TECHNICAL SPECIFICATION

Communication Protocol for Controller
I-DIGIT (RS485-MODBUS-RTU)

REV.0/2013

INDEX

1 General Description

The controller I-DIGIT2 is a device MODBUS-RTU compatible.
The communication between the controller and a master (PC or other) is through a serial communication RS485 , transmission frequency of 9600 BAUD, 8 bit, no parity, 1 bit stop.

In a communication network RS 485 , can be addressed 255 devices, as required by the MODBUS protocol.
The communication bus of each individual controller is 2-wire: LINE + and LINE - .
Every single regulator is powered by insulated transformer, therefore the digital ground is separated from the neutral and the phase.

The communication with the regulator allows the following features:

- Reading all the control variables and I / O state of the device;
- Reading of the main state of the controller (Season, mode, status of valves, fan speed);
- Setting the current season;
- Setting the mode (Comfort-Economy);
- Writing of operating parameters (in RAM);
- Saving of operating parameters (in FLASH PERMANENT MEMORY);

2 Requirements

The controller has series of programmable operating parameters via MODBUS-RTU. By reading and writing configuration registers you can set the device operation.

The parameters can be anytime viewed using the function MODBUS FUNCTION 3 to specific addresses and writable by the MODBUS FUNCTION 6 (Preset Single Register).
The thermostat has 53 operating parameters useful for to set the regulator on different types of plant.
All parameters and control variables are arranged in a "Word" equal to two consecutive bytes.
Using the function 6 is possible to modify the single parameter, registering the data in the RAM memory of the device. To save the parameters in the flash memory (non-volatile memory), you must use the save command as described later.

3 Parameters List

Following are (Table 1) described the Modbus registers I / O used as operating parameters, description, and the assigned address.
When you change a parameter (see Table 1 below) you modify the register only in the RAM of the controller.
To save the value in flash memory (permanent memory of the controller), is necessary send the command SAVING PARAMETERS described in List of Controller Commands (pag. 17).
All parameters are allocated from address number 1001 (41001 for ModScan) to address number 1053 (41053 for ModScan)

Table 1 : parameter list			
MODBUS Function	Word address Parameter	Description	Note
HOLDING REGISTER (MODBUS FUNCTION 3)	41001-41053 41001 = P1 (Parameter 1, Time-Prog-Mode)	The value is displayed in decimal at 1 Word The parameter set the mode of the programming time. It can be set to 0,1,2 option	Parameter for option read-write 0 = Time Scheduler Excluded 1 = Time Scheduler programmed band 2= Time Scheduler sets the ON- OFF controller
(MODBUS FUNCTION 3)	41002 = P2 (Parameter 2, Default parameters list (Pre configured parameter))	The value is displayed in decimal at 1 Word The parameter sets the mode of the programming time. Selectable to the values 0 ... 9 from the user	Parameter for option read-write 0 = Set values / Table 1 . . . 9 = Set values / Table 10
HOLDING REGISTER (MODBUS FUNCTION 3)	41003 = P3 (Parameter 3, Neutral Band)	The value is displayed in decimal at 1 Word The parameter sets the Neutral Band if it is used in the type of system 4-pipe.	Read-write parameter Represented in ° C x 10 Example: If you want to set a B.N. 4.5 ° C, the register must be set to 45. Setting limits: 0.0 ..... 10.0 ° C
HOLDING REGISTER (MODBUS FUNCTION 3)	41004 = P4 (Parameter 4, Type of plant)	The value is displayed in decimal at 1 Word The parameter set the type of system that can be 2 or 4 pipes	Parameter for option read- write 0 = 2 Pipes 1 = 4 Pipes
HOLDING REGISTER (MODBUS FUNCTION 3)	41005 = P5 (Parameter 5, Fan operating mode)	The value is displayed in decimal at 1 Word The parameter sets the mode of operation of the fan, thermostat or continuous	Parameter at read-write option 0 = Thermostat controlled 1 = Continuous
HOLDING REGISTER (MODBUS FUNCTION 3)	41006 = P6 (Parameter 6, Actuator Type)	the value is displayed in decimal at 1 Word The parameter set the type actuator	Parameter at read-write option 0 = ON-OFF 1 = THERMAL 2 = FLOATING

MODBUS Function	Word address Parameter	Description	Note
HOLDING REGISTER (MODBUS FUNCTION 3)	41001-41053 41007 = P7 (Parameter 7, Electrical heater option)	The value is displayed in decimal at 1 Word The parameter defines the mode of operation of the electrical resistance. It can be set to 0,1,2,3 option	Parameter for option read-write 0 = no resistance wired 1 = resistance in substitution (primary) 2 = resistance in integration 3 = resistance in integration mode RH
(MODBUS FUNCTION 3)	41008 = P8 (Parameter 8, Water sensor function)	The value is displayed in decimal at 1 Word The parameter defines the functionality of the water probe. Can assume the values 0,1,2, 3 to option	Parameter for option read- write 0 = water probe not present 1 = sensor for water transmission season 2 = water sensor for activating the fan 3 = water sensor to enable change of season + fan
HOLDING REGISTER (MODBUS FUNCTION 3)	41009 = P9 (Parameter 9, Season change mode)	The value is displayed in decimal at 1 Word This parameter defines how the season change. Can assume the values 0,1,2, 3 to option	Parameter for option read-write 0 = central / water probe 1 = manual 2 = module environment 3 = + module temperature water environment
HOLDING REGISTER (MODBUS FUNCTION 3)	41010 = P10 (Parameter 10, Delta Economy)	The value is displayed in decimal at 1 Word The parameter defines the increasing or decreasing of the set point in Economy	Read-write parameter Represented in ° C x 10 Example: If you want to set a delta-economy of 2.0 ° C, the register must be set to 20. Setting limits: 1.0 ..... 6.0 ° C
HOLDING REGISTER (MODBUS FUNCTION 3)	41011 = P11 (Parameter 11, Proportional Band)	The value is displayed in decimal at 1 Word The parameter set the proportional band.	Read-write parameter Represented in ° C x 10 Example: If you want to set a B.P. of 2.0 ° C, the register must be set to 20. Setting limits:1.0 … 5.0C
HOLDING REGISTER (MODBUS FUNCTION 3)	41012 = P12 (Parameter 12, Function mode in RH)	The value is displayed in decimal at 1 Word The parameter defines the action of the thermostat in relation to the moisture reading	Parameter for option read-write 0 = display only 1 = humidification 2 = dehumidification 3 = cool + RH

