Corrigo E

Second generation which contains all applications and languages

The controllers in the Corrigo E series are intended for applications within heating, boiler and ventilation control in buildings. Each unit contains all applications. You easily choose which application should be used during configuration.

- **Pre-programmed with all applications and languages**
- **Ventilation, heating or boiler control**
- **Easy to integrate into an existing installation**

- **Model with integrated web server**
- **Different communication possibilities**
- **Configuration on units with display or via the PC-based software E tool**

Corrigo E is a range of digital controllers for ventilation, heating or boiler control. The controllers can be used stand-alone or as part of a network.

Corrigo E is easy to install and adjust according to your needs. The controller fits on a standard DIN rail or into a standard housing.

Corrigo E is available with or without display. Models without display can be mounted in a cabinet and be controlled via the external display unit E-DSP, which functions as a remote control.

Corrigo E - The easy way to perfect control

Corrigo E makes every step from installation to operation and maintenance easier than ever before. Just connect the controller, adjust the pre-installed applications if needed and start up.

The model program has a logical order, which is helpful when you choose a model for you application. It will also be easier to get the right functionality at the right price.

Communication

Corrigo E is easy to integrate with existing products. All models have a port for communication with a PC. Other standards are available. Read more in the section *Corrigo E with communication* on page 3.

Model with web server and TCP/IP

Corrigo E for ventilation and heating applications is also available in a web version with integrated web server and TCP/IP communication. Read more about the possibilities on page 3.

Applications

- **Ventilation control**
  For control of air handling units with temperature control (up to 4 sequences), 1- or 2-speed operation, or alternatively, pressure or air flow control of supply air fan and extract air fan, humidity control and other functions within ventilation.

- **Heating control**
  For control of up to three heating systems and one or two hot water circuits. Pump control, pressure control of pump, hot water preparation, inputs for water and energy meter.

- **Boiler control**
  For control of boilers with up to four boilers in sequence, where each boiler can have single or double burners. Also for control of up to three outdoor temperature controlled heating systems and one domestic hot water system, with the same functions as for application heating above.

E tool

E tool is a PC-based software which makes it possible to configure and supervise an installation via a graphical interface.
Read more in the section *To use Corrigo E* on page 2.

Display

The display is backlit and has 4 rows of 20 characters. The illumination is normally off, but is activated as soon as a button is pressed. It is turned off after a certain period of inactivity.

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To use Corrigo E

Each model of Corrigo E is loaded with all applications (ventilation, heating and boiler control). At the first start-up, you choose application and language. Thereafter, the unit should be configured. Inputs and outputs must be assigned and all relevant parameters must be set to adapt the application to the current operation mode.

Configuration

Corrigo E can be configured in different ways:

Via the display

Directly on the controller panel in "step-by-step menus". Operation status, alarms and values are shown in the backlit display.

E tool

Corrigo E tool is a PC-based configuration software with graphical user interface. The program gives you a very good overview of the settings, which will save time.

Using E tool, all settings can be done on the computer and then be downloaded to the Corrigo. An infinite number of configurations can be stored in the computer memory for later use.

When E tool is used for configuration, a file is saved which documents the settings. This can easily be distributed when needed via for example e-mail.

E-DSP

The external display E-DSP can be ordered with 3 or 10 m cable length. To handle greater distances than 10 m, E-DSP can also be used together with the repeaters E0-R and E0-R230K, for distances up to 1000 m (RS485).

Front panel

Corrigo E has a clear and functional front panel for simple operation of the controller. All information is shown in the backlit display.
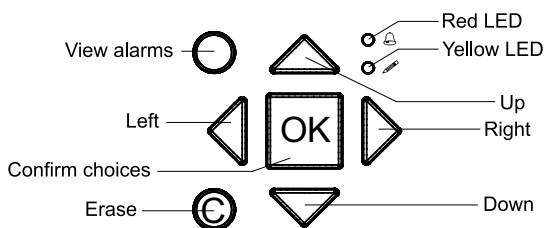
LEDs

There are two LEDs on the front:

- The alarm LED is marked with a ⌂ symbol
- The "write enable" LED is marked with a ✎ symbol

Buttons

All functions can be configured by using the display information and buttons on the controller.

