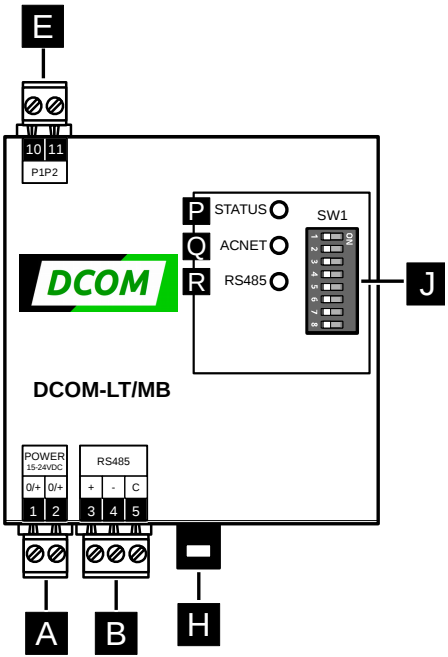


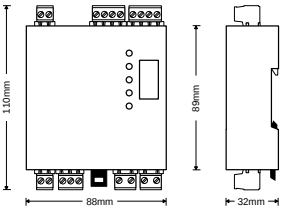
Reference
manual

DCOM-LT/MB

Reference manual
DCOM-LT/MB

English

20



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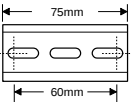

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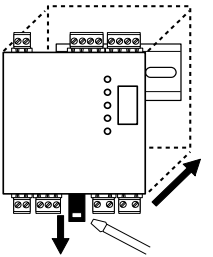

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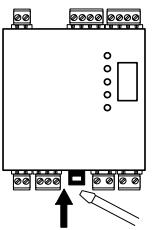

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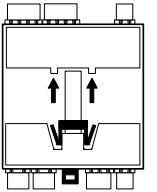

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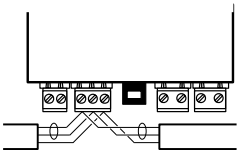

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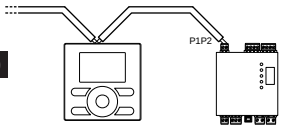

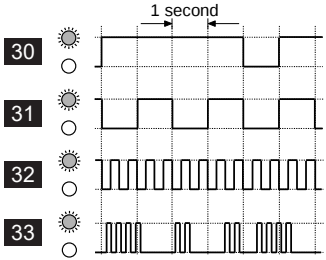

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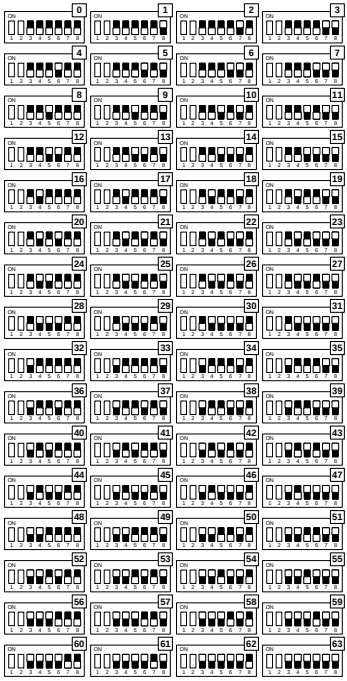

English

GENERAL SAFETY PRECAUTIONS

The English text is the original instruction. Other languages are translations of the original instructions.

Refer to http://www.daikineurope.com/support-and-manuals/product-information/ for more detailed user reference guides

Refer to Daikin documentation on the Daikin Altherma products and controllers compatibility.

Supported DCOM functions might be different depending on the unit. Refer to the unit manual for more details.

WARNING

Carefully read these instructions before installation. They will tell you how to install, how to configure and how to use the unit properly. Keep this manual in a handy place for future reference.

This is an option to be used in combination with Daikin units. Refer to the installation and operation manual of the units for installation and operation instructions.

Improper installation or attachment of equipment or accessories could result in electric shock, short-circuit, leaks, fire or other damage to the equipment or personal injury.

