DKM-046

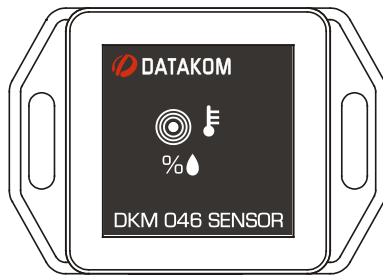## TEMPERATURE & HUMIDITY SENSOR WITH RELAY OUTPUT

DESCRIPTION

DKM-046 is a DIN Rail mounted precision unit capable of measuring temperature and humidity in three different locations, provide protection with 4 relay outputs and serve data to remote monitoring and control systems.

Sensing modules are separated from the base unit, connecting with cables. One sensor comes together with the base unit. Additional sensors may be purchased separately.

Two different auxiliary supply versions are available. The AC model accepts 85 to 305VAC and the DC model accepts 19 to 150VDC.

The module provides data to automation and BMS systems through its isolated RS-485 Modbus port.

The programming is performed through pushbuttons on the unit.

Sensor modules incorporate ST-HTS221 polymer dielectric planar capacitive sensors.

Relay functions are programmable with functions selected from a list.
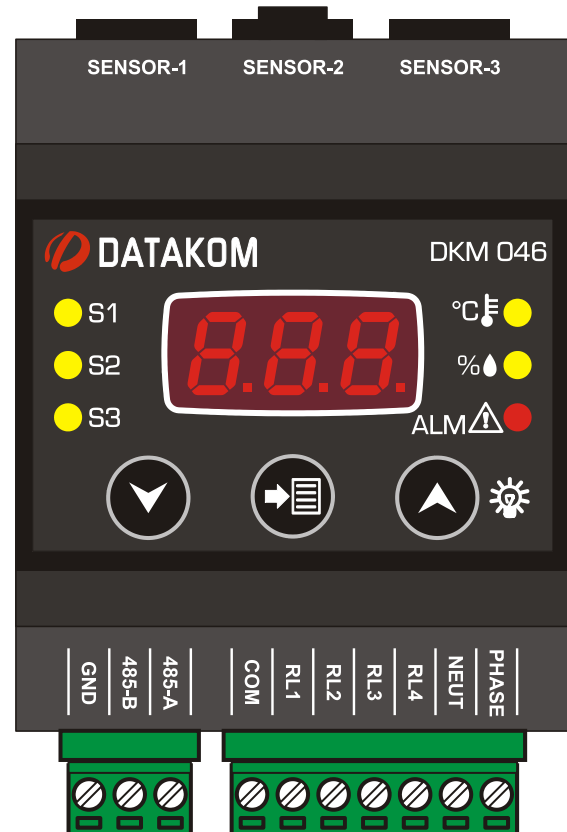
FEATURES

- *Supports 3 temperature & humidity sensors*
- *AC and DC auxiliary supply versions*
- *Programmable relay outputs: 4*
- *Temperature measuring range: -40...+80°C*
- *Humidity measuring range: 0% ... 100%*
- *Humidity accuracy: ±3.5% , 20 ... +80%*
- *Temperature accuracy: ± 1°C, 0 ... +60 °C*
- *Factory calibrated sensors*
- *Front panel programming*
- *Supports Modbus programming*
- *DIN rail mounted, easy installation*
- *Operating temp range: -20°C ... +70 °C*
- *Two part connection system*
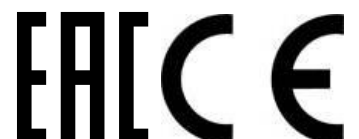
> ### SAFETY NOTICE
> ### Failure to follow below instructions will result in death or serious injury

- Electrical equipment should be installed only by qualified specialist. No responsibility is assured by the manufacturer or any of its subsidiaries for any consequences resulting from the non-compliance to these instructions.

- Check the unit for cracks and damages due to transportation. Do not install damaged equipment.

- Do not open the unit. There are no serviceable parts inside.

- Fuses must be connected to the power supply inputs, in close proximity of the unit.

- Fuses must be of fast type with a maximum rating of 6A.

- Disconnect all power before working on equipment.

- When the unit is connected to the network do not touch terminals.

- Any electrical parameter applied to the device must be in the range specified in the user manual. Although the unit is designed with a wide safety margin, over-range parameters may reduce lifetime, alter operational precision or even damage the unit.

- Do not try to clean the device with solvent or the like. Only clean with a dump cloth.

- Verify correct terminal connections before applying power.

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1. INSTALLATION INSTRUCTIONS

<u>**Before installation:**</u>

- Read the user manual carefully, determine the correct connection diagram.
- Install the unit to the DIN rail.
- Make electrical connections with plugs removed from sockets, then place plugs to their sockets.
- Be sure that adequate cooling is provided.
- Be sure that the temperature of the environment will not exceed the maximum operating temperature in any case.
- Be sure that the unit is not subject to water spill.

