

# Energycomfort



## Contents

<b>3 Part 1 – General</b>	
3	Introduction
3	General
3	Application
3	Good to know
<b>4 Description of control</b>	
4	Appearance
<b>5 Display management</b>	
5	General
5	Min-/max limits
5	Operating keypad
<b>6 Menu tree</b>	
<b>8 Navigate between the menus</b>	
8	Start windows
8	System window
8	Main menu
<b>9 Functions</b>	
9	Login/Authorization
9	Idle mode
<b>10 Basic functions</b>	
10	Overview operating modes
10	Economy (Normal operating mode)
10	Timer
10	Comfort
10	Setback
<b>11 Part 2 – Temperature settings</b>	
(requires login for industrial version)	
<b>11 Economy temperature</b>	
<b>12 Comfort temperature</b>	
<b>13 Setback temperature</b>	
<b>13 Battery</b>	
<b>14 Timer temperature</b>	
<b>15 Engine heater/Lights in Energycomfort Domestic</b>	
<b>16 Part 3 – Function settings</b>	
(requires login for industrial and domestic version)	
16	Time and date
16	Default timer time
17	No heat mode
18	Manual control
19	P-band and I-time
19	Outdoor curve
20	Min and max limits of radiator output
20	Max limit using external loadguard
21	Fresh air brake
22	Output control of radiators
23	Start time optimiz.
23	Calibration of sensors
24	Alarm configuration
<b>25 Part 4 – Configuration</b>	
(requires login for industrial and domestic version)	
25	Configuration Temperature sensors
26	Digital inputs
<b>27 Installation</b>	
27	Zone division
27	Junction box with contactors (Energycomfort Industrial)
27	Switch for Energycomfort Domestic
27	Sensors
28	Control unit Energycomfort Industrial
28	Setting of radiators for Domestic
28	System overview
<b>29 Wiring diagrams</b>	
29	Energycomfort Industrial 4 zones
30	Energycomfort Industrial 6 zones
31	Energycomfort Domestic 4 zones
31	Energycomfort Domestic 6 zones
<b>32 Inputs and outputs</b>	
32	Analogue inputs
32	Universal inputs
32	Digital inputs
32	Digital outputs (Contactors)
<b>33 Alarm</b>	
33	Alarm list
<b>34 Detailed description of how Energycomfort functions</b>	
34	Calculation of supplied output as percentage of full output
34	Calculation of Weekly program's optimisation times with adaptive settings
34	Energycomfort gives soft heat
<b>35 Trouble shooting</b>	
35	The display goes out
35	The temperatures in the zones are considerably too low
35	Less deviations from room temperatures in zones 1 - 4 or increases of room temperature occur too early / late
35	Connection of electrical apparatus never occurs
35	Incorrect outdoor temperature or room temperature displayed
35	The apparatus has been reset which means that the set values have been lost
36	Select control and resetting of the apparatus

## Part 1 – General

### Introduction

The manual for Energycomfort is divided into four parts and contains basic information about the product, such as appearance and how the display and keys are used. This describes how to read off the indoor temperature and the different control settings that have been programmed. There is information about which work method and functions are available in the control. This shows how the product is programmed and installed.

### General

Energycomfort is available in two versions

1. Domestic version in two sizes, 4 and 6 zones
  2. Industrial version in two sizes, 4 and 6 zones.
- There is an extra time channel for the domestic version that can be used for an engine heater or lighting control. The industrial version has an alarm via a digital output. In the domestic version the contactors and control are in a common enclosure. In the industrial version the contactors and control unit are in separate enclosures.

### Application

Energycomfort is intended for central control of direct electrical heat in up to six zones. The separate zones are controlled individually with reference to the zone's indoor temperature and the outdoor temperature.

Energycomfort domestic can also control other electrical functions connected to the property, for example engine heating with time optimisation or time controlled functions such as exterior lighting.

Energycomfort replaces the electrical heaters' existing thermostats and gives accurate soft heat control, i.e. an even indoor temperature without temperature fluctuations which creates a more comfortable indoor climate.

The programming options give a large number of possibilities to save energy in a simple way by controlling the heat to the family personal pattern with setback reductions with optional time points and zones. Setback temperatures with calendar setting can be used to schedule

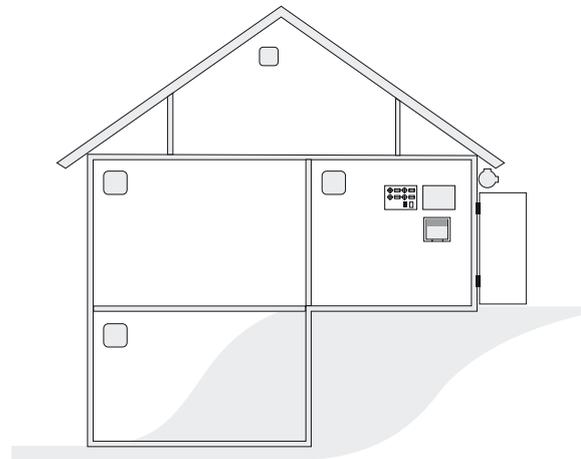
setback reduction (and thereby deactivate the weekly programme temporarily) in advance over a time period, for example a vacation. It is also possible to interrupt the weekly program at any time by activating a timer controlled constant temperature.

### Good to know

The control is self adaptive, which means that no further setting or calibration is required after Energycomfort is installed in the property. It automatically corrects the output to the house's own conditions.

The control unit is preset to economy temperature 20 °C in all zones around the clock. The only thing that one must know about using the soft heat control without setback reductions is the following:

The control must not be switched off during the warm seasons of the year at a main circuit breaker or the switches on the elements. The control unit switches off the heat itself when it is not required. The heat in the house is controlled in zones; each zone has its own temperature and time settings. Energycomfort controls the zones



individually with reference to, for example, temporary free heat from public gatherings, wind, solar radiation, outdoor and indoor temperatures.

Examples of good zone division:

- Zone 1: upper floor south side.
- Zone 2: upper floor north side.
- Zone 3: ground floor south side.
- Zone 4: ground floor north side.
- Zone 5: basement south side.
- Zone 6: basement north side.

## Description of control

### Four Different versions of Energycomfort

Energycomfort domestic with 4 zones

Energycomfort domestic with 6 zones

Energycomfort industrial with 4 zones

Energycomfort industrial with 6 zones

### Appearance

**Energycomfort domestic consists of the following components:**

1. Enclosure with control unit, transformer and 4 or 6 contactors. All internally connected and routed to terminal block.
2. 4 or 6 room sensors
3. 1x outdoor sensor

**Energycomfort industrial consists of the following components:**

1. Enclosure with control unit and transformer.
2. 4 or 6 room sensors
3. 1x outdoor sensor
4. Enclosure with contactors 4 or 6 16A or 20A.  
The number of enclosures with contactors is ordered as necessary.



**Energycomfort Domestic**



**Energycomfort Industrial**



**Indoor, outdoor sensor**



**Contactor box for Energycomfort Industrial**



## Display management

### General

In the 4 zone version display texts are not shown for zones 5 – 6.

Configuration and Settings can be made via the display.

Certain settings and configurations are only changeable in the display after having logged in with a special password. The settings and configurations that require a password will not be displayed if the user is not logged in.

In the domestic version it is possible to change set point values for each zone without logging in with an authorization, provided that the control unit is in Comfort mode. In the industrial version the set point value cannot be changed without logging in.

When the display is left untouched for an adjustable time (default 2.5 minutes) the display returns to the start window and all logins are stopped.

When a changeable value is in the display window a yellow LED lights beside the pen symbol. When the OK button is pressed the marker is moved to the first changeable value in the display. When the OK button is pressed the marker is moved over the changeable values in the display. Arrow up/down changes the value, the C button erases. If the C button is held depressed it exits edit mode.

### Min-/max limits

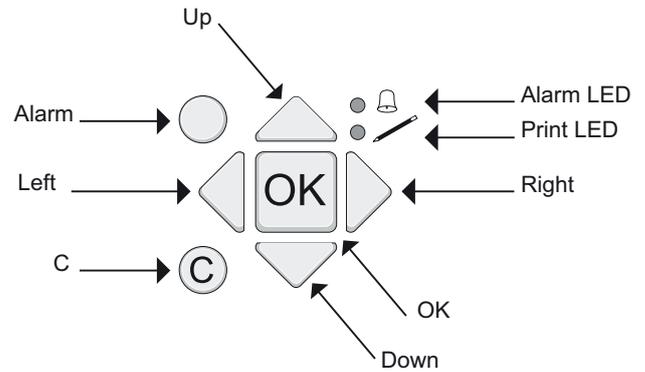
The display contains min-/max limits so that it is not possible to enter unreasonable values in variables. These limits cannot be changed.