If unsure of installation procedures or use, always contact your dealer for advice and information.

NOTICE

Do **NOT** install the DCOM:

Near machinery emitting electromagnetic radiation. Electromagnetic radiation may disturb the operation of the control system and result in a malfunction of the unit.

In moist areas or places where it may be exposed to water. If water enters the device, electric shocks may be caused and the inner electronics may fail.

NOTICE

In order to comply with SELV system requirements do not connect the P1P2 network to any other connection apart from the P1P2 connection on the DCOM and compatible P1P2 connections on Daikin equipment

WARNING

The operation of the product in smart-grid applications must be according to EN60730-1:2011 and must not override the operation of any type 2 action controls nor interfere with any protective function of the control

WARNING

All cables must be fitted with adequate strain relief and be protected from abrasion.

EN 60730-1 DECLARATION

Category	Declaration
Model Name	DCOM-LT/MB
Model Number	534-001
Mounting	Surface Mounting
Purpose of control	Operating Control
Protection against electric shock	Independently mounted Class I Equipment
Software Class	Class A
Control Action	Type 1
Pollution degree	2
Rated Impulse Voltage	Category II 500V
Surge Immunity Category	Installation Class 2

WEEE

The adjacent symbol indicates that a product is not to be disposed of with household waste, according to the Directive and each country's national law. The product should be handed in at a designated collection point or to an authorised collection site for recycling waste electrical and electronic equipment (EEE).

SPECIFICATIONS

Physical	Dimensions	110 x 88 x 32 mm
	Weight	80g
	Enclosure	PC ABS UL94-V0
	Connectors	PA 6.6 UL94-V0
	Mounting	35mm IEC/EN 60715 DIN Rail
	Protection	IP20
Electrical	Power Supply	Regulated 15-24VDC 80mA
	Terminals	CSA 0.5 to 2.5mm2 Torque 0.5Nm
Networks	P1P2	<1m
	RS485	RS485(TIA-485-A) 3-wire <500m, 9600 Baud, No Parity, 1 Stop Bit
	Modbus	Modbus RTU
Environment		Storage: -10..60ºC Operating: 0..55ºC
	Humidity	0-90% Non-condensing
	EMC	EN60730-1:2011
	Safety	EN60730-1:2011

English

INSTALLATION

MOUNTING

21 If using the DIN rail supplied with the DCOM, mount the DIN rail horizontally using two or more fasteners.

22 Align the module DIN mounting points with the top of the DIN rail.

23 Pull down the black clip H with a suitable tool, align the module vertically flush with the DIN rail and release the clip to fix the module to the DIN rail **24**.

WIRING

POWER TERMINALS **A**

Connect the Power Terminals to a regulated power supply.

NOTICE: POWER SUPPLY

The DCOM-LT/MB requires a 15-24VDC regulated power supply with a minimum supply current of 80mA. Do not operate the DCOM outside of the specified voltage range.

INFORMATION

Power terminals are polarity independent. 0V and +V can be wired to either terminal.

P1P2 TERMINALS **E**

Connect terminals P1P2 to a compatible Altherma LT Master Remote Controller, for example an MMI.

ALTHERMA 2 COMPATIBILITY

For Altherma 2 and EKRUCBL* / EKRUHML* the DCOM can only be used with Remocon if LAN adaptor is NOT connected.

Refer to Daikin documentation for more details on the compatibility.

RS485 TERMINALS **B**

The DCOM RS485 Terminals are connected to an RS485 daisy-chained bus using a stranded twisted pair with overall shield and drain wire. Terminals '+' and '-' must be connected to matching terminals on other RS485 devices using the twisted pair. Terminal 'C' must be connected to all other RS485 Common terminals using the drain wire. The shield should only be earthed at one location.

LEDS AND SWITCHES

DIP SWITCHES **J**

Switch SW1 consists of 8 switches numbered SW1.1 to SW1.8. Except for Smart Grid mode, Switches SW1.1 and SW1.2 select the operating mode, and switches SW1.3 to SW1.8 select the Modbus Address of the device **34**. In the case of Smart Grid Mode switches SW1.1 to SW1.4 select the Smart Grid function, and switches SW1.5 to SW1.8 select the Modbus Address of the device **34**.

