



# **ECA 73 M-Bus combi module for the ECL Comfort 300S controller**

## **Installation and User Guide**

## Table of Contents

<b>1.</b>	<b>Introduction</b>	<b>1</b>
1.1	How to read these instructions .....	1
1.2	Delivery scope .....	1
1.3	What to use the product for .....	1
1.3.1	Communication.....	1
1.3.2	Input configuration.....	2
1.3.3	Pulse input configuration .....	2
1.4	Compatibility.....	3
<b>2.</b>	<b>Configuration</b>	<b>3</b>
2.1	Network description.....	3
2.2	Mounting and wiring of the ECA 73 .....	4
2.3	Communication cable types .....	6
2.4	Installation of heat meters .....	6
2.5	Setting the service parameters of the ECL Comfort controller .....	6
2.5.1	Setting time constants.....	8
2.5.2	Setting desired flow or energy .....	8
2.5.3	M-Bus addresses .....	9
2.5.4	Reading measured data .....	10
2.5.5	M-Bus values.....	10
<b>3.</b>	<b>Trouble-shooting</b>	<b>12</b>
3.1	What to expect .....	12
3.2	Error conditions.....	12
3.2.1	Symptoms.....	12
3.2.2	Causes .....	12
3.3	Tips .....	13
<b>4.</b>	<b>Dismounting</b>	<b>13</b>

## 1. Introduction

### 1.1 How to read these instructions

Software and additional documentation for ECA 73 can be downloaded from <http://heating.danfoss.com>.



#### Safety Note

To avoid injury of persons and damages to the device, it is absolutely necessary to read and observe these instructions carefully.



This symbol indicates that this particular piece of information should be read with special attention.

### 1.2 Delivery scope

When delivered from Danfoss, the ECA 73 M-Bus combi module package includes:

- One ECA 73 M-Bus combi module (printed circuit board)
- One mounting guide

The supported heat meters with which the ECA 73 M-Bus combi module has been tested are listed in section 1.4.

### 1.3 What to use the product for

The ECA 73 M-Bus combi module module enables the ECL Comfort controller to read measured values of flow or energy consumption from connected heat meters as well as primary temperatures. The measured heat meter data can be used for outdoor temperature dependent flow or energy limitation.

ECA 73 can be used for all applications in the ECL Comfort 300S series (as of controller version 1.10).

The ECA 73 can be used with maximum two heat meters or pulse input for flow / energy with one heat meter. When the ECA 73 M-Bus combi module is used, the ECL Comfort controller cannot receive flow / energy data via any other ports or slots.

ECA 73 contains four additional temperature measurement inputs as well as two relay outputs (dependent on application card). The module is connected to the ECL Bus.



The ECA 73 module is powered by the system device bus of the ECL Comfort (ECL Bus) and it is necessary to connect an outdoor temperature sensor to the ECL Comfort controller in order for the ECA 73 module to function appropriately.

When several ECL Comfort controllers are connected in a network, only one ECA 73 module can be present in the network and this module must be installed in the master controller. See the Installer's Guide of the ECL Comfort for further information on ECL Comfort networking.

#### 1.3.1 Communication

When the ECA 73 M-Bus combi module is installed, the ECL Comfort can communicate with heat meters via M-Bus and / or pulse communication.

**M-Bus:**

When using M-Bus combi module, the ECL Comfort acts as master on the M-Bus. This means that other devices on the bus must be slaves. The M-Bus combi module communicates at 300 b/s. M-Bus communication in the ECL Comfort controller complies with the standard DS/EN 1434-3: 1997. When using M-Bus communication, the ECL Comfort controller can communicate with one or two heat meters via the bus.



If M-Bus is used, a 27 volt pull-up is needed, ECA 73 has to be power supplied from an external source.

**Pulse:**

When using pulse communication, the ECL Comfort controller is connected point-to-point to one single heat meter. ECL Comfort supports voltage pulse communication in the frequency range 0 – 200 Hz. The communication is supplied from the ECA 73 M-Bus combi module via a pull-up resistor.

In order for the ECA 73 to detect a pulse:

- The change in voltage must be greater than 5 V
- The pulse width must be greater than 1 ms



Exchange of data between the ECA 73 module and the ECL Comfort controller takes place once every 30 seconds.

