## **BOARD LEVEL PRODUCTS**

## 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 readwrite messages on the GPIB bus to control and query slave Modbus devices. The 4809A does all of the Modbus packet formatting and handles 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 via an RS-485 network. The 4809A firmware has an expanded Modbus command set and now includes 32-bit floating point commands so it can control newer temperature controllers. The 4809A is fully backward compatible with the earlier 4809.

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 is for ICS's GPIB Connector/Address Switch 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 a DB-25P connector.

## Operation

The user sends 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



Interfacing a Watlow Controller to the GPIB Bus



Modbus RTU format, adds the CRC checksum and transmits the messages to the Modbus device. Received messages are checked 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 a 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 and Modbus timeout. The GPIB Address can be saved internally or read from an external address switch. The user can also enter his own IDN message to personalize the 4809A as part

of his own system. The \*SAV 0 command saves the current configuration setting and Modbus device address in a nonvolatile memory so it can be recalled when the 4809A is powered-on or reset.

# 4809A GPIB<->MODBUS INTERFACE BOARD

- 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.
- GPIB Interface is IEEE-488.2 Compliant. Meets latest GPIB Standards.
- Saves GPIB address, serial settings and user IDN message in nonvolatile memory. *Personalize the 4809 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.





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 Standard 4809A board	<b>Qty</b> (1)	<b>Part Number</b> 4809A
Select a GPIB Connector/Address Switch Assembly - Horizontal style Vertical style or	(1) (1)	113640-L 113642-L
Select a GPIB Flat ribbon Interface Cable with metric studs	(1)	114439-L
Select an optional mating serial connector and hood - DB-25S connector DB Hood or	: (1) (1)	902000 902008
 Select an optional 5 foot long open end serial cable for a Watlow 942 temperature controller or for another serial device.	(1)	115118

## 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 data sheet for more details.



## **4809A** Outline Dimensions

## 4809A: SPECIFICATIONS

#### **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

Address Capability

Primary addresses 0-30.

#### Buffers

turn-on.

GPIB Input	2 Kbytes	
GPIB Input	1 Kbytes	
Serial Input/Output	ut	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 HEXIist 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 Parity Stop Bits	7 or 8 bits Odd, even or none 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
Cn -		Sets Device Address
RC? reg, 1	n 0x01	Reads coils <i>n</i> from
		register <i>reg</i>
RI? reg, n	0x02	Reads Discrete Inputs n
		from register reg
R? reg, n	0x03	Reads <i>n</i> words starting
		with register reg
RF? reg	0x03	Reads floating point
		value from register reg
		and $reg+1$
RR? reg,r	0x04	Reads <i>n</i> 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 <i>reg</i>
WB reg, r	1, WW	
	0x10	Writes multiple words <i>n</i>
		to a single register reg
WF reg, n	0x16	Writes a floating point
		value <i>n</i> to register <i>reg</i>
		and <i>reg+1</i>
Lw	0x08	Performs loopback test
D time		Sets serial timeout in ms
E?		Queries Modbus Error
		Register
1		

#### **Compatible 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 fl	at ribbon headers
GPIB:	24-pin 3M 2524 male connector
	mates to panel mounted GPIB
	connector.
CDID /A	11. O(

- 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
4809A Starter Kit includes 4809A Board, 488-LPCI GPIB Controller, Cables, Manual and CD-ROM	114923-01
4809A Starter Kit includes 4809A Board, 488-USB2 GPIB Controller, Cables, Manual and CD-ROM	114923-02

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