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en

# MANUAL OPTIGO<sup>ARDO</sup>





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# I Introduction

## I.1 About this manual

This manual covers all the models in the Optigo<sup>Ardo</sup> series.

The manual has the following main chapters:

- ✓ Information for the end user  
All the information needed by the end user. How to handle the controller, including how to navigate in the menus, LED:s and indications, how to change setpoints and handle alarms etc.
- ✓ Information for the specialist  
A comprehensive guide to all the functions of the controller.
- ✓ Information for the installer  
Everything related to the installation of the hardware, such as wiring examples and commissioning.
- ✓ Appendix  
Technical data, model overview, input and output lists, alarm list, terminal lists.

Special text formats used in the manual:



**Note!** This box and symbol is used to show useful tips and tricks.



**Caution!** This type of text and symbol is used to show cautions.



**Warning!** This type of text and symbol is used to show warnings.

**This box is used to show formulas and mathematical calculations**

This box is used to represent the display window on the controller

## I.2 More information

More information about the controller is available in:

- ✓ Product sheet for Optigo<sup>Ardo</sup>
- ✓ Instruction for Optigo<sup>Ardo</sup>
- ✓ List of predefined configurations for Optigo<sup>Ardo</sup>

All the above documents are available for download from Regin's website, [www.regincontrols.com](http://www.regincontrols.com)

## I.3 Display

There is a text display in the Optigo<sup>Ardo</sup>

The display is used to e.g. change values, set timers and monitor alarms.

### 1.4 Upgrade and backup of Optigo<sup>Ardo</sup>

There is an online tool available for Optigo<sup>Ardo</sup>. The tool is used to upgrade the controller and for backup and to restore the settings.

A LAN/Ethernet communication cable is required in order to connect to the controller, and the controller must also be powered up.

## 2 Information for the end user

The Optigo<sup>Ardo</sup> is a 24 V pre configured ventilation controller with display for use in ventilation applications.

### 2.1 LED:s and buttons





The controller has an internal text display and features 7 buttons.

#### 2.1.1 Display

The display has 4 rows of 20 characters each. It has background illumination. The illumination is normally off, but is activated as soon as a button is pressed. The illumination will be turned off again after a period of inactivity.

#### 2.1.2 LED:s

The controller has two LEDs in the front marked with the symbols  (alarm) and  (change).

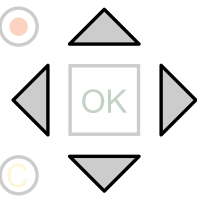

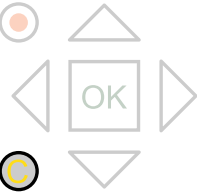
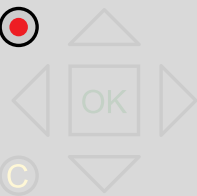
Symbol	Colour	Function
	Flashing red	There are one or more unacknowledged alarms.
	Fixed red	There are one or more remaining acknowledged alarms.
	Flashing yellow	You are in a dialog box where it is possible to switch to change mode. A quick blinking (2 times/s) indicates that the parameter can be changed using the current access level. A slower blinking (1 time/s) indicates that a higher access level is required to change the parameter.
	Fixed yellow	You are in change mode.

### Status indication

Status indication LEDs can be found in the upper left corner of the Optigo<sup>Ardo</sup>.

Designation	Colour	Description
TCP/IP	Yellow/Green	Green: Connected to other network equipment Blinking green: Network traffic Blinking yellow: For identifying
P/B (Power / Battery)	Green/Red	Power on / Battery error

### 2.1.3 Summary of the function of the buttons

Optigo <sup>Ardo</sup> (7 buttons)	Functions	Function in Alarm Mode
<p>[▲][▼][▶][◀]</p> 	<p>Navigation buttons:</p> <ul style="list-style-type: none"> <li>▲ Navigate upwards.</li> <li>▼ Navigate downwards.</li> <li>▶ Navigate to the right.</li> <li>◀ Navigate to the left.</li> </ul> <p>In change mode:</p> <ul style="list-style-type: none"> <li>◀ Move cursor to the left.</li> <li>▶ Move cursor to the right.</li> <li>▲ Increase the value by 1.</li> <li>▼ Decrease the value by 1.</li> <li>▲ and ▼ Scroll among the texts when there are several alternatives.</li> </ul>	<ul style="list-style-type: none"> <li>▲ Navigate up in the alarm stack.</li> <li>▼ Navigate down in the alarm stack.</li> <li>◀ Exit alarm display mode.</li> </ul>
<p>[OK]</p> 	<ul style="list-style-type: none"> <li>✓ Enter change mode.</li> <li>✓ Confirm a new value in change mode. An input must be confirmed with this button in order to change the value in the controller. When a value has been confirmed, the cursor will move to the next editable value in the current box.</li> </ul>	<ul style="list-style-type: none"> <li>✓ A menu with all actions that are available for the current alarm is displayed.</li> </ul>
<p>[C]</p> 	<ul style="list-style-type: none"> <li>✓ Enter change mode and erase the value in the display.</li> <li>✓ Erase the sign at the cursor.</li> <li>✓ When the current value is completely empty, the edit mode is cancelled and the cursor will move to the next value that will also be erased in the window.</li> <li>✓ Undo (erase) the input</li> </ul>	<ul style="list-style-type: none"> <li>✓ Closes the menu containing available alarm actions without changing the state of the alarm point.</li> </ul>
<p>[ALARM]</p> 	<ul style="list-style-type: none"> <li>✓ Enter alarm display mode.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Browse among alarms in alarm display mode.</li> </ul>

## 2.2 Navigating the menus

The appearance of the start display may vary since there are several different start displays to choose from during configuration.

```
Optigo Ardo 1.0
2021-06-09 14:29
System: Normal run
Sp: 22.0 Act: 22.5°C
```

Sp and Act stand for Setpoint and Actual value.

Actual value = the current measured temperature

Setpoint = the desired configured temperature

You can navigate through the menu choices at this level by pressing the [▼] and [▲] buttons.

Which menu items that are shown depends on the access level of the user and the configured inputs/outputs and functions.

Below, all possible menu entries are shown.

- ✓ Ventilation
- ✓ Alarm events
- ✓ Time settings
- ✓ Inputs/Outputs
- ✓ Configuration
- ✓ Alarm status
- ✓ Access rights

To enter a higher menu level, press the [▶] button when the display marker is located at the menu item you wish to enter. At each level there may be several new menus through which you may browse using the [▲] and [▼] buttons.

When there are further submenus linked to a menu or menu item, it is indicated by an arrow symbol at the right-hand edge of the display. To choose one, press the [▶] button again. To return to a lower menu level, press the [◀] button.

## 2.3 Changing values

When you are at a position where it is possible to change one or more values, and your access level is high enough, you can edit the existing value, or enter a new one. After changing the value, you confirm the input with the [OK] button, or undo the change by pressing the [C]/ [▼▶] buttons for a short while until the original value reappears in the window and change mode is exited. These actions are described in detail in the following sections.

### 2.3.1 Editing an existing value

1. Press the [OK] button to go to change mode. A flashing cursor appears. If there are multiple editable values in one menu, press the [OK] button until the value you want to change flashes.
2. Move the cursor to the right and to the left with the navigation buttons [▶] and [◀].
3. The value at the cursor can now be changed in the following ways:
  - ✓ Erase the current digit or character with the [C]/ [▼▶] buttons.
  - ✓ Use the [▲] and [▼] buttons to increase or decrease the value at the cursor. Editable texts can also be changed with this method.
  - ✓ If the character at the cursor is a decimal point, you cannot browse with the [▲] and [▼] buttons. You can however erase the decimal point with the [C]/ [▼▶] buttons.
  - ✓ If the cursor is placed to the right of the value, i.e. the character at the cursor is a space, you can add a decimal point with the [▼] button, or the figure 0 with the [▲] button.
  - ✓ If you require a negative number, move the cursor to the leftmost position and press the [▼] button to get a minus sign. Then edit the following digits to the required value.
  - ✓ Scroll up [▲] and down [▼] to browse through texts when there are several texts to choose from instead of numerical values.



### 2.3.2 Enter a completely new value

- ✓ Press the [C] / [▼▶] buttons to go to change mode. The value is erased in the window, and you have to enter a completely new value.
- ✓ If you require a negative number, move the cursor to the leftmost position and press the [▼] button to get a minus sign. Then edit the following digits to the required value.
- ✓ Press [▲] to begin the input with the digit 0, then browse to the required digit or character with [▲] and [▼].
- ✓ Press [▼] to get a decimal point. When the cursor is placed at a decimal point, you cannot browse with the [▲] and [▼] buttons.

### 2.3.3 Confirm the change

Press [OK] to confirm the change when the required value has been entered. Then the value you see in the window will be updated in the installation.

After the value has been confirmed, the cursor will move to the next editable value in the current menu.



---

**Note!** As long as you don't confirm a change with the [OK] button, no change will be made in the installation.

---

### 2.3.4 Undo an initiated change



---

**Note!** As long as you don't confirm a value with the [OK] button, you can undo an initiated change by pressing the [C] / [▼▶] buttons for a short while until the original value reappears in the window and change mode is exited.

---

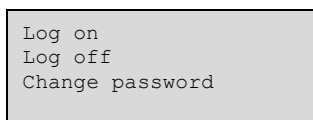
## 2.4 Logging on and off

The controller has four different access levels. The choice of access level determines which menus are shown, as well as which parameters can be changed in the displayed menus.

- ✓ **Guest** level does not require logging on, and only permits changes in running mode and gives read-only access to a limited number of menus.
- ✓ **Operator** level gives the same access as **Guest** level, and in addition, access to change setpoints.
- ✓ **Service** level gives the same access as **Operator** level, and in addition, access to change controller settings and manual mode.
- ✓ **Admin** level gives full read/write access to all settings and parameters in all menus.

### 2.4.1 Log on

1. Browse to **Access Rights** in the main menu and press [▶].



2. Select **Log on** and press [►].

```
Log on
Enter password:****
Actual level:
None
```

3. Press [OK] to make a cursor marker appear at the first digit position.
4. Enter the password (4-digit code) by pressing [▲] until the correct digit is displayed. Press the [►] to move to the next position. Repeat the procedure until all four digits are displayed, and press [OK] to confirm.

## 2.4.2 Log off

1. Go to **Access Rights** in the main menu and press [►].
2. Select **Log off** and press [►].

```
Log off?
No
Actual level:
Admin
```

3. Select **Yes** and press [OK].

## 2.4.3 Change password

1. Go to **Access Rights** in the main menu and press [►].
2. Select **Change password** and press [►].

```
Change password for
level:Operator
New password: ****
```

3. Select **Yes** and press [OK]
4. Press [OK] to enter change mode.
5. Use the [▲] and [▼] buttons to browse and select the access level to change the password for, and press [OK] to confirm.

6. Enter the new password (4-digit code) by pressing [**▲**] until the correct digit is displayed. Press the [**▶**] to move to the next position. Repeat the procedure until all four digits are displayed, and press [**OK**] to confirm.

The following passwords are the default for the different access levels:

Access level	Password
Admin	1111
Service	2222
Operator	3333
Guest	5555

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



**Caution!** Do not set the password for two different access levels to the same value, as this would prevent access to the higher of these two access levels. This is especially important for the **Admin** level.



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

### 2.4.4 Automatic logoff

When logged in as **Operator**, **Service** or **Admin**, the user will automatically be logged off to **Guest** after a settable time of inactivity (the default is 60 seconds). It is possible to disable the automatic logoff.

#### Change password to remove automatic logoff

If you want to remove the automatic logoff, change the password of the desired level to 0000. This can be very useful in certain cases if the unit is intended to be used by trained personnel or, for instance, during commissioning.



**Note!** Removing the automatic logoff should be done with consideration, since no alarm is continuously given that a certain level has been activated.

## 2.5 Menu structure

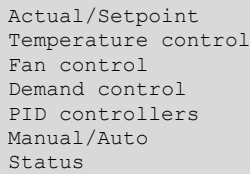
The display is used to select predefined configurations for the system, and to change some settings.

Start menu:

```
Ventilation
Alarm events
Time settings
Inputs/Outputs
Configuration
Alarm status
Access rights
```

## 2.5.1 Ventilation

Ventilation has up to seven submenus:



```
Actual/Setpoint
Temperature control
Fan control
Demand control
PID controllers
Manual/Auto
Status
```

### Actual/Setpoint

In this submenu, you can read all the actual values of the configured inputs of the circuit. For more information, see [4.4.1 Actual / Setpoint](#).

### Temperature control

In this submenu, you can read and set all the setpoints for the selected circuit. You need **Operator** or higher access level to be able to change setpoints. For more information see [4.4.2 Temperature control](#).

### Fan control

In this submenu, settings of the fan can be read and set. It is only visible for access level **Operator** and higher, and only editable for access level **Service** and higher. For more information, see [4.4.3 Fan control](#).

### Demand control

In this submenu, settings for Demand control can be read and set. It is only visible for access level **Operator** and higher, and only editable for access level **Service** and higher. For more information, see [4.4.4 Demand control](#).

