Corrigo E - manual

Boiler application

REGIN

THE CHALLENGER IN BUILDING AUTOMATION

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Software revision: 1.0-1-00

Table of contents

Chapter 1 About the manual

This manual covers all the models in the Corrigo E series controllers loaded with the Boiler application. This revision covers program revision 1.0-1-00.

More information

More information about Corrigo E can be found in:

- ***Manual E tool*** – Manual of how to configure the controllers using the PC software E tool
- ***Network variables for EXOline and Modbus*** – Variable list for EXOline and Modbus communication
- ***CE - Declaration of conformity, Corrigo E***

The information is available for download from Regin's homepage, www.regin.se.

Chapter 2 **About Corrigo E**

Corrigo E series comprises three model sizes: 8, 15 or 28 in-/outputs.

In each model of Corrigo E generation 2, all applications are loaded in a separate memory area. The models have item number E... -S (where S stands for Second generation).

Available with or without front panel display and buttons. For units without front panel display and buttons a separate, cable-connected terminal E-DSP with display and buttons is available.

All programming and normal handling can be done using the display and buttons or from a connected computer running Corrigo E tool.

Application selection

On delivery the main memory of the Corrigo is empty. In a separate memory area all the different applications that can be run in the Corrigo are stored.

On first power-up the Corrigo will start a special selector program to enable loading of the desired application and language to the main memory.

```
Corrigo E Controller
 08:01:01   00:00
Select application
with down arrow
```

First, click on OK in order to set the date and time. Use up- down-buttons to change the values and right- left-arrows to move between input fields. When the correct date has been entered, click on OK to acknowledge and the cursor will move to the time setting. Set the time in the same way as the date and acknowledge by clicking on OK.

Click on the down-button to go to the application selection.

```
->Ventilation
  Heating
  Boiler
```

Use the up-down-buttons to move the arrowcursor until it is opposite the application to be loaded. Click on right-button.

```
Boiler
Choose language
English
Accept changes:No
```

Click on OK to select language. Use up- down-buttons to find the language of your choice and acknowledge by clicking on OK.

If you choose a language other than English, both English and the selected language will be loaded.

To finalise the selection, change No to Yes and click on OK

After a few seconds the display will show the English start display for the chosen application. After another few seconds the display will change to shov the chosen language if other than English

```
Boiler
 08:06:03   09:32
RAD1
SP: 19.5 Act: 20.1°C
```

If you make an incorrect choice you can always reset the unit and start again. Resetting is done by first disconnecting the supply voltage. Then look at the right hand side of the Corrigo. There you will find a small hole. Use a suitable object, for example a straightened out paper clip, to depress the reset switch which is located inside the hole. Reconnect power and you should be back at the starting point.

Boiler application

Corrigo E Boiler is a new application with function for controlling a boiler circuit with 1…4 boiler vessels with either a common pump or individual boiler pumps and 1…3 heating systems. The controller is based on Corrigo 28, 15 and 8 with internal or external display. The configuration is done from the display or from E tool in the same way as the other Corrigo E applications.

The temperature controllers are PI-controllers for heating control and PID control for domestic hot-water, with a pre-programmed set of control modes. To the controllers can be bound a number of different control functions as well as analogue and digital input and output functions. The choice of which functions are to be used is free, the only restriction lying in the physical number of inputs and outputs that the different models have.

The Corrigo is designed for DIN-rail mounting.

The program contains, apart from other things, the following functions:

Boiler control

Control of one boiler circuit containing 1…4 boilers

Heating circuit control

Control of 1…3 individual heating circuits.

Domestic hot water control

1 domestic hot water circuit and 1 storage-tank charger circuit.

Differential pressure control

One constant differential pressure control circuit

Timer outputs

Up to 5 individually settable timer outputs for control of, for example, lighting, door locks etc.

Timer control

Year-base clock, individual schedulers, holiday scheduler.

Water consumption

Energy consumption

Corrigo E hardware overview

Model	8	8D	15	15D	28	28D
Analogue Inputs	2	2	4	4	4	4
Digital Inputs	3	3	4	4	8	8
Universal Inputs	-	-	-	-	4	4
Analogue Outputs	1	1	3	3	5	5
Digital Outputs	2	2	4	4	7	7
RS485*	Yes	Yes	Yes	Yes	Yes	Yes
WEB (TCP/IP)**	Option	Option	Option	Option	Option	Option
Display	No	Yes	No	Yes	No	Yes
Ext. display	Option	No	Option	No	Option	No

*Communication port RS485 is not available for option WEB (TCP/IP)

**Built-in web server not yet available for boiler application

Technical data

Protection class IP20
Display..... 4 rows of 20 characters. Background illumination.
LEDs
Yellow ..... Settable parameter
Red ..... Alarm
Clock ..... Year base 24 hour clock with battery backup. Automatic summer-/winter-time changeover.
Operating system ..... EXOreal
Supply voltage ..... 24 V AC ±15%, 50…60 Hz or 20…36 V DC
Power consumption ..... 8 VA, 4 W (DC), model WEB: 12 VA, 6 W (DC)
Dimensions ..... 148x123x60 (WxHxD incl. terminals)
Casing ..... Standard Euronorm (8.5 modules wide)
Mounting ..... On DIN-rail
Operation
Climatic conditions according to IEC 721-3-3 ..... Class 3k5
Ambient temperature ..... 0...50°C
Ambient humidity ..... Max 95% RH
Mechanical requirements according to IEC721-3-3 ..... Class 3M3
Vibration ..... IEC60068-2-6, Test FC, vibration Sinusoidal
Shock ..... IEC60068-2-27, Test Ea
Transport
Climatic conditions according to IEC 721-3-2 ..... Class 2k3
Ambient temperature ..... -20...70°C
Ambient humidity ..... Max 95% RH
Mechanical requirements according to IEC721-3-2 ..... Class 2M2
Vibration ..... IEC60068-2-6, Test FC, vibration Sinusoidal
Shock ..... IEC60068-2-27, Test Ea
Free fall ..... IEC60068-2-27, Test Ed
Storage
Climatic conditions according to IEC 721-3-1 ..... Class 1k3
Ambient temperature ..... -20...70°C
Ambient humidity ..... Max 95% RH

Battery

Type ..... Replaceable Lithium cell
Battery life ..... Better than 5 years
Warning ..... Low battery warning
Battery backup ..... Memory and real time clock

Communication

EXOline Port 1, insulated via a built-in RS485 contact.
The basic version of Corrigo E can communicate with Modbus. You do not need an activation code.
Corrigo E can be ordered with a communication port for TCP/IP or LON.

CE-marking

Conforms with the EMC standards: CENELEC EN61000-6-3:2001, CENELEC EN61000-6-1:2001.

Inputs

Analogue inputs AI ..... Settable 0…10 V DC or PT1000, 12 bit A/D
Digital inputs DI ..... Potential free closure
Universal inputs UI ..... Can be set to act as either an analogue input or a digital input with specifications as above

Outputs

Analogue outputs AO ..... Configurable 0…10 V DC; 2…10 V DC; 10…0 V DC or 10…2 V DC
8 bit D/A short-circuit protected
Digital outputs DO ..... Mosfet outputs, 24 V AC, 2 A continuous. Totally max 8 A

Options

LON ..... FT3150, gives a second communication route
WEB (TCP/IP port) ..... Replaces RS485 for EXOline (Port 1) communication
External hand terminal, E-DSP ..... For use with Corrigo E units without display

Chapter 3 **Installation and wiring**

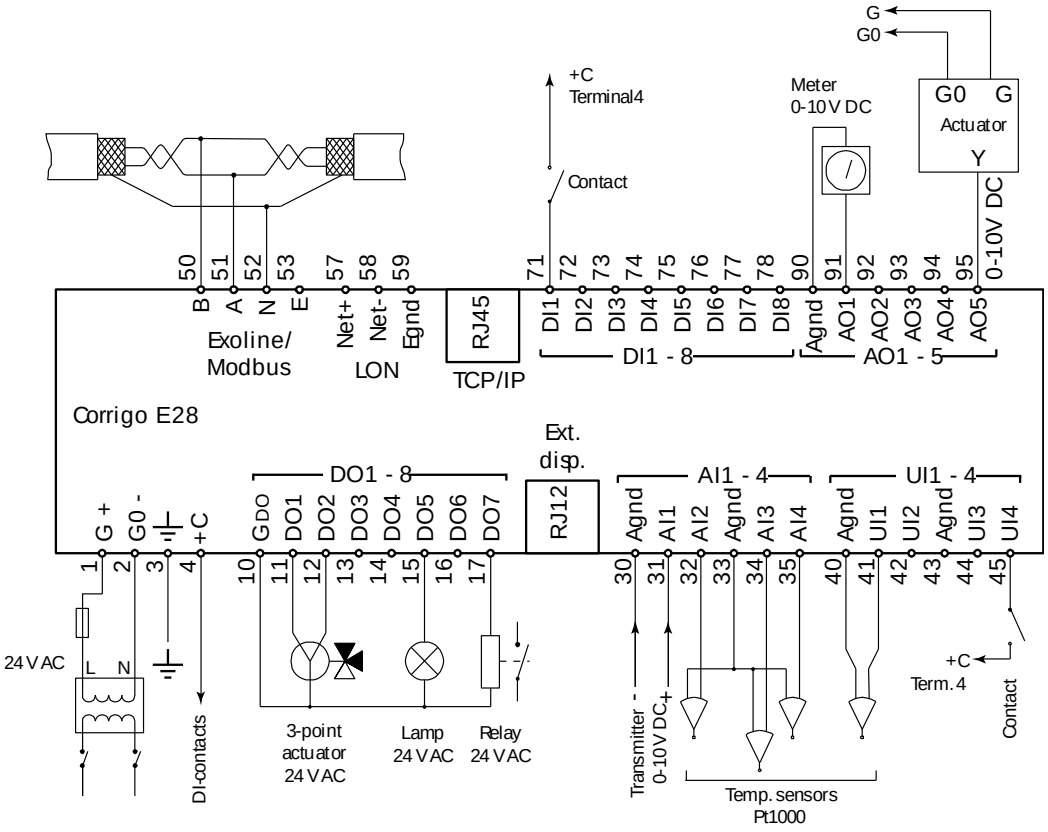
3.1 Installation

Corrigo E can be mounted in a DIN-standard casing (minimum 9 modules), on a DIN-rail in a cabinet or, using a suitable front-mounting kit, in a cabinet door or other control panel.

Ambient temperature: 0…50°C.

Ambient humidity. Max. 90 %RH, non-condensing.

The picture below shows a wiring example for Corrigo E28.



3.2 Wiring

At the end of this chapter there are wiring diagrams showing the factory set configuration. We have also included blank diagrams. Since the function of most of the inputs and outputs depends on the programming of the unit the final wiring diagram cannot be filled in until the installer has decided how to use the inputs/outputs. It is important to make sure that the wiring is correctly done and in accordance with the instructions given in this manual.

3.2.1 Supply voltage

24 V AC ±15%, 50…60 Hz or 20…36 V DC

If the Corrigo E and the actuators connected to it share the same transformer it is essential that the same transformer-pole is used as reference for all the equipment. Failure to do so will prevent the equipment from functioning as intended and may also lead to damages.

3.2.2 Inputs and outputs

The list of input and output functions in section 3.2.3 is a handy instrument to help you keep track of which inputs and outputs you will need to configure.

Analogue inputs

Analogue inputs must refer to an A-gnd terminal placed in the same terminal block as the input being wired.

Analogue inputs can, depending on the configuration, be used for either PT1000 temperature sensors or for 0…10 V DC analogue input signals, for example from a pressure transmitter.

Digital inputs

Digital inputs must refer to C+ on terminal 4. Digital inputs may only be wired to voltage-free contacts. Any external voltage applied to a digital input may harm the unit.

Universal inputs

A universal input can be configured to act as either an analogue input or as a digital input.