**1.3.2 Input configuration**

The ECA 73 module can receive data input for up two circuits, I and II. These can be configured as shown in table 1.3.2a:

Circuit I	Circuit II
M-Bus	M-Bus
M-Bus	Puls
Pulse	M-Bus
M-Bus	Not used
Not used	M-Bus
Pulse	Not used
Not used	Pulse

Table 1.3.2a: Possible input setup

**1.3.3 Pulse input configuration**

The ECA 73 M-Bus module can receive pulse data from a heat meter through terminals 36-37 and can be configured as shown in figure 1.3.3a:

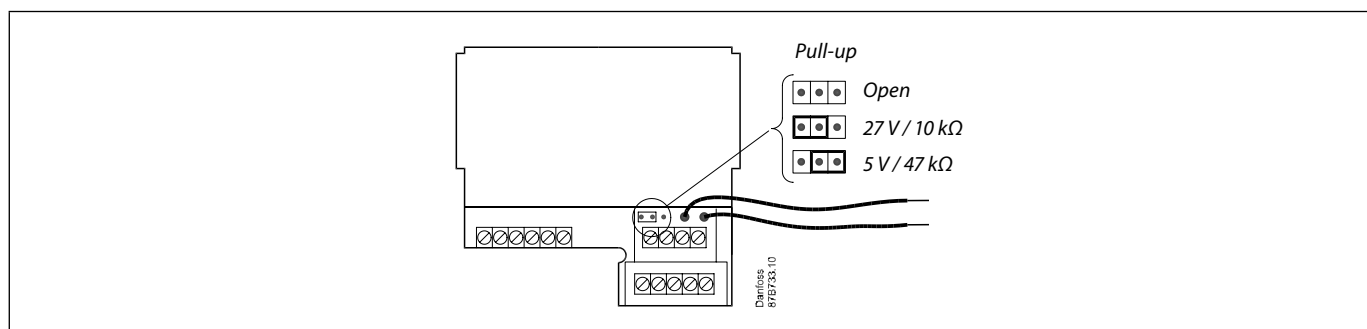


Fig. 1.3.3a: Pulse input configuration



If a 27 volt pull-up is needed, ECA 73 has to be power supplied from an external source.

## 1.4 Compatibility

### Optional ECA modules:

The ECA 73 is compatible with ECA 60-63, ECA 71, ECA 72, ECA 82, ECA 83 and ECA 87. Max. 2 ECA modules can be connected. Power supply: As of hardware version B (B200) and software version 2.00 only the 24 V a.c. version is supported.

### ECL Comfort:

ECL Comfort 300 series

- ECL Cards as of CI08 or higher versions (M-Bus and pulse are not supported)

ECL Comfort 300S series

- Software versions as of 1.10



In ECL Comfort master/slave systems, slave addresses 7, 8, 9 and 14 must not be used.

### Supported heat meters:

Heat meter	Manufacturer	Communication
Infocal™ 5	Danfoss A/S	M-Bus, pulse
CALSTREEM™, type EEM-C	Danfoss A/S	M-Bus, pulse
MULTICAL® III	Kamstrup A/S	M-Bus, pulse
WZD4 x.xx with pulse module WZD-PC	Siemens Building Technologies Landis & Staefa Division	Pulse
SHARKY-HEAT 130 °C	Hydrometer GmbH	M-Bus, pulse
Multidata N1	Zenner	M-Bus
CQM-II	Apator	M-Bus
Celec	Aquametro	M-Bus

Table 1.4a: Heat meters

### Transmitted heat meter data:

- Primary flow temperature\*
- Primary return temperature\*
- Actual flow
- Accumulated flow\*
- Actual energy
- Accumulated energy\*

