NILAN®
OUTSTANDING INDOOR CLIMATE

Protocol description

Nilan CTS400

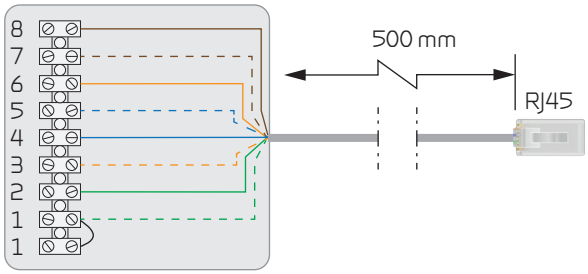
Modbus version 1.0

Table of Contents

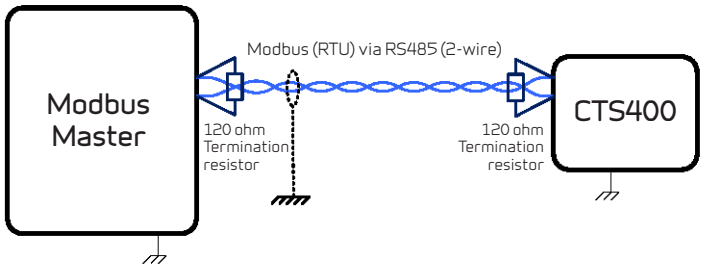
1. Connection

Use a RJ45 connector

CTS400 Modbus connector:



Point to point bus wiring:



Cable specification:
Tinned twisted-pair, with foil or braided shield, connected to ground only on the master side.

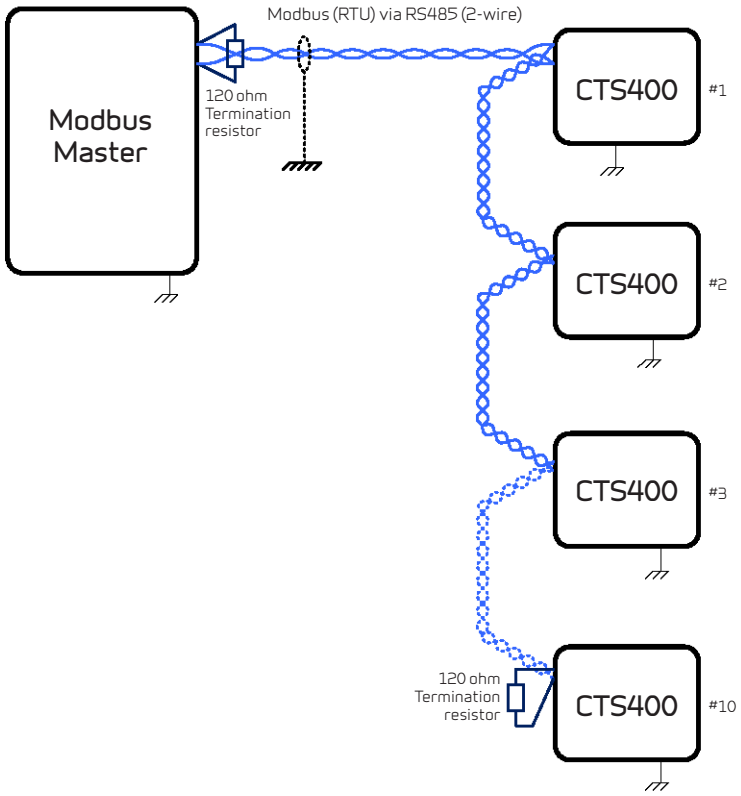
Max 200 m cable length.
Characteristic impedance 100 - 130 Ohm.
Shunt capacitance < 100 pF/m.
AWG 24 / 0,25 mm^2.

Suggested types: Belden 941/942 or Multicable LIYCY-P 2*2*0,25 mm^2.

Common ground:
All network nodes must share a common ground connection as the bus signals shall refer to the same voltage potential.
There is no opto-isolation on the CTS602.