MODBUS Function	Word address Parameter	Description	Note
HOLDING REGISTER (MODBUS FUNCTION 3)	4101-41053 41013 = P13 (Parameter 13, Neutral Band RH)	The value is displayed in decimal at 1 Word The parameter sets the Neutral Band (%) in control RH	Read-write parameter Represented in% RH Setting limits: 5 ..... 20%
(MODBUS FUNCTION 3)	41014 = P14 (Parameter 14, Integral Time)	The value is displayed in decimal at 1 Word The parameter sets the integration time used in the function of P + I	Read-write parameter Defines the integral action in sec.x10 Setting limits: 0 ..... 200 Ex. if you set the value 3 the integral time is 30 seconds. If you set the value 10 the integral time is 100 seconds
HOLDING REGISTER (MODBUS FUNCTION 3)	41015 = P15 (Parameter 15, Auxiliary output function)	The value is displayed in decimal at 1 Word The parameter defines the functionality of the auxiliary output. It can be set to 0,1,2or 3	Read-write parameter 0 = Output Resistance 1 = Output Hum. / Deumid. 2 = Output Damper 3 = Output Control Lights
HOLDING REGISTER (MODBUS FUNCTION 3)	41016 = P16 (Parameter 16, Consensus winter Temperature)	The value is displayed in decimal at 1 Word The parameter sets the temperature of consensus Winter.	Read-write parameter Represented in ° C x 10 Example: If you want to set a temperature of 35.0 ° C, the register must be set to 350. Setting limits: 20.0 ..... 50.0 ° C
HOLDING REGISTER (MODBUS FUNCTION 3)	41017 = P17 (Parameter 17, Consensus Summer Temperature)	The value is displayed in decimal at 1 Word The parameter sets the consensus of Summer temperature.	Read-write parameter Represented in ° C x 10 Example: If you want to set a temperature of 15.0 ° C, the register must be set to 150. Setting limits: 5.0 ..... 25.0 ° C
HOLDING REGISTER (MODBUS FUNCTION 3)	41018 = P18 (Parameter 18, Activation of fan in Winter season)	The value is displayed in decimal at 1 Word The parameter sets the temperature of the fan consensus in Winter.	Read-write parameter Represented in ° C x 10 Example: If you want to set a temperature of 38.0 ° C, the register must be set to 380. Setting limits: 20.0 ..... 50.0 ° C

MODBUS Function	Word address Parameter	Description	Note
HOLDING REGISTER (MODBUS FUNCTION 3)	41001-41053 41019 = P19 (Parameter 19, Activation of fan in Summer season)	The value is displayed in decimal at 1 Word The parameter sets the temperature of consent Fan in Summer	Read-write parameter Represented in ° C x 10 Example: If you want to set a temperature of 13.0 ° C, the register must be set to 130. Setting limits: 5.0 ..... 25.0 ° C
(MODBUS FUNCTION 3)	41020 = P20 (Parameter 20, Setpoint Antifreeze)	The value is displayed in decimal at 1 Word The parameter sets the Setpoint frost protection	Read-write parameter Represented in ° C x 10 Example: If you want to set a freeze of 4.0 ° C, the register must be set to 40. Setting limits: 0.0 ..... 10.0 ° C
HOLDING REGISTER (MODBUS FUNCTION 3)	41021 = P21 (Parameter 21, Actuator running time for floating valve)	The value is displayed in decimal at 1 Word The parameter sets the time in seconds of actuator stroke (floating valve)	Read-write parameter Represented in seconds. Setting limits: 0 .... 400 seconds
HOLDING REGISTER (MODBUS FUNCTION 3)	41022 = P22 (Parameter 22, Fan operating hours for signaling dirty filter)	The value is displayed in decimal at 1 Word The parameter sets the operating hours of the fan overcome which is the reporting of the dirty filter.	Read-write parameter Parameter is expressed in hours x 300 Setting limits: 0 ..... 20th Ex. if you set a value of 1 corresponds to the filter hours 1x300 = 300 hours if you set the value 6 hours filter corresponding to 6x300 = 1800 hours
HOLDING REGISTER (MODBUS FUNCTION 3)	41023 = P23 (Parameter 23, Set minimum temperature value)	The value is displayed in decimal at 1 Word This parameter defines the minimum setpoint set by the user	Read-write parameter Represented in ° C x 10 Example: If you want to set a minimum setpoint of 10.0 ° C, the register must be set to 100. Setting limits: 10.0 ..... 30.0 ° C
HOLDING REGISTER (MODBUS FUNCTION 3)	41024 = P24 (Parameter 24, Set maximum temperature value)	The value is displayed in decimal at 1 Word This parameter defines the maximum setpoint set by the user	Read-write parameter Represented in ° C x 10 Example: If you want to set a maximum setpoint of 30.0 ° C, the register must be set to 300. Setting limits: 10.0 ..... 30.0 ° C

MODBUS Function	Word address Parameter	Description	Note
HOLDING REGISTER (MODBUS FUNCTION 3)	41001-41053 41025 = P25 (Parameter 25, Offset temperature)	The value is displayed in decimal at 1 Word The parameter defines the offset for to compensate the reading of the temperature sensor	Read-write parameter Represented in ° C x 10 with management of the positive / negative. Example: If you want to set an offset of -5.0, the register must be set to 0xFFCE. If you want to set an offset of +5.0, the register must be set to 0x0032 Setting limits: -5…+5°C
(MODBUS FUNCTION 3)	41026 = P26 (Parameter 26, Offset humidity value RH)	The value is displayed in decimal at 1 Word The parameter defines the offset for to compensate for the reading of the humidity sensor RH	Read-write parameter Represented in% RH with management of the positive / negative. Example: If you want to set an offset of -20%, the register must be set to 0xFFEC. If you want to set an offset of +20%, the register must be set to 0x0014. Setting limits: -20% ..... +20%
HOLDING REGISTER (MODBUS FUNCTION 3)	41027 = P27 (Parameter 27, Delay of fan start in Winter set)	The value is displayed in decimal at 1 Word The parameter sets the delay in seconds to start the fan in winter.	Read-write parameter Represented in seconds. Setting limits: 0 .... 250 seconds
HOLDING REGISTER (MODBUS FUNCTION 3)	41028 = P28 (Parameter 28, Delay of fan start with electrical heater primary resistance in winter set)	The value is displayed in decimal at 1 Word The parameter sets the delay in seconds to start the fan with primary resistance in Winter.	Read-write parameter Represented in seconds. Setting limits: 0 .... 250 seconds
HOLDING REGISTER (MODBUS FUNCTION 3)	41029 = P29 (Parameter 29, , Delay of fan OFF with electrical heater primary resistance in winter set)	The value is displayed in decimal at 1 Word The parameter sets the delay in seconds to turn off the fan with primary resistance in Winter.	Read-write parameter Represented in seconds. Setting limits: 0 .... 250 seconds