### PID control

In this submenu, the control parameters can be read and set. It is only visible for access level **Operator** and higher, and only editable for access level **Service** and higher. For more information, see [4.4.5 PID controllers](#).

### Manual/Auto

In this submenu, the ventilation unit can be set to manual mode. It is only visible for access level **Operator** and higher, and only editable for access level **Service** and higher.

For more information, see [4.4.6 Manual / Auto](#).

### Status

In this submenu, the status of the ventilation unit can be read.

Each function also has different sub-statuses. For more information, see [4.4.7 Status](#).

## 2.5.2 Time settings

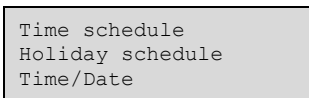
Optigo<sup>Ardo</sup> has a year-based clock function. This means that a week-schedule with holiday periods for a full year can be set. The clock has an automatic summertime/wintertime change-over.

It has individual schedules for each weekday plus a separate holiday setting. Up to 24 individual holiday periods can be configured. A holiday period can be anything from one day up to 365 days. Holiday schedules take precedence over other schedules.

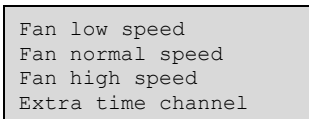
Each day has up to four individual running periods. There are daily individual schedules for low speed, normal speed and high speed of the fan, each with up to four running periods.

One output can be used as a timer controlled output, with individual week-schedules with four activation periods per day. This output can be used to control lighting, door locks etc.

The **Time settings** menu contains the submenus **Time schedule**, **Holiday schedule** and **Time/Date**.



### Time settings



In the time schedules, four periods are available for each day of the week. Also, four periods are available for days that are configured as holidays in the holiday schedule. During the periods the assigned circuit is working with the corresponding setpoint. Outside of a period the system is off.

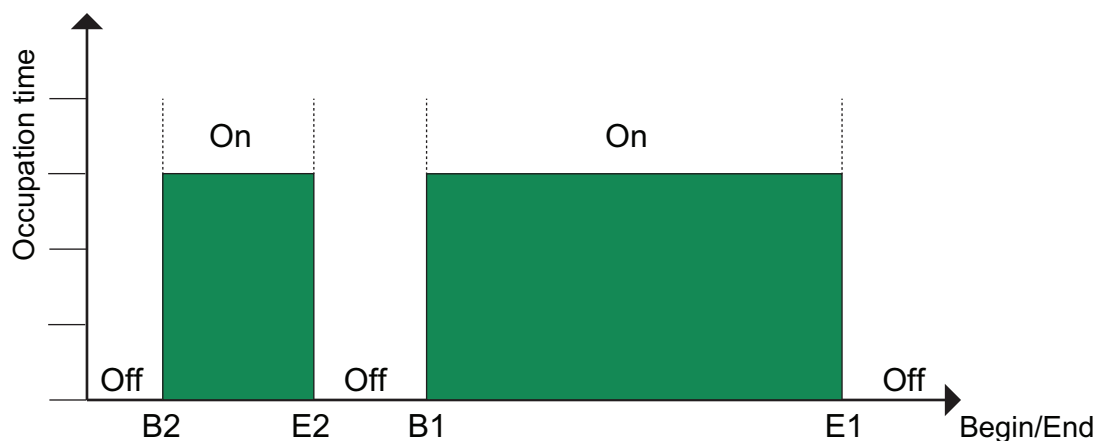


Figure 2-1 Time schedule

The above figure shows an example of period states. It is not possible for periods to overlap each other.

Timer Low speed, Normal speed, High speed

There are sixteen separate settings menus for each timer channel, two for each weekday and two extra for holidays. Holiday schedules take precedence over other schedules.



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

To inactivate a period, set the time to 00:00 - 00:00. If all periods of a day are set to 00:00 - 00:00, the unit will not run that day.

```
Normal speed
Monday Per3-4 >
Per 1: 00:00 - 24:00
Per 2: 00:00 - 00:00
```

```
Normal speed
Monday
Per 3: 00:00 - 00:00
Per 4: 00:00 - 00:00
```

If you want to run the unit from one day to another, e.g. from Monday 22:00 to Tuesday 09:00, the desired running time for both must be entered.

```
Normal speed
Monday
Per 1: 22:00 - 24:00
Per 2: 00:00 - 00:00
```

```
Normal speed
Tuesday
Per 1: 00:00 - 09:00
Per 2: 00:00 - 00:00
```

Should periods for the different speeds overlap, high speed takes precedence over normal speed, and normal speed takes precedence over low speed.

### Extra time channel

One digital output can be used as a timer controlled output with individual week-schedules and four activation periods per day. The output has sixteen separate setting menus; two for each weekday and two extra for holidays. Holiday schedules take precedence over other schedules.

```
Extra time channell
Wednesday Per3-4 >
Per 1: 00:00 - 00:00
Per 2: 00:00 - 00:00
```

```
Extra time channell
Wednesday
Per 3: 00:00 - 00:00
Per 4: 00:00 - 00:00
```

### Parameters (Fan normal speed)

Name	Unit	Min	Max	Default	Description
Monday Per.1 Start	hh:mm	00:00	24:00	00:00	Start of period 1 Mondays.
Monday Per.1 End	hh:mm	00:00	24:00	24:00	End of period1 Mondays.
Monday Per.2 Start	hh:mm	00:00	24:00	00:00	Start of period 2 Mondays.
Monday Per.2 End	hh:mm	00:00	24:00	00:00	End of period 2 Mondays.
Monday Per.3 Start	hh:mm	00:00	24:00	00:00	Start of period 3 Mondays.
Monday Per.3 End	hh:mm	00:00	24:00	00:00	End of period 3 Mondays.
Monday Per.4 Start	hh:mm	00:00	24:00	00:00	Start of period 4 Mondays.
Monday Per.4 End	hh:mm	00:00	24:00	00:00	End of period 4 Mondays.
...					

Name	Unit	Min	Max	Default	Description
Holiday Per.1 Start	hh:mm	00:00	24:00	00:00	Start of period 1 holidays.
Holiday Per.1 End	hh:mm	00:00	24:00	00:00	End of period 1 holidays.
Holiday Per.2 Start	hh:mm	00:00	24:00	00:00	Start of period 2 holidays.
Holiday Per.2 End	hh:mm	00:00	24:00	00:00	End of period 2 holidays.
Holiday Per.3 Start	hh:mm	00:00	24:00	00:00	Start of period 3 holidays.
Holiday Per.3 End	hh:mm	00:00	24:00	00:00	End of period 3 holidays.
Holiday Per.4 Start	hh:mm	00:00	24:00	00:00	Start of period 4 holidays.
Holiday Per.4 End	hh:mm	00:00	24:00	00:00	End of period 4 holidays.

Parameters (Fan low and high speed, Extra time channel)

Name	Unit	Min	Max	Default	Description
Monday Per.1 Start	hh:mm	00:00	24:00	00:00	Start of period 1 Mondays.
Monday Per.1 End	hh:mm	00:00	24:00	00:00	End of period 1 Mondays.
Monday Per.2 Start	hh:mm	00:00	24:00	00:00	Start of period 2 Mondays.
Monday Per.2 End	hh:mm	00:00	24:00	00:00	End of period 2 Mondays.
Monday Per.3 Start	hh:mm	00:00	24:00	00:00	Start of period 3 Mondays.
Monday Per.3 End	hh:mm	00:00	24:00	00:00	End of period 3 Mondays.
Monday Per.4 Start	hh:mm	00:00	24:00	00:00	Start of period 4 Mondays.
Monday Per.4 End	hh:mm	00:00	24:00	00:00	End of period 4 Mondays.
...					
Holiday Per.1 Start	hh:mm	00:00	24:00	00:00	Start of period 1 holidays.
Holiday Per.1 End	hh:mm	00:00	24:00	00:00	End of period 1 holidays.
Holiday Per.2 Start	hh:mm	00:00	24:00	00:00	Start of period 2 holidays.
Holiday Per.2 End	hh:mm	00:00	24:00	00:00	End of period 2 holidays.
Holiday Per.3 Start	hh:mm	00:00	24:00	00:00	Start of period 3 holidays.
Holiday Per.3 End	hh:mm	00:00	24:00	00:00	End of period 3 holidays.
Holiday Per.4 Start	hh:mm	00:00	24:00	00:00	Start of period 4 holidays.
Holiday Per.4 End	hh:mm	00:00	24:00	00:00	End of period 4 holidays.

## Holiday schedule

The system operator can define specific periods of operation or non-operation throughout the year. During these defined periods, the settings in the week schedule do not apply. The holiday schedule provides 24 periods. All holiday periods are working with a special day plan with a maximum of 4 periods.

A holiday period can be any number of consecutive days from 1...365. The dates are in the format: MM:DD.

When the present date falls within a holiday period, the scheduler will use the settings for the weekday **Holiday**.

Parameters

Name	Unit	Min	Max	Default	Description
Holiday Per.1 Start	MM:DD	01:01	12:31	01:01	The start date of holiday period 1.
Holiday Per.1 End	MM:DD	01:01	12:31	01:01	The end date of holiday period 1.
...					

Name	Unit	Min	Max	Default	Description
Holiday Per.24 Start	MM:DD	01:01	12:31	01:01	The start date of holiday period 24.
Holiday Per.24 End	MM:DD	01:01	12:31	01:01	The end date of holiday period 24.

## Time/Date

This menu displays time, date and weekday, and it permits the setting of time and date.

Time is shown in 24 hour format.

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

### 2.5.3 Inputs/Outputs

In the sub menu Inputs/Outputs you can find raw values and analog and digital inputs and outputs. For more information see [4.7 Inputs/Outputs](#).

```
Raw values
Analog inputs
Digital inputs
Analog outputs
Digital outputs
```

### 2.5.4 Mode switch

In addition to the items in the main menu, there is also an extra menu called **Mode switch**, that is reached by pressing **[▶]** in the main menu. The mode switch changes the operation of the system.

Mode switch position	
0 — Off	Manual mode Off. System is switched off. No control function.
1 — Auto	Automatic mode. Control function depending on timer and settings.
2 — Low speed	Manual mode. System is forced to low speed of the fans.
3 — Normal speed	Manual mode. System is forced to normal speed of the fans.
4 — High speed	Manual mode. System is forced to high speed of the fans.

## 2.6 Alarm handling

Alarms are indicated by the red alarm LED on the front of the unit. If an alarm condition occurs, an alarm is logged in an alarm list. The list shows the type of alarm, the alarm date and time and the alarm priority (A, B or C alarm).

### 2.6.1 Alarm priorities

Alarms can be given different priority levels: **A alarm**, **B alarm**, **C alarm** or **not active**. There is one digital output that can be used as alarm output: **Sum alarm**.

- ✓ A and B alarms activate the sum alarm output, if it has been configured.
- ✓ Class C alarms are removed from the alarm list when the alarm input resets even if the alarm has not been acknowledged.

### 2.6.2 Inspect alarms

- ✓ Press the alarm buttons [ALARM] / [◀▲] to display the alarms.
- ✓ If there is more than one alarm at the same time, this is indicated by up/down arrow symbols at the right-hand edge of the display. You can browse among them in two ways:
  1. By using the navigation buttons [▼] and [▲].
  2. By pressing the alarm buttons [ALARM] / [◀▲] several times.
- ✓ Press [◀] to exit alarm handling and return to the previous menu.

### 2.6.3 Acknowledge, block and unblock alarms

- ✓ Press the [OK] button to get a menu with the available alarm actions for the currently displayed alarm.
- ✓ Select the required alarm action with the buttons [▼] and [▲].
- ✓ Press the [OK] button to execute the action.

At the left end of the bottom display line the alarm status is shown. For active, unacknowledged alarms the space is blank. Alarms that have been reset are indicated by the text **Acknowledged**. Active or blocked alarms are indicated by the text **Acknowledged** or **Blocked**.

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 been reset and the block has been removed. New alarms of the same type will not be activated as long as the block remains.



**Caution!** Blocking alarms can be potentially dangerous. A high log on access level is therefore required to block alarms.

---

### Alarm events

In the **Alarm Events** menu, there is an alarm log which contains the 100 latest alarm events. The latest event is shown at the top of the list. The alarm log is only used to view alarm history, which may simplify troubleshooting of the installation.

---

## 3 Information for the specialist

### 3.1 Function overview

The selected control modes and activated functions depends on the selected configuration. Find more information about the available configurations in the document Optigo Ardo 1.0 - Predefined configurations, which is available on Regin's homepage [www.regincontrols.com](http://www.regincontrols.com). A description about the activation of a configuration will be found in chapter 4.1 *Predefined configurations in OptigoArdo*.

The program for an air handling unit contains, apart from other things, the following functions:

#### Different temperature control modes

- ✓ Supply air temperature control
- ✓ Room temperature control (cascade control)
- ✓ Extract air control (cascade control)

#### With control of:

- ✓ Heat exchangers (plate)
- ✓ Mixing dampers
- ✓ Heating coil (water with or without frost protection, electric with high temperature limit switch)
- ✓ Cooling (water)
- ✓ Circulation pumps

#### Fan control

- ✓ 1- or 2-speed supply air and extract air fans
- ✓ Manual control of fans

#### Timer control

For starting and stopping the unit, annual clock function. One output for control of external functions such as lighting, door locks etc.

