Tango

alpha nea

- Installed in Tango (standard) or alpha nea frames
- Modbus RTU communication over RS485 line
- Wide range of power supply
- Control knob for correction setting
- Can be installed in a multifunction frame

The thermometers and controllers AMD Series are intended to sense and eventually correct the interior room temperature. The device measures, displays, and by means of control knob sets the temperature correction. The controllers, with their adjustable functions, can be used primarily in applications for individual room temperature control.
The controller can be supplied in several functional electronic versions as well as with mechanical covers and installation modes.
The circuits are located on PCB's inside the cover. The power supply is typically 24Vss. The temperature sensor itself is placed inside a metal case on the front of the controller.
The device allows the choice of attenuation mode (green LED indicator) by a push button application. Communication with the supervisory system passes via the RS485 and the Modbus RTU protocol. The address and the speed of the controller are preset by an entry to the register. All terminals are doubled in order to ease the installation of continuous conductors.

Technical data

Supply voltage	12 to 30 VDC	Accuracy	± 0,5 °C
Current consumption	max. 20 mA	Time needed for equalization	30 min.
Sensor	Pt1000	Communication	RS485, Modbus RTU
Sensor accuracy	class B	Communication speed	1200 ÷ 19200 Bd
Meassuring range	-30 to 60°C	Terminals	screw terminal (wire max. 1mm²)
Ambient temperature	-30 to 40°C	Indication of attenuation	Green LED
Relative humidity	< 80 %	Protection type	IP40

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Review of controller types

The customer has a choice of suitable electrical and mechanical versions of the controller to suit their requirements – see Table 1. The mechanical arrangement allows the controller to be mounted in multifunction frames of a specific version of the cover together with other electrical elements (switches etc.).

Tab. 1. Type of controllers type Ax – modes of marking

AM1	temperature measurement and correction, attenuation push button, LED indicator
AM2	temperature measurement, attenuation push button, LED indicator
AM3	temperature measurement, and correction, LED indicator
AM4	temperature measurement, LED indicator

Cover version
T– Tango (ABB) A – alpha nea (ABB)

Sample of marking on an order :
AM1T –controller series A without display, communication protocol Modbus RTU, with temperature sensor,control knob, attenuation push button, LED indicator, cover of Tango version.

Properties of the communication protocol
Modbus RTU protocol with selectable speed of 1200 to 19200 Bd, 8 bites, less parity, line RS485. Controllers have the address space available from 1 to 255.

Description of data registers
To read these registers use command no. 03 "register reading"
0x0005 measured temperature -30.0 °C to +60.0 °C
0x0006 required correction 0 to 100
0x0007 position of attenuation push button 0 or 1

Temperature measurement:
- is conducted over a resistive sensor Pt1000. The sensor is built into the front panel and connected to the circuit board by means of a loose lead and connectors. The measured temperature is evaluated electronically and the values are transmitted by RS485 to the supervisory system. The temperature sensor is calibrated in the range of -30 to 60 °C. The temperature is transmitted to the control system in as a 16 - bit signed integer multiplied by a constant 10:
Register 0 x0005 ** (measurement temperature): 0xFED4; 65236dek (- 30°C) 0x0258; 600dek (60° C)

Set point correction:
is performed by mechanical turning the knob, which is located on the front panel of cover.
Register 0 x0006 ** (position of the potentiometer): 0x0000; 0dek (min) 0x0064; 100dek (ma x)

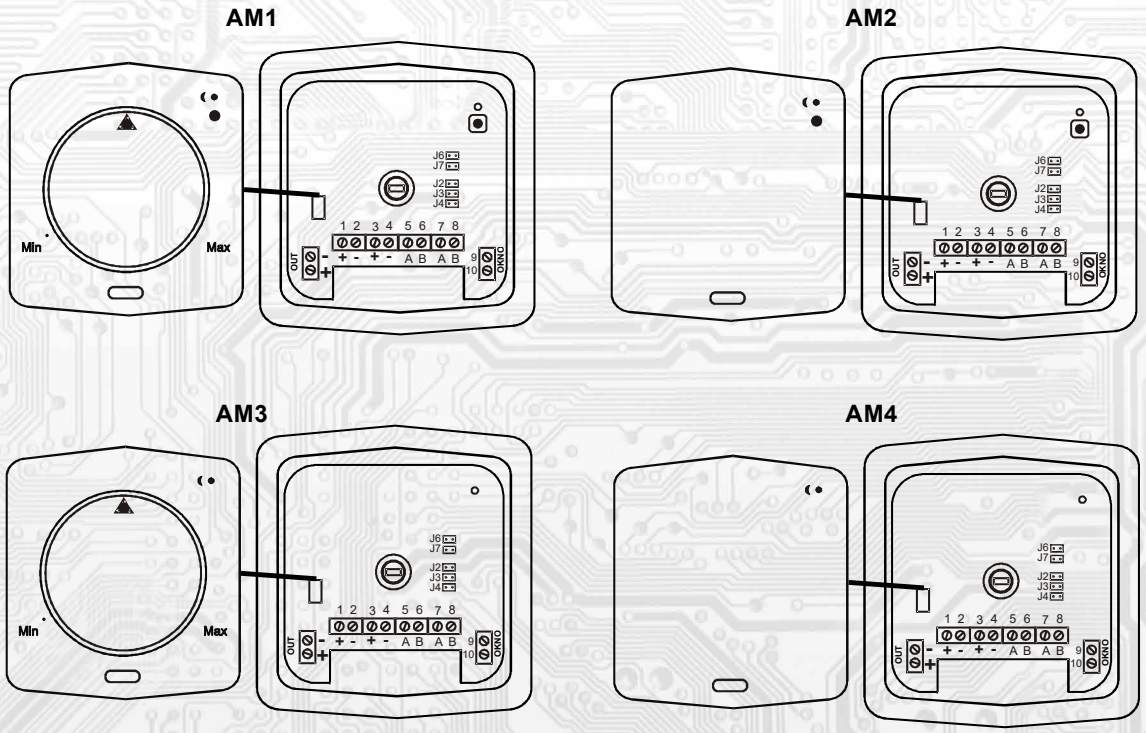
Button attenuation:
can be used for quick switching of the heating mode. The micro button without lock is located in the upper right corner of the front panel. By depressing each button the value of the flip-flop circuit can be adjusted in cycles from log 0 to log 1 and vice- versa. This information is transmitted to the supervisory system over the line.
Register 0 x0007 ** (mode status): 0x 0000; 0dek (LED is OFF) 0 x0001; 1dek (LED is ON)

