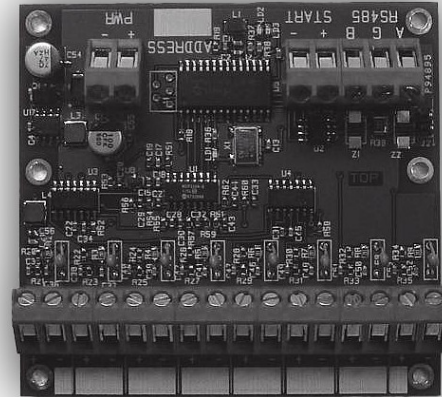




FEATURES

- POWERS AND MEASURES THE SIGNAL OF EIGHT LOOP POWER 4-20 mA SENSORS
- ALL INPUTS MEASURED 100 TIMES PER SECOND
- ERROR 0.01% FS TYP.
- ALL INPUTS ARE PROTECTED
- PROGRAMMABLE BAUD RATE FROM 9600 TO 115200
- PROGRAMMABLE PARITY
- WORKS WITH 7-40 VDC POWER, REVERSE POLARITY AND SURGE PROTECTED
- STOP WATCH INPUT
- STOP WATCH TIME ERROR LOWER THAN 1 ms
- RS485, 1/8 LOAD, TWO WIRE COMMUNICATION
- HIGH PROTECTION ON THE RS485
- BUILT-IN TERMINATION RESISTOR, JUMPER SELECTABLE
- FULLY COMPLIANT TO MODBUS RTU STANDARD
- LOW POWER CONSUMPTION
- SMALL SIZE



1. DESCRIPTION

GDA8A powers up to eight sensors or devices that provide a loop power 4-20 mA signal. It also measures all inputs one hundred times per second with an error of 0.01% FS typ., filters and conditions their signal. Using its RS485 two wire communication capabilities the data for all inputs can be read by a MODBUS RTU master. GDA8A has a stop watch input and measures accurately the duration for which that input has been shorted. The RS485 driver represents only 1/8 load which allows up to 247 devices on the same network (up to 1976 analog signals total). Using multiple GDA8A on different remote locations a high quality data acquisition system can be built. The stop watch time provided by each GDA8A can be used for detailed and accurate data logging and reports, or just as a digital input. The high protection of all inputs, the power supply and RS485 connection ensures high reliability and accuracy.

The slave address, baud rate and parity are programmable. Number of stop bits is not programmable to fully comply to the MODBUS RTU standard.

A blue LED provides indication for the inputs being measured, while a green and yellow LED provide indication about sending and receiving data over the RS485 communication port.

APPLICATIONS

- TO POWER AND MEASURE ANALOG SIGNALS FROM VARIOUS SENSORS AND DEVICES
- DATA ACQUISITION SYSTEMS
- REMOTE MONITORING
- FLOW MEASUREMENT
- TEMPERATURE MEASUREMENT
- PRESSURE MEASUREMENT



2. ABSOLUTE MAXIMUM RATINGS *

| | |
|-----------------------|---------------|
| Operating temperature | -20 to +70 °C |
| Power supply voltage | 40 V DC |

*** NOTICE: Stresses above those ratings may cause permanent damage to the device.**

3. CHARACTERISTICS

| Parameter | Conditions | Min | Typ | Max | Units |
|-------------------------|--|-----|------|-----|------------------|
| Power Supply | | | | | |
| Voltage | 25 ° C, NOTE 1 | | 24 | 36 | V DC |
| Power Consumption | 25 ° C, 24 VDC, all inputs at 20 mA, communicating | | | 4.5 | VA |
| Sensor Power | | | | | |
| Voltage | 25 ° C, NOTE 1 | | 24 | 36 | V DC |
| Analog Inputs | | | | | |
| Input resistance | Input 4-20 mA, 25 ° C | | 207 | | ohm |
| Error | Input 4 – 20 mA, 24 V, 25 ° C, NOTE 2 | | 0.01 | | % FS |
| Temperature coefficient | Input 4 - 20 mA, -20 to +70 ° C, 24 V DC | | 30 | | ppm/°C |
| Stop Watch | | | | | |
| Error | Open drain electronic switch, 24 V, 25 ° C, NOTE 3, NOTE 4 | | | 1 | ms |
| Time base error | Time base for the stop watch, -20 to +70 ° C | | | 25 | ppm |
| Minimum time to measure | -20 to +70 ° C | 100 | | | ms |
| Minimum pause | -20 to +70 ° C | 100 | | | ms |
| Communication | | | | | |
| Sampling rate | All data – 8 analog channels and stop watch elapsed time at the lowest baud rate | 35 | | | Times per second |

Note 1: The voltage to power all input sensors equals the power supply voltage. The minimum power supply voltage must be at least 5 VDC higher than the minimum sensor voltage for any input.