#### Demand controlled ventilation

In buildings with strongly varying occupancy, the fan speeds or mixing dampers can be controlled by the air quality measured by a CO<sub>2</sub> sensor.

#### Support control

When using the control function room control or extract air temperature control, it is possible to utilise support-heating and/or support-cooling.

#### Free cooling

When this function has been activated, it is used during the summer to cool the building during the night using cool outdoor air, thereby reducing the need to run chillers during the day.

#### Free heating

If the outdoor temperature is higher than the indoor temperature and there is a heating demand, the recovery damper will not open for recovery but instead open fully for outdoor air. This may occur during low night-time outdoor temperatures, when the room has been cooled considerably and the outside heat is rising faster than indoors. This function is activated at the same time as **Free cooling**.

#### Cooling recovery

If the cooling recovery has been configured, there is a cooling requirement and the extract air or room temperature is a settable amount lower than the outdoor temperature, thus cooling recovery can be



activated. When cooling recovery is activated the heat exchanger and damper sequence output signal will be activated in the cooling demand. The function also activates the heating function **Free heating**: if heating is required and the outdoor temperature is higher than the extract air or room temperature, outdoor air will primarily be used.

### **Change-over**

In 2-pipe systems where a combination heater/cooler is operating together with a heat pump, change-over is a function that enables using the same pipe for both heating and cooling, depending on which is currently required.

## 3.2 Temperature control

### 3.2.1 General

Optigo<sup>Ardo</sup> has a choice of the following control modes:

1. Supply air
2. Room cascade
3. Extract air cascade

The supply air temperature controller is reverse acting, i.e. the output will increase for decreasing temperature. The temperature at the supply air sensor will be constantly kept at the user setpoint value. The controller is a PID-controller with settable P-band, I-time and D-time.

In the Room cascade and Extract air cascade modes the supply air is controlled as part of a cascade controller together with the room/extract temperature controller. The room/extract temperature offset will dictate the supply air temperature setpoint.

### 3.2.2 Control modes

Read more about configuration of the control modes in [4.4 Ventilation](#).

#### Supply air control

The supply air temperature is kept at the setpoint value by controlling the output signals for the sequences. A single PI control loop is used.

The actual setpoint for the supply air temperature will be limited to a settable minimum and maximum.

Settings and configuration for Supply air control

Table 3-1 Path to configuration and settings for Supply air control

Feature	Menu path in display	Variable	Note
Configure input <sup>1</sup>	Configuration ► Inputs/Outputs ► Analog inputs ► Supply air temperature		
Sensor type selection <sup>2</sup>	Configuration ► Inputs/Outputs ► Analog inputs ► Supply air temperature	Sensor type	
Controller output	Ventilation ► Actual/Setpoint ► - Supply air controller	Controller output (%)	
Neutral zone setting	Ventilation ► Actual/Setpoint ► - Supply air controller	Neutral zone (C°)	
Min / Max limit supply air	Ventilation ► Actual/Setpoint ► - Supply air controller	Min / Max limit supply air (C°)	
Setpoint supply air	Ventilation ► Actual/Setpoint ► - Supply air controller	Setpoint supply air	

1. Configured according to config-file, but can be changed.

2. Configured according to config-file, but can be changed.

#### Room cascade

Cascade control of room temperature and supply air temperature to achieve a constant, settable room temperature. The room controller output signal (0-100%) generates the supply air controller's setpoint value between min and max supply setpoint.

The room temperature is kept at the setpoint value by controlling the output signals for the sequences. Two PI loops are used.

Settings and configuration for Room cascade control

Table 3-2 Path to configuration and settings for Room cascade

Feature	Menu path in display	Variable	Note
Configure input <sup>1</sup>	Configuration ► Inputs/Outputs ► Analog inputs ► Room air temperature		
Setting of P-band and I-time	Ventilation ► PID ► Room air controller		
Setpoint room temperature	Ventilation ► Actual/Setpoint ► Room air controller	Setpoint room temperature	
Setpoint adjustment	Ventilation ► Actual/Setpoint ► Room air controller	Setpoint adjustment	

1. Configured according to config-file, but can be changed.

### Extract air cascade

Cascade control of extract air temperature and supply air temperature to achieve a constant, settable room temperature. The extract air controller output signal (0-100%) generates the supply air controller's setpoint value between min and max supply setpoint.

The extract air temperature is kept at the setpoint value by controlling the output signals for the sequences. Two PI loops are used.

Settings and configuration for Extract air cascade control

Table 3-3 Path to configuration and settings for Extract air cascade

Feature	Menu path in display	Variable	Note
Configure input <sup>1</sup>	Configuration ► Inputs/Outputs ► Analog inputs ► Extract air temperature		
Setting of P-band and I-time	Ventilation ► PID ► Extract air controller		
Setpoint extract air temperature	Ventilation ► Actual/Setpoint ► Extract air controller	Setpoint extract air	
Setpoint adjustment	Ventilation ► Actual/Setpoint ► Extract air controller	Setpoint adjustment	

1. Configured according to config-file, but can be changed.

## 3.3 Temperature sequences

The supply air controller output is either a heating demand or a cooling demand depending on if the supply temperature is over or under the setpoint. This demand is then divided into up to 4 sequences A to D. Each sequence is configured as *Heating*, *Cooling*, *Exchanger*, *Damper*, or *Not used* depending on the selected configuration.

Each sequence has its own PID-settings that can be set in the **Ventilation** menu in the display.

Each of these output sequences can be bound to either an analog output, to one pulse-width modulated (PWM) digital output with a settable period time, or to a start/stop digital output.

### 3.3.1 Heater

#### Heater types

#### Water heating

#### Control

If a sequence is configured as water heating, it's possible to select if the sequence should be controlled with freeze protection. The sequence is controlled by the corresponding sequence analog output.

Table 3-4 Settings and configuration for water heater

Feature	Menu path in display	Variable	Note
Freeze protection temperature	Configuration ► Inputs/Outputs ► Analog inputs ► Freeze protection temperature	<ul style="list-style-type: none"> <li>✓ Sensor type</li> <li>✓ Filter factor</li> <li>✓ Compensation</li> <li>✓ Actual value</li> </ul>	
Analog output	Configuration ► Inputs/Outputs ► Analog outputs ► Heater	Range output: <ul style="list-style-type: none"> <li>✓ 0...10 V</li> <li>✓ 2...10 V</li> <li>✓ 10...2 V</li> <li>✓ 10...0 V</li> </ul>	

#### Freeze protection

The heater return water temperature is measured using the analog input *Freeze protection temperature*. Low temperatures will generate an internal, proportional signal that is used to force the heating valve open, thereby preventing freeze-up of the heater.

The internal signal will begin to rise as the frost protection temperature falls below the *Alarm limitation running mode + P-band running mode* in order to reach 100 % output when the signal has fallen to *Alarm level*.

When the internal signal reaches 100 %, the unit is shut down, the heating output is set to completely open mode and an alarm is activated. .



**Note!** The unit is restarted when the alarm has been acknowledged and the temperature for the frost protection sensor has risen above *Alarm limitation running mode + P-band running mode*.

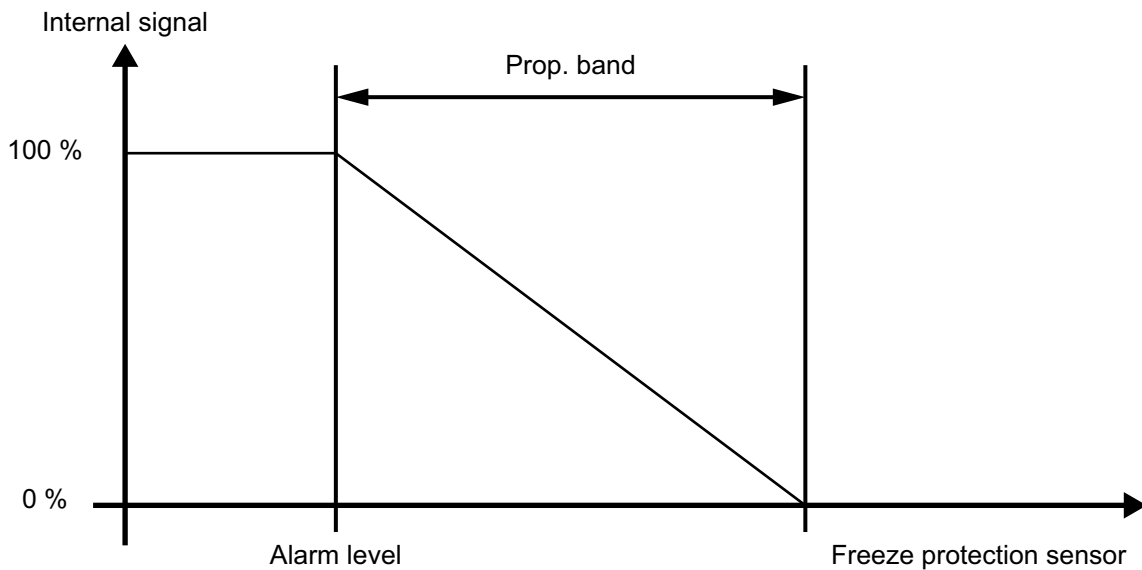


Figure 3-1 Freeze protection

Table 3-5 Settings and configuration for freeze protection

Feature	Menu path in display	Variable	Note
Configuration of freeze protection temperature,	Configuration ► Inputs/Outputs ► Analog inputs ► Freeze protection temperature	<ul style="list-style-type: none"> <li>✓ Sensor type</li> <li>✓ Filter factor</li> <li>✓ Compensation</li> <li>✓ Actual value (read only)</li> </ul>	
Freeze protection setpoints	Ventilation ► Temperature control ► Freeze protection	<ul style="list-style-type: none"> <li>✓ Alarm limitation running mode</li> <li>✓ P-band running mode</li> <li>✓ Setpoint standby mode</li> </ul>	
PID-settings	Ventilation ► Temperature control ► Freeze protection		

### Standby mode

If frost protection is activated the controller will go into *Standby mode* when the running mode switches to **Off**. The controller will then control the heating output to maintain a constant temperature at the frost protection sensor. The setpoint for the standby mode is found in *Ventilation ► Temperature control ► Freeze protection*

### Electric heating

Electric heating is controlled using the analog output sequence. On activation of the digital input *Overheated electric heater* the unit will be shut down, either according to the stop sequence or as an emergency shutdown. The unit will restart after the alarm has been acknowledged and *Overheated electric heater* has reset. Note that activation of the input signal *Flow guard* will also stop the unit.

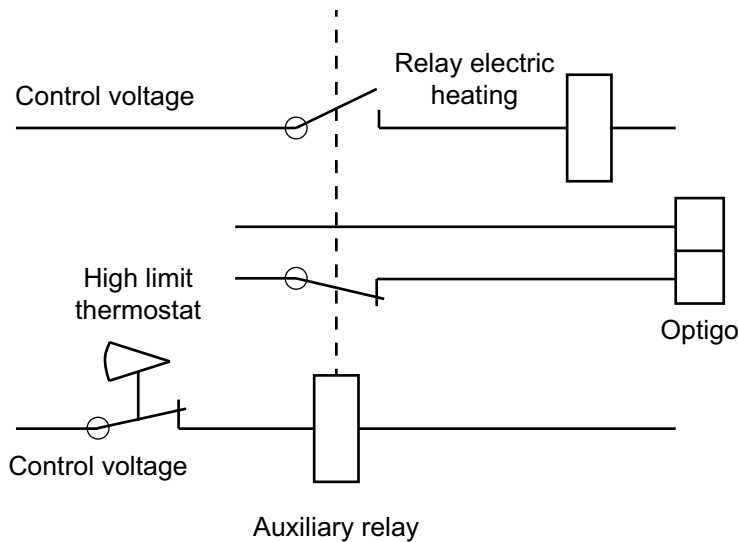


Figure 3-2 Wiring example, high temp. limit. Contactors are drawn inactivated.



**Note!** It is important that the high temperature thermostat is hardwired to disconnect the power to the heater to ensure that the heating is shut down when the thermostat is activated even if the Optigo<sup>Ardo</sup> should be faulty.

Table 3-6 Settings and configuration for electric heating

Feature	Menu path in display	Variable	Note
Overheating	Configuration ► Inputs/Outputs ► Digital inputs ► Overheated electric heater		
Flow guard	Configuration ► Inputs/Outputs ► Digital inputs ► Flow guard		
Alarm	Alarm status		

### Fast stop on overheating

**Fast stop** is an option in Alarm - *Electric heating is overheated*. The function means that the fans will be immediately stopped when there is an overheating alarm, regardless of the set cool-down time. It is set in *Alarm status ► Electric heating is overheated ► Edit ► Alarm action*.

### 3.3.2 Exchanger

#### Control

The airflow through the exchanger is controlled by a shut-off damper and a bypass damper. Both dampers are controlled by the same analog output.

#### Defrosting

Defrosting is activated when the value of the analog input *Defrosting temperature* falls below the de-icing limit (-3°C).

It is deactivated when the analog signal rises above the limit value plus a settable differential (*Ventilation ▶ Temperature control ▶ Exchanger ▶ Hysteresis*).