LES **P** **Q** **R**

LED flashing sequences are defined in **30** to **33**.

INFORMATION: LED OPERATION AT POWER-UP

At power-up all LEDs illuminate for 2 seconds. LEDs **P**, **Q** and **R** change from RED to GREEN and then revert to the behaviour described in the following sections for each LED.

Status LED **P** will then flash Yellow indicating ***Waiting for Altherma Master***. All other LEDs will initially be off, until communications occurs on P1P2 or RS485 network.

STATUS LED **P**

Colour	Pattern	Meaning
YELLOW	**31**	Waiting for Altherma Master
YELLOW	**32**	Synchronising with Master
RED	**31**	Timeout Waiting for Master
GREEN	**30**	Master synchronised, No Fault
RED	**30**	Master synchronised, Unit Fault

When the device powers up it starts in the ***Waiting for Altherma Master*** status and the Status LED will flash YELLOW slowly **31**. When the Altherma master is detected the Status LED will flash YELLOW fast **32** while synchronising with the Altherma Master. When synchronisation is complete the Status LED is GREEN or RED depending if a fault condition exists, the LED will be off for 1 second every 5 seconds to indicate normal operation **30**.

Synchronisation can take up to 8 minutes. When synchronised, if communications fails for 60 seconds then the DCOM reverts to ***Waiting for Altherma Master*** status.

If synchronisation takes more than 10 minutes then the DCOM will revert to ***Waiting for Altherma Master*** status and wait for synchronisation to restart. If the DCOM remains in ***Waiting for Altherma*** status for more than 3 minutes then the DCOM will switch to ***Timeout Waiting for Master*** status and the Status LED will flash RED **31**.

ACNET LED **Q**

Colour	Pattern	Meaning
GREEN	**33**	Normal Communication
RED	**33**	Communications Errors
RED	**30**	Communications Failure

The ACNET LED will flash GREEN at irregular intervals when a message is received to indicate normal communications **33**. If a communications error occurs the error will be indicated by the LED flashing RED on each error. If the communications are permanently in error then the LED will flash RED continuously **30**.

RS485 LED **R**

Colour	Pattern	Meaning
GREEN	**33**	Normal Communication
RED	**33**	Communications Errors
RED	**30**	Communications Failure

The RS485 LED will flash GREEN at irregular intervals when a message is received to indicate normal communications **33**. If a communications error occurs the error will be indicated by the LED flashing RED on each error. If the communications are permanently in error then the LED will flash RED continuously **30**.

English

DESCRIPTION OF OPERATION

The DCOM-LT/MB is a control interface for Daikin Altherma units, refer to Daikin documentation on the Daikin Altherma model and the controller compatibility. Refer to the **DCOM-LT/MB Reference Manual** for a complete guide to DCOM Modbus Networking.

MODBUS PROTOCOL

The DCOM Modbus Protocol has the following configuration

Network	EIA-RS485 2-wire
Protocol	Modbus RTU
Configuration	9600 baud, 8 data bits, 1 stop bit
Register Base	0
Register Types	Analog Holding, Analog Input

FUNCTION CODES

The following function codes are supported by the interface. For each code the maximum number of registers that can be read/or written is listed.

Function Type	Function Code	Maximum Count
Input Register Read	4	64
Holding Register Read	3	64
Single Holding Register Write	6	1
Multiple Holding Register Write	16	64

SPECIAL RETURN VALUES

In cases where data is not currently available, or a register is not supported in the current device configuration, a number of special return values are assigned. These values will be returned if the Modbus register is read as a signed or unsigned 16 bit value.

Return Value	Meaning	Description
32767	Register Unsupported	Device does not support requested register
32766	Register Unavailable	Requested register is not available in current configuration
32765	Wait for value	Requested register value is not loaded

If the DCOM is timed out or synchronising with the Altherma master, values will return **Wait for value** until the value is loaded.