A universal input configured as analogue input must refer to an A-gnd terminal placed in the same terminal block as the input being wired.

A universal inputs configured as an analogue input can, depending on the configuration, be used for either PT1000 temperature sensors or for 0…10 V DC analogue input signals, for example from a pressure transmitter.

A universal input configured as a digital input must refer to C+ on terminal 4. It may only be wired to voltage-free contacts.

Analogue outputs

Analogue outputs must refer to the A-gnd terminal placed in the AO terminal block.

All analogue outputs can be individually set to any one of the following signals:

0…10 V DC

2…10 V DC

10…0 V DC

10…2 V DC

If the Corrigo E and the actuators connected to it share the same transformer it is essential that the same transformer-pole is used as reference for all the equipment. Failure to do so will prevent the equipment from functioning as intended and may also lead to damages.

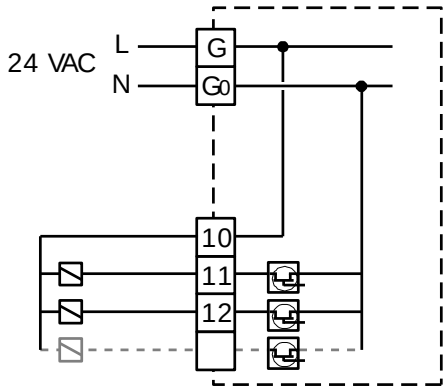
Digital outputs

Digital outputs should normally refer to G_{DO} on terminal 10. G_{DO} is internally connected to G on terminal 1 and supplies 24 V AC or DC depending on the choice of supply voltage.

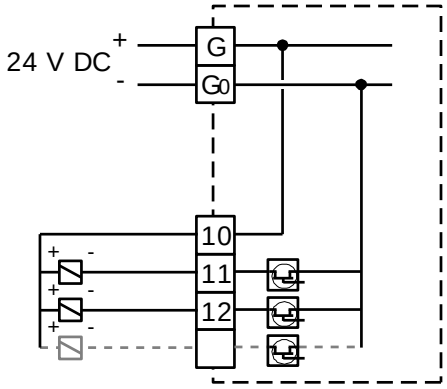
All the digital outputs are controlled by mosfet transistors. The outputs are internally connected to G_0 and can deliver max 2 A per output. However, the total power for all the DOs must not be over 8 A.

A number of different wiring alternatives are possible depending on the type of supply voltage to the Corrigo and the relay type.

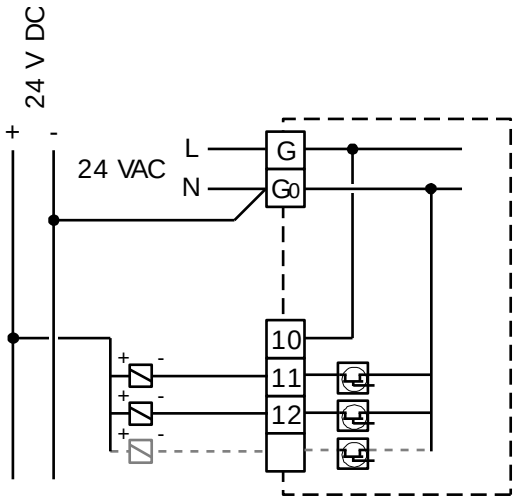
24 V AC supply and 24 V AC relays



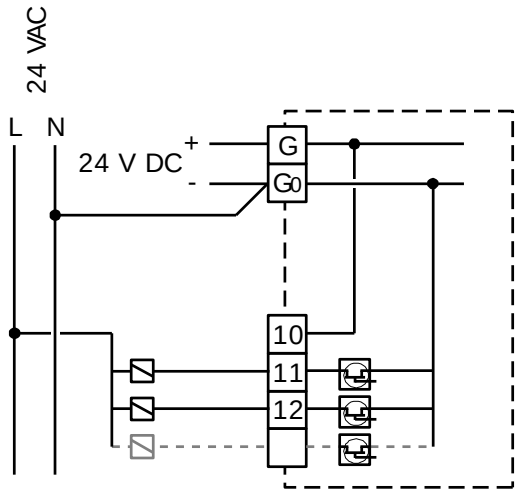
24 V DC supply and 24 V DC relays



24 V AC supply and 24 V DC relays



24 V DC supply and 24 V AC relays



3.2.3 Input and output lists

Use these lists during commissioning to help you keep track of which input and output functions you wish to use.

Analogue inputs

✓	Analogue input signal
	Outdoor temperature
	Boiler supply temperature
	Boiler 1 Return temperature
	Boiler 2 Return temperature
	Boiler 3 Return temperature
	Boiler 4 Return temperature
	Supply temperature HS 1
	Supply temperature HS 2
	Supply temperature HS 3
	Supply temperature Domestic hot water circuit 1
	Supply temp Storage tank
	Room temperature HS 1
	Room temperature HS 2
	Room temperature HS 3
	Return temperature Boiler circuit
	Return temperature HS1
	Return temperature HS2
	Return temperature HS3
	Return temperature Storage tank
	Wind-speed transmitter, 0…10 V DC
	Differential pressure transmitter, 0…10 V DC

Digital inputs

✓	Digital input signal
	Run-indication/alarm Boiler 1
	Run-indication/alarm Boiler 2
	Run-indication/alarm Boiler 3
	Run-indication/alarm Boiler 4
	Run-indication/alarm circulation pump, Boiler 1
	Run-indication/alarm circulation pump, Boiler 2
	Run-indication/alarm circulation pump, Boiler 3
	Run-indication/alarm circulation pump, Boiler 4
	Run-indication/alarm Transport pump
	External stop
	Run-indication/alarm circulation pump, P1A-HS1
	Run-indication/alarm circulation pump, P1B-HS1
	Run-indication/alarm circulation pump, P1A-HS2
	Run-indication/alarm circulation pump, P1B-HS2
	Run-indication/alarm circulation pump, P1A-HS3
	Run-indication/alarm circulation pump, P1B-HS3
	Run-indication/alarm circulation pump, P1-HW1
	Run-indication/alarm storage tank charge pump P1-HP
	Run-indication/alarm frequency converter for pressure control
	Pressure switch, expansion vessel pressure
	External alarm
	Boiler alarm
	External power limitation
	Flow/Pressure, Boiler circuit
	External comfort switch HS1
	External comfort switch HS2
	External comfort switch HS3
	Volume pulses, heating usage
	Energy pulses, heating usage
	Volume pulses, cold water usage 1
	Volume pulses, cold water usage 2
	Electricity meter pulse

Note: The universal inputs on Corrigo E28 can, individually, be configured as either analogue inputs using any of the analogue input signals above or as digital inputs using any of the digital input signals above.

Analogue outputs

✓	Analogue output signal
	Boiler 1 burner
	Boiler 1 recirculation valve
	Boiler 2 recirculation valve
	Boiler 3 recirculation valve
	Boiler 4 recirculation valve
	Valve actuator, Heating sequence1, HS1
	Valve actuator, Heating sequence1, HS2
	Valve actuator, Heating sequence1, HS3
	Valve actuator, Domestic hot water 1, HW1
	Frequency converter, pressure control
	Split of any one of the above circuits

Digital outputs

✓	Digital output signal
	Start/stop burner 1, Boiler 1
	Start/stop burner 2, Boiler 1
	Start/stop burner 1, Boiler 2
	Start/stop burner 2, Boiler 2
	Start/stop burner 1, Boiler 3
	Start/stop burner 2, Boiler 3
	Start/stop burner 1, Boiler 4
	Start/stop burner 2, Boiler 4
	Start/stop pump Boiler 1
	Start/stop pump Boiler 2
	Start/stop pump Boiler 3
	Start/stop pump Boiler 4
	Start/stop Transport pump
	Start/stop pump, P1A-HS1
	Start/stop pump, P1B-HS1
	Actuator HS1 increase
	Actuator HS1 decrease
	Start/stop pump, P1-HW1
	Start/stop pump, P1A-HS2
	Start/stop pump, P1B-HS2
	Actuator HS2 increase
	Actuator HS2 decrease
	Start/stop pump, P1A-HS3
	Start/stop pump, P1B-HS3
	Actuator HS3 increase

✓	Digital output signal
	Actuator HS3 decrease
	Actuator HW1 increase
	Actuator HW1 decrease
	Actuator HW2 increase
	Actuator HW2 decrease
	Start/stop charge pump for storage tank, P1-HP1
	Start frequency converter for diff pressure control
	Start step 1, boiler
	Start step 2, boiler
	Time channel 1
	Time channel 2
	Time channel 3
	Time channel 4
	Time channel 5
	Sum alarm A
	Sum alarm B
	Sum alarm A + B

Wiring diagram Corrigo E28 Boiler, factory configuration

1	G	Supply voltage 24 V AC or 24 V DC, ±15%. 50…60 Hz
2	G0	
3	⏚	Protective earth
4	+C	+24 V DC. Reference for digital inputs DI.

50	B	RS485 EXOline / Modbus (not in WEB (TCP/IP) models)
51	A	
52	N	
53	E	

10	G	Reference for digital outputs DO.
11	DO1	Start/stop Burner 1, Boiler 1
12	DO2	Start/stop pump, Boiler 1
13	DO3	Start/stop Transport pump
14	DO4	Start/stop pump, P1A-HS1
15	DO5	Start/stop pump, P1B-HS1
16	DO6	Start/stop pump, P1A-HS12
17	DO7	Start/stop pump, HW1

57	Net+	LON-connection (LON-versions only)
58	Net-	
59	Egnd	

30	Agnd	Reference pole for analogue inputs AI
31	AI1	Outdoor temperature sensor
32	AI2	Boiler supply temperature
33	Agnd	Reference pole for analogue inputs AI
34	AI3	Supply temp, heating sequence 1, HS1
35	AI4	Supply temp, heating sequence 1, HS12

71	DI1	Run-indication/alarm Boiler 1
72	DI2	Run-indication/alarm pump, Boiler 1
73	DI3	Run-indication/alarm Transport pump
74	DI4	Run-indication/alarm pump, P1A-HS1
75	DI5	Run-indication/alarm pump, P1B-HS1
76	DI6	Run-indication/alarm pump, P1A-HS2
77	DI7	Run-indication/alarm pump, P1-HW1
78	DI8	Inactive

40	Agnd	Reference pole for universal inputs UI
41	UI1	Supply temp, hot water sequence 1, HW1
42	UI2	Return temp, heating sequence 1, HS1
43	Agnd	Reference pole for universal inputs UI
44	UI3	Return temp, heating sequence 2, HS2
45	UI4	Boiler return temperature

90	Agnd	Reference for analogue outputs AO
91	AO1	Actuator Heating sequence 1, HS1
92	AO2	Actuator Heating sequence 2, HS2
93	AO3	Actuator Domestic hot water HW1
94	AO4	Inactive
95	AO5	Inactive

Wiring diagram Corrigo E15 Boiler, factory configuration

1	G	Supply voltage 24 V AC or 24 V DC, ±15%. 50…60 Hz
2	G0	
3	⏚	Protective earth
4	+C	+24 V DC. Reference for digital inputs DI.

50	B	RS485 EXOline / Modbus (not in WEB (TCP/IP) models)
51	A	
52	N	
53	E	

10	G	Reference for digital outputs DO.
11	DO1	Start/stop pump, burner 1, Boiler 1
12	DO2	Start/stop pump, Boiler 1
13	DO3	Start/stop Transport pump
14	DO4	Start/stop pump, P1A-HS1

57	Net+	LON-connection (LON-versions only)
58	Net-	
59	Egnd	

30	Agnd	Reference pole for analogue inputs AI
31	AI1	Outdoor temperature sensor
32	AI2	Boiler supply temperature
33	Agnd	Reference pole for analogue inputs AI

71	DI1	Run-indication/alarm Boiler 1
72	DI2	Run-indication/alarm pump, Boiler 1
73	DI3	Run-indication/alarm Transport pump
74	DI4	Run-indication/alarm pump, P1A-HS1

90	Agnd	Reference for analogue outputs AO

34	AI3	Supply temp, heating sequence 1, HS1
35	AI4	Supply temp, heating sequence 1, HS2

91	AO1	Actuator Heating sequence 1, HS1
92	AO2	Actuator Heating sequence 2, HS2
93	AO3	Actuator Domestic hot water HW1

Wiring diagram Corrigo E8 Boiler, factory configuration

1	G	Supply voltage 24 V AC or 24 V DC, ±15%. 50…60 Hz
2	G0	
3	⏚	Protective earth
4	+C	+24 V DC. Reference for digital inputs DI.

