



Modbus Standard setup vers.1.0

This chapter is very important to read and understand it contains some very important information about how the modules must react during start-up. There are some simple rules that must be followed and they are:

It's not allowed to answer any packet/register request before all measurement have been made and all application registers have a valid value.

It is not allowed to return 0x0002 (started) in the Operation (0x0001) register before all measurement have been made and all application registers have a valid value. It does not matter if we lose some measurements what is important here is that all registers contains valid and correct values so we can trust the output from all modbus modules in our systems.

Rule number 1 & 2 is only valid for smaller applications that can not be stopped via the OpSignal (0x0800) register when sending the value 0x0001 (Stop).

2.2. Default Communication setup

A device fulfilling the guidelines set out by this document **must** implement the default communication setup that is:

Speed 115200 baudrate

1 Stop bit

Even parity

8 bit data

2.3. Slave communication timeout

IMPORTANT: All responses to read and write request must be delivered and finished within 100 ms after the master has sent the message to the slave device

2.4. Assigned Application ID

Application ID (0xFF01)	Application	Default address (0xFF81)
0x0015	CO2 Sensor	0x15

2.5. Assigned Hardware ID

Hardware Type	Item / Project
0x1A	CO2 Sensor

2.6 Modbus register layout

The standard registers come in two flavours. "Device configuration registers" (DCR) and "Application registers" (AR).

DCR registers are placed in the address space 0xFF00 through 0xFFFF. Application design is not allowed to define registers in the DCR range. AR registers are defined in the address space from 0x0001 through 0x08FF

To support the register layout a device **must** implement Modbus function: 0x03, 0x04, and 0x10.

Please be aware that register numbers are not mentioned in the tables to follow.



2.6.1 DCR registers

DCR register addresses from 0xFF00 to 0xFF7F are of Modbus type Input register, from 0xFF80 to 0xFFFF are of Modbus type Holding register.

DCR registers: M : Minimum Implementation, O : Optional						
Name	Register Address	Allowed values	Reg Type	Default	M O	Description
AppType	0xFF00	0x0000 = Bootstrapper 0x0001 = Bootloader 0x0002 = Application	Input	0x0002	M	-
AppID	0xFF01	0x0000 – 0xFFFF	Input	0x0000	M	-
SWRelease	0xFF02	0x0000 -0xFFFF	Input	-	M	SW release number
SWVersion	0xFF03	0x0000 -0xFFFF	Input	-	M	SW version number
SWLevel	0xFF04	0x0000 -0xFFFF	Input	-	M	SW level number
SWPatch	0xFF05	0x0000 -0xFFFF	Input	-	M	SW patch number
HWType	0xFF06	0x0000 -0xFFFF	Input	-	M	-
CmdReply	0xFF07	0x00 : Nothing 0x02 : Cfg. Programming Done 0x82 : Cfg. Programming Error 0x03 : Going to Application mode 0x83 : Cannot go to application mode 0x04 : Going to Bootloader mode 0x84 : Cannot go to bootloader mode 0x8F : Cmd not supported	Input	0x0000	O	Success or failure issuing command to 'Cmd' register.
Status	0xFF08	0: Cfg Not dirty 1: Cfg Dirty	Input	0x0000	O	If any register from 0xFF80 upwards has changed this field reflects the dirty status.
Cmd	0xFF80	0 : Ready 1 : Clear (CmdReply = 0) 2 : Program Configuration 3 : Set Application mode and reboot (wait 3 sec) 4 : Set Bootloader mode and reboot (wait 3 sec). 5 : Reset communications to factory settings.	Holding	0x0000	O	Cmd returns to 0 when a command is executed.
Address	0xFF81	1 - 247	Holding		O	This section implements configuration registers. If changed 'Status' reflects dirty, Assign 0x0001 to 'Cmd' to initiate programming. When programming is done Assign 0x0002 to 'Cmd' to reboot, and saved configuration will be in effect.
Baudrate	0xFF82	0x0001 : 9600 0x0002 : 19200 0x0003 : 115200 0x0081 : 300 0x0082 : 1200 0x0083 : 4800 0x0084 : 38400	Holding	0x0003 : 115200	O	
Stopbits	0xFF83	1, 2	Holding	1	O	
Paritet	0xFF84	0 : None 1 : Even 2 : Odd	Holding	1 : Even	O	

In case of setting wrong values to the holding registers starting from FF81, an error code matching the address is set to AR register "ErrCode" (0x0002) and "Operation" bit Error (0x0080) is set.



2.6.2 AR registers

AR register addresses from 0x0000 to 0x07FF are of Modbus type Input register, from 0x0800 to 0xFEFF are of Modbus type Holding register.

AR registers: M : Minimum Implementation, O : Optional						
Name	Register Address	Allowed values	Reg Type	Default	M	Description
Reserved	0x0000		Input		M	-
Operation	0x0001	Bitmask field. 0x0001 : Stopped 0x0002 : Started 0x0008 : Error 0x0080 : Restarting	Input	See note		Stopped: Device stops performing its regulation. Started: Device is performing its regulation. See note .
ErrCode	0x0002	Application error codes	Input	0x0000	M	-
CO2Value	0x0003	0x0000 ~ 0x07D0	Input	Variable		0x0001 : 0.01% 0x0002 : 0.02%
OpSignal	0x0800	0x0000 : Ready 0x0001 : Stop 0x0002 : Start 0x0008 : Reset Error 0x0080 : Restart	Holding	0x0000	M	Ready – Cmds. can be issued Stop - regulation Start - regulation Reset – error Restart – reboot.

Small devices 0x0002 = started, larger applications 0x0001 = stopped.

Stopped/Started logic is for larger applications where it makes sense to start/stop. Small devices most likely does not need it.

ErrCode = 0, Operation = clear 0x0008 Error

- 1 Baudrates 9600, 19200, 115200 are preferred standard communication speeds.
- 2 Baudrates 300, 1200, 5800. 38400 are optional communication speeds.
- 3 Small devices 0x0002 = started, larger applications 0x0001 = stopped.
- 4 Stopped/Started logic is for larger applications where it makes sense to start/stop. Small devices most likely does not need it.
- 5 ErrCode = 0, Operation = clear 0x0008 Error