Network termination:
120 Ohm resistors shall be connected between the two RS485 signal wires at each end-point of the bus wire.
The resistor value shall match the characteristic impedance of the cable.
Receiver impedance >= 12 kOhm.

Linear bus wiring:



2. Setup

Protocol	Modbus (RTU mode), see http://www.modbus.org/specs.php		
Node address	Default 30, Address is selectable between 1 and 247		
Device type	CTS400 is a Modbus slave		
	Default		Other options
Baud rate	19.200		9.600
Databits	8		
Stopbits	1		
Parity	Even		Odd, None (2 stopbits by None Parity)
Packet size	Max. 255 bytes		

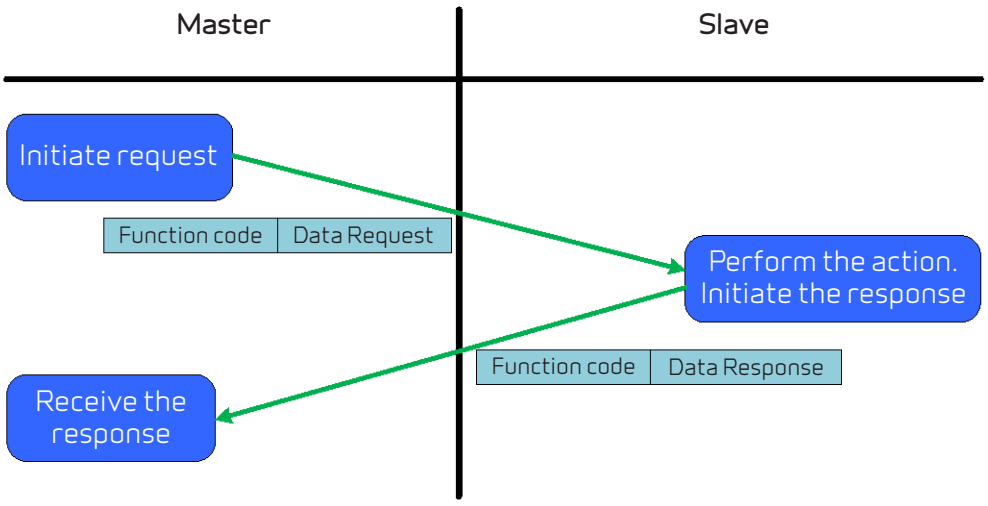
3. Supported functions

Input and holding registers are supported.
Unless otherwise specified, all registers are 16 bit size.

The controller will respond to the below listed Modbus message functions only.

Please note that no other function codes are supported.

Function	Name	Description
03	Read Holding Registers	Read one or more holding registers
04	Read Input Registers	Read one or more input registers
06	Preset Single Register	Write one holding registers