MODBUS Function	Word address Parameter	Description	Note
HOLDING REGISTER (MODBUS FUNCTION 3)	41001-41053 41030 = P30 (Parameter 30, Option Window Contact)	The value is displayed in decimal at 1 Word This parameter defines the mode of contact window (N.C. or N.A.) Can assume the values 0.1	Parameter for option read-write 0 = Contact closed -> Open Window 1 = Contact open -> Open Window
(MODBUS FUNCTION 3)	41031 = P31 (Parameter 31, Option Economy Contact)	The value is displayed in decimal at 1 Word The parameter defines the mode of contact presence to activate the Economy (N.C. or N.A.) Can assume the values 0,1	Parameter for option read-write 0 = Contact closed -> Economy Comfort with open contact 1 = Contact open -> Economy Comfort with closed contact
HOLDING REGISTER (MODBUS FUNCTION 3)	41032 = P32 (Parameter 32, Option Auxiliary Contact)	The value is displayed in decimal at 1 Word The parameter defines the mode of auxiliary contact to activate the function defined by parameter P33 (N.C. or N.A.) Can assume the values 0,1	Parameter for option read-write 0 = Contact closed auxiliary function -> ON 1 = Contact open -> auxiliary function ON
HOLDING REGISTER (MODBUS FUNCTION 3)	41033 = P33 (Parameter 33, Ttype of Auxiliary function)	The value is displayed in decimal at 1 Word The parameter defines the type of auxiliary function associated with the contact Can assume the values 0,1,2	Parameter for option read-write 0 = Enable fan 1 = Warning Bathroom 2 = Smoke Alarm
HOLDING REGISTER (MODBUS FUNCTION 3)	41034 = P34 (Parameter 34, Type of configuration HW)	The value is displayed in decimal at 1 Word The parameter defines the type of hardware configuration of the controller, Ex, the wiring in four possible pre settled options	Parameter for option read-write 0 = Configuration 0 1 = Configuration 1 2 = Configuration 2 3 = Configuration 3

MODBUS Function	Word address Parameter	Description	Note
HOLDING REGISTER (MODBUS FUNCTION 3)	41001-41053 41035 = P35 (Parameter 35, Minimum current absorbed by the fan)	The value is displayed in decimal at 1 Word The parameter defines the Minimum current level absorbed by the fan. Under this value an alarm is generated	Read-write parameter Defines the minimum current mA.x10 Setting limits: 0 .... 50 Ex. if you set the limit value of 50, minimum current is 500 mA. 0 = test undercurrent excluded
(MODBUS FUNCTION 3)	41036 = P36 (Parameter 36, maximum current absorbed by the fan)	The value is displayed in decimal at 1 Word The parameter defines the maximum limit current absorbed by the fan, Over this value an alarm is generates	Read-write parameter Defines the upper limit of current mA.x10 Setting limits: 0 .... 120 Ex if you set the limit value 120 will be the maximum current of 1200 mA. 0 = test overcurrent excluded
HOLDING REGISTER (MODBUS FUNCTION 3)	41037 = P37 (Parameter 37, Type of NTC probe)	The value is displayed in decimal at 1 Word The parameter defines the type of NTC sensor connected	Parameter for option read- write 0 = NTC @10K 1 = NTC @ 20K
HOLDING REGISTER (MODBUS FUNCTION 3)	41038 = P38 (Parameter 38, Setpoint controller)	The value is displayed in decimal at 1 Word The parameter defines the current working setpoint	Read-write parameter Represented in ° C x 10 Example: If you want to set a setpoint of 20.0 ° C, the register must be set to 200. Setting limits: 10.0 ..... 30.0 ° C
HOLDING REGISTER (MODBUS FUNCTION 3)	41039 = P39 (Parameter 39, Temperature mode)	The value is displayed in decimal at 1 Word The parameter sets the mode of temperature display	Parameter for option read- write 0 = ° C (Celsius) 1 = ° F (Fahrenheit)
HOLDING REGISTER (MODBUS FUNCTION 3)	41040 = P40 (Parameter 40, Back light 1 minimum)	The value is displayed in decimal at 1 Word The parameter sets the minimum backlight of BK1	Parameter for option read- write 0 = 0%, 1 = 20%, 2 = 40%, 3 = 60%, 4 = 80%, 5 = 100%
HOLDING REGISTER (MODBUS FUNCTION 3)	41041 = P41 (Parameter 41, Back light 2 minimum)	The value is displayed in decimal at 1 Word The parameter sets the minimum backlight of the BK2	Parameter for option read- write 0 = 0%, 1 = 20%, 2 = 40%, 3 = 60%, 4 = 80%, 5 = 100%

MODBUS Function	Word address Parameter	Description	Note
HOLDING REGISTER (MODBUS FUNCTION 3)	41001-41053 41042 = P42 (Parameter 42, MODBUS Slave Address)	The value is displayed in decimal at 1 Word The parameter defines the RS485 network address for communication with the master	Read-write parameter Setting limits: 0 .... 255 as required by the standard BUS
(MODBUS FUNCTION 3)	41043 = P43 (Parameter 43, Hysteresis% on the valve proportional band ON- OFF)	The value is displayed in decimal at 1 Word The parameter defines in% 's hysteresis working valve ON-OFF	Read-write parameter Setting limits: 2 .... 100%
HOLDING REGISTER (MODBUS FUNCTION 3)	41044 = P44 (Parameter 44, valve in HP mode opening time in minutes)	The value is displayed in decimal at 1 Word The parameter sets in minutes, the opening of the valve in HP mode. The opening occurs every minute P45 (HP cycle mode)	Read-write parameter Setting limits: 1 .... 100 minutes
HOLDING REGISTER (MODBUS FUNCTION 3)	41045 = P45 (Parameter 45, valve cycle opening time in HP mode in minutes)	The value is displayed in decimal at 1 Word The parameter sets the opening cycle of the valve in HP mode. L 'opening occurs every P45 minutes for a time of initiation of P44 minutes (HP cycle mode)	Read-write parameter Setting limits: 1 .... 999 minutes
HOLDING REGISTER (MODBUS FUNCTION 3)	41046 = P46 (Parameter 46, Setpoint controller in the winter when the table is selected #3)	The value is displayed in decimal at 1 Word The parameter determines the controller setpoint in the winter when the selected table (recipe) # 3	Read-write parameter Represented in ° C x 10 Example: If you want to set a setpoint of 18.0 ° C, the register must be set to 180. Setting limits: 5.0 ..... 30.0 ° C
HOLDING REGISTER (MODBUS FUNCTION 3)	41047 = P47 (Parameter 47, Setpoint controller in the summer when the table is selected #3)	The value is displayed in decimal at 1 Word The parameter determines the controller setpoint in the summer when selected table (recipe) # 3	Read-write parameter Represented in ° C x 10 Example: If you want to set a setpoint of 27.0 ° C, the register must be set to 270. Setting limits: 5.0 ..... 30.0 ° C