### Operating keypad

There are seven keys:

- Four arrow keys
- OK key
- C key
- ALARM key

The four arrow keys in the manual are UP,



DOWN, RIGHT, LEFT.

When changing the values, UP and DOWN are used to increase or reduce the number values and to scroll between selectable alternatives.

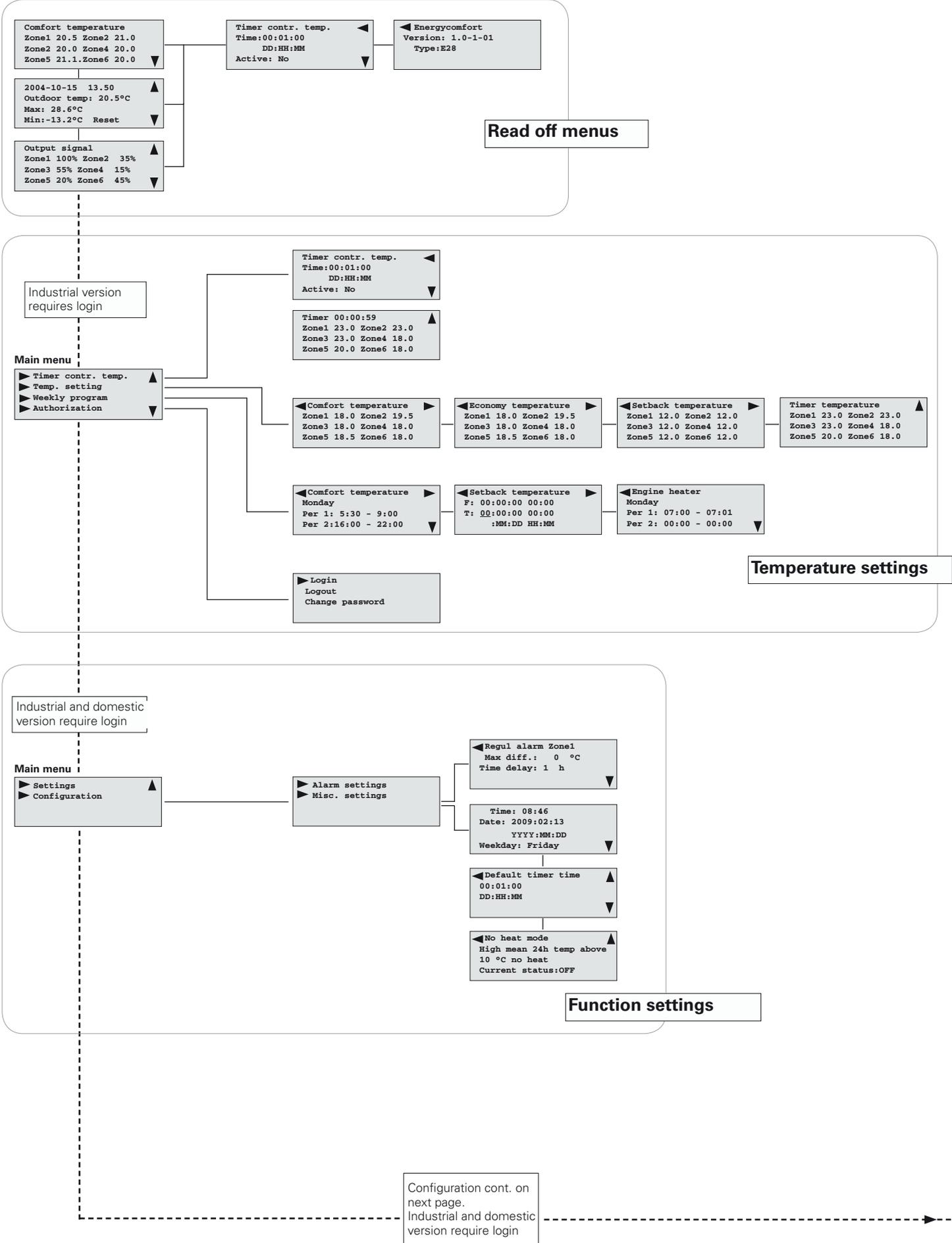
RIGHT and LEFT are used to move the marker between number positions (for example single units, tens, hundreds).

The key marked OK is used to confirm a selection and to change to print mode in those menus that have changeable values.

The key marked C deletes and backs out of change mode if held depressed.

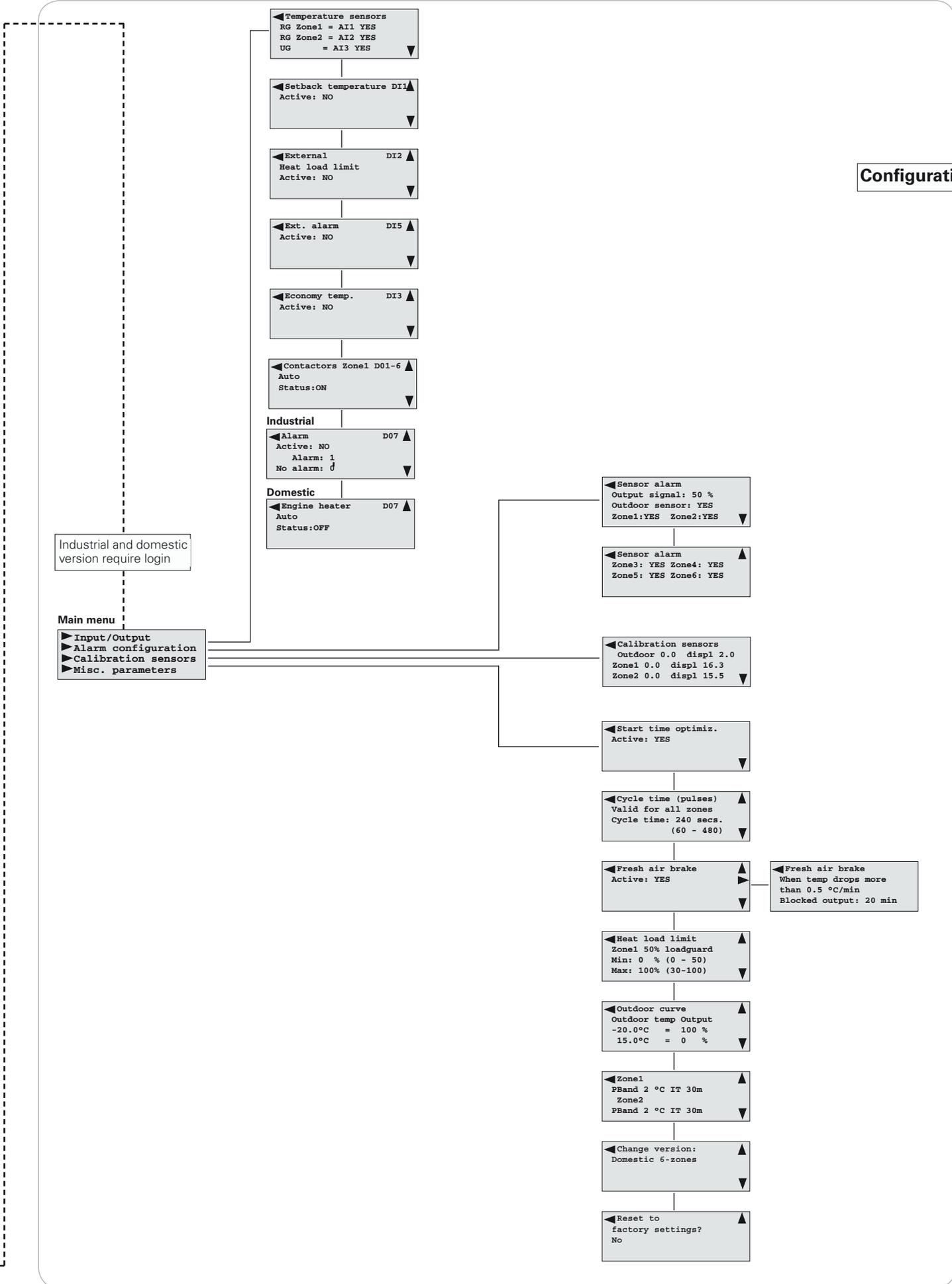
The key marked ALARM is used to acknowledge an alarm. When the key is pressed an alarm text that describes the fault is shown in the display.