- Attenuation ON is indicated by a green LED light
The supervisory system can also remotely perform the ON and OFF switching of the attenuation signaling.
This remote switching is done from the supervisory system by command 05 for coil 0x0001**. The position of the flag is transcribed in register 0x0007**.

Description of configuration registers.
The user setting of the address and the communication speed are provided by the inserted "J6 –service" jumper, which is also used for the calibration of the converter. With this jumper plugged in, the converter communicates with a speed of 19.200 Bd at address 255.

During sending of query to device initial register address and number of registers to read are sent.Register addresses are indexed from zero - register 0x0005 is physically send as value 0x0004... (zero based addressing)

Arrangement of jumpers and connectors (Fig.1)



Terminal

A, B	RS485 communication line
+	Power source positive terminal
-	Power source ground

J2… definition of idle status (conductor A)
J3… definition of idle status (conductor B)
J4… termination resistor 120R
J6… jumper “service"

J7.... jumper (setting a fixed address 255 and setup communication speed of 19200 baud

Terminal: 1,3 - Power source positive terminal
2,4 - Power source ground
OUT - Output of switching transistor
OKNO (WINDOW) – input of window contact

Installation and connection of the controller

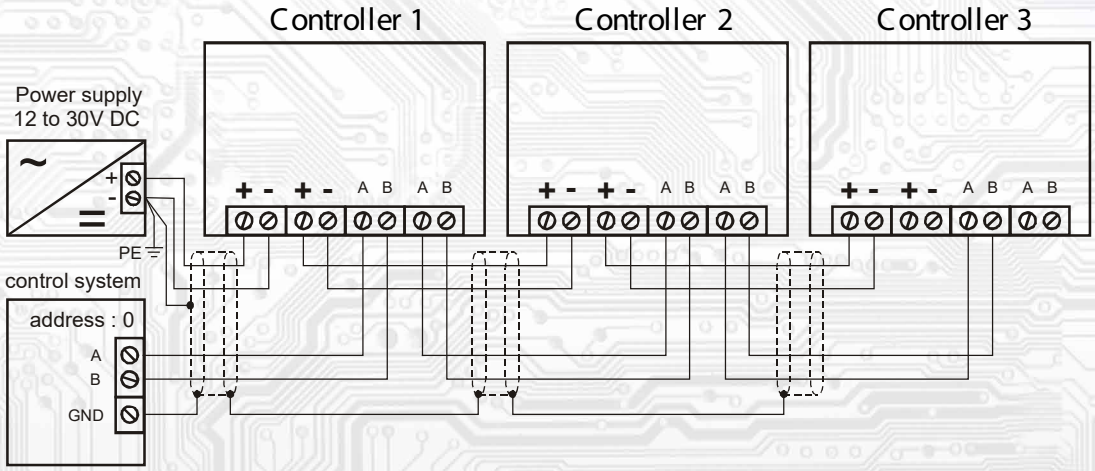
Series A controllers have been designed for installation into boxes under wall stucco or into boxes on terminal boards (height 16 mm).
The PCB is to be located in the frame on the terminal board towards the outside and screwed tight to the installation box by two self tapping screws 2.9 mm in diameter. This completes the installation.
Wiring is done on the terminal board using wires of 1 square mm as in Fig, 1 and 2. The A and B signal terminals on the controller are wired to the corresponding terminals on the control system. Jumpers J2 and J4 are used as defined by the rules of communication on RS485 lines.

Note: The endpoint of the RS485 must be terminated by J4 (load resistor.)