A PI-controller compares the defrosting setpoint with the signal *Defrosting guard exchanger*. The lesser of the output signal from this controller and the output from the ordinary controller is used as output to the bypass dampers.

#### Freeze protection

A defrosting sensor can be used as a prevention sensor. It is possible to set a starting temperature in *Ventilation ▶ Temperature control ▶ Exchanger ▶ Defrosting setpoint* and *Min time*. This represents both the minimum time that the function should be active, the supply air fan (SAF) and extract air fan (EAF) compensation, as well as the minimum time before the next prevention cycle should begin. While the cycle is active, **Defrosting mode** is shown in the display.

Table 3-7 Configuration and settings for Plate exchanger

Feature	Menu path in display	Variable	Note
Exchanger control, Analog Output	Configuration ▶ Analog output	Range output: ✓ 0...10 V ✓ 2...10 V ✓ 10...2 V ✓ 10...0 V	
Defrosting exchanger	Configuration ▶ Function config. ▶ Temperature control	Defrosting exchanger	Yes / No
Defrosting temperature	Configuration ▶ Analog inputs ▶ Defrosting temperature	✓ Sensor type ✓ Filter factor ✓ Compensation (°C) ✓ Actual value (°C)	
Extract air fan speed when defrosting	Configuration ▶ Function config. ▶ Temperature control	Extract air fan speed when defrosting with stopped supply air	✓ Auto ✓ Low ✓ Normal ✓ High
Temperature setpoints	Ventilation ▶ Temperature control ▶ Exchanger	✓ Outdoor start / stop exchanger temperature (°C) ✓ Defrosting setpoint limit (°C) ✓ Stop supply air time if outdoor temp < (°C)	
Hysteresis setpoints	Ventilation ▶ Temperature control ▶ Exchanger	✓ Hysteresis (°C) ✓ Hysteresis to stop defrosting (°C)	
Delay setpoints	Ventilation ▶ Temperature control ▶ Exchanger	✓ Start delay exchanger (s) ✓ Start delay with 100 % exchanger (s) ✓ Start alarm delay (s)	



### 3.3.3 Cooler

#### Control

If a cooler is configured, it's controlled by the corresponding sequence analog output.

Table 3-8 Settings and configuration for water cooling

Feature	Menu path in display	Variable	Description
Analog output	Configuration ► Analog outputs ► Cooler	Range output: ✓ 0...10 V ✓ 2...10 V ✓ 10...2 V ✓ 10...0 V	
PID settings	Ventilation ► PID controllers ► Cooler		

### 3.3.4 Mixing damper

#### Control

The analog output signal controls two dampers for gradual mixing of outdoor air and recirculated air. In this mode the output signal decreases with decreasing heat demand.

#### CO<sub>2</sub>

If demand controlled ventilation is activated in combination with mixing dampers, CO<sub>2</sub>-control is activated for the sequence, and the CO<sub>2</sub>-value rises above the setpoint value, the dampers will let in more outdoor air. The function is controlled by a PI-controller.

Table 3-9 Settings and configuration for CO<sub>2</sub> and mixing dampers

Feature	Menu path in display	Variable	Note
CO <sub>2</sub> setpoint	Ventilation ► Demand control ► CO <sub>2</sub>	✓ Setpoint mixing damper (ppm) ✓ Start limit fan start / stop (ppm) ✓ Stop hysteresis fan start / stop (ppm) ✓ Demand control ✓ Min time for CO <sub>2</sub> control (min)	
PI settings	Ventilation ► PID controllers ► CO <sub>2</sub>		

#### Minimum limit

An outdoor air minimum limit for the amount of fresh air can be set. The limit value is settable between 0 and 100 %. For example: to reach a minimum of 20 % fresh air you need to set the max limit of the sequence to 80 %. (Configuration ► Function config. ► Sequence x ► Sequence output min limit (%) and Sequence output max limit (%))

## 3.4 Fan control

### 3.4.1 Fan levels

Frequency controlled fans, EC-fans or fans with 2-step control work with the Optigo<sup>Ardo</sup>. The fan can be set to *Low*, *Normal* or *High* speed. The selection of the fan speed defines which time channel will be active in the application.

The fans will always start directly with the desired speed.

The extract air fan and the supply air fan have individual start and stop delays which are normally set so that the extract air fan is started before the supply air fan. If there are not enough digital outputs for individual control, both fans will have to be started using the signal for the supply air fan, and the delay will be created using an external time relay.

## 3.5 CO<sub>2</sub> control

In applications with varying occupancy the fan speeds or mixing dampers can be controlled by the air quality as measured by a CO<sub>2</sub> sensor.

With the CO<sub>2</sub> function it's possible to start and stop the fans, compensate the fan speed and in combination with mixing damper let in more outdoor air depending on the CO<sub>2</sub> value. This can be configured with the CO<sub>2</sub> control settings.

Table 3-10 CO<sub>2</sub> control settings

<b>Fan stop/start function</b>	When the function is activated with start/stop function and the CO <sub>2</sub> value rises above settable start value the fans will start at configured speed (default: normal speed), if they are not already running.
<b>Mixing damper function</b>	If demand controlled ventilation is activated in combination with mixing dampers, and the CO <sub>2</sub> -value rises above the setpoint value the dampers controlled by a sequence with CO <sub>2</sub> function will be overtaken by the CO <sub>2</sub> controller and let in more outdoor air. The function is controlled by a PI-controller.
<b>Fan start/stop + mixing damper</b>	If demand controlled ventilation is activated in combination with mixing dampers, and the CO <sub>2</sub> -value rises above the setpoint value the dampers controlled by a sequence with CO <sub>2</sub> function will be overtaken by the CO <sub>2</sub> controller and let in more outdoor air. The function is controlled by a PI-controller.

## 3.6 Free cooling

This function is used during the summer to cool the building night-time using cool outdoor air, thereby reducing the need for cooling during the day and saving energy.

Free cooling requires an outdoor sensor and either a room sensor or an extract air sensor.

Free cooling is only activated when all the start conditions below are fulfilled.

- ✓ It is between 00:00 and 07:00 in the day (settable).
- ✓ The timer outputs for *Normal* speed, *Extended running*, *Normal* and *External switch* are **Off**.
- ✓ A timer channel will be **On** sometime during the next 24 hours.

If an extract air sensor is selected and ALL the start conditions are fulfilled, free cooling is activated and will run for 3 minutes (settable) to ensure that the temperature measurement when using an extract air sensor reflects the corresponding room temperature.

If a room sensor is selected, the unit will not start free cooling as long as all the temperatures are not within the start and stop temperature intervals.

---

## 3.7 Support control

Support control is normally used when room temperature control or extract air control has been configured. When extract air control is configured a room sensor must be installed.

Support control can also be configured to start only with the supply air fan. In this mode, the extract air fan is not active. This requires a digital output to be configured, which controls the recirculation damper to open completely so the supply air fan can circulate the air to and from the room.

## 3.8 Fire

It is possible to configure the controller operating mode when there is a fire alarm. The following options are available: *Stopped*, *Continuous run*, *Run via normal start/stop conditions*, *Only extract air fan*, *Only supply air fan*.

It is possible to configure which speed the fan should have when in fire mode.

It's also possible to configure if outdoor air damper and exhaust air damper should have *Normal* function or be *Always open* or *Always closed*. Normal function means that the damper open and close depending on if the corresponding fan is running or not.

## 3.9 Filter monitoring

Turn on filter monitoring to monitor the flow through the filter. Digital inputs can be used to connect a pressure switch to monitor the status of the filter and create an alarm if the signal of the pressure switch turns on.

## 3.10 Dampers

The outdoor air and exhaust air ducts close-off dampers can be controlled by a digital output or be hard-wired to the supply air fan relays for normal, reduced and high speed in such a fashion that the damper is open when the supply air fan is running.

## 3.11 Changing the battery

The controller has an internal battery to ensure the operation of the memory and real-time clock in the event of a power failure. When the alarm **Internal Battery** is activated and the battery LED lights up red, the battery has become too weak and needs to be changed. Nonetheless, due to a backup capacitor, the controller will function at least 10 minutes without power supply.



**Caution!** Changing the battery, as well as dismantling and opening the unit requires knowledge of proper ESD protection. Therefore, this should be handled by skilled service personnel.

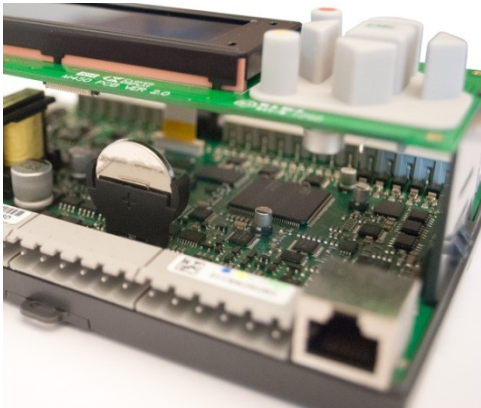
An earthed wristband must be used during this procedure.

---

1. Remove the cover by pressing down the locking torques at the edge of the cover using a small screwdriver, and at the same time pulling the cover outwards.



2. Grip the battery firmly with your fingers and lift it upwards until it rises from its holder.



3. Press the new battery firmly down into place.



---

**Note!** For proper functionality, ensure that the polarity is correct. The replacement battery must be of type CR2032.

---

## 4 Information for the specialist - Configuration

### 4.1 Predefined configurations in Optigo<sup>Ardo</sup>

To configure the controller, predefined configurations are used. The configuration is selected in the text display.

The predefined configurations are different combinations of components that are activated in the air handling system. The configuration number corresponds to the components that are active, see the schematic below in *Figure 4-1*.

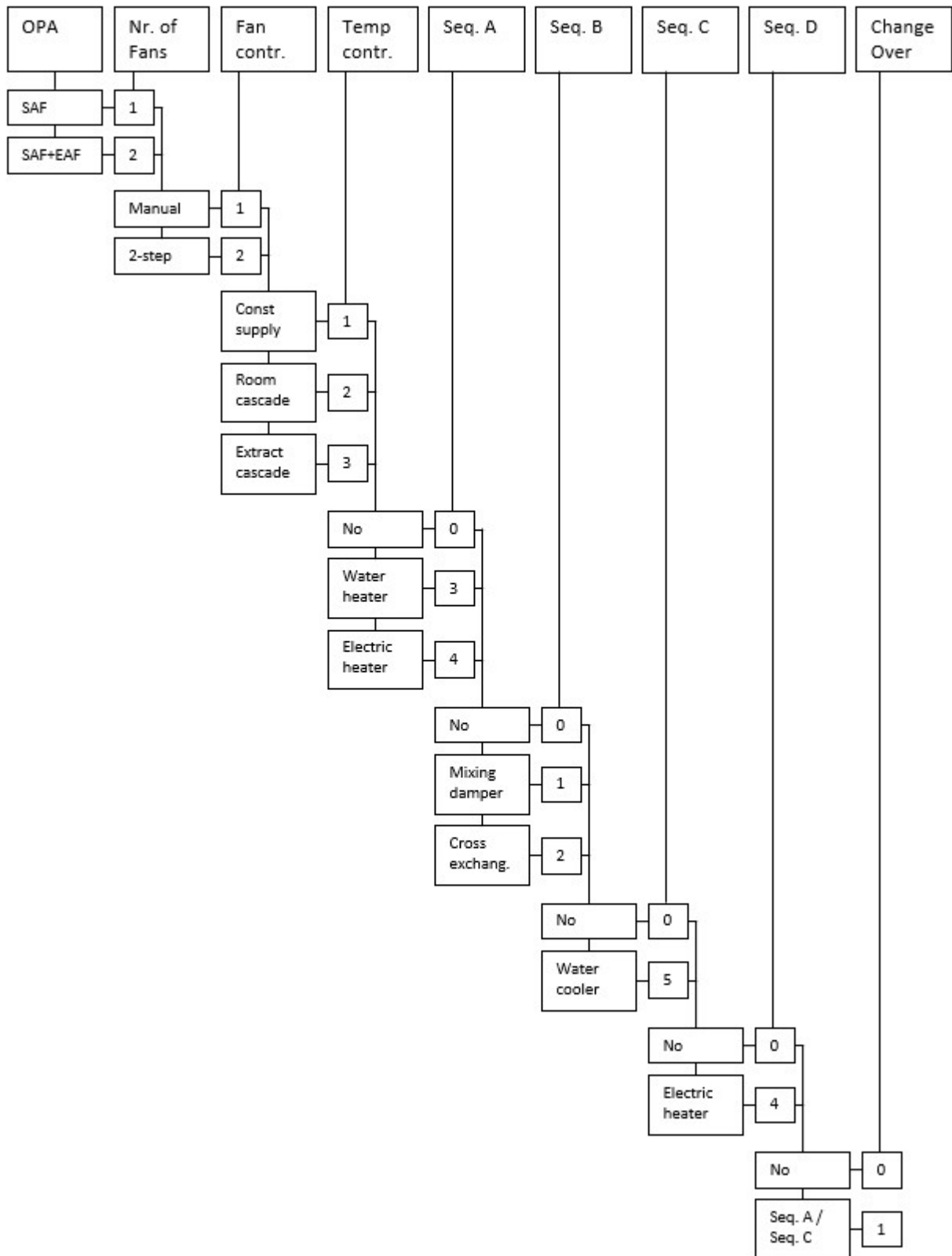


Figure 4-1 Predefined configurations

Read more about predefined configurations in the document *Optigo Ardo 1.0 Predefined configurations* which is available on Regin's homepage [www.regincontrols.com](http://www.regincontrols.com).