<u>**Below conditions may damage the device:**</u>

- Incorrect connections.
- Incorrect power supply voltage.
- Connecting or removing data terminals when the unit is powered-up.
- Connecting or removing sensors when the unit is powered-up.
- High voltage applied to communication ports.
- Overload or short-circuit at relay outputs.
- Excessive vibration, direct installation on vibrating parts.

<u>**Below conditions may cause abnormal operation:**</u>

- Power supply voltage below minimum acceptable level.
- Power supply frequency outside acceptable limits.

1.1 FRONT PANEL VIEW

SENSOR-1   SENSOR-2   SENSOR-3

DATAKOM   DKM 046

S1   °C

S2   %

S3   ALM ⚠

GND | 485-B | 485-A | COM | RL1 | RL2 | RL3 | RL4 | NEUT | PHASE
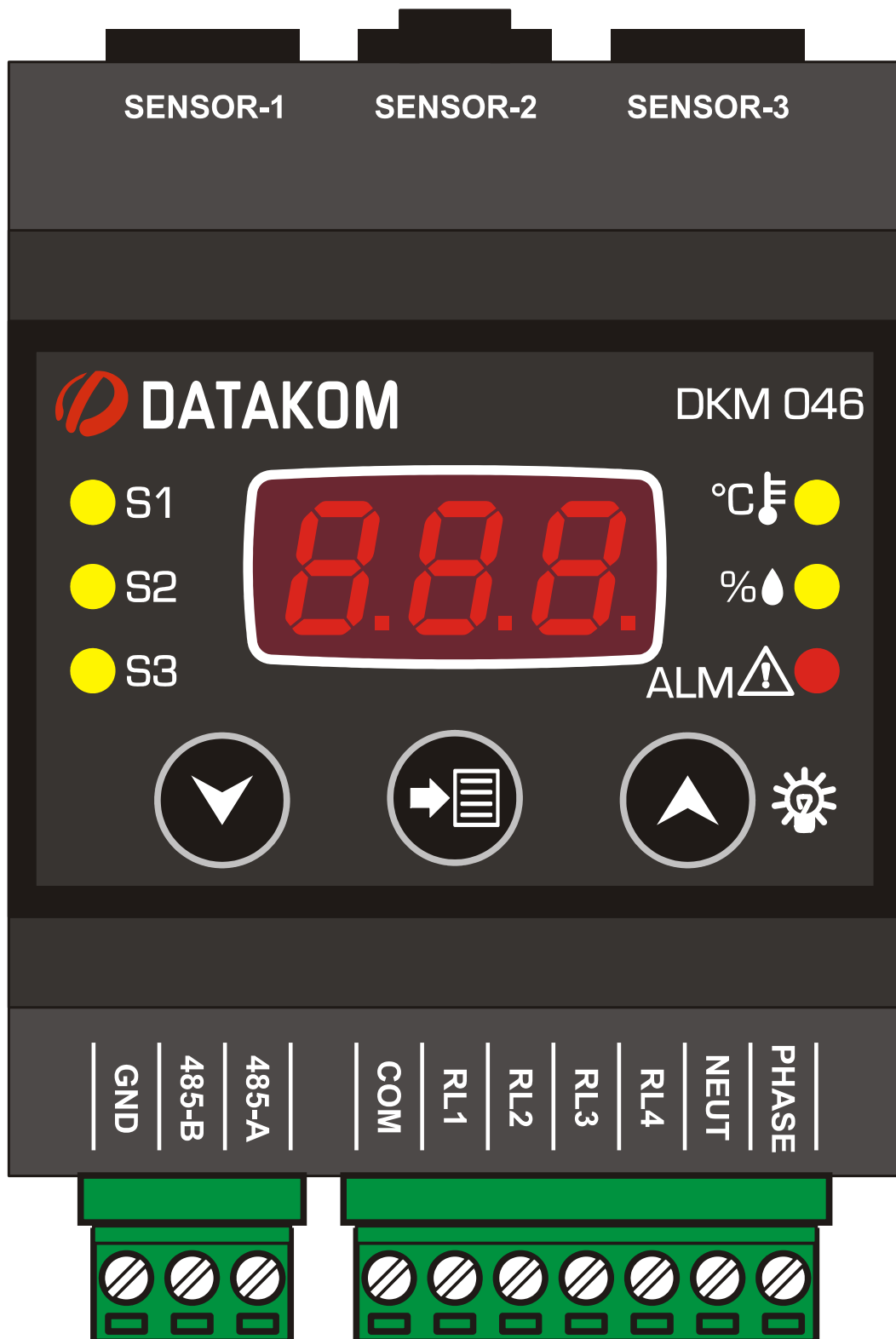
1.2 ELECTRICAL INSTALLATION

Do not install the unit close to high electromagnetic noise emitting devices like contactors, high current busbars, switchmode power supplies and the like.

Although the unit is protected against electromagnetic disturbance, excessive disturbance can affect the operation, measurement precision and data communication quality.