Access rights

Corrigo E has three different log on levels.

- System - gives full read/write access to all settings and parameters in all menus.
- Operator - gives read-only access to all settings and parameters and write access to all settings and parameters in all menus except Configuration.
- Basic level - gives read-only access to all settings and parameters.

Scheduler

Corrigo has a year-based clock function. This means that a week-schedule with holiday periods for a full year can be set. The clock has automatic summertime/wintertime change-over.

The controllers have individual schedules for each weekday plus a separate holiday schedule.

Holiday period

Up to 24 individual holiday periods can be configured. Holiday schedules take precedence over other schedules.

Running periods

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.

Manual control (Manual / Auto position)

Corrigo E and all the configured outputs can be manually controlled, as well as a number of control functions.

This is a very handy feature which simplifies the checking of individual functions in the Corrigo. The supply air controller's output signal can be manually set (Manual/Auto) to any value between 0 and 100%. The temperature output signals will change accordingly if they are in Auto mode.

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.

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).

Alarm classification

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). These alarms are removed from the alarm list when the alarm input resets, even if the alarm has not been acknowledged.

Menu information

With E tool connected to Corrigo E you can add free text in the first line of the start-up screen. As an example, you can give the controller an identity. There are also five different menu alternatives for other information. Corrigo E also has an information screen where all 4 rows can be used. You can for example display contact information etc.

Corrigo E with communication

The basic version of Corrigo E is equipped with an RS485 port for connection via EXOline or Modbus. As an option, the controllers can be delivered with ports for TCP/IP or LON communication. This makes it possible to use Corrigo E in existing networks, and to supervise the application via the Internet or a local computer.

Connection via LAN/Internet gives excellent opportunities for preparing changes, storing settings and supervising functions.

Modbus communication

The basic version of Corrigo E can be changed to communicate with Modbus RTU via the RS485 port.

When Modbus has been activated, Corrigo E automatically senses if communication is taking place via Modbus or EXOline (with E tool).

Modbus communication is not yet available for boiler application.

Models with LON communication

Models with LON use LonWorks, adjusted according to the LonMark-guidelines. See separate network variable list LON.

LON communicates via the LON port on Corrigo E. The configuration takes place in the display of the controller or via E tool on a PC connected via the RS485 port on Corrigo E. Corrigo E should be installed in the LON network with the help of LonMaker or a corresponding computer program.

LON communikation is not yet available for boiler application.

Corrigo Web (with TCP/IP port)

E...-WEB models communicate via TCP/IP and use the TCP/IP port instead of the RS485 port on Corrigo E. This communicates with EXOline via TCP/IP.

To connect Corrigo E to a PC and the configuration tool E tool, a special network cable, E-CABLE-TCP/IP, should be used. This is a crossover network cable. The RS485 port cannot be used on Corrigo E with TCP/IP.

Corrigo Web

The E...-WEB models has an integrated web server, which is easy to commission and configure using E tool.

The web server automatically puts required information and values on the website, depending on the configuration of the application in Corrigo E (which functions are used, inputs and outputs etc.).

Corrigo E with integrated web server can be used in internal intranet solutions as well as externally towards the Internet. If you want to connect the controller to the Internet, you need broadband Internet access. The ventilation and heating applications have this web server function. However, Corrigo Web for application boiler control is not yet available.

Below are examples of what the website looks like for Corrigo Web.