4.1 Input registers

Modbus Datapoints for ES1077 / CTS400 (Input registers) Firmware 1.0

Name	Unit	Modbus Address	Number of decimals	Data type
Current status of digital input D1	OnOff	20	0	Unsigned 16bit
Current status of digital input D2	OnOff	21	0	Unsigned 16bit
Current status of digital input D3	OnOff	22	0	Unsigned 16bit
Bypass damper status (1=Open)	OnOff	23	0	Unsigned 16bit
Extract air (%)	%	24	1	Unsigned 16bit
Supply air (%)	%	25	1	Unsigned 16bit
Status after heating element (%)	%	26	1	Unsigned 16bit
T1	Temp	27	1	Signed 16bit
T2	Temp	28	1	Signed 16bit
T3	Temp	29	1	Signed 16bit
T4	Temp	30	1	Signed 16bit
RH%	%	31	1	Unsigned 16bit
Current status of analog input (Volt)	Volt	32	2	Unsigned 16bit
T7	Temp	45	1	Signed 16bit
Calculated average air humidity	%	46	1	Unsigned 16bit
CO2	ppm	47	0	Unsigned 16bit
VOC	ppm	48	0	Unsigned 16bit
Filter change status (1=Filter change must be made)	OnOff	49	0	Unsigned 16bit
Alarm status (0=No alarm)	OnOff	50	0	Unsigned 16bit
Alarm code 1		51	0	Unsigned 16bit
Alarm code 2		52	0	Unsigned 16bit
Alarm code 3		53	0	Unsigned 16bit
Info alarm 1		56	0	Unsigned 16bit
Info alarm 2		57	0	Unsigned 16bit
Info alarm 3		58	0	Unsigned 16bit
Level		63	0	Unsigned 16bit
Average level humidity 24 hours OK	OnOff	64	0	Unsigned 16bit
Fan speed level override	Binary	65	0	Unsigned 16bit
High level humidity		66	1	Unsigned 16bit
Time of high humidity (S)		70	0	Unsigned 16bit
Mode (Summer=0/Winter=1)		72	0	Unsigned 16bit
After heating (On/Off)		74	0	Unsigned 16bit
Timer used filter		77	0	Unsigned 16bit
Time since last fire damper test (Hours)		87	0	Unsigned 16bit
De-icing (0=Off, 1=On)		91	0	Unsigned 16bit
User D1 active time (S)	Sec	96	0	Unsigned 16bit
Fan speed level room temperature		97	0	Unsigned 16bit
Fire damper open (1=Fully open)		100	0	Unsigned 16bit
Fire damper closed (1=Fully closed)	OnOff	106	0	Unsigned 16bit
Fire input	OnOff	108	0	Unsigned 16bit
Filter Time back (Days)		110	0	Unsigned 16bit