- **ALWAYS remove plug connectors when inserting wires with a screwdriver.**

- **Fuses must be connected to the power supply inputs, in close proximity of the unit.**

- **Fuses must be of fast type with a maximum rating of 6A.**

- **Use cables of appropriate temperature range.**

- **Use adequate cable section, at least 0.75mm^2 (AWG18).**

- **Follow national rules for electrical installation.**

1.3 INSTALLATION DIAGRAM
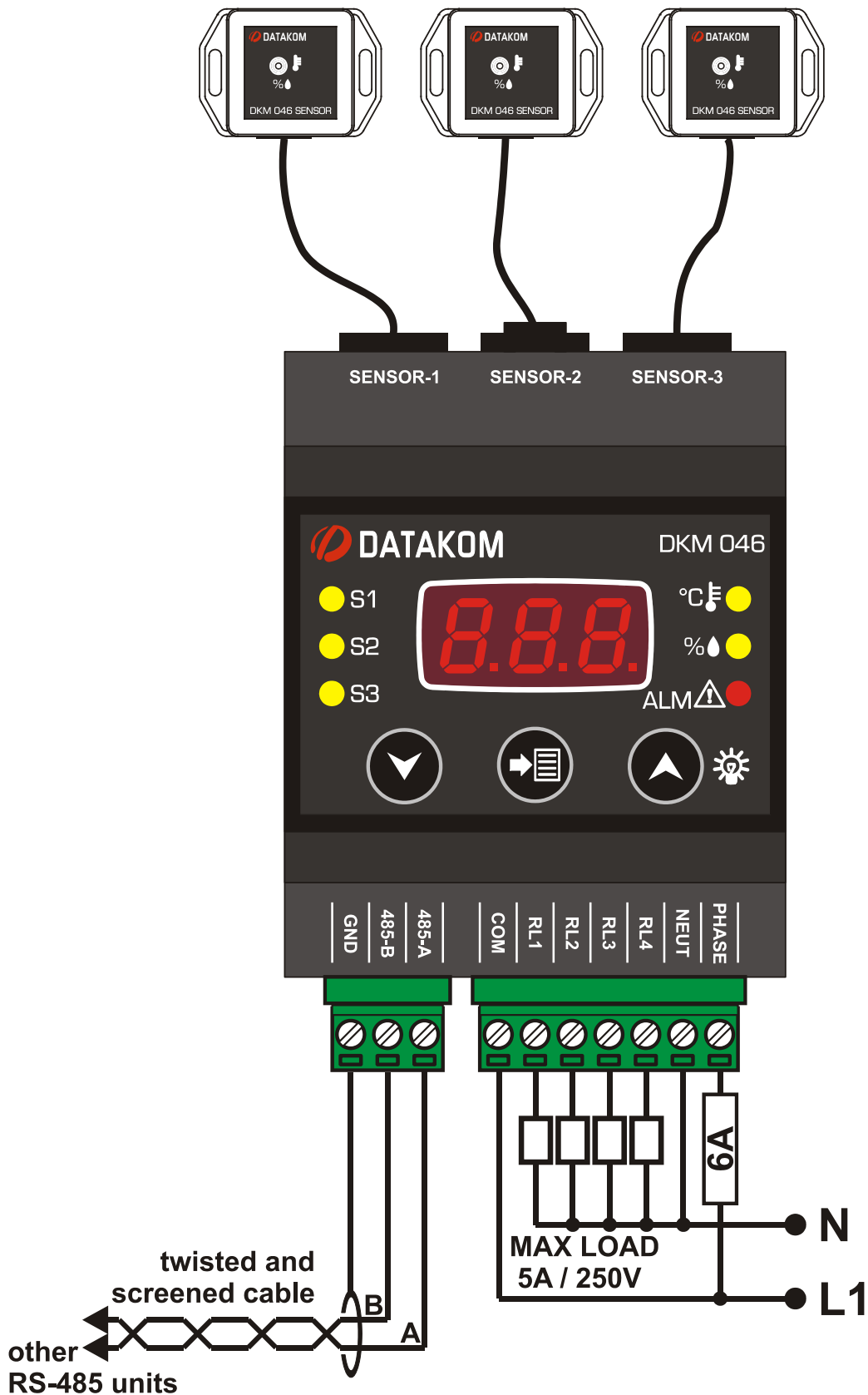
2. PUSHBUTTON FUNCTIONS

BUTTON	FUNCTION
	PROGRAMMING: Select related parameter / save adjusted parameter.
	Switch to the upper screen. **PROGRAMMING: increase value**
	Switch to the lower screen. **PROGRAMMING: decrease value**
	HELD PRESSED TOGETHER FOR 2 SECONDS: **Selects programming mode. If held pressed in programming mode, then returns to normal mode.**
	NO KEY PRESSED DURING 1 MINUTE: **Returns to the main display screen.**

3. SCREEN NAVIGATION

 Buttons allow navigation between measurement values. (Temp_1, Humidity_1, Temp_2, Humidity_2, Temp_3, Humidity_3, Alarms)

Leds related to the currently displayed values will turn on, other leds will turn off.