3
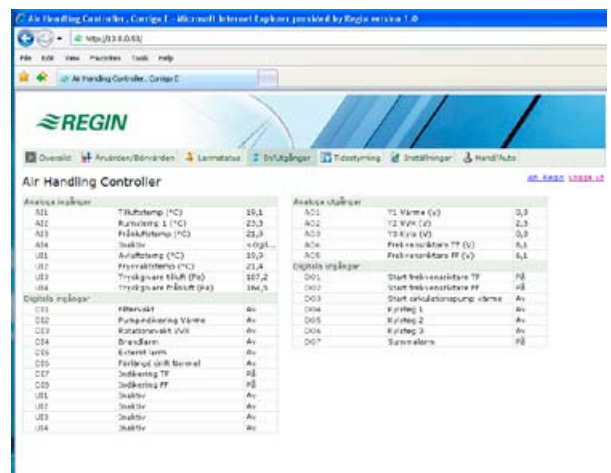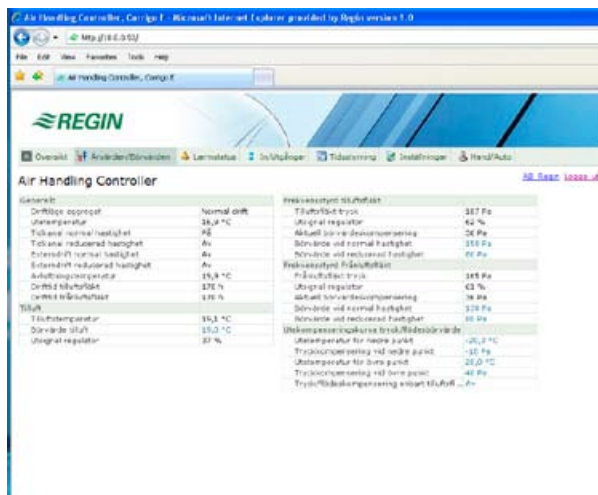
Control and functionality: Ventilation control
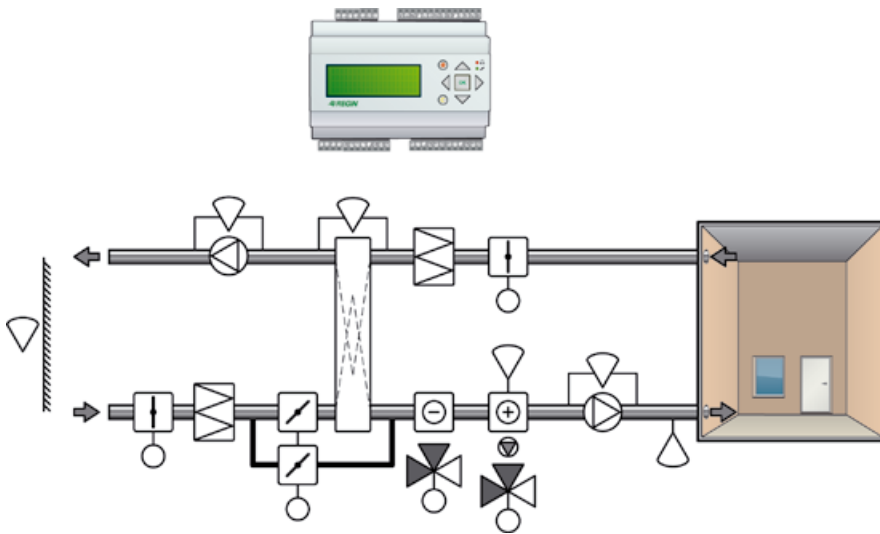
Example of ventilation control

Temperature control

The temperature controller is based on a supply air PI-controller for heating control with a pre-programmed set of control modes. The controller uses data from sensors etc. to control a number of different control functions, as well as various input and output functions. The user can choose which functions are to be used, the only restriction is the physical number of inputs and outputs of the different models.

Corrigo E has achoice of the following control modes:

1. Supply air control
2. Outdoor temperature compensated supply air control
3. Cascaded room temperature control
4. Cascade connected extract air temperature control
5. Outdoor temperature dependent switching between room control and supply air control
6. Outdoor temperature dependent switching between extract air control and supply air control

Applications Heating - Cooling - VVX - Dampers

Output functions which can be controlled by Corrigo E.

Analogue temperature control
- **Water heating**
- **Electric heating**
- **Heat exchanger output**
   Plate exchanger
   Rotating exchanger
   Liquid connected exchanger
   Mixing dampers
- **Water cooling**

Digital temperature control
- **Heating / DX-cooling**

As alternative or complement to the above mentioned analogue control, heating and cooling can be activated in steps. The internal signal is then used to activate digital outputs for control of the heaters/chillers. Up to four heating outputs and three cooling outputs can be configured.

