Note, AB48-25 describes how to use the 4809A to control a Modbus device and includes an example Visual Basic control program.

Configuring

The 4809A's SCPI command parser lets the user configure and query the 4809A's interface settings with SCPI commands. This includes the serial communication settings, GPIB Address, Status Structure Register settings, data format, Modbus timeout and Modbus device address. The GPIB Address can be saved internally or read from an external address switch. The user can also enter an IDN message to personalize the 4809A as part of his own system. The current configuration settings can be saved in nonvolatile memory so they can be recalled when the 4809A is powered-on or reset.

- Converts simple ASCII commands into Modbus RTU messages.
  Relieves user from having to generate and check RTU packets.

- Expanded Modbus RTU Command Set now includes Floating Point commands.
  Controls a wider range of Modbus devices.

- Provides both single ended RS-232 and balanced RS-422/RS-485 serial signals.
  Connects to single and multiple Modbus devices.

- IEEE-488.2 Compliant GPIB interface responds to all common commands.
  Provides an easier, more user friendly interface.

- GPIB address, serial settings and user IDN message saved in nonvolatile memory.
  Personalize the 4809A as part of your system.

- Diagnostic LEDs show address and status.
  Visual indication of operation and test status.

- Operates on +5 to 15 volt power.
  Uses existing power supplies in most cases.

☑ *RoHS Compliant*
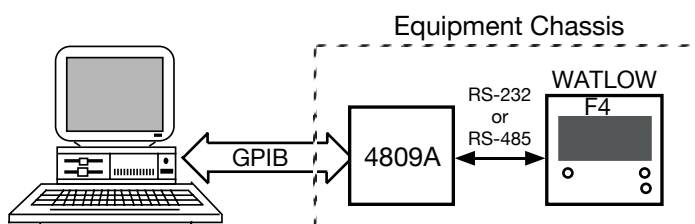
**Interfacing a Watlow Controller to the GPIB Bus**

ICS ELECTRONICS
division of Systems West Inc.

7034 Commerce Circle
Pleasanton, CA 94588
Phone: **925.416.1000**
Fax: **925.416.0105**
Web: **www.icselect.com**

Start with the 4809A board and then pick your accessory items.

Part Selection	**Qty**	**Part Number**
Standard 4809A board	(1)	4809A

Select a GPIB Connector/Address Switch Assembly - Horizontal style (1) 113640-L

Vertical style (1) 113642-L

or

Select a GPIB Flat ribbon Interface Cable with metric studs (1) 114439-L

Select an optional mating serial connector and hood - DB-25S connector (1) 902000

DB Hood (1) 902008

or

Select an optional 5 foot long open-end RS-232 serial cable for a Watlow F4
temperature controller or for another modbus device. (1) 115118

or

Select an optional 5 foot long open-end serial RS-485 cable for a Watlow EZ Zone
temperature controller or for another modbus device. (1) 115114

Notes:

-L is the cable length in cm. You can order any length from 10 to 90 cm.
Standard stocked lengths are: 30, 45, 60 and 90 cm. Select an appropriate length as it is best to not
have extra cable coiled up in the chassis to minimize EMI pickup. See the GPIB Connector/Address
Switch Assembly datasheet for more details.
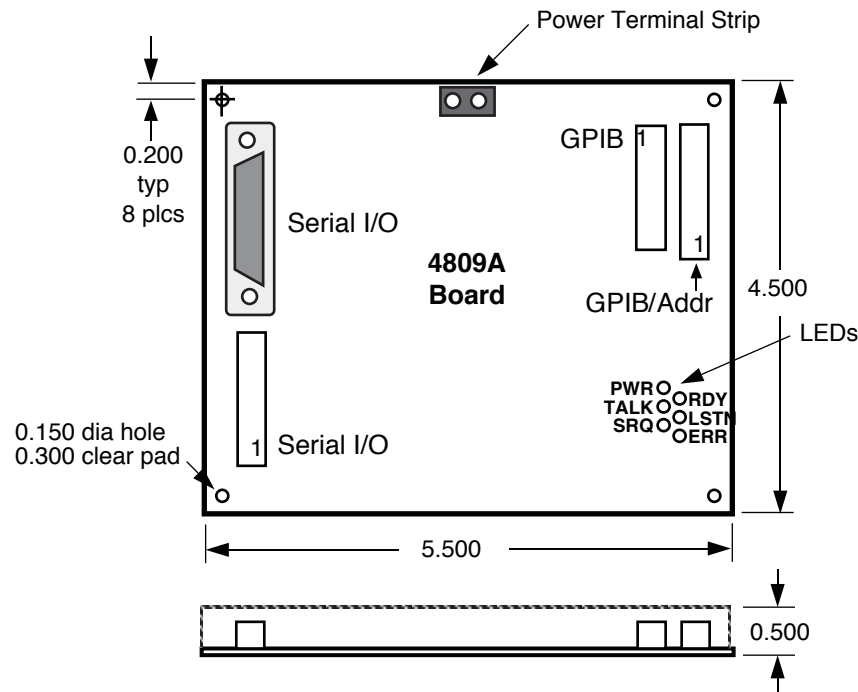
4809A Outline Dimensions

IEEE 488 Bus Interface

The 4809A's 488 Bus Interface meets IEEE STD 488.2-1987 and has the following capabilities:
SH1, AH1, T5, L3, SR1, PP0, DC1
RL0, DT0, C0 and E1/E2 drivers
Bus drivers incorporate power up/down protection to prevent glitching the bus during power turn-on.