Temperature display: Temperature is displayed with 0.1 °C accuracy. The related Modbus register has 0.01 °C accuracy.

Humidity display: The relative humidity is displayed with 1% accuracy. The related Modbus register has 0.01% accuracy.

3.1 LAMP TEST

	HELD PRESSED FOR 2 SECONDS: **Enters lamp test mode. When released returns to normal operating mode.**

4. PROGRAMMING

4.1 ENTERING THE PROGRAMMING MODE

In order to offer the maximum flexibility to the customer, the module has several programmable parameters.

> **Device configurations**
>   - Default screen configuration
> **Measurement configurations**
>   - Alarm reset
> **Alarm high/low limit adjustments**
> **Input/Output Configurations**
>   - Relay configuration
>   - Alarm delays
>   - Modbus configuration
> **Unit Calibration**
>   - Modbus configuration
>
> **Return to factory settings**

⌄ ⌃	**In order to enable the programming menu, hold both MENU buttons pressed for 2 seconds.**

⌄ ⌃	**In order to exit programming menu, hold both MENU buttons pressed for 2 seconds.** **If no button is pressed during 1 minute, then the unit will automatically close the programming mode.**

⌄ ⌃	**Parameters may be scrolled with these buttons.**

➡▤	**When SET button is pressed:** 　- **The parameter value is displayed** 　- **The value on the screen is recorded and the next parameter is displayed.**

⌄ ⌃	**Parameter values are modified with UP and DOWN Menu buttons. If the button is held pressed, the the value will change with larger steps.**

➡▤	**After adjusting the parameter value this button saves the value on the screen and switched to the next parameter.**

4.2 RESETTING ALARMS

Parameter value
0: No operation
1: Reset alarms

Setting this parameter to 1 causes alarms to be reset.

The parameter value is not saved and always reads 0.

4.3 SELECTING THE DEFAULT SCREEN

This parameter selects the screen menu where the unit returns when no pushbutton is pressed during 1 minutes.

Param. değeri	Ekran
0	Auto-scroll screens
1	Temperature_1 measurement
2	Humidity_1 measurement
3	Temperature_2 measurement
4	Humidity_2 measurement
5	Temperature_3 measurement
6	Humidity_3 measurement

4.4 ADJUSTING TEMPERATURE LOW AND HIGH LIMITS

t 1L

t2L

t3L

These parameters adjust the low temperature alarm limit for the related sensor.

Adjustment range is between -20°C and +80°C.

If the parameter is set to -20°C then low temperature alarm is not monitored for the related sensor.

As the default factory set, the alarm is passive.

t 1H

t2H

t3H

These parameters adjust the high temperature alarm limit for the related sensor.

Adjustment range is between -20°C and +80°C.

If the parameter is set to +80°C then high temperature alarm is not monitored for the related sensor.

As the default factory set, the alarm is passive.

4.5 ADJUSTING RELATIVE HUMIDITY LOW AND HIGH LIMITS

H 1L

H2L

H3L

These parameters adjust the low relative humidity alarm limit for the related sensor.

Adjustment range is between 1% and 99%.

If the parameter is set to 1% then low relative humudity alarm is not monitored for the related sensor.

As the default factory set, the alarm is passive.

H 1H

H2H

H3H

These parameters adjust the high relative humidity alarm limit for the related sensor.

Adjustment range is between 1% and 99%.

If the parameter is set to 99% then high relative humudity alarm is not monitored for the related sensor.

As the default factory set, the alarm is passive.

4.6 ENABLING / DISABLING SENSORS

Parameter value:
0: Sensor disabled
1: Sensor enabled

These parameters enable/disable sensors 2 and 3.

The factory set value is 0 (sensor disabled).

When a sensor is disabled, the temperature and relative alarm limits related to this sensor cannot be adjusted.

Sensor 1 cannot be disabled. It is always active.

4.7 CONFIGURING RELAY OUTPUTS

The unit provides 4 relay outputs. Each output reflects the combination of 4 different relay functions. The combination options are explained in the next parameter.

The total number of relay functions are 16. They are presented as in the picture at left.

As an examle, 1r4 means function_4 of relay_1, 3r2 means function_2 of relay_3.

Bu parametreler örneğin, 1r4: 1. rölenin 4. fonksiyonu, 3r2: 3. rölenin 2. fonksiyonu şeklinde anlaşılmalıdır.

Functions are selected from below list. Unused funtions should be left as 0.

