

WG-R 101

The protocol-translator for the Rinstrum electronics

The WG-R 101 is a small board, microcontroller based, with two serial ports (RS232 + RS232, RS232 + RS485, RS485 + RS232) . The main function for which it was designed is to connect the world of Rinstrum weighing electronics (weighing indicators, remote displays, Rinstrum networks) to PLC's or to other single or networked equipment when different communication protocols are to be used. . MODBUS ASCII , MODBUS RTU and Siemens 3964R protocols over an RS485 network were implemented as standard , and from the proprietary protocols Rinstrum, TOLEDO and EHP protocols were implemented. Almost any other documented protocol could be easily added to these lists.



Hardware

Several boards were developed in order to better fit various applications.

The standard board AI485232 REV.B has the following capabilities:

- ATmega8 @4.9152MHz microcontroller with:
 - 8K bytes flash for code
 - 1K byte RAM for data
 - 512 bytes eeprom for nonvolatile storage
- 1 x RS485 driver + 1 x RS232 driver
- optical isolation between drivers with DC-DC and optocouplers
- 4 signaling LEDs:
 - green LED (shows the presence of the main power supply, 9V...36V)
 - yellow LED (shows the presence of the isolated power supply derived from the main power supply)
 - red pulsing LED (indicate the RS485 transmission)
 - red LED (software driven)
- on-board switched mode power supply, accepting 9-36VDC input
- block of 4 dip-switches for some (software driven) configuration

Programming

Choosing one protocols from the standard protocols is easy by selecting the corresponding combination of the dip-switches. The other (incoming) protocol is automatically recognized by the self-tuning WG-R. For customized protocols a development platform is available (implementing of a new proprietary protocol is a matter of days)

WG-R101 Serial communication

WG-R101 has two serial ports

1. RS485 port which implements the MODBUS RTU protocol
2. RS232 port for Rinstrum Indicator communication

WG-R101 acts as a bridge between a Rinstrum indicator and a RS485 industrial bus. With the aid of several WG-R101, several Rinstrum Indicators can be connected to a single master PLC.

RS232 port specification, for Rinstrum connection:

- Baudrate : 9600
- Line parameters: N, 8, 1
- Mode : "nEt"
- Address : 1

RS485 MODBUS RTU port specification – for PLC/PC connection:

- Baudrate : 19200
- Line parameters : N, 8, 1
- Mode : RTU (binary)
- Address : 100 + DIPSW[0...15]



The above parameters are fixed on the WG-R101, so they should be set accordingly in the Rinstrum indicator (9600, N, 8, 1, "nEt", Address=1) and in the PLC port settings(19200, N, 8, 1, RTU, Address=100..115). The only programmable parameter is the WG-R101 modbus address which can be set in the 100-115 interval, 100 being a base address at which the DIPSWITCH code should be added.

High Level Modbus Protocol Implementation

WG-R101 presents to the Modbus Master a single 16bit register which is the weight read from the Rinstrum Indicator. This register should be read from Modbus Address 0x0000, with the Modbus function 0x03 ("read holding registers").

Modbus Function 3 (0x03), "Read Holding Registers".

Request (from Master)

Function code	1 byte	0x03
Read Starting Address	2 bytes	0x0000
Quantity to read	2 bytes	0x0001

Response

Function code	1 byte	0x03
Byte count	1 byte	0x02
Registers ...	2 bytes	Weight

Error

Function code	1 byte	0x83
Exception code	1 byte	1, 2, 3

Note that in the Request, the function code is 0x03 (read), the address is 0 (0x0000) and the quantity is 1 (0x0001). This means “Read One (0x0001) register from address 0 (0x0000)”. The register value (the Weight) will be transmitted in the Response message.

The Weight value 0x8000 (-32768, the most negative 16bit number) is NOT a valid weight value. This is an error code meaning that the communication with the Rinstrum Indicator is lost (Timeout). So, the Response of the WG-R101 in this case is:

Response

Function code	1 byte	0x03
Byte count	1 byte	0x02
Registers ...	2 bytes	0x8000

PIN assignement

PIN 1 – + Vcc (9V-36V)
 PIN 2 – - Vcc & RS485-GND
 PIN 3 – (RS485-B) => to RS485-B, external network
 PIN 4 – (RS485-A) => to RS485-A, external network
 PIN 5 – NC (not connected)
 PIN 6 – RS232-GND
 PIN 7 – (RS232-Rx) <= from RS232-Tx , external PC/PLC
 PIN 8 – (RS232-Tx) <= from RS232-Rx , external PC/PLC

Applications

1. Interfacing several Rinstrum RI323 weight indicators to a PLC using the MODBUS RTU protocol. Up to 15 indicators could be connected to the PLC. Each indicator has a network address which is configurable from the board dip-switches.

Several applications were developed : batching equipment using 4xRI323 and 1 x XC Moeller PLC for asphalt or concrete mixing plants,

2. Connecting Rinstrum networks to any MODBUS network. A multi-hopper feeding system using 12xRI323 and 2 x TWIDO Schneider mini-PLC was designed for mixing food and ingredients , for animal feeding.

3. Interfacing EHP crane scales to the Rinstrum D740 Remote Display

An OIML approved, LDN crane scale manufactured by EHP Wagetchnik GmbH from Buhl, Germany (www.ehp.de) was connected to a D740 Rinstrum remote display in a crossbeam scale combination. The D740 was powered from two VRLA 12V batteries (in order to supply with the requested 24V for the display)

Servicing

In case of any problem, please contact: office@tehnomei.ro