The outputs can be set to sequential or binary control. At binary control, the analogue heating and cooling outputs can be set to 0...100 % between every step for equalization purposes.

Outdoor temperature dependent, individual blocking of DX cooling steps is possible.

Digital time-switch

Up to 5 digital outputs can be used as timer controlled outputs. Each timer channel has a separate scheduler with two periods per weekday. These outputs can be used to control lighting, doorlocks etc.

Support control

When running room temperature control or extract air control (with a room sensor connected), "Support control Heating" or "Support control Cooling" will run.

- Support control heating
- Support control cooling
- Recirculation damper
- Stopped extract fan can be selected

Free cooling

This function is used during the summer to cool the building during the night using cool outdoor air.

Cooling recovery

If the extract air temperature is lower than the outdoor temperature, cooling recovery can be activated.

Heat exchanger efficiency monitoring

Gives an alarm when the efficiency falls below set value.

External setpoint

For connection of an external setpoint device.

Humidity control

Humidity control can be configured as:

- Humidification
- Dehumidification
- Humidification/Dehumidification

Two humidity sensors can be connected, a room sensor

Cont. Control and functionality: Ventilation control

for control and a duct sensor for maximum limiting.

The humidity sensors must give 0…10 V for 0…100% RH.

Fan control

Fans can be 1-speed, 2-speed or frequency controlled. For frequency controlled fans there are a number of options:

1. Constant pressure: The pressure signal from a pressure transmitter is kept constant by frequency controlling the fan.

2. Constant flow: The flow m³/h is calculated using a signal from the pressure transmitter. The flow is kept constant by frequency controlling the fan. The supply and extract air fans have individual conversion parameters for calculation of their respective flow.

3. Manual output to fixed values: Pressure signals are not used. Instead, the output signal for the frequency converter is set to a fixed value.

4. External control signal: Direct control of both SAF and EAF with external 0…10 V control signals for integration with VAV systems.

5. Frequency control SAF with EAF slave: Frequency and pressure controlled supply air fan with frequency controlled extract air fan. The EAF output follows the SAF output.

6. Frequency control SAF with flow controlled EAF: Frequency and pressure controlled supply air fan. The extract air fan flow is controlled by the flow in the supply air fan.

Demand controlled ventilation

In applications with varying occupancy, the fan speeds or mixing dampers can be controlled by the air quality, which is measured with a CO2/VOC-sensor.

Pump control

Digital inputs and outputs can be configured for pump control.

- Heating circuit
- Exchanger circuit, liquid connected exchangers
- Cooling circuit

Damper control

Control possibilities:

- Close-off dampers
- Return air damper
- Extract air damper control
- Fire dampers
- Fire damper exercising

The close-off damper can be controlled individually or together with Return air damper / Extract air damper.

Extended running

Digital inputs can be used to force the unit to start although the timer says the running mode should be "Off". These input signals have higher priority than the internal timer channels.

Recirculation function

Function for distributing the air in the room using the supply air fan, with or without temperature control.

Alarms

Alarm log in the display which shows the 40 latest alarm events.

Change-over

"Change-over" function for switching between heating and cooling control in 2-pipe systems. A new analogue output signal which is set to either heating or cooling. A digital input signal is used for switching between heating or cooling function.

User settings

Factory settings and user settings can be handled directly in the display. It is possible to save a configuration as user setting in the controller. A configuration can also be reset to factory settings or to a previously made user setting. Using E tool, a configuration can be saved as factory setting in the controller.

External control circuit

Separate, external control circuit with a sensor input as well as an analogue and a digital output signal for control of for example a post-treatment unit.