Value	Relay Function
0	-
1	Sensor-1 low temperature
2	Sensor-1 high temperature
3	Sensor-1 low relative humidity
4	Sensor-1 high relative humidity
5	Sensor-2 low temperature
6	Sensor-2 high temperature
7	Sensor-2 low relative humidity
8	Sensor-2 high relative humidity
9	Sensor-3 low temperature
10	Sensor-3 high temperature
11	Sensor-3 low relative humidity
12	Sensor-3 high relative humidity
13	Function active if any alarm exists
14	Through Modbus registers: If any non-zero value is written in related register, then the function is active. **Relay-1:** address **48** **Relay-2:** address **49** **Relay-3:** address **50** **Relay-4:** address **51**

The factory set value for all relay functions is 0.

The adjustment range is from 0 to 14.

Each relay output is activated by the combination of 4 different functions as explained above. Thus relay may be assigned to complex functions.

Parameters at left adjust the function combination method for each relay output.

0: Functions are combined with logical OR operation. Thus if any of the function is active, then the relay output is active.
1: Functions are combined with logical AND operation. Thus the relay output will be active only if all functions are active.

This parameter adjusts the delay for relay activation after all conditions for relay operation are met.

The factory set value is 0.

Adjustment range is between 0 and 999 seconds.

4.8 ALARM DELAY

This parameter adjusts the delay for alarm activation after an alarm condition occurs. It also determines the delay for alarm deactivation after the alarm condition is removed.

The factory set value is 0.

Adjustment range is between 0 and 999 seconds.

4.9 ALARM LOCK

0: Alarm lock disabled

1: Alarm lock enabled

When this parameter is set to 1, even if the alarm cause is removed, alarms will persist until manually reset.

When this parameter is set to 0, when the alarm cause is removed, alarms automatically disappear.

Factory set value is 0.

Adjustment range is 0 to 1.

4.10 MODBUS PARAMETERS

This parameter determines the Modbus node address of the unit. Every unit in the same Modbus loop must have a different node address.

Factory set value is 1.

Adjustment range is 0 to 255.

This parameter determines the data rate (baud rate) used in the Modbus communication. Every unit in the same Modbus loop must use the same data rate.

0: Baud rate = 2400

1: Baud rate = 4800

2: Baud rate = 9600

3: Baud rate = 19200

4: Baud rate = 38400

5: Baud rate = 57600

6: Baud rate = 115200

Factory set value is 2.

Adjustment range is 0 to 6.

4.11 ADJUSTING TEMPERATURE OFFSET VALUES

These parameters determine respectively the offset value to be added to temperature sensors 1, 2 and 3.

Factory set value is 0.

Adjustment range is between – 9.9 and + 9.9 °C.

4.12 ADJUSTING RELATIVE HUMIDITY OFFSET VALUES

These parameters determine respectively the offset value to be added to relative humidity sensors 1, 2 and 3.

Factory set value is 0.

Adjustment range is between – 9.9% and + 9.9%.

4.13 DISPLAYING THE FIRMWARE VERSION

The firmware version is displayed in the PGv (program version) parameter.

It cannot be modified by the user.

Any inquiry to the manufacturer must state the firmware version in question.

4.14 RETURN TO FACTORY SETTINGS

Parameter value:
57: return to factory settings
Other values: No operation

Setting this parameter to 57 causes the unit to return to initial factory settings.

The parameter value is not recorded and always reads as 0.

5. MODBUS COMMUNICATIONS

5.1. DESCRIPTION

The unit offers serial data communication port allowing it to be integrated in automation systems.

The serial port is of RS-485 MODBUS-RTU standard. It is fully isolated from power supply and measurement terminals for failure-free operation under harsh industrial conditions.

The MODBUS properties of the unit are:
 -Data transfer mode: RTU
 -Serial data: 2400-115200 bps, 8 bit data, no parity, 1 bit stop
 -Supported functions:
  -Function 3 (Read multiple registers)
  -Function 6 (Write single register)
  -Function 10 (Write multiple register)
 -The answer to an incoming message is sent with a minimum of 4.3ms delay after message reception.

Each register consists of 2 bytes (16 bits). Larger data structure contain multiple registers.

Detailed description about the MODBUS protocol is found in the document "**Modicon Modbus Protocol Reference Guide"**. This document may be downloaded at: http://www.modbus.org/specs.php

Data Reading

The function 03 (read multiple registers) will be used for data reading. The MODBUS master will send a query. The answer will be one of the below:
 -A response containing the requested data
 -An exceptional response indicating a read error.

The maximum number of registers read in one message is 120. If more registers are requested, the unit will send only the first 120 registers.

The query message specifies the starting register and quantity of registers to be read. The message structure is below:

Byte	Description	Value
0	Controller address	1 to 254
1	Function code	3
2	Starting address high	See below the description of available registers
3	Starting address low	
4	Number of registers high	always 0
5	Number of registers low	max 78h (120 decimal)
6	CRC low byte	See below for the checksum calculation
7	CRC high byte	

Here is the sequence to read 16 registers starting from address 20h (32 decimal):
01 03 00 20 00 10 45 CC (each byte is expressed as 2 hexadecimal characters)

The checksum value in the above message may be used for the verification of checksum calculation algorithm.