To supply power to the controllers, one source of 12 V= to 30 V= may be used, while the voltage is connected to the controller terminals marked + and -, see Fig. 2. It is recommended to wire the controllers with suitable multi-conductor shielded cables for data signals as well as power supply. The shield must be interconnected between the specific sections and then only once to the lowest voltage level, terminal PE.

When the terminal board is connected, the connector for the temperature sensor is wired to the pins on the PCB. The cover is mounted to the frame; - the model with the rotary knob: the shaft of the knob is inserted to the center hole of the trimmer in the "zero" position and then is pushed into the housing.

Example of wiring the controllers in the system (Fig. 2)



Examples of communication controller frames

Frame "03" reading N-registers

Master:

02 03 00 04 00 03 Crc Crc
- 02 Module address (module with address 2)
- 03 Command (Reading N registers)
- 00 04 Address of initially read register (0x0004 hex)
- 00 03 Number of read registers (3 registers)
- Crc Crc

Slave:

02 03 06 00 FF FF FF 00 01 Crc Crc
- 02 Module address (module with address 2)
- 03 Command (Reading N registers)
- 06 Number of bytes (6)
- 00 FF FF FF 00 01 Data from register (0x00FF hex, 0xFFFF hex, 0x0001 hex)
- Crc Crc

The address of the initial register is 0x0005 hex, which is the address of the measured temperature register, the number of read registers is three. Serviceable data is the refore: Measured temperature 0x00FF hex = 25.5^{0}C, required correction 0xFFFF hex = -0.1^{0}C, push button position 0x0001 hex = P/B final position active, LED is ON.

Frame "05" set up of zeroing out the bite

Master:

02 05 00 06 FF 00 Crc Crc
- 02 Module address (module of address 2)
- 05 Command (force COIL)
- 00 06 Address of the accessed register (0x0007 hex)
- FF 00 Command code (0xFF00)
- Crc Crc

Slave:

02 05 00 06 FF 00 Crc Crc
- 02 Module address (module of address 2)
- 05 Command (force COIL)
- 00 06 Address of the accessed register (0x0106 hex)
- FF 00 Command code (0xFF00)
- Crc Crc

Command code is "0xFF00 hex" thus LED is ON, the command acts as a parallel push button. To deactivate the command, the code is "0x0000hex".

Command "16" (0x10) write multiple registers

Master:

FF 10 20 09 00 01 02 09 04 Crc Crc
- FF Address module (module with embedded jumper "service" - address 255)
- 10 Command (Preset Multiple Register)
- 20 09 Address of first written register (0x200A**)
- 00 01 Number of written registers (1)
- 02 Number of bytes (2)
- 09 04 Data written (0x0904)
- Crc Crc

Slave:

FF 10 20 09 00 01 Crc Crc
- FF Address module (module with embedded jumper "service" - address 255)
- 10 Command(Preset Multiple Registers)
- 20 09 Address of first written register (0x200A**)
- 00 01 Number of written registers (1)
- Crc Crc

Writing data 0x0904 to the register 0x200 A** is set address 9 and communication speed of 19200 Bd.

** During sending of query to device initial register address and number of registers to read are sent.
Register addresses are indexed from zero - register 0x0005 is physically send as value 0x0004... (zero based addressing)

Map X RAM (EXTENDED REGISTERS) AM

Advanced registry can be modified by command 16 (write multiple registers) when jumper SERVICE (J6)is inserted .
Change shall be entered after removing the jumper.
X Reg = 8 bytes, ie 4 Modbus registers.
The base address of registers X from is the value of 0x2001 = 8193dek. Private addresses are arranged in ascending order.

Label	volume X Reg								range of adresses X Reg **	
X Reg	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	[hex]	[dek]
X Reg 0	-	-	ZD_TEXT/0	ZD_TEXT/1	ZD_TEXT/2	ZD_TEXT/3	ZD_TEXT/4	ZD_TEXT/5	0x2001 ÷ 0x2004	8193 ÷ 8196
X Reg 1	ZD_TEXT/6	ZD_TEXT/7	ZD_TEXT/8	ZD_TEXT/9	-	-	-	-	0x2005 ÷ 0x2008	8197 ÷ 8200
X Reg 2	--	-	SK_ADR	SK_SPD	-	-	-	-	0x2009 ÷ 0x200C	8201 ÷ 8204

** During sending of query to device initial register address and number of registers to read are sent. Register addresses are indexed from zero - register 0x0005 is physically send as value 0x0004... (zero based addressing)

Byte variables:

ZD_TEXT Customer text box. Range of 10 bytes. It is intended for customer identification of the sensor.
SK_ADR Network address of the controller. The range is 1 byte. Takes the value 0 to 255, addresses 0 is reserved for broadcast and a sensor on it does not match, address 255 is reserved for sensor configurations. Unsigned number format is binary, 0x01 = 1 and 0xFE = 254.
SK_SPD Communication speed. The range is 1 byte. Takes the value 0 to the 4. Unsigned number format is binary, 0x00 =0 and 0x04 = 4

The value "0" corresponds to the speed 1200Bd
The value "1" corresponds to the speed 2400Bd
The value "2" corresponds to the speed 4800Bd
The value "3" corresponds to the speed 9600Bd
The value "4" corresponds to the speed 19200Bd