50	B	RS485 EXOline / Modbus (not in WEB (TCP/IP) models)
51	A	
52	N	
53	E	

10	G	Reference for digital outputs DO.
11	DO1	Start/stop pump, burner 1, Boiler 1
12	DO2	Start/stop pump, Boiler 1

57	Net+	LON-connection (LON-versions only)
58	Net-	
59	Egnd	

30	Agnd	Reference pole for analogue inputs AI
31	AI1	Outdoor temperature sensor
32	AI2	Boiler supply temperature

71	DI1	Run-indication/alarm Boiler 1
72	DI2	Run-indication/alarm pump, Boiler 1
73	DI3	Run-indication/alarm Transport pump

90	Agnd	Reference for analogue output AO
91	AO1	Actuator Heating sequence 1, HS1

Empty wiring diagram Corrigo E28

1	G	Supply voltage 24 V AC or 24 V DC, ±15%. 50…60 Hz
2	G0	
3	⏚	Protective earth
4	+C	+24 V DC. Reference for digital inputs DI.

50	B	RS485 EXOline / Modbus (not in WEB (TCP/IP) models)
51	A	
52	N	
53	E	

10	G	Reference for digital outputs DO.
11	DO1	
12	DO2	
13	DO3	
14	DO4	
15	DO5	
16	DO6	
17	DO7	

57	Net+	LON-connection (LON-versions only)
58	Net-	
59	Egnd	

71	DI1	
72	DI2	
73	DI3	
74	DI4	
75	DI5	
76	DI6	
77	DI7	
78	DI8	

30	Agnd	Reference pole for analogue inputs
31	AI1	
32	AI2	
33	Agnd	Reference pole for analogue inputs
34	AI3	
35	AI4	

90	Agnd	Reference for analogue outputs AO
91	AO1	
92	AO2	
93	AO3	
94	AO4	
95	AO5	

40	Agnd	Reference pole for analogue inputs
41	UI1	
42	UI2	
43	Agnd	Reference pole for analogue inputs
44	UI3	
45	UI4	

Empty wiring diagram Corrigo E15

1	G	Supply voltage 24 V AC or 24 V DC, ±15%. 50…60 Hz
2	G0	
3	⏚	Protective earth
4	+C	+24 V DC. Reference for digital inputs DI.

50	B	RS485 EXOline / Modbus (not in WEB (TCP/IP) models)
51	A	
52	N	
53	E	

10	G	Reference for digital outputs DO.
11	DO1	
12	DO2	
13	DO3	
14	DO4	

57	Net+	LON-connection (LON-versions only)
58	Net-	
59	Egnd	

30	Agnd	Reference pole for analogue inputs
31	AI1	
32	AI2	
33	Agnd	Reference pole for analogue inputs
34	AI3	
35	AI4	

71	DI1	
72	DI2	
73	DI3	
74	DI4	

90	Agnd	Reference for analogue outputs AO
91	AO1	
92	AO2	
93	AO3	

Empty wiring diagram Corrigo E8

1	G	Supply voltage 24 V AC or 24 V DC, ±15%. 50…60 Hz
2	G0	
3	⏚	Protective earth
4	+C	+24 V DC. Reference for digital inputs DI.

50	B	RS485 EXOline / Modbus (not in WEB (TCP/IP) models)
51	A	
52	N	
53	E	

10	G	Reference for digital outputs DO.
11	DO1	
12	DO2	

57	Net+	LON-connection (LON-versions only)
58	Net-	
59	Egnd	

30	Agnd	Reference pole for analogue inputs
31	AI1	
32	AI2	

71	DI1	
72	DI2	
73	DI3	

90	Agnd	Reference for analogue outputs AO
91	AO1	

Chapter 4 **Commissioning**

General

Before the Corrigo can be used it must be configured, inputs and outputs must be assigned and all relevant parameters must be set.

All commissioning can be done using the Corrigo front panel display and buttons or using the display unit E-DSP.

Corrigo E tool

The best way however, is to configure the Corrigo E by using Corrigo E tool.

Corrigo E tool is a PC-based configuration program specially developed to simplify the commissioning of the Corrigo E-series.

When using E tool the whole configuration and all settings can be done on the computer and then downloaded to the Corrigo. An infinite number of different configurations can be saved in computer memory for later use.

4.1 How to do it?

For configuration using E tool, see the E tool manual.

For configuration using the front panel there are two ways to go depending on how much help you need.

Option 1:

- Jump straight to chapter 6 and 7, *Display, buttons and LEDs* and *Access rights.*
- After mastering the button and menu system, connect power to your Corrigo, log on at System level and go to the menu *Configuration.*
- For the time being, skip the configuration menu *Inputs/Outputs* and start by configuring *Control functions.*
- Run through the configuration menus in order and set whatever functions and parameters you wish to include. Use chapter 4 of this manual for reference. Keep track of which inputs and outputs you will need. To help you, there is a list of input and output functions provided in chapter 3, (*3.2.3 Input / Output list*.)
- Finally, configure *Inputs/Outputs*.
- Exit *Configuration* and go to *Settings*
- Set the control values in *Settings*
- Set the clock and scheduler functions in *Timers*.
- Set the control setpoints in *Actual/Setpoint.*

Your Corrigo should now be ready to run.

Option 2:

Read this manual in the order given below: The manual has been designed to act as a guide through the commissioning. The last chapters of the manual, not listed below, cover menus and functions that are not used during commissioning.

Functional description

Start by reading the chapter 5. *Functional description* below. Some functions are essential to the working of the unit and must be included. Others are more of the nature of optional extras which can be excluded.

Display, buttons and LEDs

Read chapter 6 on how to use the front panel buttons to navigate the Corrigo E menu system.

Access rights

Chapter 7. Learn how to log in on the Corrigo E.

Configuration

Chapter 8. Configuration.

Connect power to the Corrigo. Using the buttons and menu system, go through the configuration menus covering the functions you wish to use.

On delivery the units already have the inputs and outputs assigned to various functions. These can, of course, be changed. In chapter 3 *Installation and wiring* there are two sets of wiring diagrams, one set showing the pre-configured input / output configuration and one set where you can fill your own configuration choices.

Settings

Set the control parameters, P-band, I-time for the temperature control loops in use.

Set the alarm parameters; alarm levels and delay times.

Timer settings

Set the clock and calendar functions

Setpoints

Set all the setpoints for all active control loops.

Hand/Auto

Learn to use manual control. Very useful for testing out your system.

Chapter 5 **Functional description**

5.1 Boiler control

The boiler controller can be set to either modulating control or switched setpoint control.

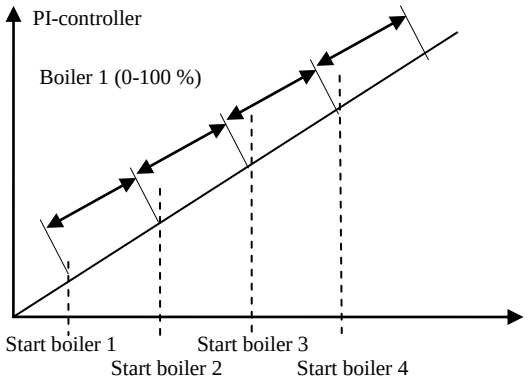
In modulating control the boilers are controlled by a signal from a PI-controller. See section 5.1.1 below.

In switched setpoint control the boilers are started and stopped at predetermined temperature offsets. See section 5.1.2 below.

5.1.1 Modulating control

5.1.1.1 Control sequence

The boiler controller can be configured to control 1 – 4 boilers in sequence. The number of started boilers is controlled by a PI-controller with settable P-band and I-time. Each boiler can individually be configured as Off/On (1-step) or Off/Low/High (2-stage). Boiler number 1 can also be configured for modulating control 0 – 10V or three point control. If so this boiler will be run 0 – 100% output before and between the activation of the other boilers.



5.1.1.2 Setpoint

The boiler controller has one setpoint. The setpoint can be configured to any one of the following alternatives:

- Constant value. A fixed temperature is set.
- Outdoor temperature dependent.
  The setpoint varies according to outdoor temperature. The setpoint/Outdoor temperature relationship is set using a control curve with 8 settable fixpoints. The default setting of the outdoor temperature values for the fix points are -20, -15, -10, -5, ±0, +5, +10, +15. These can not be changed using the Corrigo front panel but can be changed using E tool. The corresponding supply temperature values are settable using the front panel or E tool.
- Heating system setpoint dependent.
  The boiler setpoint varies according to the highest setpoint of the radiator circuits that are active. As default it is set to 5 degrees above the highest radiator circuit setpoint.

5.1.1.3 Min runtime and stoptime

Minimum runtime and stoptime can be set individually for each boiler. On increasing heat demand a boiler will not be activated until the previous boiler in line has run for at least the set minimum runtime. On decreasing heat demand a boiler will not shut down until it has run for at least the minimum runtime. A boiler that has shut down can not be reactivated until after the set minimum stoptime. As default both values are set to 180 seconds for all boilers.

5.1.1.4 Starting order

The starting order for multiple boilers can be individually set for each boiler.

- Fixed start order: Fixed1, Fixed2, Fixed3, Fixed4. The boilers will always start in the set order.
- Run-time controlled. The controller will balance the accumulated running time for the boilers by starting the boiler with the shortest running time first and the rest in increasing accumulated running time.
- Alternate. The controller will change starting boiler HB1 > HB2 > HB3 > HB4 > HB1 etc moving 1 step per switching period but maintaining the order between the boilers. The time for boiler switching is configurable by setting the weekday and the hour for switching boiler. All boiler stops when switching startorder. It's also possible to disable the switching by setting the weekday value to 0.

5.1.1.5 Boiler exercise

Boilers are exercised for a settable duration at configured time and weekday. The number of weeks between exercises can be set 1 – 4.

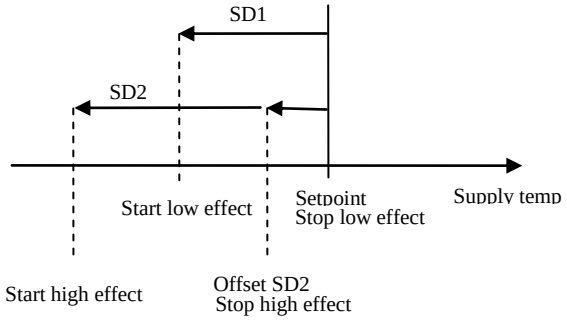
5.1.1.6 Disturbance takeover

Should a boiler alarm condition occur, that boiler is shut down and the next boiler in order to start will be activated.

5.1.2 Switched setpoint boiler control

5.1.2.1 Control sequence

It is also possible to configure the controller to control each boiler with a setpoint and a switch difference (SD1) for starting low effect and one switch difference (SD2) with offset for starting high effect. Low effect is stopped at setpoint and high effect is stopped at offset for high effect.



SD1 = 5°C, SD2=5°C and Offset SD2=3°C as default.