DATA TYPES

DCOM Modbus registers return data in the formats listed in the following table.

Data Type	Signed	Bits	Scaling	Range
temp16	signed	16	/ 100	-327.68 .. 327.67
int16	signed	16	none	-32768 .. 32767
text16	unsigned	16	none	2 ASCII Characters

HOLDING REGISTERS

Register Offset	Name	Type	Range
1	Leaving Water Main Heating Setpoint	int16	25 .. 55ºC
2	Leaving Water Main Cooling Setpoint	int16	5 .. 22ºC
3	Operation Mode	int16	0: Auto, 1:Heating, 2:Cooling
4	Space Heating/Cooling On/Off	int16	0:OFF 1:ON
6	Room Thermostat Control Heating Setpoint	int16	12 .. 30ºC
7	Room Thermostat Control Cooling Setpoint	int16	15 .. 35ºC
9	Quiet Mode Operation	int16	0:OFF 1:ON
10	DHW Reheat Setpoint	int16	30 .. 60ºC
12	DHW Reheat On/Off	int16	0:OFF 1:ON
13	DHW Booster Mode On/Off	int16	0:OFF 1:ON
53	Weather Dependent Mode	int16	0:Fixed 1: Weather Dependent 2: Fixed +Scheduled 3: Weather Dependent +Scheduled
54	Weather Dependent Mode LWT Heating Setpoint Offset	int16	-10 .. 10ºC
55	Weather Dependent Mode LWT Cooling Setpoint Offset	int16	-10 .. 10ºC

INFORMATION

The available range for setpoint registers is determined by the Minimum and Maximum Setpoint of the function defined in the Altherma system field settings. Consult the Altherma operation manual for the setpoint ranges of the selected product.

INFORMATION

If a write to a setpoint register is outside of the configured range of the register then the setpoint will be set to the nearest valid minimum or maximum value.

For all other registers, if a value outside of the register range is written, then the register value is not updated..

English

INPUT REGISTERS

Register Offset	Name	Type	Range
21	Unit Error	int16	0:No Error 1: Fault 2: Warning
22	Unit Error Code	text16	2 Ascii Characters
23	Unit Error Sub Code	int16	If No error 32766 If Unit Error 0 .. 99
30	Circulation Pump Running	int16	0:OFF 1:ON
31	Compressor Run	int16	0:OFF 1:ON
32	Booster Heater Run	int16	0:OFF 1:ON
33	Disinfection Operation	int16	0:OFF 1:ON
35	Defrost/Startup	int16	0:OFF 1:ON
36	Hot Start	int16	0:OFF 1:ON
37	3-Way Valve	int16	0: Space Heating 1: DHW
38	Operation Mode	int16	1: Heating 2: Cooling
40	Leaving Water Temperature pre PHE	temp16	-100.00 ..100.00ºC
41	Leaving Water Temperature pre BUH	temp16	-100.00 ..100.00ºC
42	Return Water Temperature	temp16	-100.00 ..100.00ºC
43	Domestic Hot Water Temperature	temp16	-100.00 ..100.00ºC
44	Outside Air Temperature	temp16	-100.00 ..100.00ºC
45	Liquid Refrigerant Temperature	temp16	-100.00 ..100.00ºC
49	Flow Rate	int16	litres/minute x 100
50	Remocon room temperature	temp16	-100.00 ..100.00ºC

INFORMATION: TEMPERATURE SENSOR DATA

Temperature Sensor values are returned in Modbus using the **temp16** data format. To convert the value to Centigrade, read the Modbus Register as a signed 16 bit value and then divide the value by 100.

UNIT ERROR REGISTERS

When the DCOM is Synchronised with the Altherma system the Unit Error information from the Altherma is reported by the DCOM.

When the DCOM is Waiting or Synchronising with the Altherma system then the Unit Error register value will be **0:No Error**.

If the DCOM status is ***Timeout Waiting for Master*** then the Unit Error Value will be set to **1:Fault** and Unit Error Code will return the value **21816** which converts to fault code **U8**.

Refer to the installation and operation manual of the Altherma System for information on Fault Code meaning.