### 4.1.1 How to use the predefined configurations

Select a predefined configuration in the display.

1. Start from the start menu.

```
Optigo Ardo 1.0
2020-01-08 14:29
System: Normal run
Sp:22.0 Act: 22.5°C
```

2. Press the right button **[▶]** 7 times until you reach the menu to select the configuration.

```
Choose Config File
None
```

3. Select the configuration you want. Available configurations depend on the number of IOs in the hardware.
4. Select add-ons. Available add-ons depends on the used hardware and selected configuration.

- a. For Optigo<sup>Ardo</sup> with 15 I/Os

```
CO2/FreeCool add-on
```

```
Ext.run/Fire add-on
```

- b. For Optigo<sup>Ardo</sup> with 28 I/Os

```
CO2 fan add-on
No
```

```
CO2 damper add-on
Yes/No
```

```
Extended run add-on
Yes/No
```

```
Fire alarm add-on
Yes/No
```

```
Free cooling add-on
Yes/No
```

5. Activate the configuration

```
Load configuration
Yes/No
```

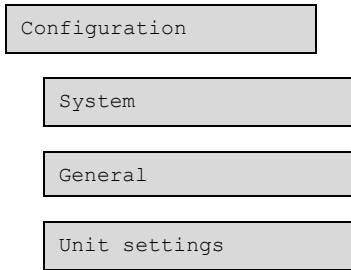
## 4.2 Adjust settings in Optigo<sup>Ardo</sup>

There is a possibility to adjust the predefined settings in the controller. The work flow for this is:

1. Select the predefined configuration in the text display
2. Go to the **Configuration** menu and adjust settings
3. Go to the **Ventilaton** menu and adjust setpoint settings for e.g. fan control and temperature control.
4. Go to the **Time settings** menu to adjust the settings of the timer channels and the holiday plan if needed

## 4.3 Configuration of Optigo<sup>Ardo</sup>

### 4.3.1 System

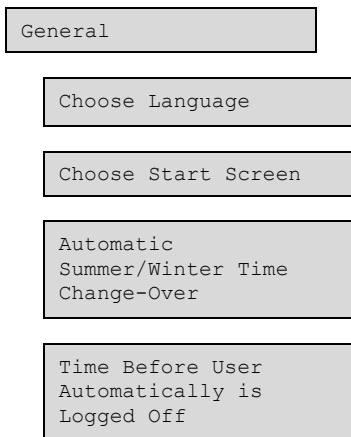


To configure the system there are two configurations that can be made:

- ✓ General settings
- ✓ Unit settings

#### General settings

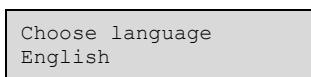
Under *General* is information about the controller, and some general settings can be made.



#### Change language

The display language can be changed in the menu

##### Display menu:



---

**Note!** This menu is also accessible by holding the [OK] button pressed during power-up or by pressing the [▶] button four times when the start display is shown.

---

#### Start screen

There are several different start screens to choose from.



Show headline, date/time, vent. mode, supply temp / setp.

```
Optigo Ardo 1.0
2019-08-01 11:28
System: Normal speed
Sp: 32.8°C Act:33.1°C
```

Second line: Date and time

Third line: Status of the unit

Fourth line: Supply temperature and setpoint

Show headline, vent. mode, supply temp / setp, sequence A to C

```
Optigo Ardo 1.0
System: Normal speed
Sp: 32.8°C Act:33.1°C
A 100 B 100 C 100
```

Second line: Status of the unit

Third line: Supply temperature and setpoint

Fourth line: Output signal of the sequences A to C

Show headline, date/time, vent. mode

```
Optigo Ardo 1.0
2019-08-01 11:28
System: Normal speed
```

Second line: Date and time

Third line: Status of the unit

Show headline, date/time

```
Optigo Ardo 1.0
2019-08-01 11:28
```

Second line: Date and time

Automatic switch between summer and winter time adjustment

The internal clock is normally configured for automatic summer / winter time adjustment. When enabled, the clock will be set forward one hour at 02:00 am on the last Sunday of March and adjusted back one hour at 03:00 am on the last Sunday of October.

The function can be disabled in: *Configuration* ▶ *System* ▶ *General*

Automatic logoff

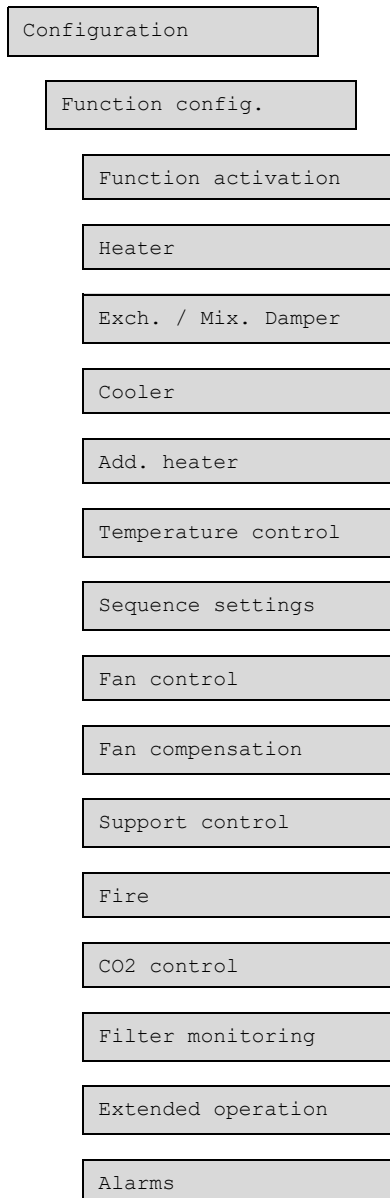
If the access level is set to **Operator** or **Admin**, the user will automatically be logged off after a set time of inactivity. The time is settable in units of 5 seconds. The default is 60 units = 5 minutes

The automatic log off can be disabled in: *Configuration* ▶ *System* ▶ *General* ▶ *Time before automatic logoff in display (unit 5s) (min)*

### Unit settings

Select if the temperature should be displayed in Celsius (°C) or Fahrenheit (°F)

#### 4.3.2 Function configuration



This is where you activate the functions that will be used in the BAS (Building Automation System). It is also where you set up sequences.

#### Function activation

This is where you select:

- ✓ Fan levels (Low-Normal-High)
- ✓ Support control (Yes/No)
- ✓ Free cooling (Yes/No)
- ✓ Auto restart (Yes/No)

The **Auto restart** function makes it possible to block automatic restart of the unit at power-up. At power-up, the B-alarm

*Restart blocked after power on* is generated. Once this alarm has been acknowledged, the unit will start.

## Sequences

There are four sequences in the controller, and which sequence or sequences that will be used depends on which predefined configuration that has been chosen in the controller. Each sequence will have their own PID-settings.

The available settings for the different sequences depends on which predefined configuration you have selected.

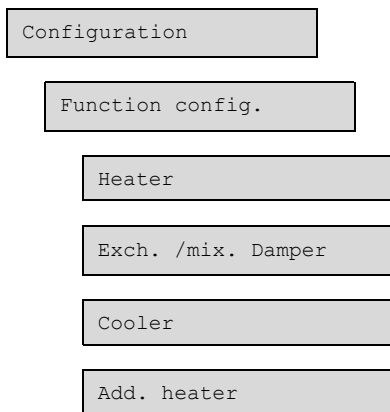
The sequence types are:

- ✓ Not used
- ✓ Heater
- ✓ Cooler
- ✓ Exchanger
- ✓ Mixed Damper
- ✓ Additional heater



**Note!** The sequence menus are adaptive and the setting options will change depending on the selections you make in other menus.

## Setting for sequences



The table below shows the possible settings for all sequences (Heater, Cooler, Exchanger/Mixed damper, Additional heater).

Table 4-1 Sequence settings

Menu	Setting alternatives	Note
Pump stop mode	<ul style="list-style-type: none"> <li>✓ Always running</li> <li>✓ Auto</li> </ul>	
Period time for PWM-signal (s)	Writable. Default 60 s	
Sequence output min limit (%)	Writable	
Sequence output max limit (%)	Writable	

Table 4-1 Sequence settings (continued)

Menu	Setting alternatives	Note
Sequence output when the unit is stopped (%)	Writable	
Sequence output when fire mode (%)	Writable	

### Starting order heating/cooling

The following picture shows the default settings of the configured sequences, where the Exchanger or Mixed damper starts first in heating mode followed by the Heater and the Additional heater. In cooling mode, the Exchanger or Mixed damper starts first followed by the Cooler.

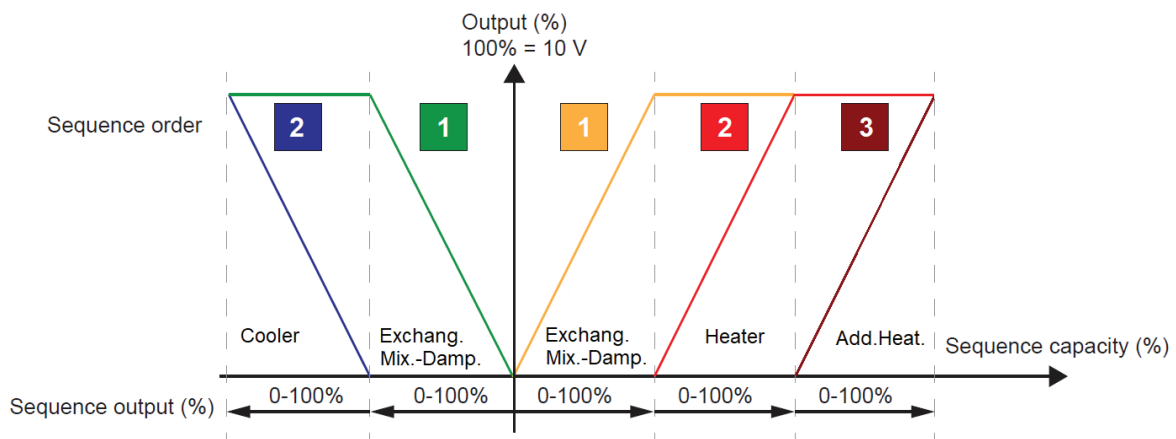


Figure 4-2 Sequence starting order

### Temperature control

Table 4-2 Settings for temperature control

Menu	Setting alternatives	Note
Activate summer mode	<ul style="list-style-type: none"> <li>✓ No summer setpoint</li> <li>✓ Switch with calendar</li> <li>✓ Switch with changeover</li> <li>✓ Switch with digital input</li> <li>✓ Switch with outdoor temp</li> </ul>	
Cooling recovery mode	On / Off	
Fan speed temp. setpoint	Low / High	
Defrosting Exchanger	Yes / No	
EAF speed when defrosting with stopped SAF	Normal	

## Sequence settings

These settings are used to define the start of the sequences when the unit starts. There are two different modes to start the unit:

- ✓ Normal start up
- ✓ Warm (Heat) start up

### Normal start up:

The sequence control starts at 100% for the heating sequence which is selected at the parameter *At startup begin temperature control at 100%*. The default setting is *Heating 1*, which means it starts at 100% for heating sequence 1 which is the exchanger in the default configuration.

### Warm start up:

If the outdoor temperature is lower than the settable limit *Warm start up if outdoor temperature < (°C)* the unit will start in the warm start mode. A second sequence will start at 100% in this mode if the unit starts. The default setting is *Heating 2*, which means it starts at 100% for the heating sequence 2 which is the heater in the default configuration.

Table 4-3 Sequence settings

Display	Setting alternatives	Note
Begin temperature control at 100 %	<ul style="list-style-type: none"> <li>✓ Heating X 0%</li> <li>✓ Heating X</li> </ul>	
Warm start up if outdoor temperature < (°C)	Writable	
If warm start begin temperature control at 100 % in	<ul style="list-style-type: none"> <li>✓ Heating %</li> <li>✓ Heating X</li> </ul>	

## Fan control

Settings for fan control.