\* Data are not displayed in the ECL Comfort controller

## 2. Configuration

### 2.1 Network description

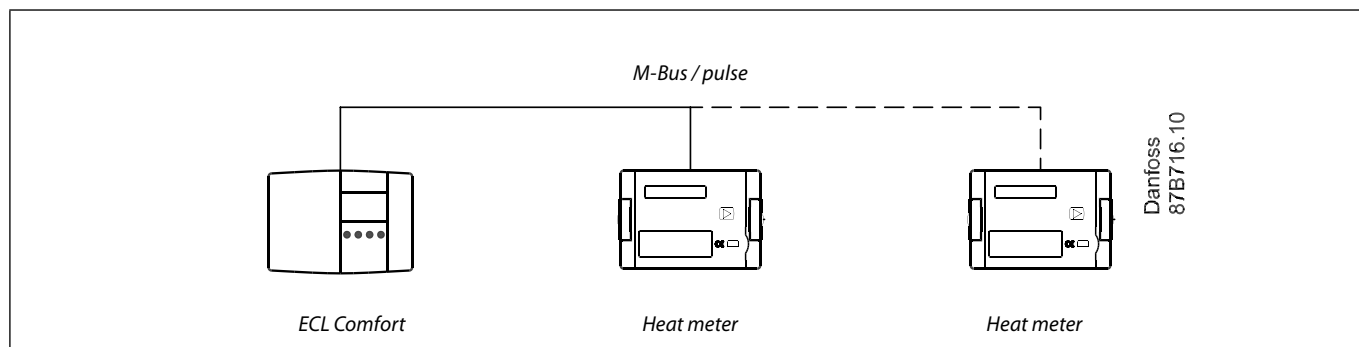
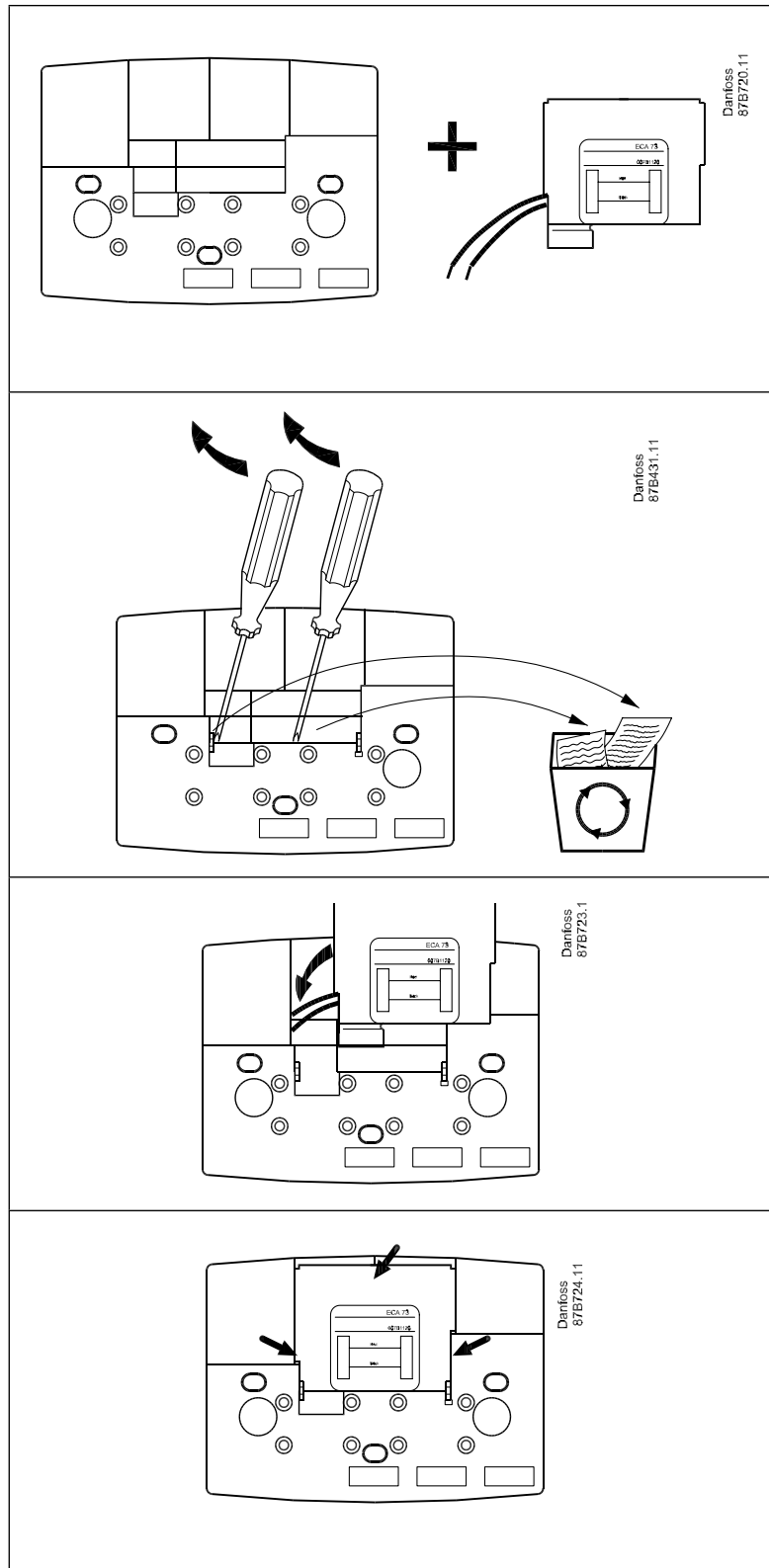


