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DESCRIPTION

ICS’s 4899A GPIB<->Modbus Interface is an IEEE 488.2/GPIB to Serial Interface that adapts Modbus slave devices to the GPIB or HP-IB bus. The 4899A lets the user send simple read-write messages on the GPIB bus to control and query slave Modbus devices. The 4899A does all of the Modbus packet formatting and handles the response packets. The 4899A 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 4899A firmware has an expanded Modbus command set and now includes 32-bit floating point commands so it can control newer temperature controllers. The 4899A is fully backward compatible with the earlier 4899.

The 4899A is packaged in ICS's small Minibox™ case that can be rack mounted in a 1 U high space. Connections to the GPIB bus and the Modbus are made via standard IEEE 488 and a 25-pin serial connectors on the 4899A's rear panel.

Operation

The user sends simple commands to the 4899A that sets the Modbus device address, specifies the Modbus device register to be read or written to and the data value. The 4899A converts these commands into the 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 4899A is next addressed to talk.

4899A Modbus Interface

Modbus communication faults, exception messages and other errors are reported to the user through a Modbus error register in the 4899A's 488.2 Status Structure. The user can set up the 4899A'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 4899A to control a Modbus device and includes a example Visual Basic control program.

Configuring

The 4899A's SCPI command parser lets the user configure and query the 4899A's interface settings with SCPI commands. This includes the serial communication settings, GPIB Address, Status Structure Register settings, data format and Modbus timeout. The user can also enter an IDN message to personalize the 4899A 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 4899A is powered-on or reset.

4899A

GPIB<->MODBUS INTERFACE

- 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 and serial interface settings in nonvolatile memory. Configures unit without having to remove the cover.
- Front panel LEDs show address and status. Visual indication of operation and test status.
- Small 1 U high, metal box design has CE approval. Rugged case with full EMI/RFI protection.

Approved

RoHS Compliant
IEEE 488 Bus Interface

The 4899A'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

### SCPI Commands
The 4899A 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

### Modbus Commands
Modbus commands accept ASCII decimal values or HEX values starting with #h. Code is the Modbus RTU command code produced by the 4899A. Integer and register values from 0 to 65,535. Floating Point per IEEE-754.

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

### Serial Interface

- **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

### Compatible Controllers
The following is a partial list of compatible Modbus RTU Slave Controllers:
- Watlow F4, F4T (serial), 96, SD and EZ Zone series
- Cincinnati SubZero EZT550

### Controls and Indicators
- **Power**: Front-panel switch
- **LEDs**:
  - PWR: On when power applied
  - RDY: On when self test passed
  - TALK: On when addressed to talk
  - LSTN: On when addressed to listen
  - SRQ: On when asserting SRQ
  - ERR: On when ESR error bits set

### Physical
- **Size**: 7.45" L x 5.57" W x 1.52" H (18.92cm L x 14.15cm W x 3.86cm H)
- **Weight**: 3lbs. (1.4kg.) including adapter
- **Temperature**:
  - Operating: -10 °C to +55 °C
  - Storage: -20 °C to + 70 °C
- **Humidity**: 0-90% RH without condensation
- **Shock/Vibration**: Normal handling only
- **Construction**: All metal case
- **Power**: 9 to 32 Vdc @ 3.5 VA

### Included Accessories
- **Instruction Manual**
- **3.5 in Configuration Program Disk**
- **UL/CSA/VDE approved AC power Adapters provided for**:
  - US - 115±10% Vac, 60 Hz (std)
  - -U option is a universal adapter for 115/230±10% Vac, 50/60 Hz with plugs for US, UK, Europe, Australia/China and Japan

### Included Accessory
- Configuration Disk with menu driven configuration programs for ICS, NI and compatible GPIB Controller Cards and sample programs.