Note 2: The parameter includes all errors, non-linearity and noise at constant voltage and temperature. Only one input is connected and measured.

Note 3: If an electromechanical switch, button or dry contact is used there will be a bouncing time of the mechanical contact. The error may be higher and an external filtering capacitor across that contact may be needed.

Note 4: Both high and low registers of the stop watch must be read every time, in that order

4. PROGRAMMING

The parameters to be programmed are the MODBUS slave address, baud rate and parity. The number of stop bits is not programmable. If the parity is “none” GDA8A will use 2 stop bits. If the parity is “odd” or “even” then GDA8A will use 1 stop bits.

The programming (if needed) of these parameters can be done using G Instruments' “MODBUS_Test” software or using a PLC, terminal, computer or another equipment that has MODBUS RTU master capabilities over RS485.

4.1. Programming using G Instruments' software

4.1.1. Connect your GDA8A device to the serial port of your computer or lap top using a RS485 to RS232 converter. If your computer does not have a serial port use a USB to RS485 converter. You may need to install the driver(s) for that converter.

4.1.2. Start the “MODBUS_Test” software, choose the serial port where the device is connected to, the baud rate, 8 bit character, 1 stop bit for even and odd parity, or 2 stop bits for no parity, no handshaking. Then choose the current MODBUS slave address of the board and click on the “Open” button.

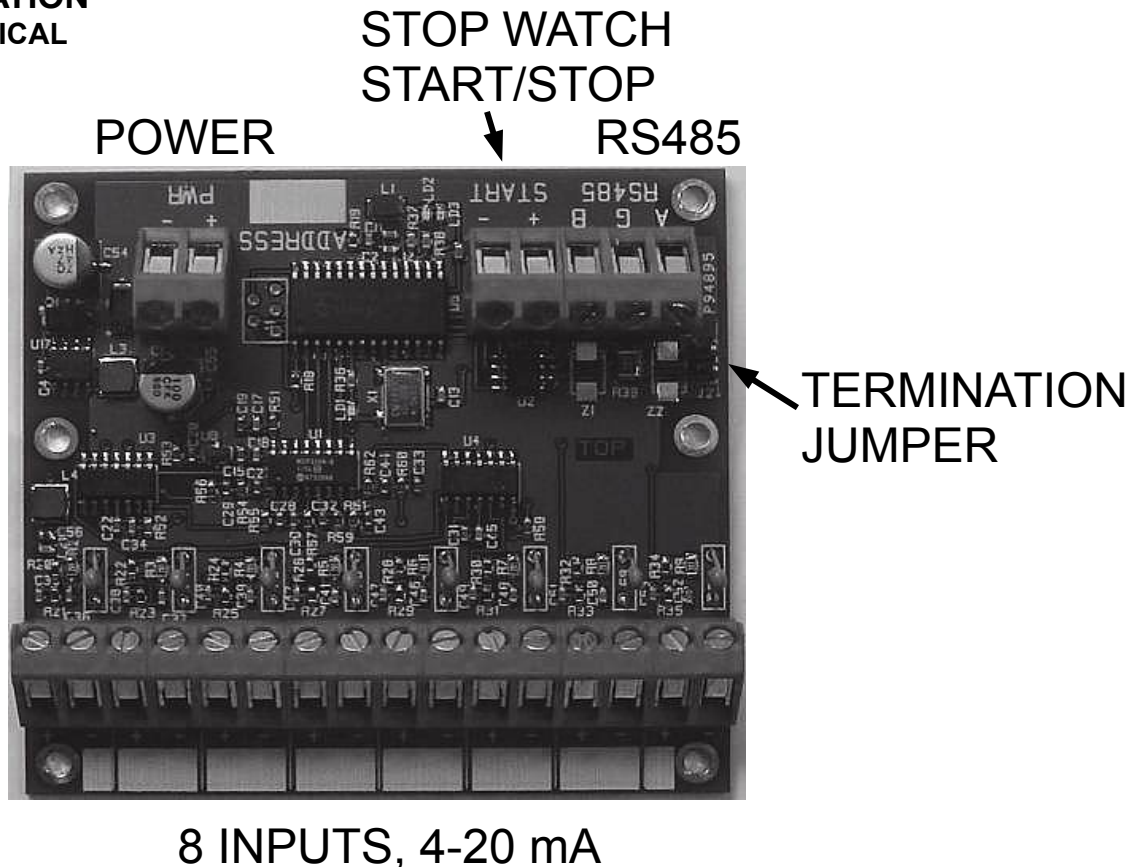
4.1.3. In order to change the address to a new one, for an example, you will need to write it into register number 1000. Enter the number 1000 in the “Register” box and the new slave address in the “Value” box. Then click on the “Write” button. A couple of seconds later the GDA8A board can be disconnected from the computer and will be ready to use.