Control and functionality: Heating control
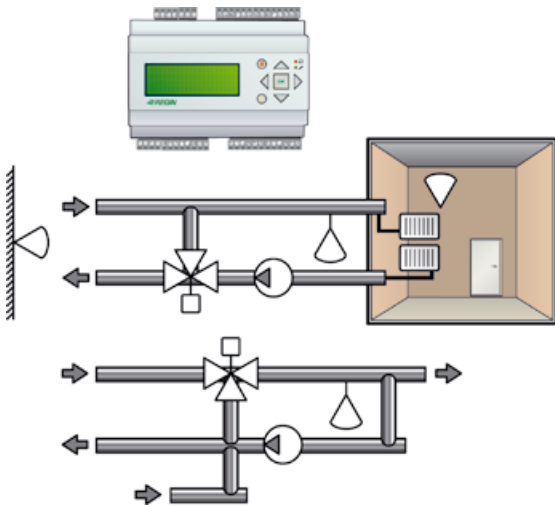
Example of heating control

In this case, Corrigo E uses PI controllers for heating control and PID for domestic hot water control. The controller uses data from sensors etc. to control a number of control functions, as well as various input and output functions. The user can choose which functions are to be used. The only restriction is the physical number of inputs and outputs of the different models.

Heating circuits
Corrigo E with heating control can be configured for 1 to 3 heating systems.

Controllers
The heating system controllers are PI-controllers with settable P-band and I-time.

Control curves
The controllers have individual outdoor temperature / supply temperature control curves.

Adaption of curves
Room sensors can be used to correct the control curves. The average room temperature error over 24 h is calculated.

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.

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.

Wind compensation
To compensate for wind chilling, it is possible to connect a wind sensor and generate a setpoint displacement.

Building inertia
The building inertia, i.e. the building heat storage capacity, is settable to one of three levels. The set inertia dictates the influence of outdoor temperature.

Night set-back
Set in room temperature degrees. The Corrigo has individual schedules for each heating system with two comfort-temperature periods per day.

Power limitation
Using a digital input the power to the heating systems can be temporarily restricted.

Domestic hot water
Can be configured for one or two domestic hot water systems, HW1 and HW2. These have constant supply-temperature control.

Controllers
The heating system controllers are PID-controllers with settable P-band, I-time and D-time.

Night set-back
Corrigo E has individual schedules for each hot water system with two normal temperature periods per day.

Pump control (HW1 only)
Corrigo E has a digital output signal which can be used to control the hot-water circulation pump in HW1.

Periodic overheating (HW1 only)
Once daily, the temperature setpoint can be increased to 62°C to prevent growth of Legionella bacteria.

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.

Pressure control
Corrigo E can, using an analogue output signal, control a variable speed pump to maintain a constant settable pressure.

Boiler control
A simple boiler control can be enabled. Two-step control using two start temperatures and one stop temperature.

Cont. Control and functionality: Heating control

Cold water monitoring

Monitoring of the cold water usage. **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 m³. The value can be reset.
- Water-flow (litres/min)

Alarm types
- Pulse error / High usage / Leakage control

Energy monitoring

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

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/MWh. The value can be reset.

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.
- Maximum value for the above instantaneous value.

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.

Electricity meter

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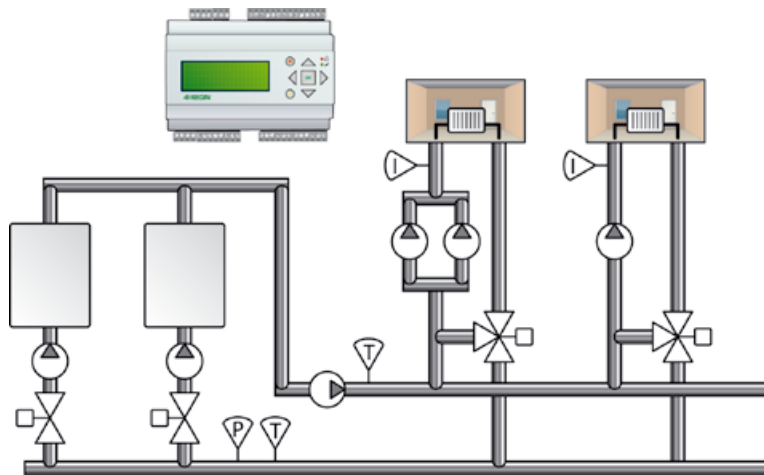
Usage values

Total usage in MWh. The value can be reset.