The Unit Error Sub Code reports a subcode value of 0 to 99 when a Unit Error or Warning exists. In the case that there is no error the Unit Error Sub Code returns the value 32766.

INFORMATION: UNIT ERROR CODE FORMAT

Daikin Fault Codes are stored as a 16 bit unsigned integer that must be decoded to return the Fault Code as two ASCII characters.

If Unit Error value is **0:No Error** then the Unit Error Code returned will be the value **11565** (decimal) which is decoded as the text '**--**' meaning No Error.

Refer to the **DCOM-LT/MB Reference Manual** for detailed information.

English

REFERENCE

RS485 NETWORK

NETWORK INSTALLATION

The RS485 must be installed in a bus configuration where each network device is attached to a single bus network 28. Do not use branches or connect the network in a ring.

NETWORK LENGTH

The RS485 network length should be less than 1000m in length.

BUS LOADING

No more than 32 Modbus devices including the Modbus Master must be installed on a single network bus. Additional devices can be added by using an RS485 physical layer repeater.

NETWORK CABLE

Network cable must be a screened twisted-pair with a drain-wire (Belden 8761 or equivalent). It is recommended that cores are stranded, with a minimum cross-sectional area of 0.33mm² and a resistance equal or less than 60Ω/km.

TERMINATION AND FAILSAFE BIAS

RS485 termination is not required for normal operation as the standard network speed of 9600 baud does not require network termination for network lengths up to 1000m. The DCOM RS485 transceiver has internal failsafe biasing which avoids the need to add external failsafe bias resistors.

In case termination is used, then for correct network operation a failsafe biasing circuit must be added as well.

MODBUS PROTOCOL

The DCOM supports the Modbus RTU protocol and operates in Slave Mode. The Modbus address of the DCOM Interface is selected by DIP Switches 1.3 to 1.8 34.

REGISTER FORMATS

The DCOM documentation uses Modbus Register Offset numbering for all registers. A register is specified by the function type (Holding or Input) and the Register Offset. The register offset is a value between 0 and 65535.

To use the alternative Modicon register addressing mode 3xxxx and 4xxxx it is necessary to perform a conversion. The Modicon Base Holding register is 40001, and the Modicon Base Input register is 30001. To convert DCOM registers to Modicon format, add the DCOM Register Offset to the Modicon Base Register.

examples:

DCOM Holding Register 1 = 40001 + 1
= Modicon Register 40002

DCOM Input Register 20 = 30001 + 20
= Modicon Register 30021

This conversion is only supported for Modbus register offsets upto 9999. All DCOM application registers are below this offset.

DAIKIN ERROR CODE FORMAT

Daikin Fault Codes are returned by the DCOM as a 16 bit unsigned integer that must be decoded to return the Fault Code as two ASCII characters.

If Unit Error value is **0:No Error** then the Unit Error Code returned will be the value `11565` (decimal) which is decoded as the text '`--`' meaning No Error.

To convert from a 16 bit unsigned integer to Fault Code characters, the following procedure is used:

1) Extract Lowest Signficiant Byte (**LSB**) from the Fault Code integer

LSB = Fault Code Integer % 256

Where % is the Modulus symbol.

2) Extract the Most Significant Byte (**MSB**) from the Fault Code Integer

MSB = (Fault Code Integer - **LSB**) / 256

3) the **MSB** and **LSB** are ASCII Character Codes for the two characters of the fault code. Lookup the ASCII Characters for the pair of values and place the characters together in the order **MSB, LSB**.

Examples of decoding Fault Code Integer are given in the following table:

Fault Code Integer	MSB	LSB	MSB to ASCII	LSB to ASCII	Fault Code
11565	45	45	'-'	'-'	--
14152	55	72	'7'	'H'	'7H'
21816	85	56	'U'	'8'	'U8'

The following table lists the ASCII characters for all returned values of **LSB** and **MSB**

LSB/ MSB Value	ASCII		LSB/ MSB Value	ASCII
45	'-'		65	'A'
48	'0'		67	'C'
49	'1'		69	'E'
50	'2'		70	'F'
51	'3'		72	'H'
52	'4'		74	'J'
53	'5'		76	'L'
54	'6'		80	'P'

English

LSB/ MSB Value	ASCII		LSB/ MSB Value	ASCII
55	'7'		85	'U'
56	'8'		88	'X'
57	'9'			

DCOM-LT/IO SEQUENCER MODE

The Modbus DCOM-LT/IO configured for Sequencer Mode has different Modbus Registers from the other operating modes. The Modbus Registers are listed below.