Address Capability
Primary addresses 0-30.

Buffers
GPIB Input	2 Kbytes
GPIB Input	1 Kbytes
Serial Input/Output	256 bytes

Status Reporting Structure
IEEE-488.2 and SCPI Status Byte, ESR, Questionable and Operational Registers.

SRQ Generation
SRQs are generated per the IEEE-488.2 specification if the unit is not addressed to talk, if SRQs are enabled and if an enabled register bit occurs.

488.2 Common Commands
*CLS, *ESE, *ESE?, *ESR?, *IDN?, *OPC, *OPC?, *PSC, *RST, *SAV, *SRE, *SRE?, *STB, *TST?, AND *WAI.

SCPI Commands
The 4809A conforms to the SCPI 1994.0 Specification and uses SCPI commands to set:
GPIB Bus Address
External GPIB Address Enable
Baud rate select
Data bits 7 or 8
Stop bits 1 or 2
Parity Odd, Even or None
RS485 Half-Duplex operation
Talk Format HEXlist or ASCii

Included Accessories

Instruction Manual
Configuration Disk with menu driven configuration programs sample programs.

Serial Interface

Full duplex serial interface with single ended RS-232 and differential RS-422 (RS-485) signals. Signal selection made by jumpers on the 4809A. RS-485 half-duplex operation enabled with a SCPI command.

RS-232 Signals	TxD,RxD,RTS,CTS, DSR and DTR
RS-422 Signals	Tx and Rx pairs
Baud Rates:	300,600,1.2K,2.4K,4.8K, 9.6K, 19.2K and 38.4K baud
Data Bits	7 or 8 bits
Parity	Odd, even or none
Stop Bits	1 or 2

Modbus Commands

Modbus commands accept ASCII decimal values or HEX values starting with #h. Code is the Modbus RTU command code produced by the 4809A. Integer and register values from 0 to 65,535. Floating Point per IEEE-754.

Cmd	Code	Function
C n	-	Sets Device Address
RC? reg, n	0x01	Reads coils *n* from register *reg*
RI? reg, n	0x02	Reads Discrete Inputs *n* from register *reg*
R? reg, n	0x03	Reads *n* words starting with register *reg*
RF? reg	0x03	Reads floating point value from register *reg* and *reg+1*
RR? reg,n	0x04	Reads *n* words starting with register *reg*
RE?	0x07	Reads Exception value
WC reg,b	0x05	Writes boolean *b* to coil
W reg, w	0x06	Writes word *w* to a single register *reg*
WB reg, n, w...w	0x10	Writes multiple words *n* to a single register *reg*
WF reg, n	0x10	Writes a floating point value *n* to register *reg* and *reg+1*
L w	0x08	Performs loopback test
D time		Sets serial timeout in ms
E?		Queries Modbus Error Register

Compatible Modbus Controllers

The following is a partial list of compatible Modbus RTU Slave Controllers:
Watlow F4, 96, SD and EZ Zone series
Cincinnati SubZero EZT550

Physical

Size, L x W x H
139.7 x 114.3 x 12.7 mm
(5.5 x 4.5 x 0.5 inches)

Connectors:
Three flat ribbon headers
GPIB: 24-pin 3M 2524 male connector mates to panel mounted GPIB connector.
GPIB/Addr: 26-pin 3M 2526 male connector mates to ICS GPIB/ Connector Switch Assemblies.
Serial: 26-pin 3M 2526 male connector mates to a DB-25 pin connector.

LED Indicators:
PWR, RDY, TALK, LSTN, SRQ and ERR

Temperature:
Operation	-10° C to +55° C
Storage	-20° C to +85° C

Humidity:
0-90% RH without condensation

Power: +5 to + 15 Vdc
400 mA (typical)

Available Accessories

See the Ordering Guide on page 2 for a complete list of accessory items.

GPIB flat ribbon cable, 90 cm max.,
P/N 114439-90.
GPIB Connector/Addr Sw Assy with flat ribbon cable, 90 cm max.,
P/N 113640-90 or 113642-90.

ORDERING INFORMATION

	Part Number
GPIB - Serial Interface Board (includes Manual and Configuration Disk)	4809A
GPIB - Serial Interface Board (Board only)	114922
Accessory cables and connectors listed in Ordering Guide on page 2	