5.1.2.2 Setpoint

The boiler controller has one setpoint. The setpoint can be configured to one of the following alternatives:

- Constant value. A fixed temperature is set.
- Outdoor temperature dependent.
  The setpoint varies according to outdoor temperature. The setpoint/Outdoor temperature relationship is set using a control curve with 8 settable fixpoints. The default setting of the outdoor temperature values for the fix points are -20, -15, -10, -5, ±0, +5, +10, +15. These can not be changed using the Corrigo front panel but can be changed using E tool. The corresponding supply temperature values are settable using the front panel or E tool.
- Heating system setpoint dependent.
  The boiler setpoint varies according to the setpoint of the radiator circuit HS1. As default it is set to 5 above the setpoint for HS1. To ensure an adequate supply temperature if more than one heating circuit have been configured, it is necessary to assign HS1 to the circuit needing the highest water temperature.

5.1.2.3 Min runtime and stoptime

Minimum runtime and stoptime can be set individually for each boiler. On increasing heat demand a boiler will not be activated until the previous boiler in line has run for at least the set minimum runtime. On decreasing heat demand a boiler will not shut down until it has run for at least the minimum runtime. A boiler that has shut down can not be reactivated until after the set minimum stoptime. As default both values are set to 180 seconds for all boilers.

5.1.2.4 Boiler exercise

Boilers are exercised for a settable duration at configured time and weekday. The number of weeks between exercises can be set 1 – 4.

5.1.3 Boiler pump control

5.1.3.1 Start/Stop pump

Each boiler can have one circulation pump. When starting a boiler, the pump is started first. Then, after a settable delay time(default 30 sec.), the burner is started. When stopping, the burner is switched off first and then the pump is stopped after the same delay time as set for startup.

5.1.3.2 Pump exercise

The boiler pumps are exercised once daily at a settable time (FS = 15:00). The exercise duration is also settable (FS = 5 min.).

5.1.4 Boiler transport pump

5.1.4.1 Start/Stop pump

The boiler control system can also have a common transport pump. This pump is started if there is any boiler running or if the outdoor temperature falls below a settable stop temperature - hysteresis.

5.1.4.2 Pump exercise

The pump is exercised once daily at a settable time (FS = 15:00). The exercise duration is also settable (FS = 5 min.).

5.1.4.3 Pump alarm

If there is a pump alarm condition indicating that the transport pump is not running all the boilers are blocked.

5.1.5 Pressure/Flow indication

One common pressure or flow indicator must be activated before any boiler can start, if this pressure or flow indicator is not activated all the boilers are blocked.

5.1.6 Boiler return temp

5.1.6.1 General

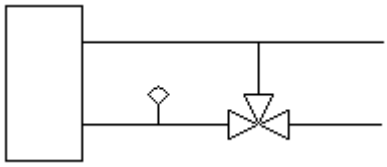
In order to reduce the risk for condensation in any boiler vessel it is important to keep the vessel temperature higher than the condensation point. In order to do this there are two different techniques of which either one can be applied.

5.1.6.2 Common boiler return temp control

To avoid condensation it is possible to use one, common boiler return temperature sensor. If this return temperature falls below a configurable limit (default 30°C) all the heating systems control valves are closed. They remain closed until the boiler return water temperature has risen by a settable amount (default 5°C).

5.1.6.3 Individual boiler return temp control

Each boiler has a return temperature sensor that controls a mixing-valve. If the return temperature is lower than a configurable setpoint (default 40°C) the valve will increase recirculation using a configurable P-band (default 10°C).



5.2 Heating system

5.2.1 General

The Corrigo E Boiler application can be configured to control 1 to 3 heating systems (radiator groups) HS1 to HS3. The heating system controllers are PI-controllers with settable P-band and I-time.

5.2.2 Control curves

The controllers have individual outdoor temperature / supply temperature control curves. Each curve has 8 fix points. The default setting of the outdoor temperature values for the fix points are -20, -15, -10, -5, ±0, +5, +10, +15. These can not be changed using the Corrigo front panel but can be changed using E tool. The corresponding supply temperature values are settable using the front panel or E tool.

5.2.3 Adaptation of curves

Room sensors can be used to correct the control curves. The average room temperature error over 24 hours is calculated. Values 1 hour before and 1 hour after a day/night or night/day change-over are ignored. The curves are corrected once daily using the average room temperature error and a settable correction factor. The correction will be a parallel displacement of the entire curve using the following formula:

```
Displacement = (Room setpoint - Average temp)*Factor
```

5.2.4 Pump control

Each system can have single or double pumps. Double pumps are run one at a time with automatic, weekly change over and automatic start of the backup pump on malfunction of the active pump.

Outdoor temperature dependent pump stop can be configured.

Pumps are exercised for 5 minutes at 3 pm daily.

5.2.5 Frost protection

If a controller is set to Off or Man(ual control) and the outdoor temperature is below a settable value a minimum, settable supply temperature will be maintained and the pump will run.

5.2.6 Wind compensation

To compensate for wind chilling it is possible to connect a wind sensor and generate a setpoint displacement according to a settable factor (°C per m/s).

5.2.7 Building inertia and boost

The building inertia is settable to one of three levels: None, Medium, High.

The set inertia dictates the influence of outdoor temperature.

With no inertia, the outdoor temperature is used directly, with medium inertia a one-hour average is used and with high inertia a 12-hour average is used.

Boost is used to speed up the raising of the indoor temperature when switching from night set back temperature to normal comfort temperature. This is done by temporarily displacing the supply temperature set-point curve. The following conditions must be met:

- Average outdoor temperature lower than 17°C
- Supply set-point value higher than 25°C
- Night set-back more than 2°C (room temperature)

The displacement is calculated as follows:

```
Displacem.=Factor*(17 - outdoor temp)*night set-back
```

Where Factor is settable 0…10 where 0 gives no boost and 10 gives high boost.

The time in minutes that boost will be active is calculated as follows:

```
Time = 1.6*(17 - Outdoor temp)
```

Time is limited to maximum 60 minutes.

5.2.8 Night set-back

Lowering of the night temperature is set in room temperature degrees. The corresponding lowering of the supply temperature is calculated by the controller by multiplying the value by 3. The Corrigo has individual schedules for each heating system with two comfort-temperature periods per day.

5.2.9 Optimizer

5.2.9.0 General

Function for calculating the starting time for the heating controllers in order to reach a pre-set temperature at a specified time.

5.2.9.1 Function

In order to reach the correct room temperature, at a specified time, the function calculates a warming capacity, **Heat Capacity**, in the unit degrees/minute, within the set maximum and minimum boundaries. Since a building is more cooled off (or warmed up) when the system is shut down for a longer period of time, the function operates internally with two different capacities. If the shutdown has lasted for more than 20 hours, one capacity is used, and if the shutdown has lasted for less than 20 hours another capacity is used. Both are however within the maximum and minimum boundaries.

5.2.9.2 Time Program

The time when the specified temperature is to be reached, is the time set for start of comfort time in the internal scheduler.

5.2.9.3 Heat Time

Calculated Heat Time is the current estimated heating time in minutes, depending on the capacity and the temperature difference between current room temperature and specified room temperature according to the following formula:

Calculated Heat Time = (Room Setpoint – Room Temp) / Capacity

5.2.9.4 Capacity

At every optimization, i.e. when the specified temperature has been reached, or at the specified point of time, a new capacity (°C/min) is calculated according to the following formula:

Capacity = (Capacity + Temperature raising(°C) / Optimization time(min)) / 2

Temperature raising = The difference in temperature between the room temperature when the optimization is stopped (i.e. maybe the room set point) and when the optimization was started.

Optimization time = the difference in time, in minutes, between the start and stop of the optimization.

Max/Min Capacity

The capacity can never be larger or smaller than the set maximum and minimum limitations. The average of the maximum and minimum limitations is used as a starting point for the first start time optimization.

Outdoor Compensation

Every minute thereafter, a new compensated capacity can be calculated according to the following formula, if you wish to compensate for varying outdoor temperatures.

$$Capacity_{compensated} = Capacity * (1 + Outdoor\ Compensation/100 * Outdoor\ Temperature\ Diff)$$

Outdoor Compensation = The set outdoor compensation in 0-100 %, 0 % = no compensation.

Outdoor Temperature Diff = The temperature difference between the current outdoor temperature and the outdoor temperature at the latest optimization.

5.3 Domestic hot water

5.3.0 General

The boiler application can be configured for one domestic hot-water system HW1with constant supply-temperature control.

5.3.1 Controller

The domestic hot water system controller is a PID-controller with settable P-band , I-time and D-time.

5.3.2 Night set-back

One time schedule with two normal temperature periods per day is used for the domestic hot-water system.

5.3.3 Pump control

Corrigo E has a digital output signal that can be used to control the hot-water circulation pump in HW1. The pump will run according to the settings of the night set-back schedule, running during normal temperature periods and standing still during periods with reduced temperature.

5.3.4 Periodic overheating

Once daily at 02:00, the temperature set-point can be increased to 62°C to prevent growth of Legionella bacteria. The raised set-point is maintained until the supply temperature reaches 60°C but not shorter than 1 minute and not longer than 5 minutes. If the pump is stopped it will start and run for the duration of the overheating period plus 2 minutes.

5.4 Storage tank

A storage tank function can be enabled.

The storage tank load pump, P1-HP1 is started depending on the storage tank supply water and return water temperatures.

Loading is started if the return water temperature is lower than the set start temperature.

Loading is stopped when the supply temperature is higher than the set stop temperature and the return temperature is higher than the set start temperature + the set differential.

5.5 Pressure control

Corrigo E Boiler can, using an analogue output signal and a PI-controller, control a variable speed pump to maintain a constant settable pressure. A digital output signal is available to give a start signal to the frequency converter. This output is enabled as soon as the converter control signal rises above 0.1 V.

5.6 Timer channel output

Up to 5 digital outputs can be used as timer controlled outputs.

These can be used for controlling, for example, door locks, lighting, laundry-room equipment etc.

Each timer has its own scheduler with two activation periods for each day of the week and a year-based holiday calendar.

5.7 Monitoring

5.7.1 Cold-water monitoring

One or two circuits monitoring cold-water usage can be configured each using a digital pulse-input from a water meter. The pulse constant is settable. Maximum pulse rate is 2 Hz.

5.7.1.1 Values

The following values are calculated

- 24 hour usage in litres, today
- 24 hour usage in litres, yesterday
- 24 hour usage in litres, day before yesterday
- Lowest hourly usage in litres, today
- Lowest hourly usage in litres, yesterday
- Usage total in m^3. The value is resettable
- Water-flow (litres / min)

5.7.1.2 Alarms

Pulse error	If no pulses are detected within a settable time an alarm is activated. Setting the time to 0 inhibits the alarm function.
High usage	If the daily usage is higher than a settable value an alarm is activated.
Leakage control	If the lowest hourly usage during the previous day is higher than a settable value an alarm is activated.

5.7.2 Energy monitoring

One digital pulse function can be configured for heating energy monitoring. The pulse constant is settable.

5.7.2.1 Usage values

The following usage values are calculated:

- 24 hour usage in kWh, today

- 24 hour usage in kWh, yesterday
- 24 hour usage in kWh, day before yesterday
- Total usage in kWh or MWh. The value is resettable

5.7.2.2 Power values

Heating power is calculated by measuring the time between the energy pulses. The following power values are calculated:

- Instantaneous value for a certain time or after a certain number of pulses
- Average of the above instantaneous value for the last hour
- Maximum value for the above instantaneous value

5.7.2.3 Leakage monitoring

Once a week, the control valves will be closed and the energy usage measured for a preset time. An alarm is generated if the energy leakage is larger than a settable value, default 3000 W. The time for and duration of the leakage monitoring is settable. Default is Sundays at 02:00 for 30 minutes.

5.7.2.4 Alarms

Pulse error If no pulses are detected within a settable time an alarm is activated. Setting the time to 0 inhibits the alarm function.

High usage If the daily usage is higher than a settable value an alarm is activated.

5.7.3 Electricity meter

One digital pulse function can be configured for electricity energy monitoring. The pulse constant is settable.