Table 4-4 Settings for fan control

Menu	Setting alternatives	Note
Switch point step 1-2	<ul style="list-style-type: none"> <li>✓ SAF, Writable%</li> <li>✓ EAF, Writable %</li> </ul>	
Hysteresis %	Writable	

## Fan compensation

Settings for fan compensation

Table 4-5 Settings for fan compensation

Menu	Setting alternatives	Note
Fan level	<ul style="list-style-type: none"> <li>✓ All levels</li> <li>✓ Low speed</li> <li>✓ Normal speed</li> <li>✓ High speed</li> <li>✓ Low + Normal speed</li> <li>✓ Normal + High speed</li> </ul>	
Mode	<ul style="list-style-type: none"> <li>✓ Inactive</li> <li>✓ In all modes</li> <li>✓ When defrosting</li> </ul>	
Fan	<ul style="list-style-type: none"> <li>✓ SAF+ EAF</li> <li>✓ SAF</li> <li>✓ EAF</li> </ul>	

### Support control

#### Settings for support control

Table 4-6 Settings for support control

Menu	Setting alternatives	Note
EAF running during support control	Yes / No	

### Fire

#### Settings for fire.

Table 4-7 Settings for fire

Display	Setting alternatives	Note
Operation mode (when fire alarm)	<ul style="list-style-type: none"> <li>✓ Stopped</li> <li>✓ Continuous run</li> <li>✓ Running via normal start/stop conditions</li> <li>✓ Supply air fan run</li> <li>✓ Extract air fan run</li> </ul>	
SAF setpoint type	<ul style="list-style-type: none"> <li>✓ Auto</li> <li>✓ Manual setpoint</li> <li>✓ Manual output</li> <li>✓ Low speed setpoint</li> <li>✓ Normal speed setpoint</li> <li>✓ High speed setpoint</li> </ul>	
EAF setpoint type	<ul style="list-style-type: none"> <li>✓ Auto</li> <li>✓ Manual setpoint</li> <li>✓ Manual output</li> <li>✓ Low speed setpoint</li> <li>✓ Normal speed setpoint</li> <li>✓ High speed setpoint</li> </ul>	
Outdoor air damper function	<ul style="list-style-type: none"> <li>✓ Normal function (follow the fan)</li> <li>✓ Always open</li> <li>✓ Always closed</li> </ul>	
Exhaust air damper function	<ul style="list-style-type: none"> <li>✓ Normal function (follow the fan)</li> <li>✓ Always open</li> <li>✓ Always closed</li> </ul>	

## CO<sub>2</sub> control

Settings for CO<sub>2</sub> control

Table 4-8 Settings for CO<sub>2</sub> control

Display	Setting alternatives	Note
Setpoint SAF	<ul style="list-style-type: none"> <li>✓ Low speed</li> <li>✓ Normal speed</li> <li>✓ High speed</li> </ul>	
Setpoint EAF	<ul style="list-style-type: none"> <li>✓ Low speed</li> <li>✓ Normal speed</li> <li>✓ High speed</li> </ul>	

## Filter monitoring

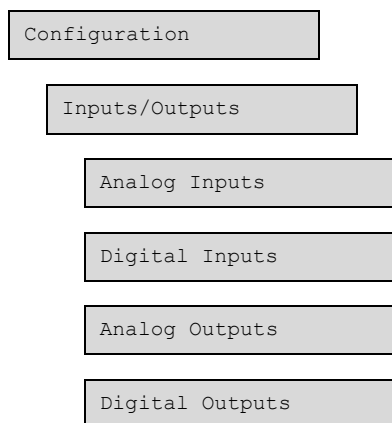
Settings for filter monitoring.

Display	Setting alternatives	Note
Filter alarm reset	Yes/No	
Filter alarm time (month)	Writable	

## Alarms

Set the Alarm delay time at start up. Default: 60 s.

### 4.3.3 Inputs/Outputs



## Analog inputs

All analog inputs are for Pt1000, Ni1000LG, Ni1000 or 0...10 V.

Input signals can be compensated e.g. for wiring resistance.

See *Appendix C Input and output lists* for a complete list of inputs and outputs.



**Note!** The menu is adaptive and not all items will be shown, depending on your previous selections.

The settings that can be selected / configured are:

Table 4-9 Analog inputs

Variable	Settings	Note
Terminal	<ul style="list-style-type: none"> <li>✓ Off</li> <li>✓ AI 1...4</li> <li>✓ UAI 1...4</li> </ul>	The number of terminals are depending on Optigo <sup>Ardo</sup> model
Sensor type	<ul style="list-style-type: none"> <li>✓ Pt1000</li> <li>✓ Ni1000LG</li> <li>✓ Ni1000</li> <li>✓ 0...10 V</li> </ul>	
Min input (V)	Writable (Default 0)	
Max input (V)	Writable (Default 10)	
Min signal (°C)	Writable (Default 0)	
Max signal (°C)	Writable (Default 100)	
Filter factor	Writable (Default 0,2)	<p>The filter factor is the damping you want the program to work with in order to reduce the influence of potential signal fluctuations on the sensor input.</p> <p>A new value is calculated using the following formula:  <math>New\ value = old\ value * filter\ factor + raw\ value * (1 - filter\ factor)</math></p>
Compensation (°C)	Writable (Default 0)	

### Digital inputs, DI

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 default normally open, i. e. if the input is closed, the function connected to the input in Optigo<sup>Ardo</sup> is activated.

See *Appendix C Input and output lists* for a complete list of inputs and outputs.



**Caution!** Be careful when changing the input from NO to NC since some digital functions can be configured to either NO or NC themselves. For example, you can choose if the fire alarm input should be activated when it is closed or opened. Therefore, there is a risk that the signal is changed twice and the result is the opposite of the desired.



**Note!** The menu is adaptive and not all items will be shown, depending on your previous selections.

The settings that can be selected / configured are:

Table 4-10 Digital inputs

Variable	Settings	Note
Terminal	<ul style="list-style-type: none"> <li>✓ Off</li> <li>✓ DI 1...8</li> </ul>	The number of terminals are depending on Optigo <sup>Ardo</sup> model
NC / NO	<ul style="list-style-type: none"> <li>✓ NO</li> <li>✓ NC</li> </ul>	<ul style="list-style-type: none"> <li>✓ NC (Normally closed )</li> <li>✓ NO (Normally open)</li> </ul>

### Analog outputs, AO

See *Appendix C Input and output lists* for a complete list of inputs and outputs.



**Warning!** Configuration of a physical output to more than 1 function will cause in an undefined behaviour of the controller. The alarm- **Internal error** will then become active.



Table 4-11 Analog outputs

Variable	Settings	Note
Terminal	<ul style="list-style-type: none"> <li>✓ Off</li> <li>✓ AO 1...5</li> </ul>	The number of terminals are depending on Optigo <sup>Ardo</sup> model
Range output	<ul style="list-style-type: none"> <li>✓ 0...10 V</li> <li>✓ 2...10 V</li> <li>✓ 10...2 V</li> <li>✓ 10...0 V</li> </ul>	

## Digital outputs, DO

Digital outputs can be NC (Normally Closed) or NO (Normally Opened).

See *Appendix C Input and output lists* for a complete list of inputs and outputs.

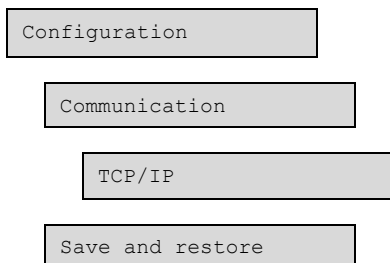


**Warning!** Configuration of a physical output to more than 1 function will cause in an undefined behaviour of the controller. The alarm- **Internal error** will then become active.

Table 4-12 Digital outputs

Variable	Settings	Note
Terminal	<ul style="list-style-type: none"> <li>✓ Off</li> <li>✓ DO 1...7</li> </ul>	The number of terminals are depending on Optigo <sup>Ardo</sup> model
NC / NO	<ul style="list-style-type: none"> <li>✓ NO</li> <li>✓ NC</li> </ul>	<ul style="list-style-type: none"> <li>✓ NC (Normally closed )</li> <li>✓ NO (Normally open)</li> </ul>

## 4.3.4 Other configuration



### Communication

The controller uses TCP/IP.

In this menu it's possible to turn on and off DHCP and set a static IP-address.

### Save and restore

Save and restore:

- ✓ Local settings
- ✓ Factory settings

## 4.4 Ventilation

Ventilation

Actual/Setpoint

Temperature control

Fan control

Demand control

PID controllers

Manual/Auto

Status

### 4.4.1 Actual / Setpoint

Actual/Setpoint

Temperature

Room air controller

Extract air contr.

Supply air contr.

CO<sub>2</sub>

Fans

Supply air fan

Extract air fan

Freeze protection

Exchanger

Read and adjust setpoints for:

- ✓ Temperature
- ✓ Room air controller
- ✓ Extract air controller
- ✓ Supply air controller
- ✓ CO<sub>2</sub>
- ✓ Fans

- ✓ Supply air fan
- ✓ Extract air fan
- ✓ Freeze protection
- ✓ Exchanger

## Temperature

Table 4-13 Setpoints for temperature control

Variable	Read/Write	Default value	Min/Max	Note
Actual control type	R			
Outdoor temperature (°C)	R			
Supply air temperature (°C)	R			
Room temperature (°C)	R			
Extract air temperature (°C)	R			
Setpoint adjustment (°C)	W	0	-10/10	

## Room air controller

Table 4-14 Setpoints for room air control

Variable	Read/Write	Default value	Min/Max	Note
Actual room air temperature (°C)	R			
Setpoint room (°C)	W	21	-20/150	
Actual setpoint room (°C)	R			
Setpoint adjustment low speed (°C)	W	0	-50/50	
Setpoint adjustment high speed (°C)	W	0	-50/50	
Summer mode: Room setpoint (°C)	W	24	-20/150	
Controller output (%)	R			

## Extract air controller

Table 4-15 Setpoints for extract air control

Variable	Read/Write	Default value	Min/Max	Note
Actual temperature (°C)	R			
Setpoint (°C)	W	21	-20/150	
Actual setpoint (°C)	R			
Setpoint adjustment low speed (°C)	W	0	-50/50	
Setpoint adjustment high speed (°C)	W	0	-50/50	
Summer mode: Setpoint (°C)	W	24	-20/150	
Controller output (%)	R			

## Supply air controller

Table 4-16 Setpoints for supply air control

Variable	Read/Write	Default value	Min/Max	Note
Actual supply air temperature (°C)	R			
Setpoint adjustment (°C)	W	0	-10/10	
Actual setpoint supply air (°C)	R			
Setpoint adjustment low speed (°C)	W	0	-50/50	
Setpoint adjustment high speed (°C)	W	0	-50/50	
Summer mode: Setpoint supply air (°C)	W	24	-20/150	
Summer mode: Outdoor temperature (°C)	W	24	-20/150	
Min limit supply air	W	12	10/150	
Max limit supply air	W	30	10/150	
Controller output (%)	R			

## CO<sub>2</sub>

Table 4-17 Setpoints for CO<sub>2</sub> control

Variable	Read/Write	Default value	Min/Max	Note
Actual CO <sub>2</sub> (ppm)	R			
Setpoint (ppm)	W	1000	0/2000	

## Fans

Table 4-18 Setpoints for fans

Variable	Read/Write	Default value	Min/Max	Note
Setpoint low speed supply air fan (%)	W	25	0/100	
Setpoint normal speed supply air fan (%)	W	50	0/100	
Setpoint high speed supply air fan (%)	W	75	0/100	
Setpoint low speed extract air fan (%)	W	25	0/100	
Setpoint normal speed extract air fan (%)	W	50	0/100	
Setpoint high speed extract air fan (%)	W	75	0/100	

## Supply air fan

Table 4-19 Setpoints for supply air fan

Variable	Read/Write	Default value	Min/Max	Note
Actual level	R			
Output (%)	R			
Actual setpoint compensation (%)	R			

## Extract air fan

Table 4-20 Setpoints for extract air fan

Variable	Read/Write	Default value	Min/Max	Note
Actual level	R			
Output signal (%)	R			
Actual setpoint compensation (%)	R			

## Freeze protection

Table 4-21 Setpoints for freeze protection

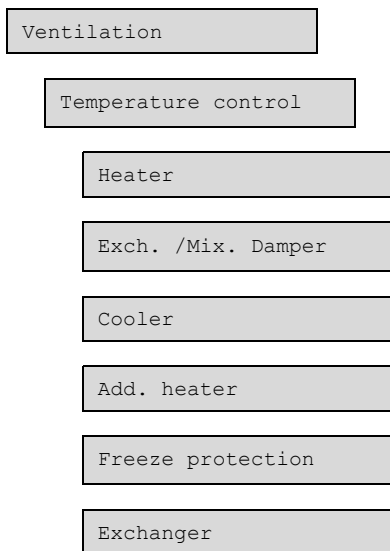
Variable	Read/Write	Default value	Min/Max	Note
Freeze protection temperature (°C)	R			

## Exchanger

Table 4-22 Setpoints for exchanger

Variable	Read/Write	Default value	Min/Max	Note
Deicing temperature (°C)	R			

### 4.4.2 Temperature control



Summer mode



**Note!** The menu *Exch. / Mix. Damper* refers to the sequence *Exch. / Mix. Damper*. The menu *Exchanger* refers to a physical exchanger.

## Sequences A to D

Read more about sequences in [4.3.2 Function configuration](#).

The sequences available in the controller are Heater, Exchanger/Mixed damper, Cooler or Additional heater. The sequence/sequences used depends on the predefined configuration chosen for the controller.

Table 4-23 Settings for sequence A to D

Variable	Read/Write	Default value	Min/Max	Note
Pump stop delay (min)	W	5	0/600	
Pump-kick hour (h)	W	15	0/23	
Pump running when outdoor temperature < (°C)	W	10	-40/100	
Hysteresis to allow pump stop (°C)	W	1	0/100	

## Freeze protection

Read more about freeze protection in [3.3.1 Heater](#).