## Menu tree



# Energy comfort

## Configuration



Industrial and domestic version require login

- Main menu**
- ▶ Input/Output
  - ▶ Alarm configuration
  - ▶ Calibration sensors
  - ▶ Misc. parameters

Fresh air brake  
When temp drops more than 0.5 °C/min  
Blocked output: 20 min

## Navigate between the menus

### Start windows

There are three start windows, the first is displayed when the control unit is switched on and also when the display returns to idle mode. A certain time after the last time a key was pressed (about 2.5 minutes) the display returns automatically to idle mode at which it jumps to the first start window.

Move between the three start windows using UP and DOWN.

```
Comfort temperature
Zone1 20.5 Zone2 21.0
Zone2 20.0 Zone4 20.0
Zone5 21.1.Zone6 20.0 ▼
```

The first start window shows the current operating mode with the current temperatures.

```
2004-10-15 13.50 ▲
Outdoor temp: 20.5°C
Max: 28.6°C
Min: -13.2°C Reset ▼
```

Press DOWN to get to the second start window which contains information about the date, time, present outdoor temperature and max and min values.

```
Output signal ▲
Zone1 100% Zone2 35%
Zone3 55% Zone4 15%
Zone5 20% Zone6 45% ▼
```

Press DOWN to get to the third start window which contains information about the relevant output signals of the different zones.

### System window

There is also a system window with information about program revisions and the module serial number.

```
◀ Energycomfort
Version: 1.0-1-01
Type.:E28
```

To access the system window, press RIGHT twice from one of the start windows.

### Main menu

It is possible to reach other sub menus via the menu selection in the main menu selection to check and/or change different values and settings using the buttons on the control unit.

```
► Timer contr. temp. ▲
Temp. setting
Weekly program
Authorization
```

To access the main menu from one of the start windows, press DOWN.

```
► Weekly program
Authorization
Settings
Configuration
```

When DOWN is pushed again the rest of the main menu is displayed.

## Functions

### Login/Authorization

Energycomfort is preset so that the most common changes can be made without a special login procedure. If changes must be made to settings over and above these a login box will be automatically displayed. After login the display returns to the previous menu selection.

```
► Timer contr. temp. ▲  
Temp. setting  
Weekly program  
Authorization
```

Login can also occur from the main menu by selecting Authorization.

Select Login to change authorization level.

```
► Login  
Logout  
Change password
```

Enter the relevant password for the level. The new authorization level is displayed when the correct password is given. There are two authorization levels: 1 and 3. Level 1 is the highest authorization with the right to change all settings, a password is obtained after contacting Frico.

Level 3 is limited authorization with right to change the temperature settings and function settings. The default password is 3333.

For Energycomfort Domestic no password is required for temperature settings, only for function settings. The default password is 3333.

```
◀ Change password for  
level: System  
New password: ****
```

To change password for an authorization level, select Authorization in the main menu and then Change password.

If the password is forgotten or lost somehow, contact Technical support at Frico AB to unlock Energycomfort.

### Idle mode

A certain time after the last time a key was pressed the display returns automatically to idle mode. The time is normally 150 seconds (2.5 minutes). When the display goes to idle mode a jump is made to the main window and the authorization level is returned to level 5.

## Basic functions

### Overview operating modes

Energycomfort has four operating modes in order to set the time variations in the indoor temperature that is desired. These operating modes can be set to ones own requirements and are described in detail on the following pages in this section of the manual. This section gives a brief introduction to the different operating modes.

### **Economy (Normal operating mode)**

If no programming of Energycomfort has been carried out, the Economy operating mode applies, which could therefore be said to be the system's normal operating mode. The Economy temperatures are preset to 20 °C in all zones around the clock, which can be changed individually per zone.

To make relative changes from the economy mode at specific and if desired recurring times use the other operating modes reported below.

### **Timer**

To change to constant temperature during a limited time period there is a timer. The timer is preset to 20°C in all zones around the clock. This value can be changed individually for each zone and the reset time can be changed at the same time that the timer is activated. It is also possible to set a default timer time that applies until further notice.

### **Comfort**

To change the temperature at certain specific times during a week the *Comfort* operating mode is used. *Comfort* is preset to 20 °C in all zones around the clock. This value can be changed individually for each zone and then define which times and weekdays the comfort temperature should be applied.

The comfort temperature is often set slightly higher than the economy temperature and is usually used when the house or premises are being used. The Economy operating mode, which has a lower temperature setting, can apply when the house or premises are empty or, if one wishes, at night.

On delivery, Comfort operating mode is preset to 20°C in all zones around the clock. To change the setting, see the "Comfort temperature" section.

### **Setback**

To change the temperature setting for a longer period between fixed dates, for example holidays, the operating mode Setback is used. The Setback temperature is preset to 12 °C in all zones around the clock.

This value can be changed individually for each zone and then defined by which dates the Setback temperature should be applied.

## Part 2 – Temperature settings (requires login for industrial version)

### Economy temperature

The Economy operating mode is the system's normal operation, (basic temperature). The Economy temperatures are preset to 20 °C, which is lower than the Comfort temperatures for example, and can apply when the house or premises are empty or, if one wishes, at night.

```
Timer contr. temp. ▲  
► Temp. setting  
Weekly program  
Authorization
```

To change the temperature, select Temp. setting in the main menu.

```
◀ Economy temperature ▶  
Zone1 18.0 Zone2 19.5  
Zone3 18.0 Zone4 18.0  
Zone5 18.5 Zone6 18.0
```

Press RIGHT repeatedly to display applicable economy temperatures. Possible set values are 0 – 50 °C.

## Comfort temperature

To change the temperature at certain specific times during a week the Comfort operating mode is used. Energycomfort is supplied preset to Comfort temperatures at 20 °C in all zones around the clock. This value can be changed individually for each zone and then define which times and weekdays the comfort temperature should be applied. The Comfort temperature is normally set slightly higher than the Economy temperature and is usually used when the house or premises are being used.

```

Timer contr. temp. ▲
► Temp. setting
Weekly program
Authorization
    
```

To change the temperature, select Temp. setting in the main menu.

```

◀ Comfort temperature ►
Zone1 18.0 Zone2 19.5
Zone3 18.0 Zone4 18.0
Zone5 18.5 Zone6 18.0
    
```

Pressing RIGHT displays the applicable comfort temperatures. Change one or several values. Possible set values are 0 – 50 °C.

One can select at what time the set point values given in the Temperature setting should be engaged.

```

Timer contr. temp. ▲
Temp. setting
► Weekly program
Authorization
    
```

Select Weekly program in the main menu to display settings for Comfort temperatures.

```

◀ Comfort temperature ►
Monday
Per 1: 5:30 - 9:00
Per 2:16:00 - 22:00 ▼
    
```

Enter which times during Monday the Comfort mode is to apply. It is possible to enter two time periods for each day. Press DOWN to display settings for other weekdays or blocks in turn and order.

```

◀ Comfort temperature ▲
Sunday
Per 1: 5:30 - 9:00
Per 2:16:00 - 22:00 ▼
    
```

Give time periods for Comfort operating mode for all weekdays.

```

◀ Comfort temperature ▲
Public holiday ►
Per 1: 5:30 - 9:00
Per 2:16:00 - 22:00
    
```

The final display shows the settings for the holiday. Give the time periods in the same way as other weekdays. To indicate which calendar days are holidays, press RIGHT

```

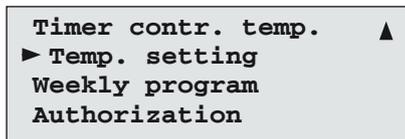
◀ Holidays (DD:MM)
1. 24:12 - 25:12
2. 01:01 - 01:01
3. 01:05 - 01:05 ▼
    
```

Holidays are given in the form of periods from a start date to an end date. The date is given as day:month with two digits each, for example 24:12.

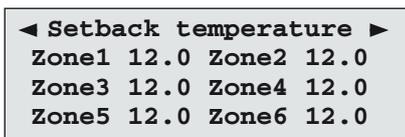
It is possible to select 24 different holiday periods. DOWN and UP switches between the displays that show the periods. To select a holiday period that just extends over one date, give the same date as start and end date in the period.

## Setback temperature

To change the temperature setting for a longer period between fixed dates, for example holidays, the operating mode Setback is used. The Setback temperature is preset to 12 °C in all zones around the clock. This value can be changed individually for each zone and then defined by which dates the Setback temperature should be applied.