MODBUS Function	Word address Parameter	Description	Note
HOLDING REGISTER (MODBUS FUNCTION 3)	41001-41053 41048 = P48 (Parameter 48, Humidity Setpoint RH)	The value is displayed in decimal at 1 Word The parameter defines the setpoint RH humidity (%)	Read-write parameter Represented in% RH Setting limits: 0% 100%
(MODBUS FUNCTION 3)	41049 = P49 (Parameter 49, Minimum output in % of the modulating valve)	The value is displayed in decimal at 1 Word The parameter defines the value of minimum output of the modulating valve. It is expressed as a percentage.	Read-write parameter Represented in% Setting limits: 0% ..... 50% 0% -> 0 Volts 50% -> 5.0 Volt
HOLDING REGISTER (MODBUS FUNCTION 3)	41050 = P50 (Parameter 50, Maximum output in% of the modulating valve)	The value is displayed in decimal at 1 Word The parameter defines The value of maximum output of the modulating valve. It is expressed as a percentage.	Read-write parameter Represented in% Setting limits: 50% ..... 100% 50% -> 5.0 Volt 100% -> 10.0 Volt
HOLDING REGISTER (MODBUS FUNCTION 3)	41051 = P51 (Parameter 51, Minimum output in % of output 0 .. 10V (modulating) the fan	The value is displayed in decimal at 1 Word The parameter defines the value of minimum output 0 ... 10V fan. It is expressed as a percentage.	Read-write parameter Represented in % Setting limits: 0% ..... 50% 0% -> 0.0 Volt 50% -> 5.0 Volt
HOLDING REGISTER (MODBUS FUNCTION 3)	41052 = P52 (Parameter 52, Maximum output in % of output 0 .. 10V (modulating) the fan	The value is displayed in decimal at 1 Word The parameter defines The value of maximum output 0 ... 10V fan. It is expressed as a percentage.	Read-write parameter Represented in% Setting limits: 50% ..... 100% 50% -> 5.0 Volt 100% -> 10.0 Volt
HOLDING REGISTER (MODBUS FUNCTION 3)	41053 = P53 (Parameter 53, Fan operating MANUAL)	The value is displayed in decimal at 1 Word The parameter defines the mode of operation of the fan in MANUAL (V1, V2, V3)	Parameter for option read- write 0 = fan always enabled 1 = Fan enabled only when are satisfied the consents set by other parameters.

4 Time-date range of the current regulator

To set (or read) the time and date of the regulator must have access to appropriate registers allocated from address in 2001 (42001 to ModScan) to address in 2004 (42004 to ModScan)

Following is a table that defines the single registers of the current date-time, the meaning for each register and the correspondent address assigned.
The access to individual registers (Holding Register) is possible by the MODBUS FUNCTION 3

Table 2 : Set Hour-Data in the controller

MODBUS Function	ONLY READ WORD ADDRESS	Description	Note
HOLDING REGISTER (MODBUS FUNCTION 3)	42001-42004 42001 = Current time 42002, 42003 = Day, Month, Year 42004 = Day of the week	42001: Time in decimal Example 1: time 05:36 The representation will be 536 (d) Example 2: time 23:45 The representation will be 2345 (d) 42002, 42003: Date expressed in two words: 42002 = dd-mm = 42003 years example: 03/09/2012 The representation will be 42 002 = 0309 (d) 42003 = 2012 (d)	42004 = Day of the week coded: 0 = SUNDAY 1 = MONDAY 2 = TUESDAY 3 =WEDNESDAY 4 = THURSDAY 5 = FRIDAY 6 = SATURDAY 7 = SUNDAY

5 Program-Time Weekly parameter list

To set (or read) the program-weekly time in the controller is necessary the access to the appropriate registers allocated to the addresses specified in the table below.
For each day of the week can be programmed 6 bands with 6 different setpoint. Each time slot can be enabled or disabled by a flag.
The 'access to individual registers (Holding Register) is possible by the MODBUS FUNCTION 3
The program time can be disabled setting Parameter P1 = 0 or enabled setting Parameter P1 = 1 or 2.

If the value of the parameter P1 is 1 , the program set, at scheduled time, the setpoint defined by the corresponding time slot.

If the value of the parameter P1 is 2 the program, at the scheduled time, set the controller in ON / OFF mode.
In this mode, the set point selected field, when P1 set to a value of 0 means that the controller will go OFF, set P1 the value 1 , the regulator will go ON.
(see Table 1, parameters, P1).
Table 3 - below shows the code mode of the times, the setpoint and flag.

Table 3 : Set week program in the controller			
MODBUS Function	I/O REGISTER ADDRESS	Description	Note
HOLDING REGISTER (MODBUS FUNCTION 3)	42101-42718 Program Time Sunday 42101 = Time Program 1 Sunday 42102 = Setpoint 42103 = Enable Flag Program 1 42104 = Time Program 2 Sunday 42105 = Setpoint 42106 = Enable Flag Program 2 42107 = Time Program 3 Sunday 42108 = Setpoint 42109 = Enable Flag Program 3 42110 = Program 4 Hours Sunday 42111 = Setpoint 42112 = Enable Flag Program 4 42113 = Time Schedule 5 Sunday 42114 = Setpoint 42115 = Enable Flag Program 5 42116 = Time Schedule 6 Sunday 42117 = Setpoint 42118 = Enable Flag Program 6 Time program Monday 42201 = Time Schedule 1 Monday 42202 = Setpoint 42203 = Enable Flag Program 1 42204 = Time Program 2 Monday 42205 = Setpoint 42206 = Enable Flag Program 2 42207 = Time Program 3 Monday 42208 = Setpoint 42209 = Enable Flag Program 3 42210 = Program 4 Hours Monday 42211 = Setpoint 42212 = Enable Flag Program 4 42213 = Time Program 5 Monday 42214 = Setpoint 42215 = Enable Flag Program 5 42216 = Time Program 6 Monday 42217 = Setpoint 42218 = Enable Flag Program 6 Scheduler Tuesday 42301 = Time Program 1 Tuesday 42302 = Setpoint 42303 = Enable Flag Program 1 42304 = Time Program 2 Tuesday 42305 = Setpoint 42306 = Enable Flag Program 2 42307 = Time Program 3 Tuesday 42308 = Setpoint 42309 = Enable Flag Program 3 42310 = Time Program 4 Tuesday 42311 = Setpoint 42312 = Enable Flag Program 4	Word time: Time in decimal Example 1: time 05:36 The representation will be 0536 (d) Example 2: time 23:45 The representation will be 2345 (d) Word Setpoint: Setpoint temperature x 10 example: Setpoint = 23.5 ° C Word value = 235	All values are read- write. Enable flag program: 0 = Disabled Program 1 = Enabled Program