5.7.3.1 Usage values

Total usage in MWh. The value is resettable.

5.8 Alarms

5.8.1 Alarm handling

Alarms are indicated by the alarm LED on the front.

All alarms can be monitored, acknowledged and blocked using the display and buttons.

5.8.2 Alarm priorities

Alarms can be given different priority levels. Digital outputs can be configured to act as alarm outputs for different priority levels.

Using the front panel it is possible to change the alarm priority level (A-/B-/C-alarm/Not active) of any alarm.

5.8.3 Alarm text

The alarm text displayed on the Corrigo display can be changed using E Tool. See the E Tool manual for further information.

Chapter 6 **Display, LEDs and buttons**

This section is applicable to Corrigo E units with display and buttons but also to the hand terminal E-DSP which can be connected to Corrigo E units without display and buttons.

6.1 Display

The display has 4 rows of 20 characters.

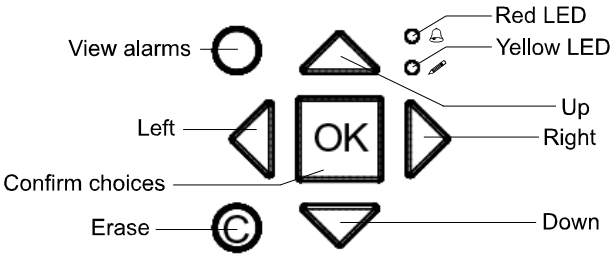
It has background illumination. The illumination will normally be off but will activated as soon as any button is pressed. The illumination will be turned off again after a period of inactivity.

6.2 LEDs

There are two LEDs on the front: The alarm LED marked with the 🔔 symbol. The "write enable" LED marked with the ✎ symbol.

The four LEDs placed next to the upper terminal strip will be described later.

6.3 Buttons



There are seven buttons: 4 arrow buttons which will be called UP, DOWN, RIGHT and LEFT. The menus in the Corrigo E are organized in a horizontal tree structure. The UP / DOWN-buttons are used to move between menus at the present menu level. The RIGHT / LEFT buttons are used to move between menu levels. When changing parameters the UP / DOWN buttons are used to increase / decrease the value of the parameter and the RIGHT / LEFT buttons to move between digits within the parameter.

- The OK button is used to confirm the choice of a parameter setting.
- The C button is used to abort an initiated parameter change and restore the original value.
- The ALARM button, marked with a red button top, is used to access the alarm list.

6.4 Navigating the menus

The start display, the display normally shown, is at the root of the menu tree.

Pressing DOWN ⬇ will move you through the menu choices at this, the lowest level. UP ⬆ will move you back through the choices.

To enter a higher menu level, use UP or DOWN to place the display marker opposite the menu you wish to access and press RIGHT ➡ . If you have sufficient log on privileges the display will change to the menu you have chosen.

At each level there may be several new menus through which you may move using the UP / DOWN buttons.

Sometimes there are further submenus linked to a menu or menu item. This is indicated by an arrow symbol at the right-hand edge of the display. To choose one, use RIGHT again. To back down to a lower menu level, use LEFT.

Change parameter

In some menus there are parameters that can be set. This will be indicated by the LED ✎ flashing. To change a parameter, first press the OK button. A cursor will appear at the first settable value. If you wish to change the value, do so by pressing the UP / DOWN buttons.

In numbers containing several digits you can move between the digits using the LEFT / RIGHT-buttons.

When the desired value is displayed press OK.

If there are further settable values displayed the cursor will automatically move to the next one.

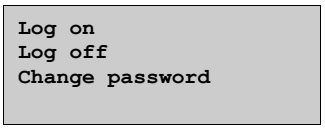
To pass a value without changing it, press RIGHT.

To abort a change and return to the initial setting, press and hold the C-button until the cursor disappears.

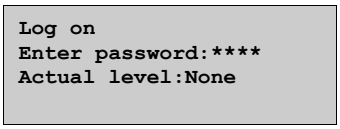
Chapter 7 **Access rights**

There are 3 different log on levels, System level which has the highest authority, Operator level and the basic “no-log on” level. System level gives full read / write access to all settings and parameters in all menus. Operator level gives read-only access to all settings and parameters and write access to all settings and parameters in all menus except *Configuration*. The basic level permits read-only access to all settings and parameters.

Repeatedly press down-arrow when the start-up display is shown until the arrow-marker to the left of the text-list points to Access rights. Press right-arrow.



7.1 Log on

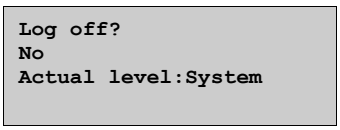


In this menu it is possible to log on to any level by entering the appropriate 4-digit code. The log on menu will also be displayed should you try to gain access to a menu or try to do an operation requiring higher authority than you have.

Press the OK-button and a cursor marker will appear at the first digit position. Repeatedly press the up-arrow until the correct digit is displayed. Press the right-arrow to move to the next position. Repeat the procedure until all four digits are displayed. Then press OK to confirm. After a short while the text on the line: Present level will change to display the new log on level. Press left-arrow to leave the menu.

7.2 Log off

Use this menu to log off from the present level to the basic "no-log on" level.



Logoff is also initiated automatically 5 minutes after the last time a button is pressed.

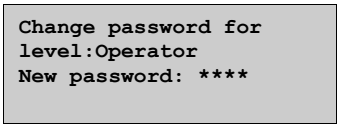
It is possible to remove the automatic logoff, see 7.5 below.

7.3 Change password

As default Corrigo comes with the following passwords for the different levels:

System	1111
Operator	3333
Basic	5555

You can only change the password for log on levels lower or equal to the presently active level, i. e. if you are logged in as System you can change all passwords, but as Operator you can only change the Operator and Basic passwords. There is no point in changing the Basic password since access to that level is granted automatically to all users.



7.4 Forgotten your password?

If the password for System has been changed and then lost, a temporary password can be obtained from Regin. This code is date dependent and only valid for one day.

7.5 Change password to remove automatic logoff

If you want to remove the automatic logoff, change the password of the desired level to 0000. After changing the password, the level will always be activated.

NB: This should be done with consideration, since no alarm is continuously given that a certain level has been activated. However, it is very useful in certain cases, if the unit is intended to be used by educated personnel or for instance at commissioning.

Chapter 8 **Configuration**

Start by logging on at System level. See section Access rights above.

Using DOWN, set the display marker opposite the menu-title **Configuration** and press RIGHT.

The main configuration menu will be shown.

```
Boiler control
Inputs/Outputs
HS Supply
Optimizer
Return temp
Pump stop
Twin/Single pump
Run ind/Motor prot
Actuator type
Actuator run time
Actuator exercise
Leakage monitoring
Pulse inputs
Alarm config.
Other params
System
```

8.1 Boiler control

```
Number of Boilers
Type of HB control
Type of setpoint
Boiler 1
Boiler 2
Boiler 3
Boiler 4
Boiler pumps
```

In this menu branch all parameters concerning the boiler controller are set.

Number of boilers

The boiler controller can handle 1 to 4 boilers in sequence

```
Number of boilers
1
```

Type of boiler control

There are two different boiler control modes: Modulating control or Switched setpoint.

For more information, see sections 5.1.1 and 5.1.2.

```
Type of boiler
control.

Modulating control->
```

With modulating control the starting order can be changed , either a specific day of the week or every day

```
Boiler Exchange
Weekday: No Exchange
Hour:  11
```

```
Type of boiler
control.

Switched setpoint
```

Type of setpoint

There are three different alternatives for the boiler control setpoint. For more detailed information see sections 5.1.1.2 and 5.1.2.2

```
Type of setpoint
Outdoor comp. setp.
```

Constant setpoint: The boilers are controlled to maintain a constant water temperature .

Outdoor compensated setpoint: The setpoint value is dictated by a settable setpoint/outdoor temperature curve.

Heating sequence setpoint dependent: The boiler temperature setpoint is always a settable number of degrees higher than the highest heating sequence setpoint at any given time.

Boiler 1 – 4

For each of the 1 – 4 available boilers there are a set of menus.

Each boiler can have 1-step or 2-step on/off burners. Boiler 1 can also be configured for an analogue 0 – 10 V DC burner control. This is however only valid if modulating boiler control has been configured. See above.

```
Vessel 1
1-steps
```

Start mode and minimum run and stop times can be set.

Start mode can be either a fixed position in the starting order or alternating or run time controlled. In alternating mode the starting order is changed at a set time. In run time controlled the starting order is constantly changed to equal out the total running time between the boilers.

The start mode settings are only valid if Modulating control has been configured. If Switched setpoint has been configured the start mode settings will be ignored.

```
Start mode:
Fixed 1:st
Min. run time : 180s
Min. stop time: 180s
```

The boiler can be exercised periodically. The number of weeks between exercise as well as the weekday, hour for and duration of the exercise can be set.

```
Exercise: On
No of weeks: 4
Wday: Sun. Hour: 15
Exercise time: 5
```

Return temp controller

To minimise the risk of condensation in a boiler, a return water temperature sensor can be configured. This monitors the water temperature and if the temperature falls below a set value (default 40°C) the valve will open to increase the temperature. The controller is a P-controller with a settable P-band (default 10°C).

```
Boiler 1
Actual: 55.4 °C
Setp:   40.0 °C
P-Band: 10   °C
```

Boiler pumps

Settings for the various pumps that can be configured in conjunction with the boiler control.

```
Transport pump
Boiler pump(s)
Exercise
```

Transport pump

The transport pump is started if the outdoor temperature falls below the set value or if any of the configured boilers are activated.

```
Outdoor temp. for
start pump:  18°C
Hyst. For start/stop
pump:  1.0°C
```

Boiler pump(s)

An individual pump can be configured for each boiler. On activation of a boiler, the pump will run for the set time before the burner is activated

```
Time that HBP is
running before HB is
allowed to start:
30 s
```

Exercise

All pumps are exercised at the set hour for the set duration

```
Exercise hour: 15
Exercise time: 5 min
```

8.1 In- and Outputs

```
Analogue inputs
Digital inputs
Universal inputs
Analogue outputs
Digital outputs
```

General

Free configuration

Any control signal can be bound to any input/output, the only restriction being that digital signals cannot be bound to analogue inputs and vice versa. It is up to the user doing the binding to make sure that activated functions are bound to appropriate signals.

Delivery setting

On delivery all the physical inputs and outputs have already been bound to a signal.

The delivery settings are suggestions only and can easily be changed.

8.1.1 Analogue inputs AI

```
Analogue input 1
Sign: Outdoortemp
Raw value: 18.3
Compensation: 0.0°C
```

All analogue inputs are for PT1000 or 0-10 Volts.

Input signals can be compensated for example for wiring resistance.

The Raw value will show the actual uncompensated input value. If an input has been assigned to pressure control the following submenu will be available:

```
AI2 Pressure at
 0V: 0.0   kPa
10V: 10.0  kPa
Filter factor: 0.2
```

8.1.2 Digital inputs DI

```
Digital input 1
NO/NC: NO Signal:
HS1-PumpA
Status: Off
```

To simplify adaptation to external functions, all digital inputs can be configured to be either normally open, NO, or normally closed, NC.

The inputs are as standard normally open, i. e. if the input is closed, the function connected to the input in Corrigo is activated.

8.1.3 Universal inputs UI

On the largest hardware version, E28 there are universal inputs. These can individually be configured as either analogue inputs or as digital inputs. When configured as analogue inputs they can be bound to any of the analogue signals described under Analogue signals.

When configured as digital inputs they can be bound to any of the digital signals described under Digital signals.

```
Universal input 1 →
Choose AI or DI sign
AI sign: HS2 Supply
DI sign: Not active
```

After choosing AI or DI signal (the unused alternative must be set to *Not active*) there is a sub-menu with settings used when the input is configured as an AI-input. This menu is accessed by pressing RIGHT.

```
Universal AI1
Sign: HS2 Supply
Raw value:38.5
Compensation: 0.0°C
```

Input signals can be compensated for example for wiring resistance.