Fig. 2.1a: Application example

2.2 Mounting and wiring of the ECA 73



1. Mounting of ECL Comfort and ECA 73.

2. Remove the knockout by inserting a screw driver into the groove. Discard the knockout cover.

3. Enter the cables through the opening in the socket.

4. Insert the base of the module and press it gently to click it into place.

Fig. 2.2a: Mounting of the ECA

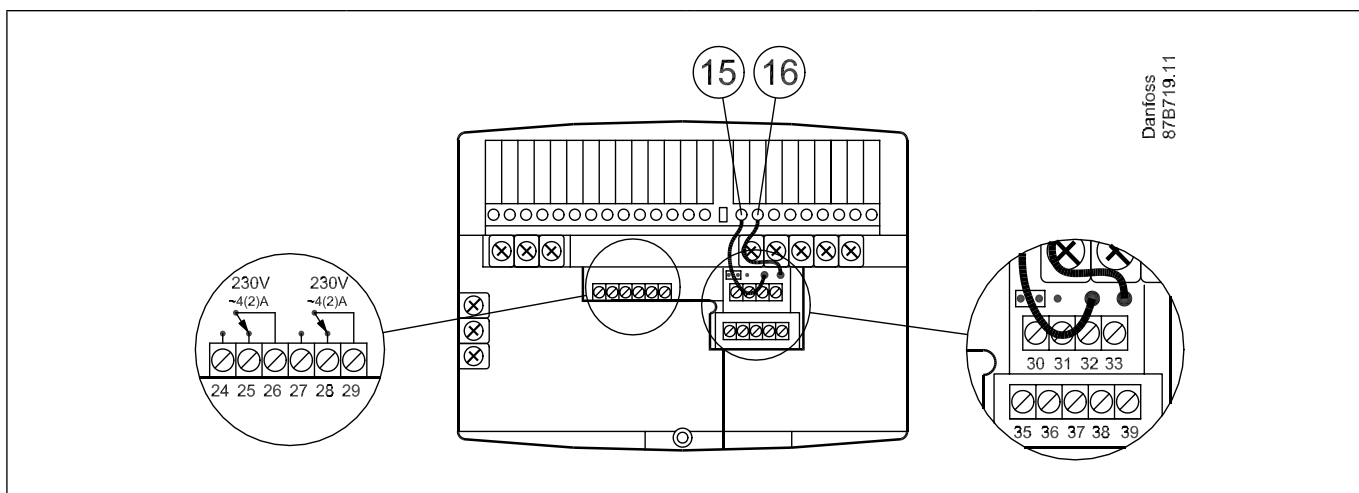


Fig. 2.2b: Wiring of the ECA 73

**Terminal connection**

<b>Terminals 24, 26</b>	Relay 4, NO (normally open)	<b>Terminal 35</b>	M-Bus
<b>Terminals 25, 26</b>	Relay 4, NC (normally closed)	<b>Terminal 36</b>	M-Bus GND
<b>Terminals 27, 29</b>	Relay 5, NO (normally open)	<b>Terminal 37</b>	Pulse input
<b>Terminals 28, 29</b>	Relay 5, NC (normally closed)	<b>Terminal 38</b>	Supply
<b>Terminal 30</b>	Sensor S7	<b>Terminal 39</b>	Supply
<b>Terminal 31</b>	Sensor S8		
<b>Terminal 32</b>	Sensor S9		
<b>Terminal 33</b>	Sensor S10		

Table 2.2c: Terminal connection

Sensor GND is connected to the common terminal of the ECL Comfort controller.

For sensor connections, the permissible cable cross-section is 0.5 mm<sup>2</sup>. The maximum cable length is 10 m.

Figure 2.2b illustrates the terminals on the inside of the ECL Comfort socket, with the ECA 73 module installed. The terminals for the ECA 73 are placed at the bottom of the socket. Therefore, it is most practical to begin by installing the cables for the ECA 73 and then proceed to install signal and other cables for the ECL Comfort controller itself.

As shown in Figure 2.2b, the system device bus cables of the ECA 73 module must be connected to terminals 15 and 16.



The total length of the cabling for sensors and system device bus must not exceed 125 m.

If you are having difficulty connecting several cables to terminal 34 (sensor common), use one of the larger common terminals immediately above the sensor terminals.

For further details on installation, see the ECL Comfort User's Guide (grey section, Installation and Maintenance).

## 2.3 Communication cable types

The table shows you the cable specifications for the two types of communication.

Communication	Cable type	Max. length	Dimension
M-Bus	Twisted pair telephone cable - JYStY	50 m	2 x 0.8 mm
Pulse	Twisted pair telephone cable - JYStY	50 m	2 x 0.8 mm

Table 2.3a: Wiring of the ECA 73

## 2.4 Installation of heat meters

For instructions on installing and setting up the heat meters, please read the documentation provided by the heat meter manufacturer.