Timer channel outputs

Up to 5 digital outputs can be used as timer controlled outputs. Each timer has its own scheduler with two activation periods for each day of the week and a year-based holiday calendar.

Control and functionality: Boiler control

Example of boiler control

In this application, Corrigo E can be used for boiler control as well as heating and domestic hot water control. The controller uses data from sensors etc. to control a number of control functions, as well as various input and output functions. The user can choose which functions are to be used. The only restriction is the physical number of inputs and outputs of the different models.

Boiler control

One boiler control circuit (one main sensor) with 1...4 boiler vessels, each with single or double burners (on/off).

Boiler 1 can have analogue control (0...10 V).

Two control modes: modulating PI-control or thermostat control (fixed starting and stopping points for each vessel).

The boiler circuit setpoint can be a fixed temperature, an outdoor temperature dependent setpoint (curve) or a heating circuit temperature dependent setpoint.

The boiler control has automatic malfunction take-over, with multiple boilers the starting order can be fixed, run-time controlled or alternating.

Common boiler pump or individual pumps for each

Cont. Control and functionality: Boiler control

boiler vessel, with start/stop and settable automatic pump exercising.

The boiler return temperature can be limited to eliminate the risk of condensation as a result of low temperature.

Heating circuits

Can be configured for 1 to 3 heating systems, which are controlled by PI-controllers with settable P-band and I-time.

Control curves/Outdoor compensation
The controllers have individual outdoor temperature / supply temperature control curves.

Adaption of curves
Room sensors can be used to correct the control curves. The average room temperature error over 24 h is calculated.

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.

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.

Wind compensation
To compensate for wind chilling, it is possible to connect a wind sensor and generate a setpoint displacement.

Building inertia
The building inertia, i.e. the building heat storage capacity, is settable to one of three levels. The set inertia dictates the influence of outdoor temperature.

Night set-back
Set in room temperature degrees. The Corrigo has individual schedules for each heating system with two comfort-temperature periods per day.

Start time optimizer
Function for automatically calculating when the night set-back should stop in order to reach a pre-set temperature at the time set for start of comfort time in the internal scheduler. Autodidact function. A room sensor is required when this function is used.

Power limitation
Using a digital input the power to the heating systems can be temporarily restricted.

Domestic hot water

Can be configured for one domestic hot water circuit, HW1, which has constant supply-temperature control and is controlled by PID-controllers with settable P-band, I-time and D-time.

Night set-back
Individual schedules for the hot water system with two normal temperature periods per day.

Pump control
Corrigo E has a digital output signal which can be used to control the hot-water circulation pump in HW1.

Periodic overheating
Once daily, the temperature setpoint can be increased to 62°C to prevent growth of Legionella bacteria.

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.

Pressure control

Corrigo E can , using an analogue output signal, control a variable speed pump to maintain a constant settable pressure.

Cold water monitoring

Monitoring of the cold water usage. **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 m³. The value can be reset.
- Water-flow (litres/min)

Alarm types
- Pulse error / High usage / Leakage control

Energy monitoring

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

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/MWh. The value can be reset.

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.
- Maximum value for the above instantaneous value.

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.

Electricity meter

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

Usage values
Total usage in MWh. The value can be reset.

Timer channel outputs

Up to 5 digital outputs can be used as timer controlled outputs. Each timer has its own scheduler with two activation periods for each day of the week and a year-based holiday calendar.

Models

Number of inputs and outputs (I/Os)*	Models with 8 I/Os 2 AI, 3 DI, 1 AO, 2 DO	Models with 15 I/Os 4 AI, 4 DI, 3 AO, 4 DO	Models with 28 I/Os 4 AI, 4 UI, 8 DI, 5 AO, 7 DO
Basic model	E8-S	E15-S	E28-S
Basic model with display	E8D-S	E15D-S	E28D-S
Model with LON port	E8-S-LON	E15-S-LON	E28-S-LON
Model with LON port and display	E8D-S-LON	E15D-S-LON	E28D-S-LON
Model with TCP/IP port	E8-S-WEB	E15-S-WEB	E28-S-WEB
Model with TCP/IP port and display	E8D-S-WEB	E15D-S-WEB	E28D-S-WEB