	42313 = Time Program 5 Tuesday 42314 = Setpoint 42315 = Enable Flag Program 5 42316 = Time Program 6 Tuesday 42317 = Setpoint 42318 = Enable Flag Program 6 Scheduler Wednesday 42401 = Time Program 1 Wednesday 42402 = Setpoint 42403 = Enable Flag Program 1 42404 = Time Program 2 Wednesday 42405 = Setpoint 42406 = Enable Flag Program 2 42407 = Time Program 3 Wednesday 42408 = Setpoint 42409 = Enable Flag Program 3 42410 = Program 4 hours Wednesday 42411 = Setpoint 42412 = Enable Flag Program 4 42413 = Time Program 5 Wednesday 42414 = Setpoint 42415 = Enable Flag Program 5 42416 = Time Program 6 Wednesday 42417 = Setpoint 42418 = Enable Flag Program 6 Scheduler Thursday 42501 = Time Program 1 Thursday 42502 = Setpoint 42503 = Enable Flag Program 1 42504 = Time Program 2 Thursday 42505 = Setpoint 42506 = Enable Flag Program 2 42507 = Time Program 3 Thursday 42508 = Setpoint 42509 = Enable Flag Program 3 42510 = Time Schedule 4 Thursday 42511 = Setpoint 42512 = Enable Flag Program 4 42513 = Time Program 5 Thursday 42514 = Setpoint 42515 = Enable Flag Program 5 42516 = Time Program 6 Thursday 42517 = Setpoint 42518 = Enable Flag Program 6 Scheduler Friday 42601 = Time Program 1 Friday 42602 = Setpoint 42603 = Enable Flag Program 1 42604 = Time Program 2 Friday 42605 = Setpoint 42606 = Enable Flag Program 2 42607 = Time Program 3 Friday 42608 = Setpoint 42609 = Enable Flag Program 3 42610 = Program 4 Hours Friday 42611 = Setpoint		

	42612 = Enable Flag Program 4 42613 = Time Schedule 5 Friday 42614 = Setpoint 42615 = Enable Flag Program 5 42616 = Time Program 6 Friday 42617 = Setpoint 42618 = Enable Flag Program 6 Program Schedule Saturday 42701 = Time Program 1 Saturday 42702 = Setpoint 42703 = Enable Flag Program 1 42704 = Time Program 2 Saturday 42705 = Setpoint 42706 = Enable Flag Program 2 42707 = Time 3 Saturday Program 42708 = Setpoint 42709 = Enable Flag Program 3 42710 = Time Schedule 4 Saturday 42711 = Setpoint 42712 = Enable Flag Program 4 42713 = Time Schedule 5 Saturday 42714 = Setpoint 42715 = Enable Flag Program 5 42716 = Time Schedule 6 Saturday 42717 = Setpoint 42718 = Enable Flag Program 6		

6 List Controller Commands

The controller execute directly the commands received from the master by writing and reading appropriate registers.
You can perform the following direct commands:

1) Save the parameters on the flash;
2) Save time program on the flash;
3) Set the regulator Off, Economy and Comfort;
4) Controlling the speed of the fan (Auto, 1, 2, 3);
5) Set the temperature set point;
6) Set the mode or season;
7) Set the humidity set point;
8) Select a factory list of data (recipe);
9) Lock the keyboard;
10) Set a temperature measured by the master to the slave controller, excluding the local temperature;

All command functions are allocated from address 4001 (44001 for ModScan) to address 4009 (44009 for ModScan)
Following table defines the individual command registers, description for each register and the related address assigned.
The access to individual registers (Holding Register) is possible by the MODBUS FUNCTION 3

Table 4 : Set commando address in the controller			
MODBUS Function	WORD COMMANDO ADDRESS	Description	Note
HOLDING REGISTER (MODBUS FUNCTION 3)	44001 44001 = COM_Parametri_Reg SAVE DATA	The value is displayed in decimal at 1 Word The register can 'be forced to 0, 1, 2	Command option to read-write 0 = No command 1 = Saving Parameters in The Flash System 2 = Saving Time Scheduler In Flash System
(MODBUS FUNCTION 3)	44002 44002 = COM_Stato_Reg STATUS OF THE CONTROLLER	The value is displayed in decimal at 1 Word The register can 'be forced to 0, 1, 2	Command option to read-write 0 = OFF (standby) control 1 = ECONOMY 2 = COMFORT The register corresponds to the status of the controller. Permit to change the thermostat from one state to one other.
HOLDING REGISTER (MODBUS FUNCTION 3)	44003 44003 = COM_Fan_Speed SET FAN SPEED MODE	The value is displayed in decimal at 1 Word The register can 'be forced to 0, 1, 2, 3	Command option to read-write 0 = MANUAL V1 1 = MANUAL V2 2 = MANUAL V3 3 = AUTOMATIC The register corresponds to the speed of the fan. Allows to change the mode of the fan
HOLDING REGISTER (MODBUS FUNCTION 3)	44004 44004 = COM_T_Setpoint SET POINT TEMPERATURE	The value is displayed in decimal at 1 Word The register accept values between 100 (10.0 ° C) and 300 (30.0 ° C)	Command option to read-write The register controls the temperature setpoint. Represented in ° C x 10 Example: If you want to set a setpoint of 20.0 ° C, the register must be set to 200. Setting limits: 10.0 ..... 30.0 ° C
HOLDING REGISTER (MODBUS FUNCTION 3)	44005 44005 = COM_Mod_Stag CONTROLLER MODE	The value is displayed in decimal at 1 Word The register can 'be forced to 0, 1, 2	Command option to read-write 0 = Summer 1 = Winter 2 = Dehumidification

MODBUS Function	WORD COMMANDO ADDRESS	Description	Note
HOLDING REGISTER (MODBUS FUNCTION 3)	44006 44006 = COM_UR_Setpoint SET POINT RELATIVE HUMIDITY	The value is displayed in decimal at 1 Word The register accept values between 0 (0% RH) and 100 (100% RH)	Command option to read-write The register controls the humidity set point. Represented in% RH Example: If you want to set a setpoint of 50%, the register must be set to 50.
(MODBUS FUNCTION 3)	44007 44007 = COM_Load_Ricetta FACTORY PRE DEFINED PARAMETER LIST	The value is displayed in decimal at 1 Word The register can 'be forced to 0 9	Command option to read-write 0 = Table 1 . . . Table 9 = 10
HOLDING REGISTER (MODBUS FUNCTION 3)	44008 44008 = COM_Lock_Key_Lcd LOCK KEYBOARD BY USER	The value is displayed in decimal at 1 Word The register can be forced to 0, 1	Command option to read-write 0 = Keyboard Enabled by User 1 = Keyboard Disabled by User
HOLDING REGISTER (MODBUS FUNCTION 3)	44009 44009 = COM_Temp_ModBus REMOTE TEMPERATURE FROM MASTER	The value is displayed in decimal at 1 Word The register accept values between 0 (0.0 ° C) and 600 (60.0 ° C)	Command option to read- write The register controls the temperature by Master represented in ° C x 10 Example: If you want to set a temperature of 20.0 ° C, the register must be set to 200. Received the command controller excludes the local reading from the sensor and takes the temperature value from the master control.