The normal response will be:

Byte	Description	Value
0	Controller address	same as in the query
1	Function code	3
2	Data lenght in **bytes** (L)	number of registers * 2
3	High byte of 1st register	
4	Low byte of 1st register	
5	High byte of 2nd register	
6	Low byte of 2nd register	
....		
L+1	High byte of the last register	
L+2	Low byte of the last register	
L+3	CRC low byte	See below for the checksum calculation
L+4	CRC high byte	

The exceptional response will be:

Byte	Description	Value
0	Controller address	same as in the query
1	Function code	131 (function code + 128)
2	Exception code	2 (illegal address)
3	CRC low byte	See below for the checksum calculation
4	CRC high byte	

Data Writing

The function 06 (write single register) or function 10h (write multiple registers) is used for data writing. A maximum of 32 registers can be written at a time.

The MODBUS master will send a query containing data to be written. The answer will be one of the below:

   -A normal response confirming successful write,
   -An exceptional response indicating a write error.

Only some of the available registers are authorized to be written. An attempt to write a write protected register will result to the exceptional response.

The query message specifies the register address and data. The message structure is below:

Byte	Description	Value
0	Controller address	1 to 254
1	Function code	6
2	Register address high	See below the description of available registers
3	Register address low	
4	Data high byte	
5	Data low byte	
6	CRC low byte	See below for the checksum calculation
7	CRC high byte	

Here is the sequence to write the value 0010h to the register 40h (64 decimal):
01 06 00 40 00 10 89 D2 (each byte is expressed as 2 hexadecimal characters)

The checksum value in the above message may be used for the verification of checksum calculation algorithm

The normal response will be the same as the query:

Byte	Description	Value
0	Controller address	1 to 254
1	Function code	6
2	Register address high	See below the description of available registers
3	Register address low	
4	Data high byte	
5	Data low byte	
6	CRC low byte	See below for the checksum calculation
7	CRC high byte	

The exceptional response will be:

Byte	Description	Value
0	Controller address	same as in the query
1	Function code	134 (function code + 128)
2	Exception code	2 (illegal address) or 10 (write protection)
3	CRC low byte	See below for the checksum calculation
4	CRC high byte	

CRC calculation

Here is a procedure for generating a CRC:

1) Load a 16–bit register with FFFF hex (all 1's). Call this the CRC register.

2) Exclusive OR the first 8–bit byte of the message (the function code byte) with the low–order byte of the 16–bit CRC register, putting the result in the CRC register.

3) Shift the CRC register one bit to the right (toward the LSB), zero–filling the MSB. Extract and examine the LSB. The LSB is the least significant bit of the CRC **before** the shift operation.

4) If the LSB is 1: Exclusive OR the CRC register with the polynomial value A001 hex.

5) Repeat Steps 3 and 4 until 8 shifts have been performed. Thus, a complete 8–bit byte will be processed.

6) Repeat Steps 2 through 5 for the next 8–bit byte of the message. Continue doing this until all bytes have been processed.

7) The final contents of the CRC register is the CRC value.

8) Place the CRC into the message such that the low byte is transmitted first. The algorithm should give the correct CRC for below messages:

    01 03 00 20 00 10 45 CC
    01 06 00 40 00 10 89 D2

Error codes

Only 3 error codes are used:
01: illegal function code
02: illegal address
10: write protection (attempt to write a read_only register)

Data types

Each register consists of 16 bits (2 bytes)

If the data type is a byte, only the low byte will contain valid data. High byte is don't care.

For data type longer than 16 bits, consecutive registers are used. The least significant register comes first.

5.2. COMMANDS

Commands to the unit are written to below addresses.

If addresses 52 and 53 are left as in the fatory setting (value=0) then the the unit will not ask any password for Modbus commands and Modbus writes.

If any non-zero value is written to register 52 or 53, then the unit will require password for Modbus commands and Modbus writes.

If the value recorded to one of the registers 52 or 53, or 3271 is written to the address 16384, then during next 10 minutes, Modbus area can be written and below commands can be executed.

All commands (other than the password) may be activated by writing a value other than zero to the related register.

ADDRESS	NAME	DESCRIPTION	LENGTH	R/W	DATA TYPE	COEFF
16384	Password	Programming password	16 BIT	W-O	unsigned word	1
16385	Reset alarms	Reset all existing alarms	16 BIT	W-O	unsigned word	1
16386	Factory set	Return to factory settings	16 BIT	W-O	unsigned word	1

5.3. PROGRAM PARAMETERS

Program parameters of the unit may be read from below registers or program parameters may be set by writing to these registers.