The heat meter must be set up to 300 baud and a unique address between 1 and 250.

## 2.5 Setting the service parameters of the ECL Comfort controller

You set up the ECL Comfort controller to measure / limit flow or energy by modifying the setting of a few of the service parameters. This section tells you which service parameters must be modified. For instructions on how to set service parameters, see the appropriate ECL Comfort Installer's Guide (the 'grey' part of the Guide). When the ECA 73 module is installed, the relevant service parameters become accessible via the ECL Comfort's front panel – provided that the application card currently used with the ECL Comfort controller supports the limiting function (see page 3). The set-up of these parameters is described in the following. You should modify the setting of the parameters in the sequence in which they are described.


### Communication:

Parameters 115 and 114 are used to inform the ECA 73 module about the communication set-up.

Before setting up parameters, you must plan:

- Which circuit(s) should be set up for communication
- How the communication in each circuit should be used (pulse, M-Bus, not used)
- The range of the measured flow / energy data
- For pulse communication: What the significance of 1 pulse received is, i.e. the amount of water or the amount of consumed energy

In order to enable flow / energy limiting in both circuits controlled by the ECL Comfort controller, you must set up parameters 115 and 114 for both circuits.

When setting up parameters 115 and 114, you change between circuit I and II by pressing .

Parameter line	Setting range	Default	Description			
115	OFF / 1 ... 15	OFF	Parameter line 115 determines the unit and range of the flow / energy measurement, actual and desired values. If pulse communication is being used, parameter line 115 also determines the unit of the amount of water or energy signified by 1 pulse.			
			The following rows of this table explain the significance of the possible values of parameter line 115:			
			<b>Value</b>	<b>Flow / energy range</b>	<b>Flow / energy unit</b>	<b>Pulse unit</b>
			OFF	0	–	–
			1	0 – 2999	l/h	ml
			2	0 – 2999	l/h	l
			3	0.0 – 299.9	m <sup>3</sup> /h	ml
			4	0.0 – 299.9	m <sup>3</sup> /h	l
			5	0.0 – 299.9	m <sup>3</sup> /h	x10 l
			6	0 – 2999	m <sup>3</sup> /h	m <sup>3</sup>
			7	0.0 – 299.9	kW	Wh
			8	0.0 – 299.9	kW	x10 Wh
			9	0 – 2999	kW	kWh
			10	0.0 – 299.9	MW	kWh
			11	0.0 – 299.9	MW	x10 kWh
			12	0 – 2999	MW	MWh
13	0.0 – 299.9	GW	MWh			
14	0.0 – 299.9	GW	x10 MWh			
15	0 – 2999	GW	GWh			

*Table 2.5a: Parameter line 115*

Parameter line	Setting range	Default	Description
114	OFF / 1 ... 999	OFF	Parameter line 114 determines the amount of water / energy that one pulse signifies. The unit of the amount (pulse unit) is determined by the set-up of parameter line 115.  OFF: Pulse communication is not being used for the circuit.

*Table 2.5b: Parameter line 114*
**Example I:**

Circuit I is used for pulse communication of measured flow data. The flow data are in the range 0.0 – 299.9 m<sup>3</sup>/h and 1 pulse signifies a water flow of 200 l.

The setting should then be: Circuit I, parameter 115 = 4, parameter 114 = 200.

**Example II:**

Circuit II is being used for M-Bus communication of measured energy data. The energy data are in the range 0.0 – 299.9 kW.

The setting should then be: Circuit II, parameter 115 = 7, parameter 114 = OFF.

Parameter 115 might also have been set to 8 – the pulse unit setting is not used in M-Bus communication.

### 2.5.1 Setting time constants

When flow / energy data is received by the ECL Comfort controller, it will apply some filtering to the received data. Limiting of flow / energy consumption takes place by integral control. For both these processes, i.e. the filtering of the received data and the integral control, the ECL Comfort controller needs a time constant. These time constants are determined by parameters 113 and 112, respectively.

Parameter 112 and 113 can be set for circuit I as well as II. When setting parameters, you change between circuit I and II by pressing  $\frac{1}{2}$ .

Parameter line	Setting range	Default	Description
112	1 ... 250	40	Parameter line 112 is a time constant for integral control of flow / energy limiting. A high value of line 112 means fast control, a low value means slow (more stable) control.