The Raw value will show the actual uncompensated input value.

If an input has been assigned to pressure control the following submenu will be available:

```
UAI1 Pressure at
 0V: 0.0   kPa
10V: 10.0  kPa
Filter factor: 0.2
```

```
Universal DI1
NO/NC: NO Signal:
HS1-PumpA
Status: Off
```

To simplify adaptation to external functions, all universal inputs configured as digital inputs can be set as either normally open, NO, or normally closed, NC.

The inputs are as standard normally open, i. e. if the input is closed, the function connected to the input in Corrigo is activated.

8.1.4 Analogue outputs

Analogue outputs are 0…10 V DC.

```
Analogue output 1
Sign: HS1 Actuator
Auto
Value: 2.3 V
```

8.1.5 Digital outputs

```
Digital output 1
Signal: HS1-PumpA
Auto
Status: On
```

8.2 HS Heating System, supply

8.2.1 Parallel displacement

To each of the set control curves can be added a parallel displacement.

```
Parallel displacemnt
HS1: 0.0   °C
HS2: 0.0   °C
HS3: 0.0   °C
```

8.2.2 Maximum limit

A maximum supply temperature can be set individually for each heating system.

```
Maximum limit
HS1: 98    °C
HS2: 98    °C
HS3: 98    °C
```

8.2.3 Minimum limit

A minimum supply temperature can be set individually for each heating system.

```
Minimum limit
HS1: 0   °C
HS2: 0   °C
HS3: 0   °C
```

8.2.4 Auto-correction of setpoint

Room sensors can be used to correct the control curves. The average room temperature error over 24 hours is calculated. Values 1 hour before and 1 hour after a day/night or night/day change-over are ignored. The curves are corrected once daily using the average room temperature error and a settable correction factor. The correction will be a parallel displacement of the entire curve using the following formula:

Displacement = (Room setpoint - Average temp)*Factor

```
Auto-correction
Setpoint HS1
On               →
```

```
Corr. factor HS1
 2.0
Present correction
 0.6°C
```

8.3 Optimizer

Function for calculating the starting time for the heating controllers in order to reach a pre-set temperature at a specified time.

In order to reach the correct room temperature, at a specified time, the function calculates a warming capacity, **Heat Capacity**, in the unit degrees/minute, within the set maximum and minimum boundaries. Since a building is more cooled off (or warmed up) when the system is shut down for a longer period of time, the function operates internally with two different capacities. If the shutdown has lasted for more than 20 hours, one capacity is used, and if the shutdown has lasted for less than 20 hours another capacity is used. Both are however within the maximum and minimum boundaries.

For more information, see section 5.2.9 Optimizer

```
Optimizer function
HS1: Yes
HS2: No
HS3: No
```

```
Min capacity
HS1: 0.04 °C/min
HS2: 0.02 °C/min
HS3: 0.02 °C/min
```

```
Max capacity
HS1: 0.13 °C/min
HS2: 0.10 °C/min
HS3: 0.10 °C/min
```

```
Outdoor comp. fact.
HS1: 3.0  %
HS2: 3.0  %
HS3: 3.0  %
```

8.3 Return water temperature

Individual maximum and minimum return water temperatures can be set for the heating systems. Should the water temperature go outside the set limits the supply water temperature will be adjusted to correct. The adjustment will be the temperature offset multiplied by the set limiting factor.

8.3.1 Maximum temperature

```
Max. return temp.
HS1:Active        →
HS2:Inactive
HS3:Inactive
```

```
Max. return temp
HS1: 50°C
HS2: 50°C
HS3: 50°C
```

8.3.2 Minimum temperature

```
Min. return temp.
HS1:Active        →
HS2:Inactive
HS3:Inactive
```

```
Min. return temp
HS1: 0°C
HS2: 0°C
HS3: 0°C
```

8.3.3 Limiting factor

```
Return limit factor.
HS1: 1.00
HS2: 1.00
HS3: 1.00
```

8.4 Pump stop

Each heating system has individual day and night stop temperatures. An active circulation pump will stop if the outdoor temperature is higher than the set value and there is no heating demand. The pump will start if the temperature falls below the set stop temperature less the set hysteresis. Night is between 00:00 am and 05:00 am.

All pumps, even resting twin-pumps, are exercised once daily for 5 minutes at 3 pm.

```
Pump stop HS1:On
Temp stop day: 17°C
Temp stop night 17°C
Hysteresis: 2.0°C
```

8.5 Twin pump / Single pump

Each heating system can be configured for either a single pump or twin pumps.

When twin pumps are configured, the pumps are alternated weekly on Tuesdays at 10:00 am. On activation of the pump alarm for the active pump the Corrigo will automatically switch to the other pump.

```
Twin/Single pump
HS1: Twin pumps
HS2: Single pump
HS3: Single pump
```

8.6 Run indication/Motor protection

Inputs are used either for indication of the motor running or for monitoring of motor protection contacts.

Run indication input should be normally closed. Open contact when the motor is running, i.e. motor control output is activated, will generate an alarm.

Motor protection should be normally open. Closed contact when the motor is running, i.e. motor control output is active, will generate an alarm.

```
Boiler1:Motor prot
Boiler2:Motor prot
Boiler3:Motor prot
Boiler4:Motor prot
```

```
B.pump1:Motor prot
B.pump2:Motor prot
B.pump3:Motor prot
B.pump4:Motor prot
```

```
Transp. Pump: M. prot
HS1: Motor prot
HS2: Motor prot
HS3: Motor prot
```

```
     HW1: Motor prot
     HP1: Motor prot
Freq.Con: Motor prot
```

8.7 Actuator type

Choose output signals to the actuators connected to the analogue control outputs: 0…10 V DC, 2…10 V DC, 10…0 V DC or 10…2 V DC.

```
Actuator type
HS1: 0-10V
HS2: 0-10V
HS3: 0-10V
```

```
Actuator type
 HW1: 0-10V
Freq: 0-10V
```

Note that although many manufacturers state 0…10 V DC as control signal, for many actuators the actual control signal is more often than not 2…10V DC. Check the actuator documentation carefully. If uncertain, choose 0…10V DC. Although control might be less accurate, it will ensure that the valve always can be driven to its fully opened and fully closed positions.

8.8 Running time, 3-pos. actuators

These parameters have no function if analogue actuators are configured.

The values are used to determine the control parameters for 3-position actuators.

It is important to set correct values since incorrect values lead to sloppy control.

```
Actuator run time
HS1: 255 sec
HS2: 255 sec
HS3: 255 sec
```

```
Actuator run time
HW1: 80 sec
HB1: 80 sec
```

8.9 Actuator exercising

The actuators can be exercised once daily at a preset hour and minute within the hour. The actuators will be forced to run in both directions for the set actuator running time. The pumps will run and the temperature offset alarm will be blocked for the duration of the exercising.

```
Actuator exercise
HS1: Off
Hour for exerc.: 15
 Minute for ex.: 00
```

8.10 Leakage monitoring

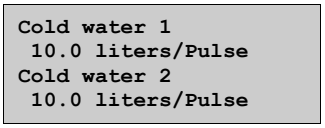
Once a week, the control valves will be closed and the energy usage measured for a preset time. An alarm is generated should the energy leakage be larger than a settable value, default 3.0 kW. The time for and duration of the leakage monitoring is settable. Default is Sundays at 2:00 am for 30 minutes.

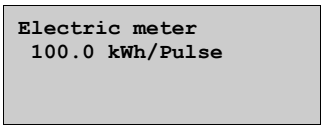
```
Leakage mon:Off
 Weekday:Sunday
    Hour: 2
Duration: 30 min
```

```
Permitted leakage
 3.00   kW
Start monitoring now
No
```

8.11 Pulse inputs

```
Energy pulse heating
 100.0 kWh/Pulse
Volume pulse heating
 10.0 liters/Pulse
```

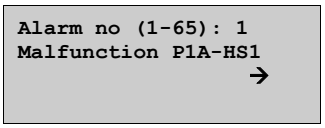


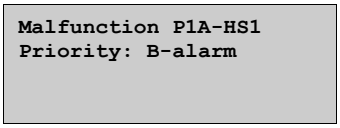


8.12 Alarm configuration

Permits configuration of all alarms.

Select the appropriate alarm number (from the alarm list). The alarm text for the alarm will be displayed and the alarm priority can be set: A-alarm, B-alarm, C-alarm or not active.





Alarm list

Values in the Priority column show the factory set values.

	Alarm text	Pri	Description
1	Malf. P1A-HS1	B	Malfunction pump P1A-HS1
2	Malf. P1B-HS1	B	Malfunction pump P1B-HS1
3	Malf. P1A-HS2	B	Malfunction pump P1A-HS2
4	Malf. P1B-HS2	B	Malfunction pump P1B-HS2
5	Malf. P1A-HS3	B	Malfunction pump P1A-HS3
6	Malf. P1B-HS3	B	Malfunction pump P1B-HS3
7	Malf. P1-HWC	A	Malfunction pump P1-HWC
8	Malf. P1-HP1	-	Malfunction pump Storage tank
9	Malf. Frequenc	B	Malfunction frequency converter
10	Exp. vessel	A	Expansion vessel alarm
11	External alarm	A	External alarm
12	Boiler alarm	A	Boiler alarm
13	Deviation HS1	A	Supply temp HS1 deviates too much from the setpoint for too long.
14	Deviation HS2	A	Supply temp HS2 deviates too much from the setpoint for too long.
15	Deviation HS3	A	Supply temp HS3 deviates too much from the setpoint for too long.
16	Deviation HWC1	A	Supply temp HWC1 deviates too much from the setpoint for too long.
17	Sensor error	B	Malfunction of a connected sensor

	Alarm text	Pri	Description
18	High HWC1	B	HWC1 temperature too high
19	High Boiler temp	B	Boiler temperature too high
20	Boiler low	B	Boiler temperature too low
21	Pulse error volume	B	No pulses from water volume meter
22	Pulse error energy	B	No pulses from energy meter
23	High cold water usage	B	24 hour cold water usage higher than limit
24	High energy usage	B	24 hour energy usage higher than limit
25	High cold water/hour	B	Cold water usage / hour higher than min. limit
26	High leakage	B	Leakage higher than set value
27	Malf. P1A&B-HS1	A	Malfunction both circulation pumps P1A and P1B in HS1
28	Malf. P1A&B-HS2	A	Malfunction both circulation pumps P1A and P1B in HS2
29	Malf. P1A&B-HS3	A	Malfunction both circulation pumps P1A and P1B in HS3
30	Pulse error CW1	B	No pulses from cold water meter 1.
31	Pulse error CW2	B	No pulses from cold water meter 2.
32	HS1 manual	C	HS1 in manual mode
33	HS2 manual	C	HS2 in manual mode
34	HS3 manual	C	HS3 in manual mode
35	HWC1 manual	C	HWC1 in manual mode
36	Not used	-	
37	Press. manual	C	Pressure control in manual mode
38	Boiler manual	C	Boiler in manual mode
39	P1A-HS1 manual	C	P1A-HS1 in manual mode
40	P1B-HS1 manual	C	P1B-HS1 in manual mode
41	P1A-HS2 manual	C	P1A-HS2 in manual mode
42	P1B-HS2 manual	C	P1B-HS2 in manual mode
43	P1A-HS3 manual	C	P1A-HS3 in manual mode
44	P1B-HS3 manual	C	P1B-HS3 in manual mode
45	P1-HWC1 manual	C	P1-HWC1 in manual mode
46	P1-HP1 manual	C	P1-HP1 (storage tank pump) in manual mode
47	P1-Freq. Manual	C	P1- frequency controlled in manual
48	HS1 Supply max	B	HS1 supply temp maximum limit activated
49	HS2 Supply max	B	HS2 supply temp maximum limit activated
50	HS3 Supply max	B	HS3 supply temp maximum limit activated
51	HS1 Supply min	B	HS1 supply temp minimum limit activated
52	HS2 Supply min	B	HS2 supply temp minimum limit activated
53	HS3 Supply min	B	HS3 supply temp minimum limit activated
54	HS1 Return max	B	HS1 return temp maximum limit activated
55	HS2 Return max	B	HS2 return temp maximum limit activated
56	HS3 Return max	B	HS3 return temp maximum limit activated
57	HS1 Return min	B	HS1 return temp minimum limit activated
58	HS2 Return min	B	HS2 return temp minimum limit activated

