

Transmitter HC304

Technical information

English Version 1.0

- * HC304 features 4 analogue inputs
- * Optional (0)4-20mA or 0-10V
- * Input 1 is transmitted as (0)4-20mA
- * Serial communication via MODbus
- * Standard RS485 with 9.6 or 19.2 kbaud
- * Via Setup up to 247 addresses may be selected
- * Transfers up to 4 datasignals pr. module
- * Galvanic insulation between input and I/O (incl. 24V)



Features

The HC300 Family Features

The Transmitter HC300 Family presently consists of the modules:
HC300: Datalogger/MODbusmaster w/ dual serial com. 4 analogue inp.
HC301: pH/temp. transmitter with MODbus and 4-20mA output.
HC302: O₂ transmitter with MODbus and 4-20mA output
HC303: Conductivity transmitter with MODbus and 4-20mA output
HC304: Transmitter for 4 analogue inp. w/MODbus and 4-20mA output

Display

The HC300 family has a 3 digit display and 6 LEDs for setup and displaying measured values. The 'Mode' key is used to navigate. The LED marked 'Com.' is lit when the MODbus is active.

Programming

The module is programmed by the use of 3 keys located on the front panel. The 'Mode' key is used for selecting setup and the 'Up' og 'Down' keys are used to scroll through the programmable parameters. The parameter to be altered is selected with the 'Mode' key and the value is changed using the 'Up' og 'Down' keys. Parameter no. 01 is a softwarelock which must be set to 'Off' in order to change any parameter.

The HC304 'mA' Module Features

The HC304 primarily acts as a transmitter with 4 analogue inputs and MODbus communication with the HC300 'Dat' module.

Analogue Inputs

Each of the 4 analogue inputs may be set to either (0)4-20mA or 0-10V. This is done in Setup. Furthermore, each input can be scaled to ingeneering values such as temperature, pressure, flow, kW etc. Typically a 2-wire sensor with 4-20mA output is used.

Analogue output

The HC304 Module has an analogue output (0)4-20 mA. Using Setup 0-20mA or 4-20mA may be selected. The output is always proportional to input 1, and it is galvanic insulated from the inputs.

MODbus

Aquired data is transferred using the MODbus standard for multidrop communication.. The units are connected using the RS485 system. The MODbus-master may be the HC300 'Dat' module or a SCADA system with installed software for MODbus. Parameter 02 is used to set the address of the module to 'Off' or 1..14.

Technical Specifications

Mechanical

Housing:	Lexan UL94V-0 (Upper part) Noryl UL94V-0 (Lower part)
Mounting:	M36 for 35 mm DIN rail
IP Class:	Housing IP40. Connector IP20
Connector:	Max 16A. Max 2,5 mm ² Max torque 0,6 Nm
Temp.:	-15 to +50 °C
Weight:	200 g
Dimens.:	D 58 x W 36 x H 86 mm
CE mark:	EN61326A

Electrical

Power Supply:	24Vdc ±10%
Consumption:	60 mA max
Input Current Range:	(0)4-20mA, 250 Ω
Input Voltage Range:	0-10V dc, 84 kΩ
Accuracy:	Class 1%
Analogue output:	0(4) - 20mA, max 300Ω
Serial port 1:	RS485, 9.6/19.2 kbaud

Parameters

Function and Programming

The 16 programmable parameters are shown in the table to the right. The table show **Par. no.**, name, function, programming range and default setting. For access see the paragraph about programming on page 1. If the softwarelock (**Par. no. 1**) is active the parameter setting can be read but not altered.

Par. no. 2 is used to set the module's address for MODbus communication.

Par. no. 3-6 indicate the type of input. Each input may be programmed individually. Data from each of the 4 inputs is only recorded if they are programmed different from 'Off'.

Par. no. 7-14 is used to programme the module to display engineering values. Max. Scale is selected and the 3 digits are altered using the arrow keys, finishing with the 'Mode' key. Then the decimal point is set using the arrow keys and the programming is ended with the 'Mode' key. The same procedure applies to the Min. Scale - although the decimal point is taken from the Max. scale setting. As indicated in the table the smallest possible range displayed is 100.