Table 2.5.1a: Parameter line 112

Parameter line	Setting range	Default	Description
113	1 ... 250	2	Parameter line 113 is a time constant for digital filtering of flow / energy input data. When line 113 is set to 1, no filtering is applied. A high value of line 113 means that a high degree of filtering is applied.

Table 2.5.1b: Parameter line 113

### 2.5.2 Setting desired flow or energy

Before the ECL Comfort can limit the flow / energy, a desired flow or energy value must be entered for each circuit in which flow / energy limitation should be active. The desired flow / energy value works differently for a heating circuit and a domestic hot-water (DHW) circuit.

#### Heating circuit:

In a heating circuit (circuit I or II of the ECL Comfort controller), the desired flow / energy is determined indirectly by the ECL Comfort controller, in accordance with the actual outdoor temperature. In a heating circuit, the ECL Comfort performs outdoor temperature dependent flow or energy limitation. The ECL Comfort Installer's Guide ('grey' section, Service Parameters) describes the function and setting of the return temperature limitation in a heating circuit. Flow / energy limitation works according to the same principle.

The desired flow / energy is determined according to an outdoor temperature curve:

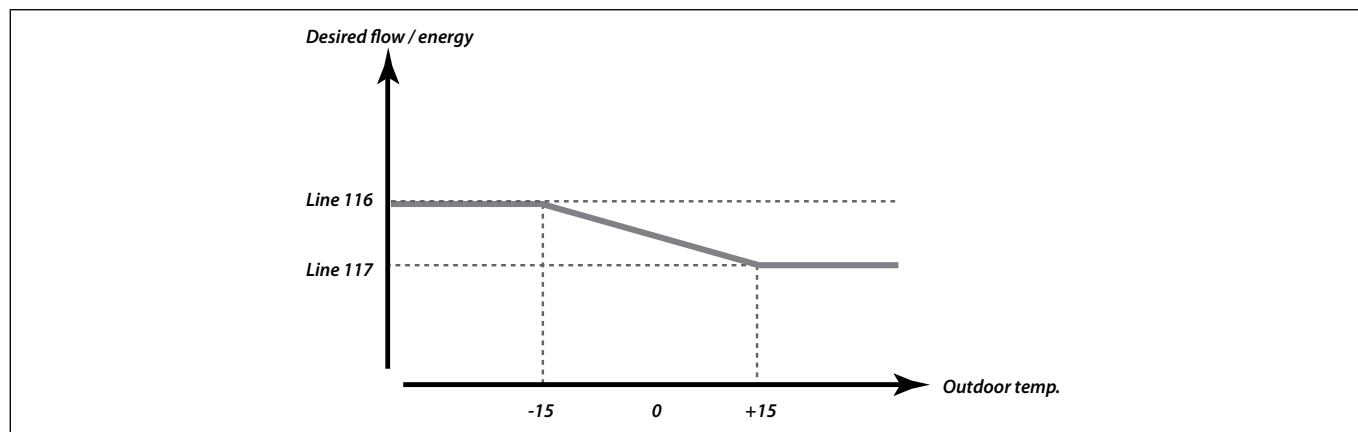


Fig. 2.5.2a: Principle of flow / energy limitation

The max. and min. of the curve shown in figure 2.5.2a are determined by parameter lines 116 and 117, respectively. The corresponding x-coordinates are identical to the x-coordinates of the return temperature limiting curve. See the ECL Comfort Installer's Guide to see how to read the x-coordinates.

Parameter line	Setting range	Default	Description
116	*	2999	Parameter 116 is the max. Y-coordinate of the flow / energy limiting curve
117	*	2999	Parameter 117 is the min. Y-coordinate of the flow / energy limiting curve

\* Depends on the setting in line 115.

Table 2.5.2b: Parameter lines 116-117

### DHW circuit:

For a DHW circuit, the desired flow / energy is entered directly into line 111.

Parameter line	Setting range	Default	Description
111	*	2999	Parameter 111 is the desired flow or energy for the DHW circuit. The unit is determined by the setting in line 115 (see page 7).

\* Depends on the setting in line 115.

Table 2.5.2c: Parameter line 111

### 2.5.3 M-Bus addresses

The scanning and swapping of addresses can be set in service parameter lines A3 and A2. To access the service menu, enter line 199 on the grey side of the ECL Card and push the arrow down button for 5 sec. Service parameter line A1 is not used for ECA 73.



Service parameters A2 and A3 are only available in the ECL Comfort 300S controller.

### Scanning addresses:

Each device attached to the M-Bus has a unique address within the interval 1...250.