ADRESS	NAME	DESCRIPTION	DIMENS	R/W	DATA TYPE	COEFF
01	Default screen	Explained ch 4.3	16 BIT	R/W	unsigned word	1
02	Sensor-1 low temp	Explained ch 4.4	16 BIT	R/W	signed word	1
03	Sensor-1 high temp	Explained ch 4.4	16 BIT	R/W	signed word	1
04	Sensor-1 low humid.	Explained ch 4.5	16 BIT	R/W	unsigned word	1
05	Sensor-1 high hum.	Explained ch 4.5	16 BIT	R/W	unsigned word	1
06	Sensor-2 enable	Explained ch 4.6	16 BIT	R/W	unsigned word	1
07	Sensor-2 low temp	Explained ch 4.4	16 BIT	R/W	signed word	1
08	Sensor-2 high temp	Explained ch 4.4	16 BIT	R/W	signed word	1
09	Sensor-2 low humid.	Explained ch 4.5	16 BIT	R/W	unsigned word	1
10	Sensor-2 high hum.	Explained ch 4.5	16 BIT	R/W	unsigned word	1
11	Sensor-3 enable	Explained ch 4.6	16 BIT	R/W	unsigned word	1
12	Sensor-2 low temp	Explained ch 4.4	16 BIT	R/W	signed word	1
13	Sensor-2 high temp	Explained ch 4.4	16 BIT	R/W	signed word	1
14	Sensor-2 low humid.	Explained ch 4.5	16 BIT	R/W	unsigned word	1
15	Sensor-2 high hum.	Explained ch 4.5	16 BIT	R/W	unsigned word	1
16	Relay-1, function-1	Explained ch 4.7	16 BIT	R/W	unsigned word	1
17	Relay-1, function-2	Explained ch 4.7	16 BIT	R/W	unsigned word	1
18	Relay-1, function-3	Explained ch 4.7	16 BIT	R/W	unsigned word	1
19	Relay-1, function-4	Explained ch 4.7	16 BIT	R/W	unsigned word	1
20	Relay-1 logic	Explained ch 4.7	16 BIT	R/W	unsigned word	1
21	Relay-2, function-1	Explained ch 4.7	16 BIT	R/W	unsigned word	1
22	Relay-2, function-2	Explained ch 4.7	16 BIT	R/W	unsigned word	1
23	Relay-2, function-3	Explained ch 4.7	16 BIT	R/W	unsigned word	1
24	Relay-2, function-4	Explained ch 4.7	16 BIT	R/W	unsigned word	1
25	Relay-2 logic	Explained ch 4.7	16 BIT	R/W	unsigned word	1
26	Relay-3, function-1	Explained ch 4.7	16 BIT	R/W	unsigned word	1
27	Relay-3, function-2	Explained ch 4.7	16 BIT	R/W	unsigned word	1
28	Relay-3, function-3	Explained ch 4.7	16 BIT	R/W	unsigned word	1
29	Relay-3, function-4	Explained ch 4.7	16 BIT	R/W	unsigned word	1
30	Relay-3 logic	Explained ch 4.7	16 BIT	R/W	unsigned word	1
31	Relay-4, function-1	Explained ch 4.7	16 BIT	R/W	unsigned word	1
32	Relay-4, function-2	Explained ch 4.7	16 BIT	R/W	unsigned word	1
33	Relay-4, function-3	Explained ch 4.7	16 BIT	R/W	unsigned word	1
34	Relay-4, function-4	Explained ch 4.7	16 BIT	R/W	unsigned word	1
35	Relay-4 logic	Explained ch 4.7	16 BIT	R/W	unsigned word	1
36	Relay delay	Explained ch 4.7	16 BIT	R/W	unsigned word	1
37	Alarm delay	Explained ch 4.8	16 BIT	R/W	unsigned word	1
38	Alarm lock	Explained ch 4.9	16 BIT	R/W	unsigned word	1

ADRESS	NAME	DESCRIPTION	DIMENS	R/W	DATA TYPE	COEFF
39	Modbus node address	Explained ch 4.10	16 BIT	R/W	unsigned word	1
40	Modbus baudrate	Explained ch 4.10	16 BIT	R/W	unsigned word	1
41	Sensor-1, temp offset	Explained ch 4.11	16 BIT	R/W	signed word	0.1
42	Sensor-1, humidity offset	Explained ch 4.12	16 BIT	R/W	signed word	0.1
43	Sensor-2, temp offset	Explained ch 4.11	16 BIT	R/W	signed word	0.1
44	Sensor-2, humidity offset	Explained ch 4.12	16 BIT	R/W	signed word	0.1
45	Sensor-3, temp offset	Explained ch 4.11	16 BIT	R/W	signed word	0.1
46	Sensor-3, humidity offset	Explained ch 4.12	16 BIT	R/W	signed word	0.1
47	Software version	Explained ch 4.13	16 BIT	R/W	unsigned word	1
48	Modbus relay-1	Explained ch 4.17 If the relay function is selected as 14 and any non-zero value is written to this register, then the relay function for the related relay will be active.	16 BIT	R/W	unsigned word	1
49	Modbus relay-2	Explained ch 4.17 If the relay function is selected as 14 and any non-zero value is written to this register, then the relay function for the related relay will be active.	16 BIT	R/W	unsigned word	1
50	Modbus relay-3	Explained ch 4.17 If the relay function is selected as 14 and any non-zero value is written to this register, then the relay function for the related relay will be active.	16 BIT	R/W	unsigned word	1
51	Modbus relay-4	Explained ch 4.17 If the relay function is selected as 14 and any non-zero value is written to this register, then the relay function for the related relay will be active.	16 BIT	R/W	unsigned word	1
52	Modbus read password	Explained ch 5.2	16 BIT	R/W	unsigned word	1
52	Modbus write password	Explained ch 5.2	16 BIT	R/W	unsigned word	1