	Alarm text	Pri	Description
59	HS3 Return min	B	HS3 return temp minimum limit activated
60	HS1 Frost	B	HS1 frost protection active
61	HS2 Frost	B	HS2 frost protection active
62	HS3 Frost	B	HS3 frost protection active
63	Battery error	B	Malfunction of the internal memory-backup battery
64	Low Boiler return temp	C	Low boiler return temp (common return sensor)
65	Malfunction Boiler1	A	Malfunction boiler vessel 1
66	Malfunction Boiler2	A	Malfunction boiler vessel 2
67	Malfunction Boiler3	A	Malfunction boiler vessel 3
68	Malfunction Boiler4	A	Malfunction boiler vessel 4
69	Malf. Boilerpump1	A	Malfunction boilerpump Boiler 1
70	Malf. Boilerpump2	A	Malfunction boilerpump Boiler 2
71	Malf. Boilerpump3	A	Malfunction boilerpump Boiler 3
72	Malf. Boilerpump4	A	Malfunction boilerpump Boiler 4
73	Malf. transportpump	A	Malfunction transport pump
74	Boiler 1 manual	C	Boiler 1 in manual mode
75	Boiler 2 manual	C	Boiler 2 in manual mode
76	Boiler 3 manual	C	Boiler 3 in manual mode
77	Boiler 4 manual	C	Boiler 4 in manual mode
78	Boilerpump 1 manual	C	Pump, Boiler 1 in manual mode
79	Boilerpump 2 manual	C	Pump, Boiler 2 in manual mode
80	Boilerpump 3 manual	C	Pump, Boiler 3 in manual mode
81	Boilerpump 4 manual	C	Pump, Boiler 4 in manual mode
82	Transportpump Manual	C	Transport pump in manual mode
83	Pressure/Flow error	C	No signal from Pressure/flow sensor

8.13 Other parameters

A collection of different parameters that did not fit into any of the other menus.

8.13.1 Building inertia and boost

For detailed information, see 5.1.7 Building inertia and boost.

The building inertia is settable to one of three levels: None, Medium or High.

The displacement is calculated as follows:

```
Displacem.=Factor*(17 - outd. temp)*night set-back
```

Where Factor is a settable factor 0…10 where 0 gives no boost and 10 gives maximum boost.

Boost duration time is calculated as below:

```
Time=1.6*(17 - outdoor temp)
```

```
Building inertia
None
Boost factor (0-10)
 1
```

8.13.2 Power limitation

Using a digital input the power to the heating systems can be temporarily restricted. When activated, the setpoints are lowered by a settable factor (% relative to 20°C). The limitation applies to all configured heating systems. The limitation is calculated as below:

Limited setpoint=20+(Setpoint-20)*Factor/100

```
Power limitation
 100% rel +20°C
```

Factor 100 gives no setpoint lowering, 0 gives full lowering to 20°C.

8.13.3 Frost protection

If the controller is in mode Off or Manual and the outdoor temperature falls below a settable value, a settable, minimum supply temperature will be maintained. Circulation pumps will be activated.

```
Frost protect.:Off
Outdoor temp activ.
Frost prot:0.0°C
Min sup. temp:10.0°C
```

8.13.4 Split of output signal

Any one of the temperature control output signals HS1, HS2, HS3, HWC1 or HWC2 can be split in two.

```
Split of any
temp sequence:
No split
```

8.13.5 Periodical heating

```
Periodical heating
HW1:  No
HP1:  No
```

8.13.6 Heating circuit blocking on low return water temperature

To avoid condensation it is possible to use one, common, boiler return temperature sensor. If this return temperature falls below a configurable limit (default 30°C) all the heating systems control valves are closed. They remain closed until the boiler return water temperature has risen by a settable amount (default 5°C).

```
Low return temp
boiler for blocking
valves: 30.0 °C
 Hyst.: 5.0 °C
```

8.14 System

8.14.1 Change language

Use this menu to change the display language.

```
Choose language
English
```

Note: This menu is also directly accessible by holding the OK-button depressed during power-up.

8.14.2 Choose start screen; the text normally shown on the display

There are 5 different to choose from.

Type 1

The first line holds a free text that can be changed using E tool.

The second line shows date and time.

The third line shows the text HS1.

The fourth line shows the present temperature setpoint and actual values for HS1.

```
Boiler Controller
 04:03:15 11:28
HS1
Sp:32.8°C Act:33.1°C
```

Type 2

The first line holds a free text that can be changed using E tool.

The second line shows date and time.

The third line shows the text HWC1.

The fourth line shows the present temperature setpoint and actual values for HWC1.

```
Boiler Controller
 04:03:15 11:28
HWC1
Sp:55.0°C Act:54.8°C
```

Type 3

The first line holds a free text that can be changed using E tool.

The second line shows the text HS1/HWC1.

The third line shows the present temperature setpoint and actual values for HS1.

The fourth line shows the present temperature setpoint and actual values for HWC1.

```
Boiler Controller
HS1/HWC1
Sp:32.8°C Act:33.1°C
Sp:55.0°C Act:54.8°C
```

Type 4

The first line holds a free text that can be changed using E tool.

The second line shows the outdoor temperature.

The third line shows the text HS1.

The fourth line shows the present temperature setpoint and actual values for HS1.

```
Boiler Controller
Outdoor temp: 8.2°C
HS1
Sp:32.8°C Act:33.1°C
```

Type 5

The first line holds a free text that can be changed using E tool.

The second line shows the outdoor temperature.

The third line shows the text HB.

The fourth line shows the present temperature setpoint and actual values for the Boiler controller.

```
Boiler Controller
Outdoor temp: 8.2°C
HS1
Sp:32.8°C Act:33.1°C
```

8.14.3 Automatic summer time adjustment

The internal clock is normally configured for automatic summertime/wintertime adjustment. The function can be disabled in this menu. When enabled, the clock will be advanced one hour at 02:00 am the last Sunday of March and retarded one hour at 03:00 am the last Sunday of October.

```
Automatic summer/
winter time change
over
Yes
```

8.14.4 Address

Corrigo E uses the addresses below when connecting to Corrigo E tool, and when multiple controllers are connected in a network. E tool normally uses the addresses below, so if an address is changed, the new address must also be entered in E tool. If several Corrigo are connected in a network, all the units must have the same ELA address, but each unit must have a unique PLA address.

```
Address
PLA: 254
ELA: 254
```

8.14.5 Display anywhere (Remote control)

If multiple Corrigo units are connected in a network, it is possible to remote control a unit in the network from a unit with display. You do this by entering the address of the unit you wish to remote control in the unit with display. The function is aborted by pressing the buttons UP, OK and DOWN simultaneously.

```
Address for
remote communication
(PLA:ELA) 00:00
```

8.14.6 Automatic logoff

If the log on level is Operator or System, the user will automatically be logged off to Normal after a settable time of inactivity. The time is settable in units of 5 seconds. Standard 60 units = 5 minutes.

```
Time before user
automatically is
logged off:60
(Unit 5 sec)
```

8.14.7 Modbus communication

Corrigo E can be connected to a network for Modbus communication. An activation code is not needed.

```
Modbus
communikation
Not Active
```

```
Modbus Address: 1
Speed: 9600 bps
Two stop bits:Yes
Parity:No
```

8.14.7 Dial-up modem

With the help of a dial-up modem, Corrigo can be connected to a supervisor Exo-system. We recommend the modem Modem56kINT485kit. The default password is exo.

```
DialUpModem: No
Number:
Password:
exo
```

8.14.8 Alarm forwarding via SMS

Via a connected GSM modem, Corrigo can send an alarm message to up to 3 different recipients. When there is an A alarm, Corrigo sends an alarm message to the first number on the list. The message consists of an alarm text, the unit name (the same text that is shown in the first row of the start display) and the time when the alarm occurred. If the recipient does not send an SMS within 5 minutes to confirm that the message has been received, Corrigo will send the message to the next number on the list.

```
SMS: Not Active
Nbr1:
Nbr2:
Nbr3:
```

Chapter 9 **Settings**

In this menu group all settings for all activated functions should be available. Depending on what choices have been made during configuration, some of the alternatives in this menu group may not be shown.

Settings

```
Control temp       →
Control pressure   →
Alarm settings
```

9.1 Control temp

Boiler controller

This menu is only shown if Modulation boiler control has been chosen

```
Boiler
P-band: 10.0  °C
I-time: 5.0  sec
```

If a boiler return temp sensor has been configured the following menu is shown. Sets the proportional band for the boiler recirculation valve. See section 5.1.6.3

```
Boiler1 return temp
P-band: 10.0 °C
```

9.1.1 HS1, HS2 and HS3

Control parameters for the three heating system controllers.

```
HS1
P-band: 100.0 °C
I-time: 100.0 sec
```

9.1.2 HWC1

Control parameters for the hot water controller.

```
HWC1
P-band: 100.0 °C
I-time: 150.0 sec
D-time: 1.0 sec
```

9.2 Control pressure

9.2.1 Control pressure

Control parameters for pressure control. Only accessible if pressure control has been configured.

```
Pressure control
P-band: 25.0 kPa
I-time: 100.0 sec
Min.output: 0%
```

9.3 Alarm settings

Alarm settings

```
Alarm limits      →
Alarm delay       →
```

9.3.1 Alarm limits

Control deviation, HS1, HS2 and HS3

```
Control deviation
HS1: 20.0 °C
HS2: 20.0 °C
HS3: 20.0 °C
```

Control deviation HWC1

```
Control deviation
HWC1: 20.0 °C
```

Scalding limit

```
Scalding
HWC1: 65.0 °C
HWC2: 65.0 °C
```

Boiler limits

```
High boiler temp
 70.0    °C
Low boiler temp
 30.0    °C
```

High water usage

```
High 24h water usage
 10000.0 liters
High 1h water usage
 10000.0 liters
```

High energy usage

```
High 24h energy usage
10000.0 kWh
```

Maximum time between pulses

```
Max between Vpulse
 0    min
Max between Epulse
 0    min
```

```
Max between CW1pulse
 0    min
Max between CW2pulse
 0    min
```

Permitted leakage

```
Permitted leakage
 3.00   kW
```

9.3.2 Alarm delays

Control deviation, HS1, HS2 and HS3

```
Control deviation
HS1: 60 min
HS2: 60 min
HS3: 60 min
```

Control deviation HWC1 and HWC2

```
Control deviation
HWC1: 60 min
HWC2: 60 min
```

Scalding limit

```
Scalding
HWC1: 300  sec
HWC2: 300  sec
```

Boiler limits

```
High boiler temp
 0      sec
Low boiler temp
 0      sec
```

Expansion vessel / External alarm

```
Expansion vessel
 60   sec
External alarm
 60   sec
```

Chapter 10 **Time settings**

General

Corrigo has a year-base clock function. This means that a week-schedule with holiday periods for a full year can be set. The clock has an automatic summer- winter-time changeover.

Individual schedules for each week-day plus a separate holiday setting. Up to 24 individual holiday periods can be configured. Holiday schedules take precedence over other schedules.

Each day has up to two individual running periods. For two-speed fans and pressure controlled fans there are daily individual schedules for normal speed and reduced speed , each with up to two running periods.