7 Variables of State List, Acquisition Analog and Digital (read only)

All reading variables are allocated from address 3001 (43001 for ModScan) to address 3024 (43024 for ModScan)
Following table defines the single read registers, description for each register and the related assigned address.
The access to individual registers (Holding Register) is possible by the MODBUS FUNCTION 3

Table 5 : Reading values in the controller

MODBUS Function	ONLY READING WORD ADDRESS	Description	Note
HOLDING REGISTER (MODBUS FUNCTION 3)	43001 43001 = Alarms WORD ALARMS	The value is displayed in decimal at 1 Word BitWise register (Boolean) Are used Bit0 ... Bit3 to indicate any alarms present. Single Bit 1 means active alarm. Single Bit 0 means alarm not active.	Read-only register, BitWise (Boolean) Bit 0 = Air Sensor Bit 1 = Check Sensor Bit 2 = low current adsorbed on the fan alarm Bit 3 = Alarm maximum current to the fan Bit 4 = Alarm Bath Bit 5 = Alarm Smoke NB If the register has the value 0 means that no alarm is present on the controller.
(MODBUS FUNCTION 3)	43002 43002 = Warning WORD WARNING	The value is displayed in decimal at 1 Word BitWise register (Boolean) Are used to indicate any Bit1 Bit 0 ... Warning Maintenance Filter Single Bit 1 means active warning. Singono Bit 0 means no active warning.	Read-only register, BitWise (Boolean) Bit 0 = Dirty filter to be cleaned or substitute NB If the register has the value 0 means that no warning is present on the controller.
HOLDING REGISTER (MODBUS FUNCTION 3)	43003 43003 = StatoReg WORD STATUS OF THE CONTROLLER	The value is displayed in decimal at 1 Word The value read i establish the current state of the controller	Read-only register 0 = OFF 1 = ECONOMY 2 = COMFORT 3 = STANDBY (open window) 4 = ECONOMY (contact)

MODBUS Function	ONLY READING WORD ADDRESS	Description	Note
HOLDING REGISTER (MODBUS FUNCTION 3)	43004 43004 = real_Setpoint REAL TEMPERATURE SETPOINT	The value is displayed in decimal at 1 Word The register accept values between 100 (10.0 ° C) and 300 (30.0 ° C)	Read-only register The registry is the actual temperature setpoint. Represented in ° C x 10 Example: If you read a value of 187 means that the actual setpoint is 18.7 ° C
(MODBUS FUNCTION 3)	43005 43005 = Temperature ROOM TEMPERATURE MESURED	The value is displayed in decimal at 1 Word The register accept values between 0 (0.0 ° C) and 600 (60.0 ° C)	Read-only register The register represents the actual temperature measured by the regulator, that enters the regulation function P + I Represented in ° C x 10 Example: If you read a value of 227 means that the measured temperature is 22.7 ° C
HOLDING REGISTER (MODBUS FUNCTION 3)	43006 43006 = humidity ROOM RELATIVE HUMIDITY	The value is displayed in decimal at 1 Word The register can 'take values between 0 and 100 (0 ... 100% RH)	Read-only register The register represents the actual humidity detected by the controller and takes values between 0 and 100%
HOLDING REGISTER (MODBUS FUNCTION 3)	43007 43007 = current absorption CURRENT MESURED AT FAN MOTOR	The value is displayed in decimal at 1 Word The register provides the reading of the current measured in milliamperes in series with the motor-fan	Read-only register Value measured in milliamps from 0 to 2000 mA (2.0 amps)
HOLDING REGISTER (MODBUS FUNCTION 3)	43008 43008 = in_internal_probe AIR TEMPERATURE MESURED FROM THE INTERNAL REGULATOR PROBE	The value is displayed in decimal at 1 Word The register accept values between 0 (0.0 ° C) and 600 (60.0 ° C)	Read-only register The register represents the reading of the internal temperature detected by the controller Represented in ° C x 10 Example: If you read a value of 258 means that the measured temperature is 25.8 ° C

MODBUS Function	ONLY READING WORD ADDRESS	Description	Note
HOLDING REGISTER (MODBUS FUNCTION 3)	43009 43009 = In_remote_ambient_probe AIR TEMPERATURE MESURED BY REMOTE PROBE	The value is displayed in decimal at 1 Word The register accept values between 0 (0.0 ° C) and 600 (60.0 ° C)	Read-only register The registry is the reading of the temperature measured by the sensor remote Represented in ° C x 10 Example: If you read a value of 205 means that the measured temperature is 20.5 ° C
(MODBUS FUNCTION 3)	43010 43010 = In_water_probe TEMPERATURE OF WATER PROBE	The value is displayed in decimal at 1 Word The register show values between 0 (0.0° C) and 600 (60.0 ° C)	Read-only register The registry is the reading of the temperature measured by the sensor remote Represented in ° C x 10 Example: If you read a value of 205 means that the measured temperature is 20.5 ° C
HOLDING REGISTER (MODBUS FUNCTION 3)	43011 43011 = TERM_A PROPORTIONAL TERM OF REGULATION FUNCTION	The value is displayed in decimal at 1 Word The register can 'take values between 0% and 100%	Read-only register When the log is <100% means that the adjustment function is within the proportional band.
HOLDING REGISTER (MODBUS FUNCTION 3)	41012 43012 = TERM_B INTEGRAL TERM OF REGULATION FUNCTION	The value is displayed in decimal at 1 Word The register can 'take values between 0% and 100%	Read-only register When the register is non-zero means that there is integral action on the control function.
HOLDING REGISTER (MODBUS FUNCTION 3)	43013 43013 = FUNZI OVERALL FUNCTION CONTROL (FUNZI = TERM_A + TERM_B)	The value is displayed in decimal at 1 Word The register can take values between 0% and 100%	Read-only register The register represents the value of the overall function of adjustment, given by the sum of the proportional + integral

MODBUS Function	ONLY READING WORD ADDRESS	Description	Note
HOLDING REGISTER (MODBUS FUNCTION 3)	43014 43014 = Step_10h_Fan TOTAL HOURS OPERATINF FAN	The value is displayed in decimal at 1 Word The register represents the total hours of operation of the fan in step 10h	Read-only register
(MODBUS FUNCTION 3)	43015 43015 = Out_Fan OUTPUT FAN STATUS	The value is displayed in decimal at 1 Word The register can take values between 0 and 3	Read-only register Fan output status: 0 = OFF 1 = SPEED 1 2 = SPEED 2 3 = SPEED 3
HOLDING REGISTER (MODBUS FUNCTION 3)	43016 43016 = Out_Fan_Pro PROPORTIONAL TENSION TO THE FAN MOTOR 0…10V	The value is displayed in decimal at 1 Word The register can take values between 0 and 100	Read-only register Indicates the output voltage 0 ... 10V control the fan: 0 = 0 Volt 100 = 10.0 Volts
HOLDING REGISTER (MODBUS FUNCTION 3)	43017 43017 = Out_Valv_Dig_Hot STATUS ON/OFF OF THE HOT WATER VALVE	The value is displayed in decimal at 1 Word The register can be 0 or 1	Read-only register 0 = valve OFF 1 = Valve ON
HOLDING REGISTER (MODBUS FUNCTION 3)	43018 43018 = Out_Valv_Pro_Hot PROPORTIONAL TENSION TO THE HOT WATER VALVE 0…10V	The value is displayed in decimal at 1 Word The register can take values between 0 and 100	Read-only register Indicates the output voltage 0 ... 10V control the valve: 0 = 0 Volt 100 = 10.0 Volts
HOLDING REGISTER (MODBUS FUNCTION 3)	43019 43019 = Out_ electrical heater STATUS ON/OFF ELECTRICAL HEATER OUTPUT	The value is displayed in decimal at 1 Word The register can be 0 or 1	Read-only register 0 = OFF electrical heater 1 = ON electrical heater