The ECA 73 module scans the addresses of heat meters present on the M-Bus in the following way: When you set parameter A3 in circuit I to ON, the ECA 73 module sends a message on the M-Bus, addressed to heat meter no. 1. If there is no answer, the ECA 73 module proceeds sending a message to heat meter no. 2, etc. When the ECA 73 module receives an answer from a heat meter (the lowest device address) on the bus, it assumes that the responding device is a heat meter and assigns this device to circuit I. The next heat meter (highest address) will be assigned to circuit II.

Parameter line	Setting range	Default	Description
A3	ON / OFF	OFF	When parameter A3 is set to ON, the M-Bus addresses of two connected heat meters are scanned. After addresses have been scanned, parameter A3 is automatically reset to OFF. The scan takes 15 min.

Table 2.5.3a: Parameter line A3

If two heat meters are connected, it is recommended to check whether the assignment of the heat meters is correct. This is carried out by reading the actual flow of the heat meter in circuit I, enter parameter line 110 in circuit I of the controller and if the actual value does not correspond with the readout, the addresses have to be swapped.

**Swapping addresses:**

If the allocated addresses are incorrect, and it is required to swap addresses of the heat meters, the setting in line A2, circuit I, will solve this:

Parameter line	Setting range	Default	Description
A2	ON / OFF	OFF	When parameter A2 is set to ON, the M-Bus addresses of two connected heat meters are swapped. After addresses have been swapped, parameter A2 is automatically reset to OFF.

Table 2.5.3b: Parameter line A2

**2.5.4 Reading measured data**

You display the data read by the ECL Comfort controller from the attached heat meter(s) by reading parameter 110 for circuit I and II. When reading the parameter, you change between circuit I and II by pressing  $\frac{1}{2}$ .

Parameter line	Setting range	Default	Description
110	*	0	The actual flow or energy measurement. The unit depends on the setting in line 115 (see page 7).

\* Depends on the setting in line 115.

Table 2.5.4a: Parameter line 110

**2.5.5 M-Bus values**

The following meter bus values are available for ECL Comfort if ECA 73 is applied.

The following heat meter value can be read by the ECL Comfort controller in line 110. The value is updated once a minute.

- Actual flow or power

The below mentioned values can only be read by an ECA 71 (MODBUS) or ECA 72 (LON) module. These values are updated once every 5 minutes.

- Accumulated volume
- Accumulated energy
- Flow temperature
- Return temperature

**M-Bus unit enumeration type for flow and power\***

Applies to	Unit	Description	Range	Resolution
Flow	0	l/h	$\pm 32768$ l/h	1 l/h
	1	10 x l/h	$\pm 327680$ l/h	10 l/h
	2	100 x l/h	$\pm 3276800$ l/h	100 l/h
	3	1000 x l/h	$\pm 32768$ m <sup>3</sup> /h	1 m <sup>3</sup> /h
	...			
	27	10 <sup>27</sup> x l/h		
Power	0	W	$\pm 32768$ W	1 W
	1	10 x W	$\pm 327680$ W	10 W
	2	100 x W	$\pm 3276800$ W	100 W
	3	1 x kW	$\pm 32768$ kW	1 kW
	...			
	27	10 <sup>27</sup> x W		

\* Values 28-99 are invalid and should not be chosen.

Table 2.5.5a

**Instructions**
**ECA 73 M-Bus combi module for the ECL Comfort 300S**
**Volume [m<sup>3</sup>]\***

The accumulated units are based on their type and a scale 10<sup>x</sup>.

Unit	Range coding	x	Description
-6	10 <sup>x</sup> x m <sup>3</sup> -6	10 <sup>-6</sup> x m <sup>3</sup>	0.000001 m <sup>3</sup>
-5	-5	10 <sup>-5</sup> x m <sup>3</sup>	0.00001 m <sup>3</sup>
-4	-4	10 <sup>-4</sup> x m <sup>3</sup>	0.0001 m <sup>3</sup>
-3	-3	10 <sup>-3</sup> x m <sup>3</sup>	0.001 m <sup>3</sup>
-2	-2	10 <sup>-2</sup> x m <sup>3</sup>	0.01 m <sup>3</sup>
-1	-1	10 <sup>-1</sup> x m <sup>3</sup>	0.1 m <sup>3</sup>
0	0	10 <sup>0</sup> x m <sup>3</sup>	1 m <sup>3</sup>
1	1	10 <sup>1</sup> x m <sup>3</sup>	10 m <sup>3</sup>
2	2	10 <sup>2</sup> x m <sup>3</sup>	100 m <sup>3</sup>
3	3	10 <sup>3</sup> x m <sup>3</sup>	1000 m <sup>3</sup>
...	...	...	...
27	27	10 <sup>27</sup> x m <sup>3</sup>	