Write the new address on the white rectangle space provided on the board.

NOTE: If the GDA8A device is not intended to work on a MODBUS network leave the MODBUS address to its factory default value of 1.

5. APPLICATION

5.1. ELECTRICAL



NOTE 1: The inputs are not isolated from the power and from the RS485 terminals

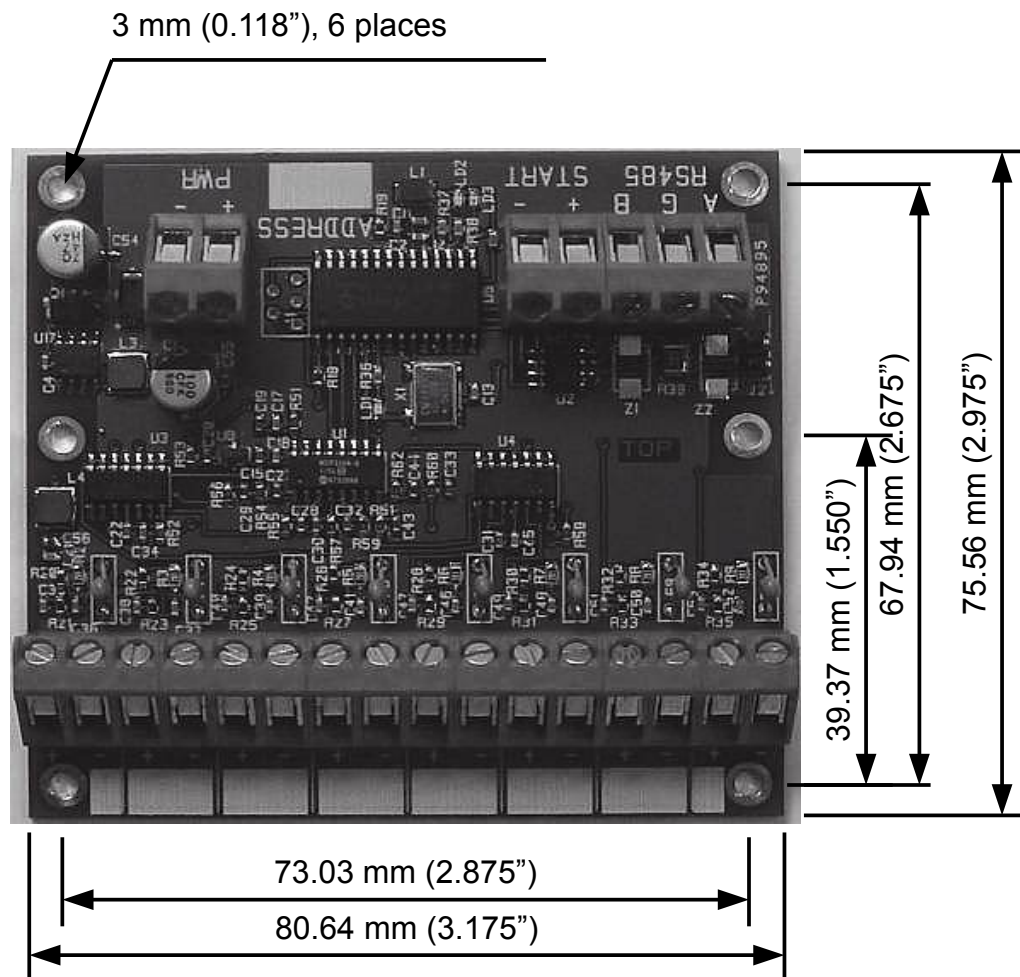
NOTE 2: All input “+” terminals are connected together

Use the white rectangle to write the MODBUS address of the board.