Par. no. 15 is used to set the analogue output to either 0-20 mA or 4-20 mA.

Par. no. 16. The MODbus standard requires a baudrate of 9.600 or 19.200, this is set using Par. no.16. The baudrate is set in accordance with the MODbus-master. The Master may be the HC300 'Dat' module or a SCADA system.

List of Parameters

No.	Parameter	Description	Range	Default
01	Locked	Software lock	On / Off	On
02	Address	Add. for MODbus	Off, 1...247	Off
03	Input 1	Type of input	Off,4-20mA,0-20mA,0-10V	4-20mA
04	Input 2	Type of input	Off,4-20mA,0-20mA,0-10V	Off
05	Input 3	Type of input	Off,4-20mA,0-20mA,0-10V	Off
06	Input 4	Type of input	Off,4-20mA,0-20mA,0-10V	Off
07	Scale Max 1	Upper value for the scale	(Min-Set) +100...999	999
08	Scale Min 1	Lower value for the scale	-99...(Max-Set)-100	0
09	Scale Max 2	Upper value for the scale	(Min-Set) +100...999	999
10	Scale Min 2	Lower value for the scale	-99...(Max-Set)-100	0
11	Scale Max 3	Upper value for the scale	(Min-Set) +100...999	999
12	Scale Min 3	Lower value for the scale	-99...(Max-Set)-100	0
13	Scale Max 4	Upper value for the scale	(Min-Set) +100...999	999
14	Scale Min 4	Lower value for the scale	-99...(Max-Set)-100	0
15	Analogue output	Type of output	0-20mA / 4-20mA	4-20mA
16	Baudrate	MODbus baudrate	9.600 / 19.200	19.200

After setup is completed **Par. no. 00** is selected and the 'Mode' key is pressed in order to return to the normal display.

MODbus

HC304 may be used as a slave for the 'Dat' - unit HC300 or as a slave in a SCADA system. The setup / communication for each case will be explained in the following.

With HC300

If HC304 is used together with the HC300, the user must pay attention to two things: The baud rate on the MODbus as well as the address of the HC304.

The baud rate (P16) must be set to the baud rate of the HC300. Whether a baud rate of 19.200 or 9.600 is used is of no importance, as long as all units on the MODbus are set to the same baud rate.

The address (P02) must be unique in the network; Two units are not allowed to have the same address. In a network with the HC300 as the master, all addresses must be assigned without leaving any address out; i.e. if 3 units are connected to an HC300, the addresses 1, 2 & 3 must be assigned to the three units. The order of the addresses is of no importance. In a network with an HC300, up to 14 slaves may be connected, allowing only the addresses 1..14.

In a SCADA system

Since different SCADA systems may have different restrictions only the general are mentioned here:

The baud rate (P16) must be set to the baud rate of the SCADA system.

The address (P02) must be unique in the network; Two units are not allowed to have the same address.

The HC304 contains up to 4 measurements (1 for each input). Access to these are gained through the function code *Read_Input_Registers (04)*. Further more the HC304 gives access to different diagnostic values via *Diagnostics (08)*, as shown in the following.

Read_Input_Registers

Function code	Start address	Number of inputs
04	1	1, 2, 3 or 4

Please note that the measurements are transmitted in sequence; If 2 inputs are chosen the value of input 1 and 2 are always transmitted. If for instance the value of input 4 is wanted, 4 inputs must be requested. All values are rated to 0-1000 corresponding to the range, but input 2 has an offset of 1024, input 3 an offset of 2048 and input 3 an offset of 3072; I.e. input 1 is transmitted as 0-1000, input 2 as 1024-2024, input 3 as 2048-3048 and input 4 as 3072-4072. The start address is of no importance - only the number of inputs determines the returned values.

Diagnostics

Function code	Sub code (HEX)	Description
08	00	Return Query Data
	0A	Clear counters and diagnostics register
	0B	Return Bus Message Count
	0C	Return Bus Communication Error count
	0D	Return Exception Error count
	0E	Return Slave Message count
	0F	Return Slave No Response count
	12	Return Bus Character Overrun count

If the HC304 receives an invalid command, an exception error will be returned to the master.

Typical Installation