ADRESS	NAME	DESCRIPTION	DIMENS	R/W	DATA TYPE	COEFF
54	Sensor-1, temperature calibration	The factory set value is 256. The measured value is multiplied with this register and divided by 256 before displaying.	16 BIT	R/W	unsigned word	1
55	Sensor-1, humidity calibration	The factory set value is 256. The measured value is multiplied with this register and divided by 256 before displaying.	16 BIT	R/W	unsigned word	1
56	Sensor-2, temperature calibration	The factory set value is 256. The measured value is multiplied with this register and divided by 256 before displaying.	16 BIT	R/W	unsigned word	1
57	Sensor-2, humidity calibration	The factory set value is 256. The measured value is multiplied with this register and divided by 256 before displaying.	16 BIT	R/W	unsigned word	1
58	Sensor-3, temperature calibration	The factory set value is 256. The measured value is multiplied with this register and divided by 256 before displaying.	16 BIT	R/W	unsigned word	1
59	Sensor-3, humidity calibration	The factory set value is 256. The measured value is multiplied with this register and divided by 256 before displaying.	16 BIT	R/W	unsigned word	1

5.4. MEASUREMENTS AND CONTROLLER RECORDS

ADDRESS	NAME	DESCRIPTION	DIMENS	R/W	DATA TYPE	COEFFI
10609	Unit ID	Unit model type	16 BIT	R-O	unsigned word	1
20480	Sensor-1 temperature		16 BIT	R-O	signed word	0.01
20481	Sensor-1 relative humidity		16 BIT	R-O	unsigned word	0.01
20482	Sensor-2 temperature		16 BIT	R-O	signed word	0.01
20483	Sensor-2 relative humidity		16 BIT	R-O	unsigned word	0.01
20484	Sensor-3 temperature		16 BIT	R-O	signed word	0.01
20485	Sensor-3 relative humidity		16 BIT	R-O	unsigned word	0.01
20486	Alarms	Alarm status bits	16 BIT	R-O	unsigned word	1
20487	Relay statuses		16 BIT	R-O	unsigned word	1

Alarm status record is 16 bit long. Each bit indicates the existence of one alarm.

BIT NO:	DESCRIPTION
0	-
1	Sensor-1 low temperature alarm
2	Sensor-1 high temperature alarm
3	Sensor-1 low humidity alarm
4	Sensor-1 high humidity alarm
5	Sensor-2 low temperature alarm
6	Sensor-2 high temperature alarm
7	Sensor-2 low humidity alarm
8	Sensor-2 high humidity alarm
9	Sensor-3 low temperature alarm
10	Sensor-3 high temperature alarm
11	Sensor-3 low humidity alarm
12	Sensor-3 high humidity alarm
13	-
14	-
15	-

Relay status record is 16 bir long. Each bit indicates the status of one relay. If the bit value is 1, this means that the relay is active.

BIT NO:	DESCRIPTION
0	-
1	-
2	-
3	-
4	-
5	Relay-1 status bit
6	Relay-2 status bit
7	Relay-3 status bit
8	Relay-4 status bit
9	-
10	-
11	-
12	-
13	-
14	-
15	-

6. TECHNICAL SPECIFICATIONS

Auxiliary supply:
      AC model: 85-305VAC (88-450VDC)
      DC model: 19-150VDC

Power consumption: 2W maximum

Relay outputs: 5A @ 250V AC

Temperature measuring range: -40°C to +80°C

Temperature accuracy: ±1°C (0 to 60°C)

Humidity measuring range: 0% to 100%

Humidity accuracy: ±%3.5 (20% to 80%)

Response delay: 15 seconds

Data port: RS-485

Data rate: 2400-115200 baud

Data type: 8 bit, no parity, 1 bit stop

Operating temp. range: -20°C to +70 °C

Max. Relative humidity: 95% non-condensing

Enclosure: Flame retardent, ROHS compliant, high temperature ABS/PC (UL94-V0)

Installation: DIN rail mounted

Dimensions: 70x115x66mm (WxHxD)

Weight: 200 g (approx.)

EU Directives:	Reference standards:
2014/35/EC (LVD)	EN 61010 (safety)
2014/30/EC (EMC)	EN 61326 (EMC)