If the board is at the end of a two wire RS485 network a termination may be needed. Shorting the jumper on the GDA8A board will connect a 120 ohm / 0.5W resistor between A and B wires.

5.2. MECHANICAL

5.2.1. Dimensions





6. COMMUNICATION

GDA8A communication port is a 2 wire RS485 – A and B plus ground - G. If the distance to the master is significant a twisted pair must be used.

The factory defaults are: baud rate 19 200, even parity, 1 stop bit.

The communication protocol is MODBUS RTU. Functions 0x03 (read holding registers), 0x04 (read input registers) and 0x06 (write a single holding register) are implemented. The GDA8A device handles exceptions 1, 2, 3 and 6.

Here are the registers implemented:

| Register address | Register Type | Read/Write | Description | Format |
|-------------------------|----------------------|-------------------|---|-----------------------------------|
| 23 | Input | R | Normalized value of input 0, the left most | -300 to 10000 = -3.00 to 100.00 % |
| 24 | Input | R | Normalized value of input 1, NOTE 1 | -300 to 10000 = -3.00 to 100.00 % |
| 25 | Input | R | Normalized value of input 2, NOTE 1 | -300 to 10000 = -3.00 to 100.00 % |
| 26 | Input | R | Normalized value of input 3, NOTE 1 | -300 to 10000 = -3.00 to 100.00 % |
| 27 | Input | R | Normalized value of input 4, NOTE 1 | -300 to 10000 = -3.00 to 100.00 % |
| 28 | Input | R | Normalized value of input 5, NOTE 1 | -300 to 10000 = -3.00 to 100.00 % |
| 29 | Input | R | Normalized value of input 6, NOTE 1 | -300 to 10000 = -3.00 to 100.00 % |
| 30 | Input | R | Normalized value of input 7, the right most | -300 to 10000 = -3.00 to 100.00 % |
| 31 | Input | R | Stop Watch time, high, NOTE 2 | In ms * 65536 |
| 32 | Input | R | Stop Watch time, low, NOTE 2 | In ms |
| 1000 | Holding | W | MODBUS slave address | 1 - 247, default is 1 |
| 1053 | Holding | W | Baud Rate 0 = 19200, 1 = 38400, 2 = 57600, 3 = 115200, 4 = 9600 | 0 – 4, default is 0 |
| 1054 | Holding | W | Parity, 0 = even, 1 = odd, 2 = none | 0 – 2, default is 0 |

NOTE 1: This is a 2 byte signed integer. Convert it to a floating point, then divide by 10000.0 to get the normalized value. If the current of an input is below about 3.5 mA GDA8A will return 0x7FFF (32767) for that input.

NOTE 2: This is a 4 byte unsigned long integer. Merge the high and low parts to construct the long integer and it will represent the time elapsed (in ms) after the start input has been shorted.

Time [ms] = (((unsigned long)high) << 16) + low;
Both high and low registers must be read every time, in that order.

The most effective way to read the data is reading 10 input registers from address 23. The watch will clear and start incrementing after shorting the start input.

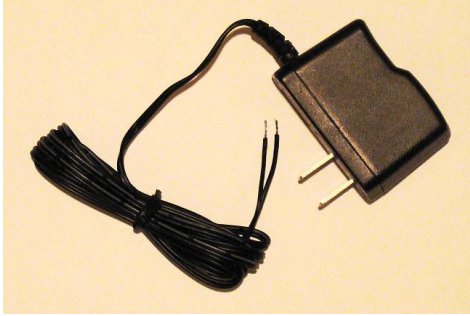
7. POWER SUPPLY

GDA8A can be powered by any DC power supply providing high enough voltage and current.

It is strongly recommended using an isolated power supply.

The voltage must be at least 5VDC higher than the minimum voltage for the sensor at any input. The voltage for the sensors equals the power supply voltage.

An excellent choice for a power supply is the adapter GPS124 on the picture below that we offer. It provides 24VDC / 250 mA regulated and filtered. It also has high isolation, protection and small size.



8. ORDERING

For ordering please use the following G Instruments part numbers:

| <i>Description</i> | <i>G Instruments PN</i> |
|--|-------------------------|
| GDA8A, 8 analog inputs 4-20 mA loop power data acquisition board | 30181 |
| GPS124 power supply, 115VAC to 24VDC/0.25A, regulated | 30138 |
| MODBUS_Test programming software | 30145 |



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