Table 4-24 Settings for freeze protection

Variable	Read/Write	Default value	Min/Max	Note
Setpoint (°C)	W	7	-40/150	
P-band (°C)	W	5	0/100	
Setpoint standby mode (°C)	W	25	-40/150	

## Exchanger

Read more about exchangers in [3.3.2 Exchanger](#).

Table 4-25 Settings for exchanger

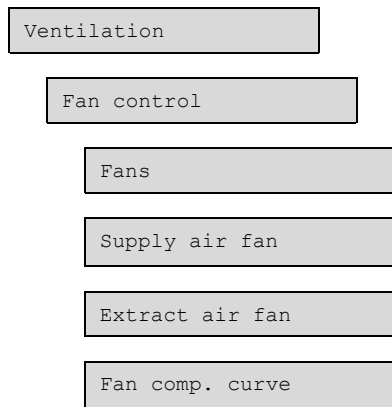
Variable	Read/Write	Default value	Min/Max	Note
Start delay exchanger (s)	W	0	0/3600	
Start delay exchanger 100 % (s)	W	2	0/3600	
Start alarm delay exchanger (s)	W	60	0/3600	
Defrosting setpoint (°C)	W			
Defrosting min time (min)	W	5	0/60	
Defrosting hysteresis (°C)	W	0,2	0/10	
Defrosting stop SAF if temp outdoor < (°C)	W	-100	-100/150	

## Summer mode

Table 4-26 Settings for Summer mode

Variable	Read/Write	Default value	Min/Max	Note
Date for start of summer period	W	1	1/31	
Month for start of summer period	W	4	1/12	
Date for end of summer period	W	1	1/31	
Month for end of summer period	W	10	1/12	
Outdoor temp for switch between summer / winter (°C)	W	13	0/99	
Outdoor temp hysteresis for switch between summer / winter (°C)	W	0,5	0/99	

### 4.4.3 Fan control



## Fans

Table 4-27 Settings for fans

Variable	Read/Write	Default value	Min/Max	Note
Offset supply air fan when free cooling (%)	W	0	-100/100	
Offset extract air fan when free cooling (%)	W	0	-100/100	

## Supply air fan

Table 4-28 Settings for supply air fan

Variable	Read/Write	Default value	Min/Max	Note
Start delay (s)	W	60	0/3600	
Stop delay (s)	W	180	0/3600	
Outdoor air damper stop delay (s)	W	0	0/3600	
SAF speed min limit (%)	W	0	0/100	
SAF speed max limit (%)	W	100	0/100	

## Extract air fan

Table 4-29 Settings for extract air fan

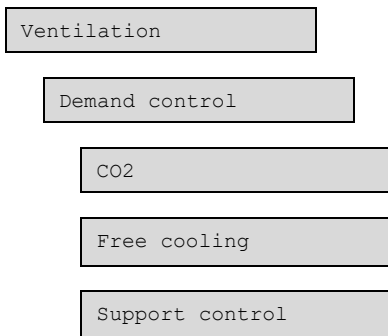
Variable	Read/Write	Default value	Min/Max	Note
Start delay (s)	W	0	0/3600	
Stop delay (s)	W	30	0/3600	
Outdoor air damper stop delay (s)	W	0	0/3600	
EAF speed min limit (%)	W	0	0/100	
EAF speed max limit (%)	W	100	0/100	

## Fan compensation curve

Table 4-30 Settings for fan compensation curve

Variable	Read/Write	Default value	Min/Max	Note
Lower point X	W	15	-30000/ 30000	
Lower point Y (%)	W	0	-100/100	
Middle point X	W	20	-30000/ 30000	
Middle point Y (%)	W	0	-100/100	
Higher point X	W	25	-30000/ 30000	
Higher point Y (%)	W	0	-100/100	

### 4.4.4 Demand control



### CO2

Table 4-31 Settings for CO2

Variable	Read/Write	Default value	Min/Max	Note
Start limit fan start/stop (ppm)	W	800	0/2000	
Stop hysteresis fan start/stop (ppm)	W	160	0/2000	
Demand control	R			
Min time for CO2 control (min)	W	20	0/600	



## Free cooling

Read more about free cooling in 3.6 *Free cooling*.

Table 4-32 Settings for free cooling

Variable	Read/Write	Default value	Min/Max	Note
Free cooling mode	R			
Running if day outdoor temperature > (°C)	W	22	10/40	
Stop if night outdoor temperature > (°C)	W	18	10/40	
Stop if night outdoor temperature < (°C)	W	10	10/40	
Stop if room temperature < (°C)	W	18	10/40	
Free cooling start hour (h)	W	0	0/23	
Free cooling stop hour (h)	W	7	1/24	
Time to block heat output after free cooling (min)	W	60	0/600	
Fan-kick temperature check (s)	W	180	0/3600	
Fan-kick interval time (min)	W	60	0/600	
Start when extract - outdoor > (°C)	W	2	1/5	

## Support control

Read more about support control in 3.7 *Support control*.

Table 4-33 Settings for support control

Variable	Read/Write	Default value	Min/Max	Note
Support control mode	R			
Min time for support control (min)	W	20	0/600	
Start heating room temperature (°C)	W	15	10/40	
Stop heating room temperature (°C)	W	21	10/40	
Setpoint heating (°C)	W	30	-20/150	
Start cooling room temperature (°C)	W	30	10/40	
Stop cooling room temperature (°C)	W	28	10/40	
Setpoint cooling (°C)	W	12	-20/150	

### 4.4.5 PID controllers

Ventilation

PID controllers

Room air controller

Extract air contr.

CO2
Heater
Exch. /Mix. Damper
Cooler
Add. heater
Freeze protection
Defrosting

### Room air controller

Table 4-34 Settings for PID-control - Room air control

Variable	Read/Write	Default value	Min/Max	Note
P-band	W	100	0/1000	
I-time (s)	W	300	0/9999	

### Extract air controller

Table 4-35 Settings for PID-control - Extract air control

Variable	Read/Write	Default value	Min/Max	Note
P-band	W	33	0/1000	
I-time (s)	W	100	0/9999	

### CO2

Table 4-36 Settings for PID-control - CO2

Variable	Read/Write	Default value	Min/Max	Note
P-band	W	100	0/1000	
I-time (s)	W	100	0/9999	
D-time (s)	W	0	0/9999	

### Sequence A to D

Table 4-37 Settings for PID-control - Sequence A to D

Variable	Read/Write	Default value	Min/Max	Note
P-band	W	10	0/1000	
I-time (s)	W	100	0/9999	
D-time (s)	W	0	0/9999	

## Freeze protection

Table 4-38 Settings for PID-control - Freeze protection

Variable	Read/Write	Default value	Min/Max	Note
P-band	W	100	0/1000	
I-time (s)	W	100	0/9999	
D-time (s)	W	0	0/9999	

## Defrosting

Table 4-39 Settings for PID-control - Defrosting

Variable	Read/Write	Default value	Min/Max	Note
P-band	W	16	0/1000	
I-time (s)	W	240	0/9999	
D-time (s)	W	0	0/9999	

### 4.4.6 Manual / Auto

Ventilation

Manual/Auto

Ventilation unit

Fan controls

Heater

Exch. /Mix. Damper

Cooler

Add. heater

Change Over

Supply air fan

Extract air fan

Outdoor Air Damper

Exhaust Air Damper

Sum Alarm

Extra TC

Free cooling indic.

Running indication

## Ventilation unit

Table 4-40 Settings for ventilation unit

Variable	Alternatives	Read/Write	Note
Mode	<ul style="list-style-type: none"> <li>✓ Off</li> <li>✓ Auto</li> <li>✓ Low speed</li> <li>✓ Normal speed</li> <li>✓ High speed</li> </ul>	W	

## Fan controls

Table 4-41 Settings for fan controls

Variable	Alternatives	Note
Supply air fan (SAF) mode	<ul style="list-style-type: none"> <li>✓ Off</li> <li>✓ Manual output</li> <li>✓ Auto</li> <li>✓ Manual setpoint</li> <li>✓ Low speed</li> <li>✓ Normal speed</li> <li>✓ High speed</li> </ul>	
Manual setpoint (%)	Writable	
Manual output (%)	Writable	
Extract air fan (EAF)	<ul style="list-style-type: none"> <li>✓ Off</li> <li>✓ Manual output</li> <li>✓ Auto</li> <li>✓ Manual setpoint</li> <li>✓ Low speed</li> <li>✓ Normal speed</li> <li>✓ High speed</li> </ul>	
Manual setpoint (%)	Writable	
Manual output (%)	Writable	

## Sequence A to D (Heater, Exchanger/Mixed Damper, Cooler, Additional heater)

Table 4-42 Settings for sequence A to D

Variable	Alternatives	Note
<b>Sequence output</b>		
Mode	<ul style="list-style-type: none"> <li>✓ Manual</li> <li>✓ Auto</li> </ul>	
Manual (%)	Writable	
Actual value (%)	Read only	
<b>Analog output</b>		
Mode	<ul style="list-style-type: none"> <li>✓ Off</li> <li>✓ Manual</li> <li>✓ Auto</li> </ul>	
Manual (%)	Writable	
Output (%)	Read only	
<b>Pump</b>		

Table 4-42 Settings for sequence A to D (continued)

Variable	Alternatives	Note
Mode	<ul style="list-style-type: none"> <li>✓ Manual</li> <li>✓ Auto</li> </ul>	
Start	<ul style="list-style-type: none"> <li>✓ On</li> <li>✓ Off</li> </ul>	
<b>Start</b>		
Mode	<ul style="list-style-type: none"> <li>✓ Off</li> <li>✓ On</li> <li>✓ Auto</li> </ul>	
Start	Read only	

## Change-over

Table 4-43 Settings for change-over, Supply air fan, Extract air fan

Variable	Alternatives	Note
Mode	<ul style="list-style-type: none"> <li>✓ Off</li> <li>✓ Manual</li> </ul>	
Manual set (%)	Writable	
Controller output (%)	Read only	
<b>Start</b>		
Mode	<ul style="list-style-type: none"> <li>✓ Off</li> <li>✓ Manual</li> <li>✓ Auto</li> </ul>	
Start	Read only	

## Supply and Extract air fan

Table 4-44 Settings for supply and extract air fan

Variable	Alternatives	Note
<b>Signal fan</b>		
Mode	<ul style="list-style-type: none"> <li>✓ Off</li> <li>✓ On</li> <li>✓ Auto</li> </ul>	
Manual set (%)	Writable	
Output	Read only	
<b>Start fan</b>		
Mode	<ul style="list-style-type: none"> <li>✓ Off</li> <li>✓ Manual</li> <li>✓ Auto</li> </ul>	
Start	Read only	

## Dampers

- ✓ Outdoor air damper
- ✓ Exhaust air damper

Table 4-45 Settings for dampers

Variable	Alternatives	Note
Mode	<ul style="list-style-type: none"> <li>✓ Off</li> <li>✓ On</li> <li>✓ Auto</li> </ul>	
Start	Read only	

### Sum Alarm

Table 4-46 Settings for alarms

Variable	Alternatives	Note
Mode	<ul style="list-style-type: none"> <li>✓ Off</li> <li>✓ On</li> <li>✓ Auto</li> </ul>	
Start	Read only	

### Extra time channel

Table 4-47 Settings for extra time channel

Variable	Alternatives	Note
Mode	<ul style="list-style-type: none"> <li>✓ Off</li> <li>✓ On</li> <li>✓ Auto</li> </ul>	
Start	Read only	

### Free cooling indication

Table 4-48 Settings for free cooling indication

Variable	Alternatives	Note
Mode	<ul style="list-style-type: none"> <li>✓ Off</li> <li>✓ On</li> <li>✓ Auto</li> </ul>	
Start	Read only	

### Running indication

Table 4-49 Settings for running indication

Variable	Alternatives	Note
Mode	<ul style="list-style-type: none"> <li>✓ Off</li> <li>✓ On</li> <li>✓ Auto</li> </ul>	
Start	Read only	

## 4.4.7 Status

Ventilation

Status

- Ventilation Unit
- Heater
- Exch. /Mix. Damper
- Cooler
- Add. heater
- Timer channel

Status for the ventilation unit, sequences A to D and timer channels.

<b>Ventilation unit</b>	<ul style="list-style-type: none"> <li>✓ Operation mode</li> <li>✓ Schedule</li> <li>✓ Manual mode</li> <li>✓ External stop</li> <li>✓ Extended operation Mode</li> <li>✓ Time left</li> <li>✓ Free cooling mode</li> <li>✓ Support control mode</li> <li>✓ Night operation active last night</li> <li>✓ Summer mode</li> <li>✓ Fire alarm input</li> </ul>
<b>Sequence A to D</b>	<ul style="list-style-type: none"> <li>✓ Output (%)</li> <li>✓ Pump</li> <li>✓ Start</li> </ul>
<b>Timer channels</b>	Timer channel: On/Off

## 4.5 Alarm events

In the **Alarm Events** menu, there is an alarm log which contains the 100 latest alarm events. The latest event is shown at the top of the list. The alarm log is only used to view alarm history, which may simplify troubleshooting of the installation.