Up to five separate digital timer outputs can be configured. Each with individual week-schedules with two activation periods per day. These outputs can be used to control lighting, doorlocks etc.

```
Time/Date          →
HS1 Night setback  →
HS2 Night setback  →
HS3 Night setback  →
HWC1 Night setback →
Timer output1      →
Timer output2      →
Timer output3      →
Timer output4      →
Timer output5      →
Holidays           →
```

10.1 Time / Date

This menu shows and permits the setting of time and date.

Time is shown in 24 hour format.

Date is shown in the format YY:MM:DD.

```
Time: 18:21
   Date: 04:02:23
Weekday: Monday
```

10.2 HS_Night Set-back

```
HS1 Night Setback
On                 →
 5.0 room-degrees
```

Lowering of the night temperature is set in room temperature degrees. The corresponding lowering of the supply temperature is calculated by the controller by multiplying the value by 3.

Setting comfort temperature periods.

For each control system there are 8 separate setting menus, one for each weekday and one extra for holidays. Each heating system has two comfort-temperature periods per day.

Holiday schedules take precedence over other schedules.

For 24 hour running, set a period to 00:00 – 24:00.

To disable a period, set it to 00:00 – 00:00.

```
HS1 Comfort time
Monday
Per 1: 07:00 – 16:00
Per 2: 00:00 - 00:00
```

10.3 HWC_Night set-back

```
HWC1 Night setback
On                →
 5.0 °C
Pump stop: Off
```

Setting comfort temperature periods.

For each control system there are 8 separate setting menus, one for each weekday and one extra for holidays.
Holiday schedules take precedence over other schedules.

For 24 hour running, set a period to 00:00 – 24:00.

To disable a period, set it to 00:00 – 00:00.

```
HWC1 Comfort time
Monday
Per 1: 07:00 – 16:00
Per 2: 00:00 - 00:00
```

10.4 Timer outputs 1…5

Up to 5 digital outputs can be configured as timer outputs, each with a separate week-schedule with two activation periods per day. Holiday schedules take precedence over other schedules.

```
Timer output 2
Wednesday
Per 1: 05:30 – 08:00
Per 2: 17:00 – 23:00
```

10.5 Holidays

Up to 24 separate holiday periods for a full year can be set.

A holiday period can be any number of consecutive days from one and upwards. The dates are in the format: MM:DD

When the current date falls within a holiday period, the scheduler will use the settings for the weekday “Holiday”.

```
Holidays   (mm:dd)
1: 01:01 -  02:01
2: 09:04 -  12:04
3: 01:05 -  01:05
```

Chapter 11 **Actual / Setpoint**

In this menu group all actual current values and setpoint values are displayed and, providing a sufficiently high log on level is used, all setpoints can be changed.

The following menus are available providing that the corresponding input is activated.

11.1 Setpoint Boiler control

For the boiler control circuit there are three different setpoint modes: Fixed, Outdoor temperature dependent and heating circuit setpoint dependent.

Fixed setpoint

```
Setpoint HB
 55.0°C
Actual:
53.4°C
```

Outdoor temperature dependent setpoint

```
Outdoortemp: 11.5°C
HB
Act.: 29.8°C   Setp→
Setp: 32.0°C
```

Submenu: Setpoint

In-between-values are calculated using straight lines between breakpoints. Setpoints for temperatures lower than the lowest breakpoint and higher than the highest breakpoint are calculated by extending the line between the two last breakpoints at either end. Example: At the lower end the setpoint is increasing by 14°C for every 5 °C lowering of the outdoor temperature. So the setpoint at –23°C would be 77+3/5 * 14°C = 85.4°C.

```
Out. comp. setp.HB
-20 °C = 77 °C
-15 °C = 63 °C
-10 °C = 59 °C
```

```
Out. comp. setp. HB
 -5 °C = 54 °C
  0 °C = 53 °C
  5 °C = 43 °C
```

```
Out. comp. setp. HB
 10°C = 35 °C
 15°C = 25 °C
```

Heating circuit (HS1) dependent setpoint. The setpoint is a settable number of degrees higher than the setpoint for heating circuit HS1. The calculated setpoint in the example below will be 48.3°C. The differential value 5.0°C is settable in this menu.

```
Setpoint HB
HS depending setp
HS: 43.3°C + 5.0°C
Actual:59.4°C
```

If an individual boiler return temperature sensor has been configured, the following menu is shown

```
HB1 Return temp.:
Setp.: 40.0°C
Actual: 48.3°C
```

If a common boiler circuit return temperature sensor has been configured, the following menu is shown

```
HB Return temp.:
 41.5 °C
HB Supply temp
 53.4°C
```

11.1 Setpoint Heating systems HS1, HS2 and HS3

```
Outdoortemp: 18.4°C
HS1
Act.: 19.8°C   Setp→
Setp: 20.0°C
```

Submenu: Setpoint

In-between-values are calculated using straight lines between breakpoints. Setpoints for temperatures lower than the lowest breakpoint and higher than the highest breakpoint are calculated by extending the line between the two last breakpoints at either end. Example: At the lower end the setpoint is increasing by 14°C for every 5 °C lowering of the outdoor temperature. So the setpoint at –23°C would be 77+3/5 * 14°C = 85.4°C.

```
Outd. comp. setp.HS1
-20 °C = 77 °C
-15 °C = 63 °C
-10 °C = 59 °C
```

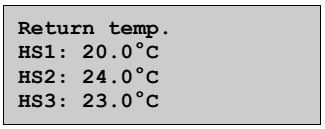
```
Outdoor comp. setp.
 -5 °C = 54 °C
  0 °C = 53 °C
  5 °C = 43 °C
```

```
Outdoor comp. setp.
 10°C = 35 °C
 15°C = 25 °C
```

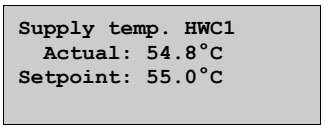
11.2 Room sensor HS1, HS2 and HS3

```
Room sensor HS1
     Actual: 20.8°C
   Setpoint: 21.0°C
Return temp: 20.0°C
```

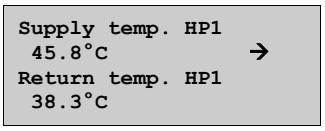
11.3 Return water temperature

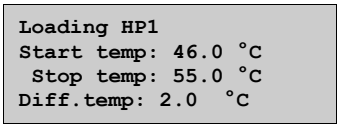


11.4 Supply temp HWC1

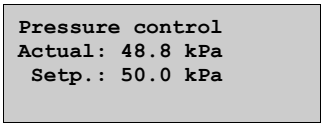


11.5 Storage tank

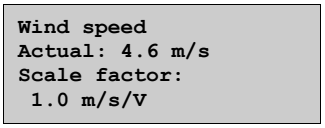


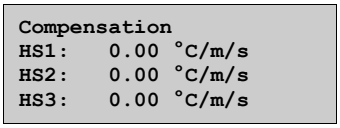


11.8 Pressure control



11.9 Wind speed





Chapter 12 **Manual / Auto**

General

In this menu the running mode of the unit and all the configured outputs can be manually controlled. This is a very handy feature which simplifies the checking of individual functions in the Corrigo.

It is also possible to manually control each of the temperature output signals individually.

All the configured digital outputs can be set to On, Off or Auto.

Since leaving any of the outputs in manual control will disrupt the normal control, an alarm will be generated as soon as any output is set to a manual mode.

Since the menus vary according to the configuration of the outputs only the most common ones will be shown here. For the digital signals you can normally choose between Auto and On and Off or similar words indicating the two possible manual states of the digital output.

Boilers

```
Manual/Auto
Boiler 1: Auto
```

```
Manual/Auto
Boiler pump 1:
Auto
```

```
Manual/Auto
Transport pump:
Auto
```

Heating systems HS1, HS2 and HS3

```
Manual/Auto
HS1
Auto
Manual set: 0.0
```

Hot water circuit HWC1

```
Manual/Auto
HWC1
Auto
Manual set: 0.0
```

Pressure control

```
Pressure control
Auto
Manual set: 0.0
Minmum set: 0.0
```

Pumps HS1, HS2 and HS3

```
Manual/Auto HS1
P1A:Auto
P1B: Auto
```

Pump HWC1

```
Manual/Auto
HWC1:Auto
```

Storage tank charging

```
Manual/Auto
HP1:Auto
```

Frequency converter start

```
Manual/Auto
Frequency conv.:Auto
```

Chapter 13 **Energy / Cold water**

In this menu the pulse-counter input results are administered. The pulse constants (pulses/unit) are set in the menu Configuration/Pulse constants.

```
Heating meter
Cold water meter 1
Cold water meter 2
Electricity meter
Leakage monitoring
```

13.1 Heating meter

```
Energy total
 1532  MWh
Hot water total
 387 m3
```

These values can be reset.

```
Energy
    Today: 28.15 kWh
Yesterday:123.45 kWh
D B Y-day:132.11 kWh
```

```
Usage
    Today: 28.15 lit
Yesterday:123.45 lit
D B Y-day:132.11 lit
```

```
Power usage
  Instant: 2.1kW
Average/h: 3.2kW
Max aver.: 5.3
```

13.2 Cold water meters CW1 and CW2

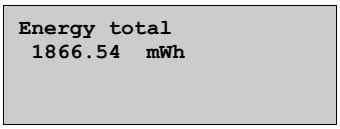
```
CW1 Usage total
 276.2 m3
CW1 Flow
 6.4   l/min
```

The total usage value can be reset.

```
CW1 Usage
    Today:  88.1 lit
Yesterday:4123.4 lit
D B Y-day:5012.1 lit
```

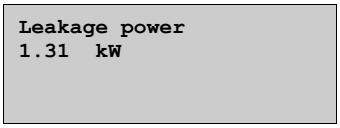
```
Lowest CW1 usage
Today: 0.1 lit./h
Yest.: 0.2 lit./h
```

13.3 Electricity meter



The value can be reset.

13.4 Leakage monitoring



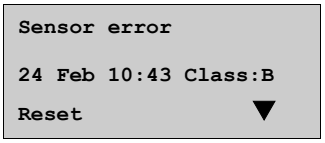
Chapter 14 **Other functions**

14.1 Alarm handling

If an alarm condition occurs the Alarm LED on the front panel on units with display will start flashing. The LED will continue to flash as long as there are unacknowledged alarms.

Alarms are logged in the alarm list. The list shows type of alarm, date and time for the alarm and the alarm class (A, B or C alarm)

To access the alarm list, press the alarm button, the front panel button with the red button-top.



If there are multiple alarms, this is indicated by up / down arrow symbols at the right-hand edge of the display.

Use the UP and DOWN buttons to access the other alarms.

At the left end of the bottom display line the alarm status is shown. For active, unacknowledged alarms the space is blank. For alarms that have reset the text: “Reset” is shown., Acknowledged, still active or blocked alarms are indicated by Acknowledged or Blocked.

Alarms are acknowledged by pressing the OK button. You are then given the choice of acknowledging the alarm or blocking the alarm.

Acknowledged alarms will remain on the alarm-list until the alarm input signal resets.

Blocked alarms remain on the alarm-list until the alarm has reset and the block has been removed. New alarms of the same type will not be activated as long as the block remains.

Since blocking alarms can be potentially hazardous, you need a high log on authority to block alarms.

Class A and B alarms will activate alarm output(s) if these have been configured.

Class C alarms do not activate the alarm output(s).

Class C alarms are removed from the alarm list when the alarm input resets even if the alarm has not been acknowledged.

14.2 Free text

If RIGHT is pressed once when the start-display is shown, see section 8.14.2, a menu showing text of your choice is displayed. The text can be used to show information concerning the commissioning company, name and phone number to service personnel etc. Text is entered using E tool. Up to 4 lines of 20 characters can be entered.

14.3 Revision numbers

If RIGHT is pressed twice when the start-display is shown, see section 8.14.2, a menu showing the program revision number and id-number will be displayed.

Chapter 15 **Index**

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