Table 2.5.5b

**Energy [Wh]\***

Unit	Range coding	x	Description
-3	10 <sup>x</sup> x Wh -3	10 <sup>-3</sup> x Wh	0.001 Wh
-2	-2	10 <sup>-2</sup> x Wh	0.01 Wh
-1	-1	10 <sup>-1</sup> x Wh	0.1 Wh
0	0	10 <sup>0</sup> x Wh	1 Wh
1	1	10 <sup>1</sup> x Wh	10 Wh
2	2	10 <sup>2</sup> x Wh	100 Wh
3	3	10 <sup>3</sup> x Wh	1 kWh
...	...	...	...
27	27	10 <sup>27</sup> x Wh	

Table 2.5.5c

**Energy [J]\***

Unit	Range coding	x	Description
100	10 <sup>x</sup> x J 0	10 <sup>0</sup> x J	1 J
101	1	10 <sup>1</sup> x J	10 J
102	2	10 <sup>2</sup> x J	100 J
103	3	10 <sup>3</sup> x J	1 kJ
...	...	...	...
127	27	10 <sup>27</sup> x J	

\* Values 28-99 are invalid and should not be chosen.

Table 2.5.5d

### 3. Trouble-shooting

#### 3.1 What to expect

When the ECA 73 M-Bus combi module has been installed as described in chapter 2.2 and set up as described in chapter 2.5, the measured flow or energy data should become available in line 110 (circuit I and / or II), as described. However, take into consideration that:

- The ECA 73 M-Bus combi module exchanges data with the ECL Comfort controller once a minute.
- The process of scanning addresses on the M-Bus (see 2.5.5) may take up to 15 minutes.

When pulse communication is used, you may experience discrepancies between the data displayed by the heat meter and the data displayed in line 110 by the ECL Comfort controller *when the flow or energy consumption is low*, i.e. when it is much lower than the expected value. This phenomenon is due to the method used by the ECL Comfort controller to calculate the measurement time for pulse communication. The ECL Comfort controller measures correctly in the interval surrounding the desired value.

#### 3.2 Error conditions

##### 3.2.1 Symptoms

Symptoms of an error condition could be:

- The ECL Comfort controller consistently reports 0 for parameter line 110 – while the heat meter reports a different value (i.e. water flow or energy consumption is taking place).
- The value reported by the ECL Comfort controller deviates significantly from the value reported by the heat meter
  - when M-Bus communication is used or.
  - when pulse communication is used - in connection with values close to the desired flow / energy values.

##### 3.2.2 Causes

The cause of failure could have its origin in:

- The heat meter
- The connection
- The ECA 73 M-Bus combi module
- The ECL Comfort controller

##### Heat meter:

To eliminate errors due to the functioning of the heat meter, check that the device is properly connected and set up according to the instructions of the manufacturer.

##### Connection:

To eliminate errors due to the connection, you should:

1. Check that the cables that are used meet the specifications on page 6, that they are properly connected to the ECL Comfort as well as to the heat meter and without any visible signs of damage.
2. Check the ECA 73 is supplied with power (for M-Bus communication)
3. Check whether you need to swap the M-Bus addresses of the heat meters (page 10) if you are using both circuits for M-Bus communication.

##### ECA 73 M-Bus combi module:

Once the ECA 73 module is installed in the ECL Comfort controller, you should be able to access the service parameters described in chapter 2.5. If these parameters are not accessible, the ECA 73 module is not communicating properly: Check that the ECA 73 module is properly seated in the connector (see page 4).

**ECL Comfort:**

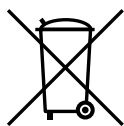
To eliminate errors caused by the ECL Comfort controller:

1. Check the software version of the ECL Comfort 300S\*. The software must be version 1.10 or later.
2. If data are displayed (service parameter 110) but values seem incorrect, check the set-up of the ECL Comfort controller. See chapter 2.5.

\* You can see the software version of the ECL Comfort controller during startup or in line 9 at the lower right-hand corner of the display (the yellow side of the ECL Card must be facing you)

**3.3 Tips**

- Choose low M-Bus addresses for faster setup
- Choose AC powered heat meter for longer life

**4. Dismounting****Disposal instruction:**

This product should be dismantled and its components sorted, if possible, in various groups before recycling or disposal. Always follow the local disposal regulations.



\* 0 8 7 R 9 7 7 1 \*



\* V I K N Y 2 0 2 \*