4.2 Holding registers

Modbus Setpoints for ES1077 / CTS400 (Holding registers) Firmware 1.0

Name	Unit	Modbus Address	Factory reset	Min.	Max.	Number of decimals	Data type
Reset alarm	OnOff	30	0	0	1	0	Unsigned 16bit
Low level humidity (%)	%	31	300	150	450	1	Unsigned 16bit
Fan speed level by low level humidity		32	1	0	3	0	Unsigned 16bit
Fan speed level by high level humidity		33	3	2	4	0	Unsigned 16bit
Timeout high level humidity	Min.	34	60	0	180	0	Unsigned 16bit
High level CO2	ppm	35	800	500	2000	0	Unsigned 16bit
High level VOC	ppm	36	800	500	2000	0	Unsigned 16bit
Wanted room temperature	°C	37	220	100	300	1	Signed 16bit
Regulatory dead band	°C	38	10	0	40	1	Signed 16bit
Start de-icing T4	°C	39	30	10	50	1	Signed 16bit
Stop de-icing T4	°C	40	70	50	100	1	Signed 16bit
Max. de-icing time	Min.	41	15	5	60	0	Unsigned 16bit
Deselect T2 temperature sensor (0=Off/1=On)	OnOff	42	0	0	1	0	Unsigned 16bit
Time between de-icing	Min.	43	60	15	760	0	Unsigned 16bit
Summer / winter mode	°C	45	130	50	200	1	Signed 16bit
Fire thermostat reset (1=Manual / 1=Automatic)		46	0	0	1	0	Signed 16bit
Filter alarm on the panel (0=None)	OnOff	47	1	0	1	0	Unsigned 16bit
Extra sensor (0=None/1=VOC/2=CO2)		48	0	0	2	0	Unsigned 16bit
Days between filter change	Day	50	90	0	360	0	Unsigned 16bit
Reset filter change timer	OnOff	51	0	0	1	0	Unsigned 16bit
Select option (1=Norm/2=Water/3=Electric)		53	1	1	4	0	Unsigned 16bit
Minimum supply air temperature	°C	57	160	100	200	1	Signed 16bit
Maximum supply air temperature	°C	58	190	100	500	1	Signed 16bit
Supply air level 1	%	59	230	200	1000	1	Unsigned 16bit
Supply air level 2	%	60	400	200	1000	1	Unsigned 16bit
Supply air level 3	%	61	650	200	1000	1	Unsigned 16bit
Supply air level 4	%	62	950	200	1000	1	Unsigned 16bit
Extract air level 1	%	63	250	200	1000	1	Unsigned 16bit
Extract air level 2	%	64	450	200	1000	1	Unsigned 16bit
Extract air level 3	%	65	700	200	1000	1	Unsigned 16bit
Extract air level 4	%	66	1000	200	1000	1	Unsigned 16bit
User selection level control panel		69	2	1	4	0	Unsigned 16bit
Stop of unit (1=Stop/1=Operation)	OnOff	70	0	0	1	0	Unsigned 16bit
Timeout user selection 1: Stop after min. (1=Off)	Min.	71	0	0	180	0	Unsigned 16bit
Cannot change fan speed level (0=Off/1=On)	OnOff	72	0	0	1	0	Unsigned 16bit
Unit cannot turn off (0=Off/1=On)	OnOff	73	0	0	1	0	Unsigned 16bit
Stop the unit	OnOff	74	0	0	1	0	Unsigned 16bit
Test interval fire damper days (0=7/1=14/2=28)		75	2	0	2	0	Unsigned 16bit
Supply air fan at de-icing (0=Stopped/1=Operation)		78	0	0	1	0	Unsigned 16bit
Fan speed level user selection 1 (0=Function Off)		79	0	0	4	0	Unsigned 16bit
Fan speed at high level		80	4	2	4	0	Unsigned 16bit
Stop at low room temperature (0=Off)	°C	81	0	0	200	1	Unsigned 16bit
Extra input (0=Off/1=User selection 2/2=Filter guard)		82	1	0	3	0	Unsigned 16bit
Output (0=Off/1=10V alarm/2=0 10V alarm/3=10V)		83	0	0	4	0	Unsigned 16bit
Timeout user selection 2 extended operation min. (0=Off)	Min.	84	0	0	180	0	Unsigned 16bit
Fan speed level user selection 2 (0=Function off)		85	2	0	4	0	Unsigned 16bit
Fire input polarity (0=No/1=NC)		86	0	0	1	0	Unsigned 16bit

5. Communication example

The sample shown below is a general Modbus communication example, and is not specific for this device.

Request: 0b041000000e75a4
Response: 0b041cffff0000095008b0e4a80014000b000108e108f1ffff000f0002fff39f8e

Request (Input register)

0x0b	Slave addr	1 byte
0x04	Function code	1 byte
0x1000	Start addr	2 bytes
0x000e	Quantity	2 bytes
0x75a4	CRC	2 bytes

Response

0x0b	Addr	1 byte
0x04	Function code	1 byte
0x1c	NB bytes of data	1 byte
0xffff	Value1	2 bytes
0x0000	Value2	2 bytes
0x0950	Value3	2 bytes
0x08b0	Value4	2 bytes
0xe4a8	Value5	2 bytes
0x0014	Value6	2 bytes
0x000b	Value7	2 bytes
0x0001	Value8	2 bytes
0x08e1	Value9	2 bytes
0x08f1	Value10	2 bytes
0xffff	Value11	2 bytes
0x000f	Value12	2 bytes
0x0002	Value13	2 bytes
0xfff3	Value14	2 bytes
0x9f8e	CRC	2 bytes
0x9f8e	CRC	2 bytes

Request: 0b03200000018f60
Response: 0b030200002045

Request (Holding register)

0x0b	Slave addr	1 byte
0x03	Function code	1 byte
0x2000	Address	2 bytes
0x0001	Quantity	2 bytes
0x8f60	CRC	2 bytes

Response

0x0b	Slave addr	1 byte
0x03	Function code	1 byte
0x02	Quantity	1 bytes
0x0000	Value1	2 bytes
0x2045	CRC	2 bytes