* AI=analogue inputs, DI=digital inputs, AO=analogue outputs, DO=digital outputs, UI=universal inputs (can be configured to function as either analogue input or digital input)

Accessories

External display unit		
Including 3 m cable		E-DSP-3
Including 10 m cable		E-DSP-10

Display repeater for E-DSP		
Supply voltage 24 V AC		E0-R
Supply voltage 230 V AC		E0-R230K

External display unit		
Including 3 m cable		ED9100-3
Including 10 m cable		ED9100-10

Front mounting kit		
Room for one Corrigo		FMCE

Cabinets		
Cabinet intended for any Corrigo E8D-... model		CAB-E8D
Cabinet intended for any Corrigo E15D-... model		CAB-E15D
Cabinet intended for any Corrigo E28D-... model		CAB-E28D

Plug-in terminals		
Set of plug-in terminals for E8 models		PLT-E8
Set of plug-in terminals for E15 models		PLT-E15
Set of plug-in terminals for E28 models		PLT-E28

GSM modem		
GSM Fargo EXOcompact/Corrigo E kit		SET-GSM100LS

Relay module		
Relay unit		RM6-24/D
Relay unit with manual/auto-switches		RM6H-24/D

Panel PC		
Panel PC with operating system in English		AFL-12A-GB
Panel PC with operating system in Swedish		AFL-12A-SE

Technical data

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)
Ambient temperature	0...50°C
Storage temperature	-40...+50°C
Ambient humidity	Max 90% RH
Protection class	IP20 (E-DSP IP44)
Connection	Disconnectable terminal strips, 4 mm²
Memory backup	Long life battery. All settings are stored in the event of power failure.
Display	Backlit, LCD, four rows of 20 characters

CE This product conforms with the requirements of European EMC standards CENELEC EN 61000-6-1:2001 and 61000-6-3:2001 and carries the CE-mark

Inputs

Analogue inputs	For Pt1000-sensors (accuracy +/- 0.4°C) or 0...10 V DC (accuracy +/- 0.15% of full output signal). 12 bit resolution in the AO conversion.
Digital inputs	For potential free contacts

Outputs

Analogue outputs	0...10 V DC, 1 mA, short-circuit proof
Digital outputs	Mosfet outputs, 24 V AC or DC, 2 A continuous. Totally max 8 A.

Indicators

|	
Operation indication	Supply voltage is indicated with green LED
Alarm indication	Clear script and blinking red LED
Sum alarm	The output can be configured

E tool

System requirements	Computer with operating system MS Windows 2000, XP or Vista

Options

LON	FT3150, gives a second communication port
WEB (TCP/IP port)	Replaces RS485 for EXOline (Port 1) communication

Dimensions
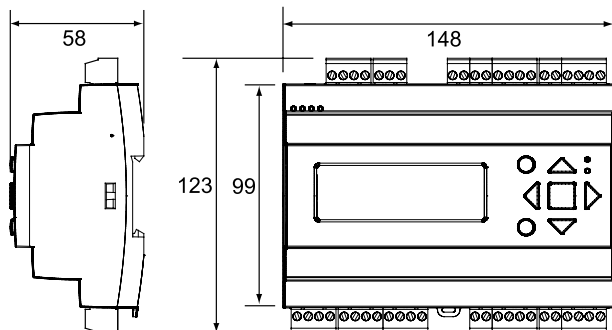
Product documentation

Document	Type
Manual Corrigo E ventilation application	
Manual Corrigo E heating application	Manuals for the different applications
Manual Corrigo E boiler application	
Manual E tool and Corrigo Web	Manual for the configuration software E tool and Corrigo Web
Product sheet and instruction E-DSP	
Product sheet and instruction E0-R/E0-R230K	
Product sheet ED9100	
Instruction FMCE	Information about accessories for Corrigo E
Instruction RM6-24/D and RM6H-24/D	
Product sheet AFL-12A	

The product documentation is available at www.regin.se.

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