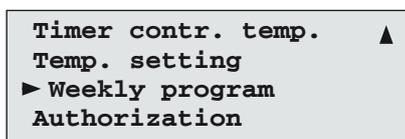


To change the temperature, select Temp. setting in the main menu.

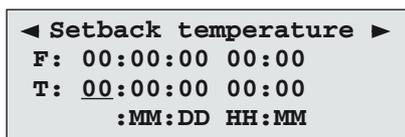


Press RIGHT repeatedly to display applicable setback temperatures. Change one or several values. Possible set values are 0 – 50 °C

Settings of the Weekly program for Setback operating mode define during which time period the Temperature setting for Setback temperature will apply.



Select Weekly program in the main menu



Press RIGHT repeatedly to display settings for Setback temperatures.

Define the period for which the Setback temperatures are to apply by giving the start date and time and the end date and time respectively. The date is given as year:month:day with two digits each, for example 05:12:25.

## Battery

The battery has a service life of 5-10 years. Battery replacement must be carried out by an authorised installer. If the battery is drained during a power cut all the settings will be reset to the default settings installed at delivery. Type CR 2032 (3V button cell).

## Timer temperature

The timer is preset to 20 °C in all zones around the clock. This value can be changed individually for each zone and the reset time can be changed at the same time that the timer is activated. It is also possible to set a default timer time that applies until further notice.

To activate the timer, carry out one of the following alternatives:

```
Comfort temperature
Zone1 20.5 Zone2 21.0
Zone2 20.0 Zone4 20.0
Zone5 21.1.Zone6 20.0 ▼
```

**Alternative 1: From one of the start windows, press RIGHT**

```
► Timer contr. temp. ▲
Temp. setting
Weekly program
Authorization
```

**Alternative 2: Select Timer in the main menu**

```
Timer contr. temp. ◀
Time:00:01:00
DD:HH:MM
Active: No ▼
```

**Settings for the timer are shown in the display. To activate the timer, set the desired time and change Active to Yes. Press DOWN to display present timer temperatures.**

```
Timer 00:00:59 ▲
Zone1 23.0 Zone2 23.0
Zone3 23.0 Zone4 18.0
Zone5 20.0 Zone6 18.0
```

Energycomfort is supplied with the timer-temperature preset to 20 °C in all zones.

```
Timer contr. temp. ▲
► Temp. setting
Weekly program
Authorization
```

**To change the timer temperature, select Temp. setting in the main menu. Press RIGHT repeatedly to display applicable temperatures for the timer.**

```
Timer temperature ▲
Zone1 23.0 Zone2 23.0
Zone3 23.0 Zone4 18.0
Zone5 20.0 Zone6 18.0
```

**Change one or several values. Possible set values are 0 – 50 °C**

## Engine heater/Lights in Energycomfort Domestic

A digital output will have its own time channel which can for example be used to control an engine heater.

The time channel for the engine heater is set to the point in time that the desired heating is to be ready. The regulator takes the outdoor temperature into consideration and activates the output a calculated number of minutes before the set time. The Engine heater output is normally activated for 30 minutes but when the outdoor temperature falls below +8°C 5 minutes is added to the operating time for every degree below that temperature.

Time channel setting can be used to state how long an output must be switched on after the time at which desired heating should be left.

It must also be possible to use this output for controlling lights or similar. In cases with the control of lights, the output is controlled directly by the time channel's on and off points. The outdoor temperature does not affect switch off.

```
Timer contr. temp. ▲
Temp. setting
► Weekly program
Authorization
```

Select Weekly program in the main menu. Press RIGHT repeatedly to get to Engine heater.

```
◀ Engine heater
Monday
Per 1: 07:00 - 07:01
Per 2: 00:00 - 00:00 ▼
```

Enter which times during Monday the Engine heater operating mode is to apply. It is possible to enter two time periods for each day. Press DOWN to display settings for other weekdays or blocks in turn and order.

```
◀ Engine heater
Sunday
Per 1: 10:00 - 10:01
Per 2: 00:00 - 00:00 ▼
```

Give time periods for Engine heater operating mode for all weekdays.

```
◀ Engine heater
Public holiday
Per 1: 10:00 - 10:01
Per 2: 00:00 - 00:00 ▼
```

The final display shows the settings for the holiday. Give the time periods in the same way as other weekdays. To define which calendar days are holidays, press RIGHT.

```
◀ Holidays (DD:MM)
1. 24:12 - 25:12
2. 01:01 - 01:01
3. 01:05 - 01:05 ▼
```

Holidays are given in the form of periods from a start date to an end date. The date is given as day:month with two digits each, for example 24:12.

It is possible to define 24 different holiday periods. DOWN and UP switches between the displays that show the periods. To define a holiday period that just extends over one date, give the same date as start and end date in the period.

```
◀ Engine heater D07 ▲
Auto
Status:OFF
```

To change the function Engine heater/Lights, go to main menu, select Configuration, Input and outputs. Press DOWN until Engine heater/Lights is displayed.

## Part 3 – Function settings (requires login for industrial and domestic version)

This part of the manual contains information about the options for changing the activated functions.

In order to change these settings a higher level of authorization is required than for the basic functions given in part 2 of the manual. The authorization requirement is displayed with a password box in the display, when changing starts, see also under the section "Login/Authorization".

### Time and date

```
Weekly program
Authorization
▶ Settings
Configuration
```

Time and date are shown in the other start window. To change the details, select Settings in the main menu.

```
Alarm settings
▶ Misc. settings
```

Then select Misc. settings.

```
Time: 08:46
Date: 2009:02:13
      YYYY:MM:DD
Weekday: Friday ▼
```

Time and date are shown in the display with the possibility of changing. Resetting to warm season or winter occurs automatically.

### Default timer time

When using the timer the countdown time can be selected manually at each occasion, alternatively a default time is selected which remains in the memory and can be used again and again.

```
Weekly program
Authorization
▶ Settings
Configuration
```

To change the default timer time, select Settings in the main menu.

```
Alarm settings
▶ Misc. settings
```

Then select Misc. settings.

```
◀ Default timer time ▶
00:01:00
DD:HH:MM
```

Press RIGHT repeatedly to display default timer time.

# Energy comfort

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## No heat mode

The heat can be disconnected in selected zones when the outdoor temperature is higher than a selected level. This function can be used to shut off the heating during the warm seasons, even if the room temperature is temporarily lower than the set value.

Energycomfort is preset to close off the heat completely and assume No heat mode when the outdoor temperature High Mean 24h exceeds 10 °C.

Weekly program  
Authorization  
▶ Settings  
Configuration

To change the value of the high mean temp 24h and/or change status for the no heat mode function, select Settings in the main menu.

Alarm settings  
▶ Misc. settings

Then select Misc. settings.

◀ No heat mode ▶  
High mean 24h temp  
above 10 °C no heat  
Current status:OFF

After pushing RIGHT repeatedly the settings for no heat mode are shown. Possible set value is between 0 – 50 °C

## Manual control

The automatic control can be disconnected from the control unit, when fault tracing the contactors may need to be manually controlled. Energycomfort Domestic has a man/auto mode switch in the enclosure.

```
Weekly program
Authorization
Settings
▶ Configuration
```

To activate manual control, select Configuration in the main menu.

```
▶ Input/Output
Alarm configuration
Calibration sensors
Misc. parameters
```

Then select Input/output.

```
◀ Contactor Zone1 D01 ▲
Auto
Status:ON ▼
```

After pushing DOWN repeatedly the adjacent display is shown. Pressing DOWN again shows the settings for other contactors.

```
◀ Alarm D07 ▲
Active: NO
Alarm: 1
No alarm: 0 ▼
```

Pressing DOWN again gives the option of configuring the digital output D07 for the alarm.

```
◀ Engine heater D07 ▲
Auto
Status:OFF
```

For output D07 on the domestic version the options of either Engine heater or Lights are selected. For output D07 on the industrial version either the alarm is activated or it is not.

Manual control can now be activated for the relevant output, AUTO mode is the preset normal mode. The system gives the alarm "manual" when manual control is selected.

# Energy comfort

---

## P-band and I-time

Weekly program  
Authorization  
Settings  
▶ Configuration

To configure the settings for the P-Band and I-time, select Configuration in the main menu.

Input/Output  
Alarm configuration  
Calibration sensors  
▶ Misc. parameters

Then select Misc. parameters.