MODBUS Function	ONLY READING WORD ADDRESS	Description	Note
HOLDING REGISTER (MODBUS FUNCTION 3)	43020 43020 = Out_Valv_Dig_Cold STATUS ON/OFF OF THE COOL WATER VALVE OUTPUT	The value is displayed in decimal at 1 Word The registry can be 0 or 1	Read-only register 0 = valve OFF 1 = Valve ON
(MODBUS FUNCTION 3)	43021 43018 = Out_Valv_Pro_Cold PROPORTIONAL TENSION TO THE COOL WATER OUTPUT VALVE 0…10V	The value is displayed in decimal at 1 Word The register can 'take values between 0 and 100	Read-only register Indicates the output voltage 0 ... 10V control the fan: 0 = 0 Volt 100 = 10.0 Volts
HOLDING REGISTER (MODBUS FUNCTION 3)	43022 43022 = In_Economy STATUS INPUT ECONOMY CONTACT	The value is displayed in decimal at 1 Word The register can 'be 0 or 1	Read-only register 0 = Contact OPEN 1 = Contact CLOSED
HOLDING REGISTER (MODBUS FUNCTION 3)	43023 43023 = In_Windows STATUS INPUT CONTACT WINDOW	The value is displayed in decimal at 1 Word The register can 'be 0 or 1	Read-only register 0 = Contact OPEN 1 = Contact CLOSED
HOLDING REGISTER (MODBUS FUNCTION 3)	43024 43024 = In_Aux STATUS INPUT AUXILIARY CONTACT	The value is displayed in decimal at 1 Word The register can 'be 0 or 1	Read-only register 0 = Contact OPEN 1 = Contact CLOSED
HOLDING REGISTER (MODBUS FUNCTION 3)	43025 43025 = Temp_Air_ModBus ROOM TEMPERATURE FROM MASTER BY MODBUS	The value is displayed in decimal at 1 Word The register accept values between 0 (0.0° C) and 600 (60.0 ° C)	Read-only register The value is the temperature measured by the remote sensor Represented in ° C x 10 Example: If you read a value of 205 means the measured temperature is 20.5 ° C

8 MODBUS PROTOCOL

MODBUS protocol defines the format and the communication mode between a "master" that manages the system and one or more "slaves" that respond to the master.

The Protocol defines how the master and the slave establish and interrupt the communication, such as transmitter and receiver must be identified, such messages must be exchanged and how the errors detected.

You can connect a master and up to 32 slaves on a common line, it should be noted that this is not a protocol logic limit, but the physical interface.

Replacing the last element of the line with a special "bridge or repeater", you can connect other 32 slaves, and so on until it reaches the maximum number of logical devices applied.

Only the master can start a transaction. A transaction can be in the form direct demand / response to a Single slave or broadcast in which the message is sent to all devices on the line is not answered.

A transaction consists of a single structure demand / single answer or structure single broadcast message / no answer.

Some features of the protocol are defined and they are:
• interface standard
• equality/priority
• number of stop bits
• the format and RTU (binary).

There is also the MODBUS ASCII but in this type of device is implemented the RTU mode is the most efficient.

Message Format

In order to communicate between two devices, the message must be contained in a "shell". The casing leaves the transmitter via a "door" and "brought" along the line to a similar "door" on the receiver.

MODBUS states the size of the casing, which, for both the master and the slave, contains:
• The address of the device with which the master stated transaction (I/O address corresponds to a broadcast message sent to all slave devices).
• The code of the function that is to be or has been performed.
• The data to be exchanged.
• The error control according to the CRC16 algorithm

If a device detects an error in the received message (format, parity or in CRC16), the message is considered invalid and discarded, a slave detects an error in the message so it will perform an action and not answer the question, just as if the address does not correspond to a device online.

Character format

Normally devices that use the MODBUS protocol used in 8, N, 1, that is: 8 data bits, no parity and 1 stop bit.

The address

As mentioned above, the MODBUS transactions always involve the master, which controls the line and one slave at a time (except in the case of broadcast messages).

To identify the recipient of the message is sent as the first character is a byte containing the numeric address of the selected slave device. Each slave will then be assigned a different address number that uniquely identifies it.

The addresses are those eligible from 1 to 247, while the address 0, which can not be assigned to a slave, place on top of the message transmitted by the master indicates that it is "broadcast", that is directed to all slaves simultaneously.

Can be transmitted as broadcast messages only answer that does not require to perform their function, then only assignments

The function code

The second character of the message identifies the function to be performed in the message transmitted by the master, the slave responds in turn with the same code to indicate that the function has been performed. Normally the MODBUS most used are those described below

FUNCTION	Description
01	Read Coil Status
02	Read Input Status
03	Read Holding Registers
04	Read Input registers
05	Force Single Coil
06	Prese! Single register
07	Read Status
15	Force multiple Coils
16	Preset Multiple Registers

CRC16

The last two characters of the message contain the cyclic redundancy code (Cyclic Redundancy Check) is calculated using the CRC16 algorithm.

For the calculation of these two characters, the message (address, function code data and discarding the start bit, stop and possibly equal) is considered as one continuous binary number whose most significant bit (MSB) is transmitted first.

The message is first multiplied by 216 (shifted left by 16 bits) and then divided by
216 +215 +22 +1 expressed as a binary number (1100000000000101).

The integer quotient is then discarded and the 16-bit remainder (initialized to FFFFh beginning to avoid the case of a message of only zeros) is added below the sent message.

The resulting message, when divided by the receiving device to the same polynomial (216 +215 +22 +1) must give zero as a remainder if there have been no errors (the receiving device recalculates the CRC).

In fact, given that the device that serializes the data to transmit (UART) transmits before the least significant bit (LSB) instead of the MSB as it should be for the CRC calculation, this is done by inverting the polynomial.

Furthermore, as the MSB of the polynomial influence only the quotient and not the rest, this is eliminated thus making it 1010000000000001.

The step by step procedure for the calculation of CRC16 is as follows:
1. Load a 16-bit register with FFFFh (all bits set to 1).
2. The exclusive OR of the first character with the upper byte of the register, putting the result in the register.
3. Move the log to the right a bit.
4. If the bit came out right from the register (flag) is a 1, to the exclusive OR of the polynomial generator 1010000000000001 with the registry.
5. Repeat 8 times steps 3 and 4.
6. The exclusive OR of the next character with the upper byte of the register, putting the result in the registry.
7. Repeat steps 3 through 6 for all the characters of the message.
8. The contents of the 16-bit register is the redundancy code CRC that must be added to the message

Synchronization messages

The synchronization between the transmitter and receiver of the message is obtained by inserting a pause between messages of at least 3.5 times as long as a character.