INFORMATION

When the DCOM is not in Sequencer mode, Input registers that are only available in Sequencer mode will return 32766.

HOLDING REGISTERS: SEQUENCER MODE

Register Offset	Name	Type	Range
1	Leaving Water Main Heating Setpoint	int16	25 .. 55ºC
2	Leaving Water Main Cooling Setpoint	int16	5 .. 22ºC
3	Operation Mode	int16	0: Auto, 1:Heating, 2:Cooling
4	Space Heating/Cooling On/Off	int16	0:OFF 1:ON
5	Room Thermostat Control Heating/ Cooling Setpoint	int16	Heating: 12 .. 30ºC Cooling: 15 .. 35ºC
6	DHW Reheat On/Off	int16	0:OFF 1:ON
7	DHW Booster Mode On/Off	int16	0:OFF 1:ON
9	Quiet Mode Operation	int16	0:OFF 1:ON
10	Weather Dependent Mode	int16	0:Fixed 1: Weather Dependent 2: Fixed +Scheduled 3: Weather Dependent +Scheduled
11	Weather Dependent Mode LWT Heating/ Cooling Setpoint Offset	int16	-10 .. 10ºC

INFORMATION

The available range for setpoint registers is determined by the Minimum and Maximum Setpoint of the function defined in the Altherma system field settings. Consult the Altherma operation manual for the setpoint ranges of the selected product.

INFORMATION

If a write to a setpoint register is outside of the configured range of the register then the setpoint will be set to the nearest valid minimum or maximum value.

For all other registers, if a value outside of the register range is written, then the register value is not updated..

INPUT REGISTERS : SEQUENCER MODE

Register Offset	Name	Type	Range
21	Unit Error	int16	0:No Error 1: Fault 2: Warning
22	Unit Error Code	text16	2 Ascii Characters
23	Leaving Water Temperature pre BUH	temp16	-100.00 ..100.00ºC
36	Unit Error Sub Code	int16	0 .. 99
37	3-Way Valve	int16	0: Space Heating 1: DHW
38	Operation Mode	int16	1: Heating 2: Cooling
40	Leaving Water Temperature pre PHE	temp16	-100.00 ..100.00ºC
45	Liquid Refrigerant Temperature	temp16	-100.00 ..100.00ºC
49	Flow Rate	int16	litres/minute x 100
50	Remocon room temperature	temp16	-100.00 ..100.00ºC
70	Space Heating/Cooling On/Off	int16	0:OFF 1:ON
71	Circulation Pump Running	int16	0:OFF 1:ON
72	Compressor Run	int16	0:OFF 1:ON
74	Disinfection Operation	int16	0:OFF 1:ON
76	Defrost/Startup	int16	0:OFF 1:ON
77	DHW Reheat On/Off	int16	0:OFF 1:ON
78	Booster Heater Run	int16	0:OFF 1:ON
122	Unit Error Code	text16	2 Ascii Characters
123	Leaving Water Temperature pre BUH	temp16	-100.00 ..100.00ºC
136	Unit Error Sub Code	int16	0 .. 99
131	Return Water Temperature	temp16	-100.00 ..100.00ºC
132	Domestic Hot Water Temperature	temp16	-100.00 ..100.00ºC
133	Outside Air Temperature	temp16	-100.00 ..100.00ºC

INFORMATION: TEMPERATURE SENSOR DATA

Temperature Sensor values are returned in Modbus using the temp16 data format. To convert the value to Centigrade, read the Modbus Register as a signed 16 bit value and then divide the value by 100.

English

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