

ModBus 8 Channel Pulse Counter Data Sheet 3 May 2011

The Coherent Research ModBus pulse counter (Pulse Counter) has 8 pulse input channels which can be connected to pulse output meters over more than 250 metres of cable. Pulses from the connected meters are counted, sorted into interval data and buffered in the flash memory for retrieval via the ModBus interface.

Up to four of the pulse inputs can be configured by means of the ModBus interface as open drain outputs to mirror the inputs from the meters. These outputs can switch a maximum of 100 mA at 24 V dc.

The ModBus interface supports data rates of 1200, 2400, 4800, 9600, 19200, 38400, 56000 & 115200 bps. The communication settings and slave address are set using the ModBus interface. The device also supports reprogramming over the ModBus interface. The ModBus interface has a 1/8 unit load so that up to 247 of the devices can be connected to a ModBus.

The Pulse Counter is powered by a 12 V dc supply and incorporates a rechargeable NiMH battery to operate the Pulse Counter for 100 hours in the event of a supply failure.

The maximum current drawn from the supply is 50 mA. This is only required while recharging the battery otherwise; the current drawn is less than 10 mA.

The Pulse Counter has two 4 pin pluggable terminal blocks for the 2-Wire ModBus interface and the 12 V supply. These terminal blocks are connected in parallel and two are provided to facilitate daisy chaining the devices

The Pulse Counter has a 12 pin pluggable terminal block for connecting the pulse inputs with 4 ground reference terminals.

The Pulse Counter is supplied in a 4 module wide M36-DIN standard enclosure. The overall dimensions are width 70 mm (length of DIN rail required), height 102 mm including terminals and depth 58 mm.

The Pulse Counter has a 256 Kbyte flash memory for remote reprogramming and data buffering.

COHERENT RESEARCH MODBUS PULSE COUNTER INSTALLATION

The overall dimensions of the ModBus Pulse Counter are as follows:

Width 70mm, Depth 62mm, Height 110mm.

The ModBus Pulse Counter is supplied in a 4 module wide M36-DIN standard enclosure.

The ModBus Pulse Counter has two 4 pin 5.08 mm plug in terminal block connector on its upper face. The connectors are parallel connected to facilitate daisy chaining. The ModBus connections are indicated on the legend printed on the enclosure.

The V+ signal must be connected to a 12V regulated power supply. This is typically provide from the IDC to which it is connected.

The pulse inputs are connected to the 12 pin 5.08 mm plug in terminal block connector on the lower face. The connections are indicated on the legend printed on the enclosure.

Four 0V connections are provided in addition to the 8 pulse inputs labelled P0 – P7. The pulse inputs have an open circuit voltage of approximately +5.2 V and a short circuit current of approximate 1.6 mA. To ensure detection of pulses a current in excess of 1 mA must be drawn from the input.

ModBus Protocol for 8 Channel Pulse Counter V1.0 7th June 2011

If no Set Comms command has ever been issued, the 8 Channel Pulse Counter will have the default slave address of 247 and default communications parameters of 9,600 bps, no parity and one stop bit.

Function 4 Read Input Registers

Address 0 current inputs. Bits 0 to 7 are set if the corresponding input is low. Bit 8 is set if the battery is being charged. Bit 9 is set if the input regulator is disabled (for battery testing).

Address 256 target ID

Address 257 software version

Address 258/9 variant ID

Address 260/1 target flags

Address 262/3 program size

Address 264 boot program CRC

Address 265 check of boot program CRC return 0 if error 0xFFFF if OK

Address 266 program CRC

Address 267 check of program CRC return 0 if error 0xFFFF if OK

Holding Registers Functions:

3 Read Holding Registers, 6 Write Single Register & 16 Write Multiple Registers

Address 0 to 15 current count values. Address 0/1 is count 0 etc. All 32 bits of the counts must be accessed, attempting to read or write 16 bits results in a SLAVE DEVICE FAILURE.

Address 16 to 23 control of input channels 0 to 7 respectively, these controls are non volatile and the defaults only apply if the controls have not been set.

Low byte sets minimum time for pulse recognition in units of 1 mS. Maximum time for pulse recognition is 1 mS greater. Zero disables pulse counting. If counting is disabled on channels 1, 3, 5 & 7 the input acts as a repeater for channels 0, 2, 4 & 6 respectively. Defaults to 40 mS.