If the receiving device does not receive for a period of 3.5 characters, the message is considered above and considering that the next received byte will be the first of a new message and then an address.

MODBUS FUNCTIONS

Below is a detailed description of the MODBUS functions you use most.

Read Output Status (01)

This function is used to request the ON or OFF state variable binary logic. The broadcast mode is not allowed.

question
In addition to the address of the slave and the function code (01) the message contains the starting address (starting address) expressed in two bytes and the number of bits to read also two bytes. The address numbering starts from zero (bit1 = 0).

Example: Request to read from slave 17 bit 0004 to 0015.

ADDR	FUNC	DATA start Addr HI	DATA start Addr LO	DATA bit # HI	DATA bit # LO	CRC HI	CRC LO
11	01	00	03	00	0C	CE	9F

Answer

In addition to the address of the slave and the function code (01), the message contains a character that contains the number of data bytes and characters containing the data.

The data are packed, so that a byte contains the status of 8 bits, the least significant bit of the first byte contains the bit corresponding to the starting address and so on.
If the number of bits to be read is not a multiple of 8, the last character is completed with zeros in the most significant bits.

Example: Response to the request above.

ADDR	FUNC	DATA Byte Count	DATA bit 04..11	DATA bit 12..15	CRC HI	CRC LO
11	01	02	CD	0B	6D	68

Read Output Status (01)

This function is used to request the ON or OFF state variable binary logic. The broadcast mode is not allowed.

question
In addition to the address of the slave and the function code (01) the message contains the starting address (starting address) expressed in two bytes and the number of bits to read also two bytes. The address numbering starts from zero (bit1 = 0).

Example: Request to read from slave 17 bit 0004 to 0015

ADDR	FUNC	DATA start Addr HI	DATA start Addr LO	DATA bit # HI	DATA bit # LO	CRC HI	CRC LO
11	01	00	03	00	0C	CE	9F

Answer
In addition to the address of the slave and the function code (01), the message contains a character that contains the number of data bytes and characters containing the data.

The data are packed, so that a byte contains the status of 8 bits, the least significant bit of the first byte contains the bit corresponding to the starting address and so on.

If the number of bits to be read is not a multiple of 8, the last character is completed with zeros in the most significant bits.

Example: Answer to the request above.

ADDR	FUNC	DATA Byte Count	DATA bit 04..11	DATA bit 12..15	CRC HI	CRC LO
11	01	02	CD	0B	6D	68

Read Input Status (02)

This function is operationally identical to the previous one.

Read Output Registers (03)

This feature allows you to request The value of 16-bit (word) containing numeric variables. The broadcast mode is not allowed.

question
In addition to the address of the slave and the function code (03) the message contains the starting address (starting address) expressed in two bytes and the number of words to be read also on two bytes. The maximum daily word that can be read is 125. The address numbering starts from zero.

Example: Request to read from the slave records from 25 069 in 0071.

ADDR	FUNC	DATA start Addr HI	DATA start Addr LO	DATA bit # HI	DATA bit # LO	CRC HI	CRC LO
19	03	00	44	00	03	46	06

response
In addition to the address of the slave and the function code (03), the message contains a character that contains the number of data bytes and characters containing the data. The registers require two bytes each, the first of which contains the most significant part

Example: answer to the request above.

ADDR	UNC	DATA Byte count	DATA Byte 69 HI	DATA Byte 69 LO	DATA Byte 70 HI	DATA Byte 70 LO	DATA Byte 71 HI	DATA Byte 71 LO	CRC HI	CRC LO
19	03	06	02	2B	00	00	00	64	AF	7A

Read Input Registers (04)

This function is operationally identical to the previous one.

Force Single Coil (05)

This function allows you to force the state of a single binary variable ON or OFF. Broadcast mode is enabled.

question
In addition to the address of the slave and the function code (05) the message contains the address of the variable force of two characters and two bytes of which the first is set to FFh (255) to force the ON and OFF to force ooh , the second is set to zero in each case. The address numbering starts from zero (bit1 = 0).

Example: Request to force ON the slave 47 bit 4.

ADDR	FUNC	DATA bit HI	DATA bit LO	DATA ON/OFF	DATA (zero)	CRC HI	CRC LO
2F	05	00	03	FF	00	7A	74

Answer
The answer is to retransmit the message received after the variable is been changed.
Example: Response to the request above.

ADDR	FUNC	DATA bit HI	DATA bit LO	DATA ON/OFF	DATA (zero)	CRC HI	CRC LO
2F	05	00	03	FF	00	7A	74

Preset Single Register (06)

This function allows you to set the value of a single 16-bit register. Broadcast mode is allowed

Question
In addition to the address of the slave and the function code (06) the message contains the address of the variable expressed in two bytes, and the value to be assigned. The address numbering starts from zero (word1 = 0).

Example: Request to force 928 on the slave from 35 to 26

ADDR	FUNC	DATA bit HI	DATA bit LO	DATA ON/OFF	DATA (zero)	CRC HI	CRC LO
23	06	00	19	03	A0	5E	07

The answer is to retransmit the message received after the variable is been changed.

Example: Response to the request above.

ADDR	FUNC	DATA bit #HI	DATA bit #LO	DATA Word HI	DATA Word LO	CRC HI	CRC LO
23	06	00	19	03	A0	5E	07

Read Status (07)

This function allows you to read the status of eight bits with a predetermined message compact. The broadcast mode is not allowed.

question
The message includes only the slave address and the function code (07). Example: Request status from slave 25.

ADDR	FUNC	CRC HI	CRC LO
19	07	5E	07

Answer
In addition to the address of the slave and the function code (07) the message includes a character containing the status bits.

Example: Response to the request above.

ADDR	FUNC	CRC HI	CRC HI	CRC LO
19	07	6D	63	DA

Preset Multiple Registers (16)

This function allows you to set the value of a block of consecutive 16-bit registers. Broadcast mode is enabled.

question
In addition to the address of the slave and the function code (16) the message contains the starting address (starting address), the number of words to be written, the number of bytes that contain the data and the data characters. The address numbering starts from zero (word1 = 0}.

Example: Request to set, the slave 17, 1 word at address 35. with value is 268

ADDR	FUNC	DATA Start ADDR HI	DATA Start ADDR LO	DATA Word # HI	DATA Word #LO	DATA byte Count	DATA Word 35 HI	DATA Word 35 LO	CRC HI	CRC LO
11	10	00	22	00	01	02	01	0C	6C	87

answer
In addition to the address of the slave and the function code (16) the message contains the starting address (starting address) and the number of words written.

Example: Response to the request above

ADDR	FUNC	DATA Start ADDR HI	DATA Start ADDR LO	DATA Bit # HI	DATA Bit #LO	CRC HI	CRC LO
11	10	00	22	00	01	A3	53