◀ Zone1 ▲  
PBand 2 °C IT 30m  
Zone2  
PBand 2 °C IT 30m ▼

After pushing DOWN repeatedly the adjacent display is shown. Pressing DOWN again shows the settings for zones 3-6.

## Outdoor curve

The same outdoor curve applies to all zones; each zone offsets this individually for the respective zone.

Weekly program  
Authorization  
Settings  
▶ Configuration

To configure the settings for the outdoor curve, select Configuration in the main menu.

Input/Output  
Alarm configuration  
Calibration sensors  
▶ Misc. parameters

Then select Misc. parameters.

◀ Outdoor curve ▲  
Outdoor temp Output  
-20.0°C = 100 %  
15.0°C = 0 % ▼

After pushing DOWN repeatedly the adjacent display is shown. Settable values are between -50 – +50 °C

## Min and max limits of radiator output

It is possible to limit the heat output up or down, for example to ensure that the radiator will not become too hot or to prevent cold drafts. This function is also used if a loadguard is installed. Setting for heat load limit is individual for each zone.

```
Weekly program
Authorization
Settings
▶ Configuration
```

To configure the settings for the radiator output, select Configuration in the main menu.

```
Input/Output
Alarm configuration
Calibration sensors
▶ Misc. parameters
```

Then select Misc. parameters.

```
◀ Heat load limit ▲
Zone1 50% loadguard
Min: 0 % (0 - 50)
Max: 100% (30-100) ▼
```

After pushing DOWN repeatedly the adjacent display is shown. It is possible to limit the heat output upwards and/or downwards in percent for each zone. Use DOWN and UP to move between settings for different zones.

## Max limit using external loadguard

Because the main current is too high for individual buildings, an external loadguard can be connected to DI2. If DI2 is closed the limits of the output signal made under the heat load limit apply, as described below. After external heat load limit the heating soft starts.

```
Weekly program
Authorization
Settings
▶ Configuration
```

To configure the loadguard function, select Configuration in the main menu.

```
Input/Output
Alarm configuration
Calibration sensors
▶ Misc. parameters
```

Then select Misc. parameters.

```
◀ Heat load limit ▲
Zone1 50% loadguard
Min: 0 % (0 - 50)
Max: 100% (30-100) ▼
```

After pushing DOWN repeatedly the adjacent display is shown. The default setting of the function is 50%.

```
◀ Heat load limit ▲
Zone2 50% loadguard
Min: 0 % (0 - 50)
Max: 100% (30-100) ▼
```

Pressing DOWN displays different zones 2-4 (6) with the option to change.

# Energy comfort

---

## Fresh air brake

The control unit measures the room temperature once a minute. At temperature drops at the sensor exceeding 0.5 °C per minute, the fresh air brake is activated which locks the energy output for approx 20 minutes and then slowly recovers. The fresh air brake function is always on.

Weekly program  
Authorization  
Settings  
▶ Configuration

To configure the fresh air brake function, select Configuration in the main menu.

Input/Output  
Alarm configuration  
Calibration sensors  
▶ Misc. parameters

Then select Misc. parameters.

◀ Fresh air brake ▲  
Active: YES ▶  
▼

After pushing RIGHT repeatedly the adjacent display is shown. The function is default activated as follows.

◀ Fresh air brake  
When temp drops more  
than 0.5 °C/min  
Blocked output: 20 min

## Output control of radiators

The radiator groups are connected for a part of the cycle time that is settable and is initiated to 240 seconds at start up. The average output in percentage of full output is the same as the connection time's proportion of the cycle time. Example: At 25 % supplied output the radiators are connected for 60 seconds and disconnected for 180 seconds. A new cycle time then starts and the process is repeated.

Thanks to the inertia of the radiators they are experienced as evenly heated. If the supplied output is less than 25 % the cycle time is doubled, because the cooling is lower at low temperature. To obtain even heat on fast radiators the cycle time can be selected shorter.

Because of the inertia of the radiators the cycle time can be extended to increase the service life of the contactors.

For the output on the electrical network to be distributed, the cycle time is offset evenly between the contactors. It is possible to set the cycle time as a number of minutes.

Weekly program  
Authorization  
Settings  
► Configuration

To change settings for the cycle time, select Configuration in the main menu.

Input/Output  
Alarm configuration  
Calibration sensors  
► Misc. parameters

Then select Misc. parameters.

◀ Cycle time (pulses) ▲  
Valid for all zones  
Cycle time: 240 secs.  
(60 - 480) ▼

After pushing DOWN repeatedly the adjacent display is shown. The default cycle time is 240 seconds. It is possible to set the values from 60 s up to 480 s.

# Energy comfort

---

## Start time optimiz.

The function takes the outdoor temperature into consideration and saves information about how long the heating takes at different outdoor temperatures in order to optimise the start-time. The set point value of the display is not changed before the time optimisation is complete, heating occurs in the background. Optimisation uses the average value of the zones' room temperatures as input values. The function is default activated.

```
Weekly program
Authorization
Settings
▶ Configuration
```

To configure the settings for the start time optimisation settings, select Configuration in the main menu.

```
Input/Output
Alarm configuration
Calibration sensors
▶ Misc. parameters
```

Then select Misc. parameters.

```
◀ Start time optimiz.
Active: YES
▼
```

The adjacent display is shown. It is possible to activate and deactivate the alarm.

## Calibration of sensors

It is possible to correct the measured temperature in a sensor upwards or downwards, if it is not placed so that it measures a representative temperature for the zone.

```
Weekly program
Authorization
Settings
▶ Configuration
```

Select Configuration in the main menu.

```
Input/Output
Alarm configuration
▶ Calibration sensors
Misc. parameters
```

Then select Calibration sensors.

```
◀ Calibration sensors
Outdoor 0.0 displ 2.0
Zone1 0.0 displ 16.3
Zone2 0.0 displ 15.5▼
```

The display shows the values for all sensors including the outdoor sensor.

```
Zone3: 0.0 displ 24.2 ▲
Zone4: 0.0 displ 22.6
Zone5: 0.0 displ 7.2
Zone6: 0.0 displ NaN
```

Press DOWN for other zone sensors.

## Alarm configuration

It is possible to configure sensor alarms for the relevant zone.

```
Weekly program
Authorization
Settings
▶ Configuration
```

Select Configuration in the main menu.

```
Input/Output
▶ Alarm configuration
Calibration sensors
Misc. parameters
```

Then select Alarm configuration.

```
◀ Sensor alarm
Output signal: 50 %
Outdoor sensor: YES
Zone1: YES Zone2: YES ▼
```

The adjacent display is now shown. If one does not use all available sensor inputs, the sensor alarm for the unused inputs must be switched off. In event of a fault in the sensors the system gives an output signal to the set level, settable 0-100%, in the relevant zone. Default 50%.

```
◀ Sensor alarm ▲
Zone3: YES Zone4: YES
Zone5: YES Zone6: YES
```

Pressing DOWN again shows the settings for sensors in zones 3-6.

## Part 4 – Configuration (requires login for industrial and domestic version)

In order to change the settings in this section a higher level of authorization is required than for the basic functions given in part 1 of the manual. The authorization requirement is displayed with a password box in the display, when changing starts, see also under the section Login/Authorization.

### Configuration Temperature sensors

Configuration of the temperature sensors is carried out under the main menu.

```
Weekly program
Authorization
Settings
▶ Configuration
```

Select Configuration in the main menu.

```
▶ Input/Output
Alarm configuration
Calibration sensors
Misc. parameters
```

Then select Input/output.

```
◀ Temperature sensors
RG Zone1 = AI1 YES
RG Zone2 = AI2 YES
UG      = AI3 YES ▼
```

The adjacent display is shown. There is an option to change room sensors for zones 1-4 (6), outdoor sensor. The system can be used without an outdoor sensor connected. In that case the outdoor curve for control will not be used, instead there is direct room control in the relevant zone. Factory setting is YES, that is the outdoor sensor is used.

```
◀ RG Zone3 = UI1 YES ▲
RS Zone4 = UI2 YES
RG Zone5 = UI3 YES
RG Zone6 = UI4 YES ▼
```

Press DOWN again to show other temperature sensors for zones 3-6.

## Digital inputs

It is possible to read off the digital inputs that can control Energycomfort externally via a closure over the digital inputs.

Weekly program  
 Authorization  
 Settings  
 ► Configuration

Select Configuration in the main menu.

► Input/Output  
 Alarm configuration  
 Calibration sensors  
 Misc. parameters

Then select Input/output.