High byte set maximum length of pulse before stuck bit alarm is set in units of 100 mS. Zero disables test. Defaults to 2 S.

Address 24 sampling interval in seconds. Defaults to zero which disables logging.

Address 25 stuck inputs. If the input on any active channel is active for longer than the stuck bit alarm time in the channel configuration register the corresponding bit will be set. Writing to these addresses will reset the alarm for each channel for which the corresponding bit is set.

Address 256/7 time. All 32 bits must be accessed, attempting to read or write 16 bits results in a SLAVE DEVICE FAILURE.

Address 258 current tick count. Count of 1000 Hz ticks. If read with time the tick count will reflect the count at that time. Can only be written with time. Attempting to write 16 bits results in a SLAVE DEVICE FAILURE.

Address 259 diagnostic events. Bit significant register to enable logging of diagnostic events. This register is non-volatile. Bit 0 is set to enable battery charger events.

Address 512 to 519 write GUID. Only valid for write of 8 words and if the GUID is currently undefined.

Address 520 to 523 write serial number. Only valid if the serial number is currently undefined.

Address 768 to 890 write serial flash program. Write only. Starting address must be 768 and first four bytes must be the address where the data should be stored in the serial flash with the most significant address byte transmitted first. The subsequent words transmitted are written to the serial flash memory. The flash memory must be erased before being written.

Function 8 Diagnostics

Subfunction 00 Return Query Data

Subfunction 01 Restart Communication Options

Subfunction 02 Return Diagnostic Register – Return values are bit significant.

Subfunction 04 Force Listen Only Mode

Subfunction 10 Clear Counters and Diagnostic Register

Subfunction 11 Return Bus Message Count

Subfunction 12 Return Bus Communications Error Count

Subfunction 13 Return Bus Exception Error Count

Subfunction 14 Return Slave Message Count

Subfunction 15 Return Slave No Response Count

Subfunction 16 Return Slave NAK Count – Always returns 0

Subfunction 17 Return Slave Busy Count – Always returns 0

Subfunction 18 Return Bus Character Overrun Count – Always returns 0

Subfunction 20 Clear Overrun Counter and Flag – Has no effect

Function 11 Get Comm Event Counter

Function 12 Get Comm Event Log

Function 17 Report Slave ID

Response is 0x11, 0x24, 0x00, 0x17, 0xBF 0x00, 0x00 0x03, Byte Major, Byte Minor, 2 Bytes Program CRC, 1 Byte Run Indicator Status, 1 Byte Comms Status, 16 Bytes GUID, 8 Bytes Serial Number.

Where 0x00, 0x17, 0xBF identifies the supplier as Coherent Research Ltd

Where 0x00, 0x00, 0x03 is the ModBus Pulse Counter Device Type

Byte Major is the major software version number.

Byte Minor is the minor software version number.

Run Indicator Status is 0xFF if the sampling interval is non-zero 0x00 otherwise.

The Comms Status indicates the active communication settings.

Function 43 Read Device ID

Only Basic device identification is provided.

Function 65 Device Control

Each subfunction used a GUID to verify the command. The GUID must match the Default GUID {0x05, 0x9D, 0x39, 0x53, 0xF7, 0x97, 0x46, 0xAA, 0x86, 0xC2, 0x9A, 0x8F, 0x25, 0x08, 0xF6, 0xB3} otherwise a ILLEGAL DATA VALUE error is returned.

Subfunction 00 – Set Comms Parameters

Command format 0x41, 0x00, 0x11, 16 Bytes GUID, 1 Byte Comms Parameters or 0x41, 0x00, 0x19, 16 Bytes GUID, 8 Bytes Serial Number, 1 Byte Comms Parameters.

If the Serial Number is sent it must match the serial number in the device otherwise an ILLEGAL DATA VALUE error is returned.

The Comms Parameters is the sum of the following:

Requested Data Rates are:

0: 1200 bps

1: 2400 bps

2: 4800 bps

3: 9600 bps

4: 19200 bps

5: 38400 bps

6: 56000 bps

7: 115200 bps

Requested Parity Options are:

0: No Parity

8: Odd Parity

16: Even Parity

Requested Stop Bit Options are:

0: One Stop Bit

32: Two Stop Bits

128 to terminate ModBus at slave device.

The response of 0x41, 0x00 is sent with the original communications parameters.

Note: This command will also work with the broadcast address but no response will be generated.

The settings are non-volatile.