◀ Setback temp. DI1 ▲  
 Active: NO  
 ▼

After pushing DOWN repeatedly the adjacent display is shown. It is possible to change to Setback temperatures externally via DI1.

◀ External DI2 ▲  
 Heat load limit  
 Active: NO  
 ▼

When further button pushing DOWN the following is displayed. External heat load limiting can be controlled externally via DI2. When DI2 is closed the limits of the output signal defined under the menu selection Misc. Settings apply, see the section "Heat load limit of radiators".

◀ Ext. Alarm DI3 ▲  
 Active: NO  
 ▼

When further button pushing DOWN the following is displayed. External alarm can be controlled via DI3.

◀ Economy temp. DI5 ▲  
 Active: NO  
 ▼

When further button pushing DOWN the following is displayed. It is possible to change to economy temperatures externally via DI5. When DI5 is closed, the selected temperature levels for the Economy operating mode apply, even if it should be comfort temperature according to the Weekly program.

## Installation

*The connection must only be carried out by an authorized electrician, and in accordance with the applicable regulations.*

### Zone division

The house's areas are divided up into zones of rooms with similar temperature conditions. In open plan solutions the temperature is equalised between the rooms although one should separate the zones, ground floor and upper floor. Because hot air rises it is not suitable to have a zone to contain rooms on different floors.

If the zone contains rooms on both the north and south sides a certain temperature difference may occur. In a domestic version the zone division is controlled by how the group cables are routed, while in the industrial version separate contactor boxes are used.

The contactors' switches are connected to the relevant group fuses for the electrical heat groups. Sometimes the radiators from the relevant zones are not connected to the common fuse group. Because all phases are often routed to the radiators this can often be solved in the following way:

**230V radiators:** Phase swap of certain radiators so that the contactor for a zone operates the radiators connected to one or two of the phases. The contactor for the next zone can then operate radiators connected to the next phase and so on. However, large uneven loads should be avoided.

**400V radiators:** Phase swapping of the radiators so that the contactor for a zone operates the radiators between, for example, phase 1 and 2 and the contactor for another zone operates radiators between phase 2 and 3. (Because each contactor has 4 switches they can operate two phases from another fuse group at the same time.) In this case phase 2 is common for both the zones and must not be broken by any contactor. This means some uneven loading because the current will be higher in phase 2 at high output. The connection is time distributed

between the zones. When the current in the common phase (which is nearly double the current strength in the other phases) risks becoming higher than the fuse current ratings the supplied % output can be limited (see page 19: Min and max limits of radiator output).

### Junction box with contactors (Energycomfort industrial)

Mounted in close proximity to the electrical heating loads or at the respective control centre on the outgoing group. Supply of the contactors in the junction box is drawn from the control centre outputs D01-7 24V AC. For Energycomfort Domestic the control centre is located in close proximity to the distribution box where the outgoing groups are joined via the contactors' switches. Note that the joined cables must have the same cable area, marking and insulation.

### Switch for Energycomfort Domestic

The switch is normally in the AUTO position for automatic control of the radiators, electrical apparatus etc. When the switch is set to MAN (manual) all relays (contactors) are on at which radiators, electrical apparatus etc. receive continuous constant voltage. They are then not controlled by Energycomfort. In Energycomfort Industrial each zone is set to manual output signal according to page 17 - Manual control.

### Sensors

**Outdoor sensor:** Mounted, with the cable downwards, 2-3 m above ground preferably on the north or north east side of the building. Do not place it above a door or window. It should be located in the shade.

**Room sensor:** Placed in a location that is representative for the relevant zone. Best position is on an inner wall approx 1.5 m above the floor anywhere, but protected from drafts and direct effect from radiators, lighting and the sun. Max 50 m cable length, at longer cable routing the sensor is compensated by 1 °C/50 m of further cable length, see page 22.

The sensors are connected using EKKX, EKU, LiYY or corresponding type cables. Area 0.5 mm<sup>2</sup> permits max 50 m cable length.

## Control unit Energycomfort Industrial

Can be mounted anywhere, easily accessible for reading off and setting. The connection between the control unit and the contactor box is by two conductors per zone, maximum of 12 contactors per zone. The cable area is determined by the installer based on the cable length.

## Setting of radiators for Domestic

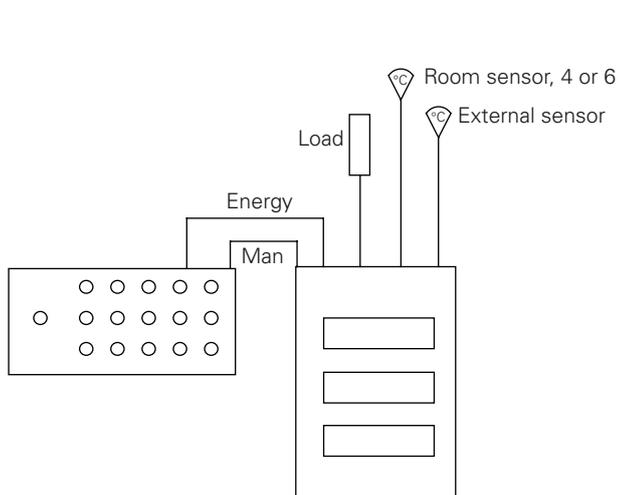
The radiator's temperature controls should normally be at the maximum position. The exceptions are rooms where there is no temperature sensor. The radiator's temperature controls can be used to limit the heat.

If the radiator capacity is unevenly divided between different rooms in the same zone, any output control on the radiators can be used to correct this (do not confuse this with temperature control).

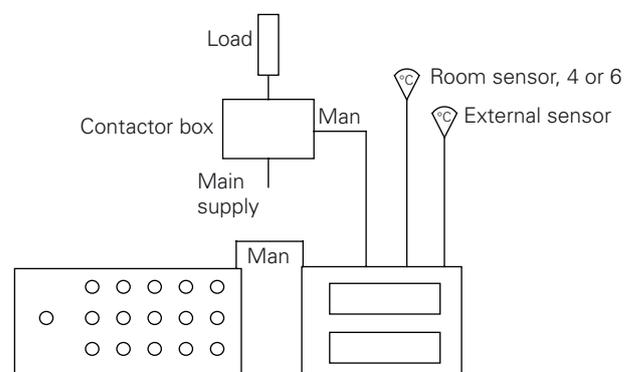
In other cases a radiator can be closed or radiators with different outputs moved between the rooms, which is easily carried out by an authorised electrician.

Leave the radiators switched on during the warm seasons, even though no heating is required. Energycomfort switches off the heat itself when it is not required.

## System overview



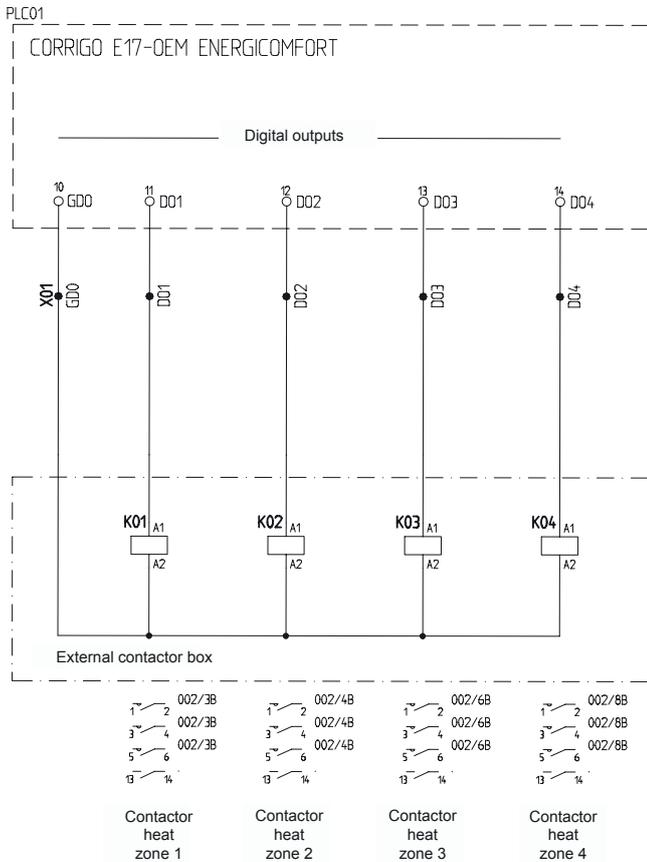
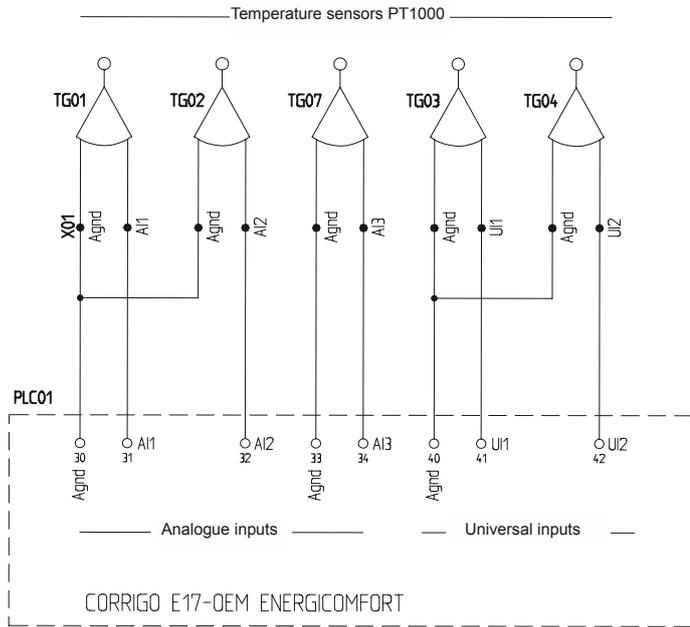
Energycomfort Domestic



Energycomfort Industry

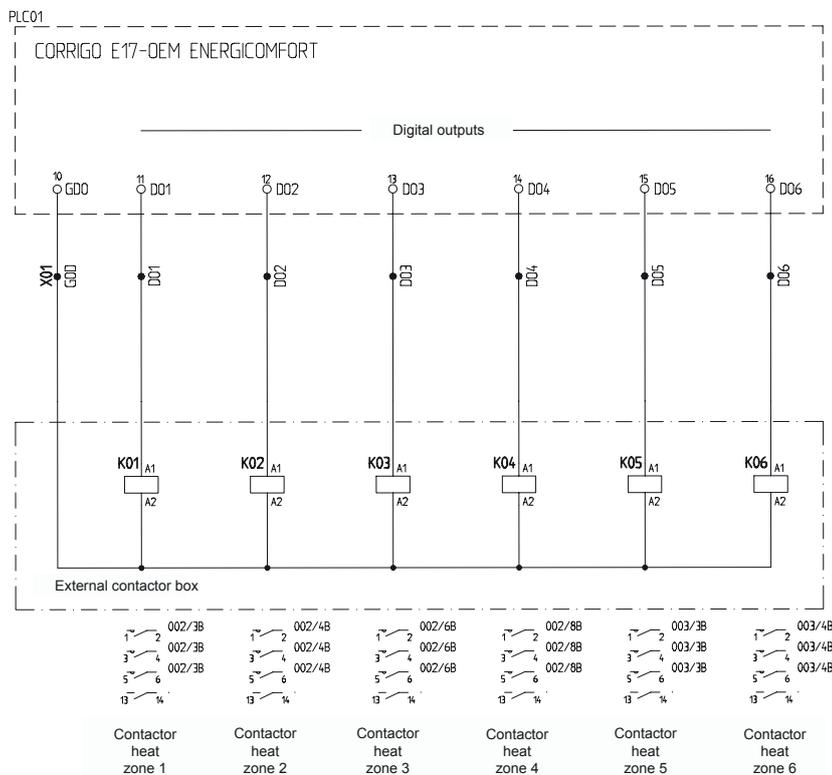
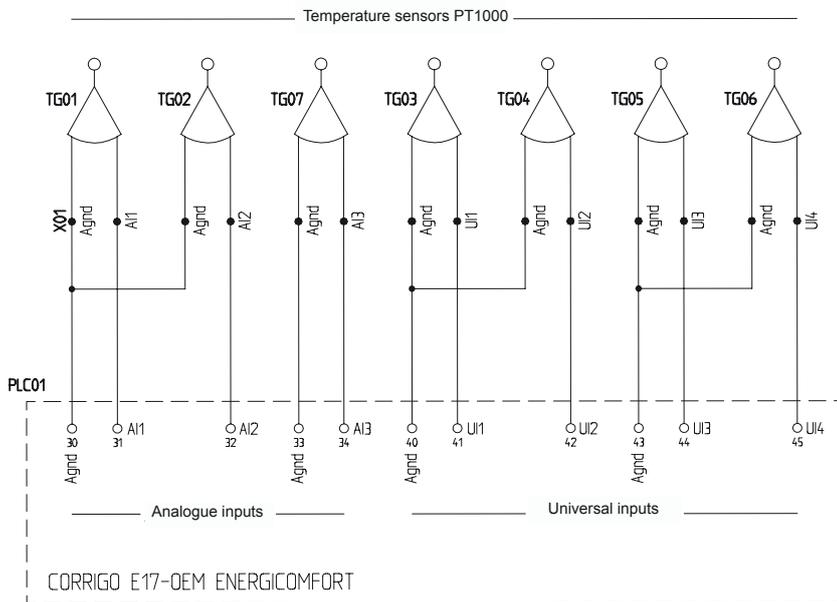
## Wiring diagrams

### Energycomfort Industrial 4 zones



The connection must only be carried out by an authorized electrician, and in accordance with the applicable regulations.

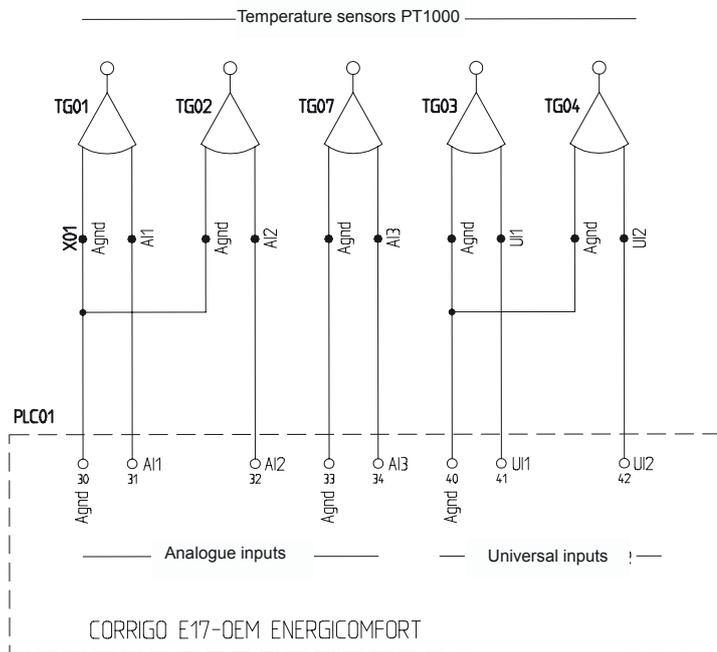
## Energycomfort Industrial 6 zones



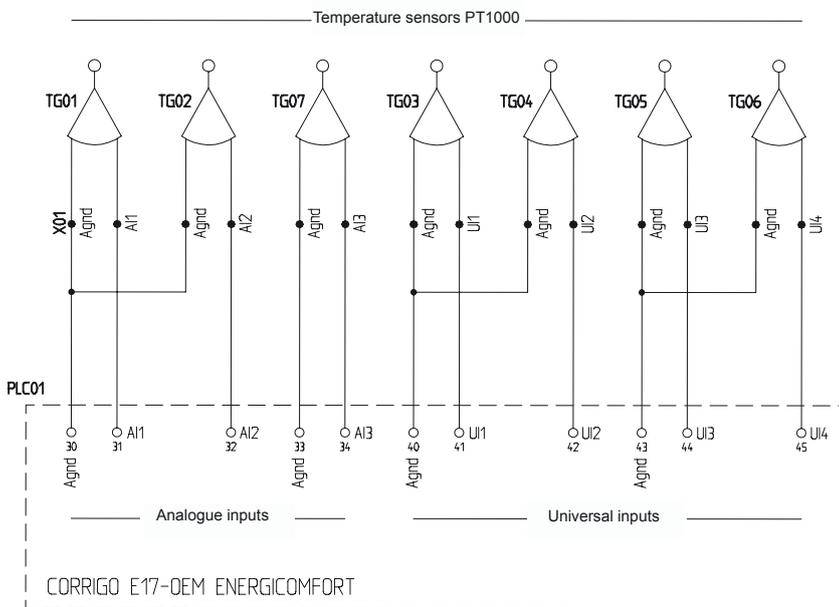
The connection must only be carried out by an authorized electrician, and in accordance with the applicable regulations.

# Energy comfort

## Energycomfort Domestic 4 zones



## Energycomfort Domestic 6 zones



The connection must only be carried out by an authorized electrician, and in accordance with the applicable regulations.

## Inputs and outputs

### Analogue inputs

All analogue inputs are the Pt1000 type and have short circuit protection.

Signal	AI	6 Zone	4 Zone
Room temp Zone 1	1	Yes	Yes
Room temp Zone 2	2	Yes	Yes
Outdoor temperature	3	Yes	Yes
	4	N.A.	N.A.

### Universal inputs

Signal	UI	6 Zone	4 Zone
Room temp Zone 3	1	Yes	Yes
Room temp Zone 4	2	Yes	Yes
Room temp Zone 5	3	Yes	N.A.
Room temp Zone 6	4	Yes	N.A.

### Digital inputs

Signal	DI	6 Zone	4 Zone
Setback mode (Activates Setback temp)	1	Yes	Yes
External Heat load limit from loadguard	2	Yes	Yes
Ext. alarm	3	Yes	Yes
Timer (Activates Timer)	4	Yes	Yes
Economy mode (activates Economy temp)	5	Yes	Yes
Zone test (Domestic only)	6	Yes	Yes

### Digital outputs (Contactors)

Signal	DO	6 Zone	4 Zone
Contactor 1	1	Yes	Yes
Contactor 2	2	Yes	Yes
Contactor 3	3	Yes	Yes
Contactor 4	4	Yes	Yes
Contactor 5	5	Yes	-
Contactor 6	6	Yes	-
Engine heater/Lights	7	Yes	Yes

## Alarm

### Alarm list

No.	Alarm text	Description	Note
1 up to and including 6	Control fault Zone 1 – 6	The measured value differs too much from the set point value for too long in zones 1 – 6	On the 4 zone variant the alarm is 1 up to and including 4
7 up to and including 12	Sensor alarm Zone 1 – 6	In the event of a sensor alarm in a connected sensor the alarm text and settable output signal to the affected zone are displayed.	On the 4 zone variant the alarm is 5 up to and including 8

For the industrial version there is an alarm that is activated in the event of control faults or sensor faults on output DO7.

## Detailed description of how Energycomfort functions

### Calculation of supplied output as percentage of full output

A control curve for the relevant zone describes the average output requirement in percent of installed output for 20 °C room temperature as a function of attenuated outdoor temperature and is registered in the computer in the following way:

The supplied output for relevant zones at different outdoor temperatures is stored. An output value for the relevant zone is calculated continuously at the prevailing attenuated outdoor temperature from the curve that the values describe. The output values are offset in proportion to the room set point value deviation from 20 °C.

The output value is then corrected when the room temperature deviates from the set point value. The correction value = ("control effect" x room temperature deviation). When the room temperature has been reached and the set point value has not been changed the correction value is limited upwards to + 15 %. If the room temperature's set point value is changed (and is not reached), the internally calculated room temperature fault is minimised to 0.5 degrees to speed up the change of the room temperature.

After 4 hours this min value is increased by 1/8 of a degree per hour. The fresh air brake limit is also disengaged. A settable total limit of the correction value is initiated to + 50 % and - 100%. The correction value is added to the calculated output of the control curve. Output values lower than 5% give 0% and greater than 95% give 100 %. Finally the final calculated output is minimised or maximised to its calculated output with selected values.

If the control curve is incorrectly set the room temperature will on average deviate from the set point value because of the remaining "P-error". Room temperature deviations are registered continuously. At an average error of 1.3 degree hours the control curve for the relevant zone is changed.

### Calculation of Weekly program's optimisation times with adaptive settings

The optimisation time, that is the time that is required to change the temperature to the set comfort temperature, which is registered in the computer in the following way:

The optimisation times for the relevant zones at attenuated outdoor temperatures 0°C and 1°C for low room temperature are stored as a number of minutes. The change in the optimisation times for the relevant zones at attenuated outdoor temperatures +/- 10°C is stored as a number of minutes. New optimisation time is calculated at the prevailing attenuated outdoor temperature from the curve that the values describe. The time is changed in proportion to the room temperature deviation. The final calculated optimisation time is rounded downwards to whole 10-minute periods and stored until the weekly program time occurs. If remaining time to the next weekly program time is the same or shorter than the calculated optimisation time a new set point value for the room temperature is engaged according to Comfort operating mode plus set change of the room temperature according to the next following weekly program time.

If the room temperature reaches the new higher set point value before the weekly program time occurs the values above fall by approx 12 %. If the room temperature is more than 0.5 °C too low when the weekly program time occurs the values above are increased by approx 12 %.

### Energycomfort gives soft heat

The heat loads in the relevant room zone are connected by contactors at intervals with pulse control (time proportional control). The radiators are controlled by the contactors, which in turn are controlled by the control unit's micro-computer. The micro-computer calculates the connection time part of the interval time. Starts/stops occur as often as the electrical heaters sense even heat, thanks to the thermal inertia of the material.

The desired room temperature and any time program can be set on the control panel. This first calculates the output requirement, as a percentage of full output, from the outdoor temperature according to control curve for

each zone. The control curves, which are calculated automatically, give the zones' average percentage output requirement at different outdoor temperatures. Deviations in the room temperatures mean a change in the output.

## Trouble shooting

### **The display goes out**

Supply voltage absent. Check the fuses in the fusebox and the fuse in the transformer. Note! The connections in the control box and contactor boxes may only be checked by an authorised electrician.

### **The temperatures in the zones are considerably too low**

First check that the time and temperature settings are correct. The applicable room temperatures are shown in the start windows arrow up/down see page 8. Compare these values with the prevailing output signal displayed in the start windows arrow up/down see page 8. Check that the supplied outputs are in reasonable proportion to the outdoor temperature, see page 8.

Note! The output is connected successively after a loss of supply voltage for longer than 10 minutes.

**If the fault remains:** Check that the fuses in the fuse box are intact and that the radiators' temperature controls are not set too low. These should normally be at the maximum position.

**If the fault remains:** Check if any heat load limit has been selected, see page 20.

To test the external installation of the domestic version the man/auto key is used. Set it to manual and all the contactors will be engaged and the electrical heat loads will become hot. In the industrial version Manual mode is engaged according to page 18 - Manual control. The contactors then move to on and the electrical heat loads become hot.

If the contactors do not switch on and electrical heaters do not get hot there is a fault in the control unit or the contactors or alternatively in a cable between them. Check the connections on the control unit. Authorised electricians must check the contactors with connections.

Note! Do not forget to reconnect the automatic control again according to the above.

### **Less deviations from room temperatures in zones 1 - 4 or increases of room temperature occur too early / late**

Small deviations of room temperature, normally less than +/- 0.5 – 1.0 °C, are acceptable. Small deviations of heating time, normally less than 20 – 30 minutes, are acceptable. These deviations can be higher in the time immediately after start up, but are reduced once the regulator has automatically adapted itself to the house.

In exceptional cases, when the room sensors are unsuitably located and the rooms are often exposed to large temperature differences the automatic adaptation can be disconnected. See page 23 – Start time optimisation.

### **Connection of electrical apparatus never occurs**

First check the connection times according to page 19 - P-band and I-time.

### **Incorrect outdoor temperature or room temperature displayed**

In the event of a short circuit or open circuit in the temperature sensor or sensor cable the alarm is displayed, also indicating which sensor is faulty. The alarm resets automatically when the fault is rectified, but can also be reset manually using the key alarm, see page 5. In the event of a fault in the sensor contact an authorised electrician

### **The apparatus has been reset which means that the set values have been lost**

A power cut has occurred with a poor or no battery connected. Replace the battery. See page 13 – Battery.

## Select control and resetting of the apparatus

Weekly program  
Authorization  
Settings  
▶ Configuration

Select Configuration in the main menu.

Input/Output  
Alarm configuration  
Calibration sensors  
▶ Misc. parameters

Then select Misc. parameters

◀ Change version:      ▲  
Domestic 6-zones

Selection of control.

◀ Reset to      ▲  
factory settings?  
No

Press DOWN repeatedly to display reset to factory settings.



**Energycomfort is a central heat control that takes over the thermostat function of your electrical heating products. It controls the heat steplessly in up to six different temperature zones in the building and you gain both financially and in comfort:**

- **More pleasant indoor climate**
- **Reduces energy costs**
- **No burn damage**
- **Saves money**

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