## 4.6 Time settings

- Time settings
  - Time schedule
    - Fan low speed
    - Fan normal speed
    - Fan high speed
  - Extra time channel
- Holiday schedule
  - Holiday calendar

Time/Date

Optigo<sup>Ardo</sup> 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 an automatic summertime/wintertime change-over.

It has individual schedules for each weekday plus a separate holiday setting. Up to 24 individual holiday periods can be configured. A holiday period can be anything from one day up to 365 days. Holiday schedules take precedence over other schedules.

This menu displays time, date and weekday, and it permits the setting of time and date.

Time is shown in 24 hour format.

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

Each day has up to four individual running periods. For fans there are daily individual schedules for low speed, normal speed and high speed, each with up to four running periods.

One digital output can be used as a timer controlled output with individual week-schedules and four activation periods per day. This output can be used to control lighting, door locks etc.

In the time schedules, four periods are available for each day of the week. Also, four periods are available for days that are configured as holidays in the holiday schedule. During the periods the assigned circuit is working with the corresponding setpoint. Outside of a period the system is off.

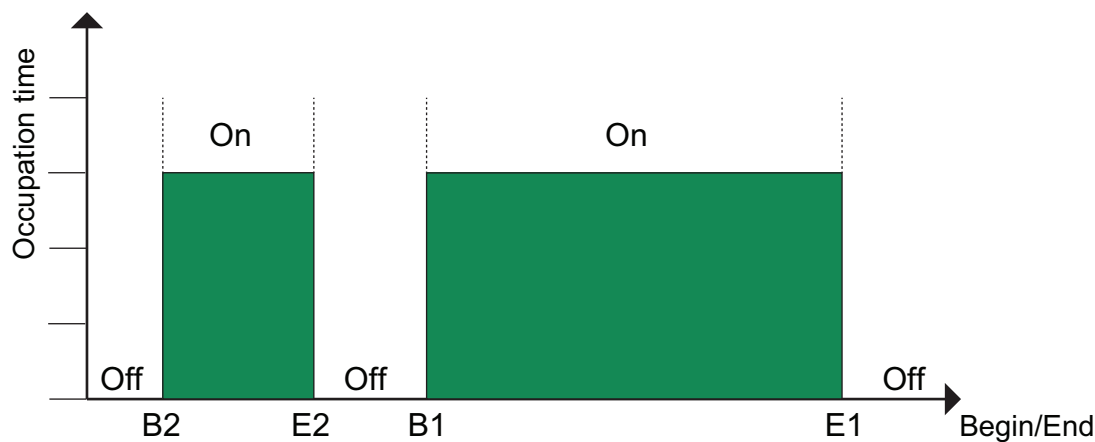


Figure 4-3 Time schedule

The above figure shows an example of period states. It is not possible for periods to overlap each other.

Holiday schedules take precedence over other schedules.

- ✓ For 24 hour running, set a period to 00:00 - 24:00.
- ✓ To inactivate a period, set the time to 00:00 - 00:00. If all periods of a day are set to 00:00 - 00:00, the unit will not run that day.
- ✓ If you want to run the unit from one day to another, e.g. from Monday 22:00 to Tuesday 09:00, the desired running time for both must be entered.



**Note!** Should periods for the different speeds overlap, high speed takes precedence over normal speed, and normal speed takes precedence over low speed.



### 4.6.1 Extra time channel

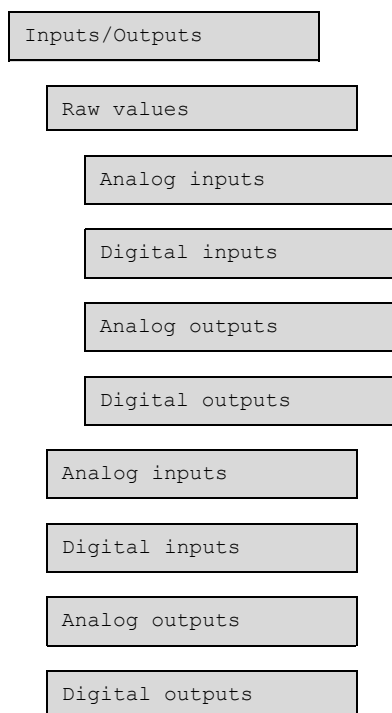
One digital output can be used as a timer controlled output with individual week-schedule and four activation periods per day.

### 4.6.2 Holiday calendar

The system operator can define specific periods of operation or non-operation throughout the year. During these defined periods, the settings in the week schedule do not apply. The holiday calendar includes 24 periods. All holiday periods are working with a special day plan with a maximum of 4 periods.

A holiday period can be any number of consecutive days from 1...365. The dates are in the format: MM:DD.

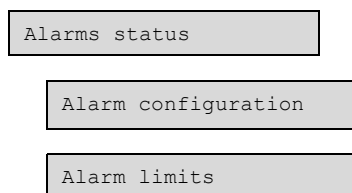
## 4.7 Inputs/Outputs



In this section, the values for all used Inputs and outputs are displayed.

There are also the raw values for the inputs and outputs (*Inputs/Outputs* ► *Raw values*)

## 4.8 Alarms status



Alarms are indicated by the red alarm LED on the front of the unit .

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

The **Alarm configuration** menu permits configuration of the priority for all alarms.

### 4.8.1 Alarm configuration

The alarm configuration menu permits configuration of the priority for all alarms. A complete alarm list with default settings and actions, can be found in *Appendix D Alarm list*. It contains all the default alarm texts and priorities.

#### Priority

Alarms can be given different priority levels **A-alarm**, **B-alarm** and **C-alarm** or **Not active**. The A- and B-alarms are connected to the digital output **sum alarm**. The digital output can be inverted, so that an inoperative alarm gives a high output and vice versa. A- and B-alarms must be acknowledged to reset. C-alarms automatically reset as soon as there is no longer a cause for alarm.

#### Stop function

Each alarm offers the possibility to choose whether an activated alarm should stop the controller or not (**Extra stop function**). The controller can also be set to run at reduced speed during alarms. Automatic restart will take place when the alarm has been acknowledged.

For some alarm types such as **Electric heating overheated** and **Warning freeze protection** it would be dangerous to not stop the unit on alarm. Therefore, for such alarm types, the program will always reset the stop function to **Active** even if the operator should choose **Inactive**.

Unfortunately it is not possible to remove the display text concerning the stop function for these alarm types. This is because the available program space demands that all alarms are treated in the same way in the display.



---

**Note!** For alarms that have been set to **Inactive**, the extra stop function should also be set to **Inactive**, or unexpected malfunctions may occur.

---

### 4.8.2 Sum alarm

There is one sum alarm function with one digital output.

- ✓ A and B alarms all activate the sum alarm output, if it has been configured.
- ✓ Class C alarms are removed from the alarm list when the alarm input resets even if the alarm has not been acknowledged.

Table 4-50 Sum alarm

Inputs and outputs	
DO	Sum alarm

### 4.8.3 Alarm limits

[Alarm status►Alarm limits]

The only alarm limit that can be set is the **Deviation alarm for supply air temperature**.

## 4.9 Access rights

Access rights

```
Log on
```

```
Log off
```

```
Change password
```

The controller has four different access levels. The choice of access level determines which menus are shown, as well as which parameters can be changed in the displayed menus.

- ✓ **Guest** level does not require logging on, and only permits changes in running mode and gives read-only access to a limited number of menus.
- ✓ **Operator** level gives the same access as **Guest** level, and in addition, access to change setpoints.
- ✓ **Service** level gives the same access as **Operator** level, and in addition, access to change controller settings and manual mode.
- ✓ **Admin** level gives full read/write access to all settings and parameters in all menus.

#### 4.9.1 Log on

1. Browse to **Access Rights** in the main menu and press **[▶]**.

```
Log on
Log off
Change password
```

2. Select **Log on** and press **[▶]**.

```
Log on
Enter password:****
Actual level:
None
```

3. Press **[OK]** to make a cursor marker appear at the first digit position.
4. Enter the password (4-digit code) by pressing **[▲]** until the correct digit is displayed. Press the **[▶]** to move to the next position. Repeat the procedure until all four digits are displayed, and press **[OK]** to confirm.

#### 4.9.2 Change password

1. Go to **Access Rights** in the main menu and press **[▶]**.
2. Select **Change password** and press **[▶]**.

```
Change password for
level:Operator
New password: ****
```

3. Select **Yes** and press **[OK]**
4. Press **[OK]** to enter change mode.
5. Use the **[▲]** and **[▼]** buttons to browse and select the access level to change the password for, and press **[OK]** to confirm.

6. Enter the new password (4-digit code) by pressing [**▲**] until the correct digit is displayed. Press the [**▶**] to move to the next position. Repeat the procedure until all four digits are displayed, and press [**OK**] to confirm.

The following passwords are the default for the different access levels:

Access level	Password
Admin	1111
Service	2222
Operator	3333

You can only change the password for access levels lower or equal to the presently active level, i.e. if you are logged in as **Admin** you can change all passwords, but as **Operator** you can only change the **Operator** password.



**Caution!** Do not set the password for two different access levels to the same value, as this would prevent access to the higher of these two access levels. This is especially important for the **Admin** level.

---



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

---

## 5 Information for the installer

### 5.1 Installation

#### 5.1.1 Optigo<sup>Ardo</sup>

The controller 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.

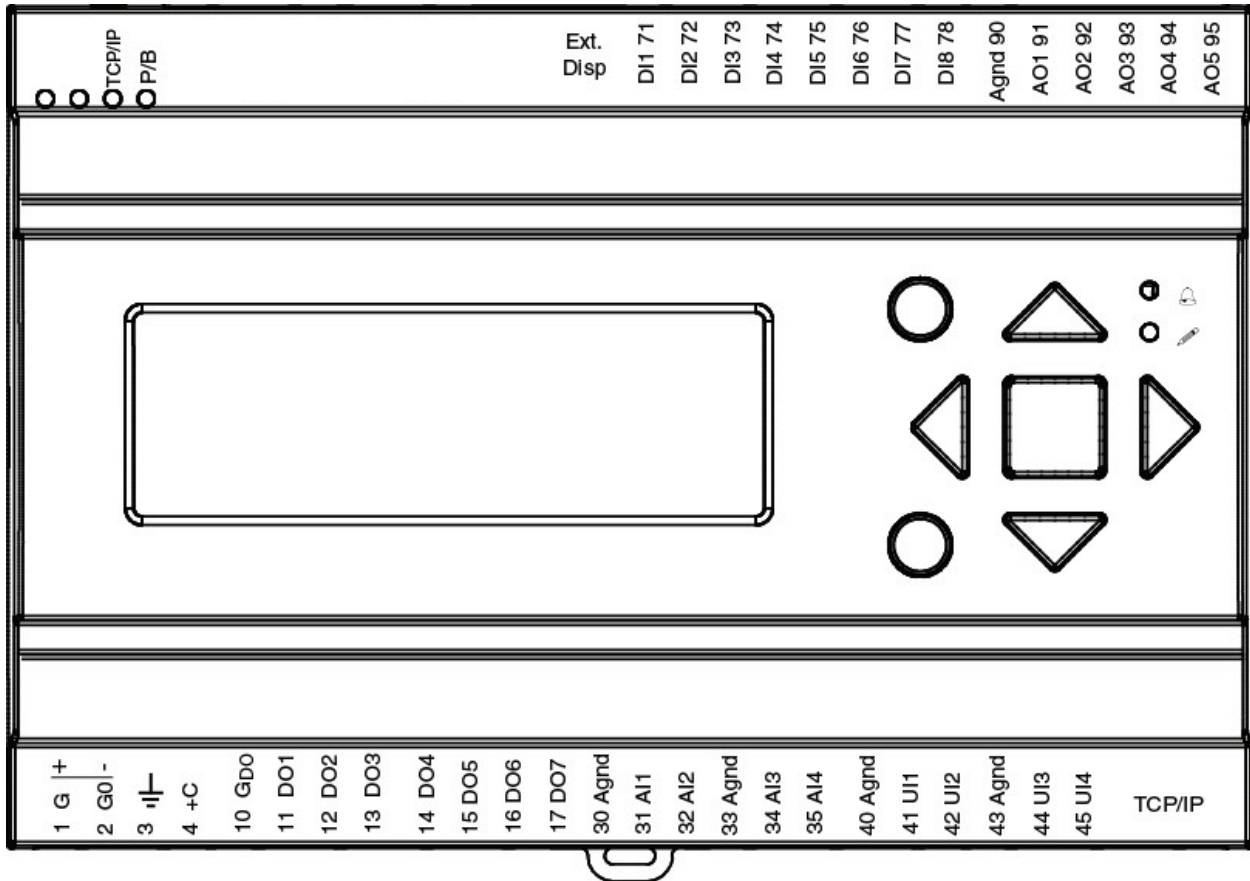


Figure 5-1 Optigo<sup>Ardo</sup>



**Caution!** Before removing the controller from the terminal block, be sure to switch off the supply voltage.



**Caution!** It is important to ensure that the wiring is performed correctly and in accordance with the instructions given in this manual.

### Wiring examples

For a complete list of terminals, see *Appendix E Terminal lists*.

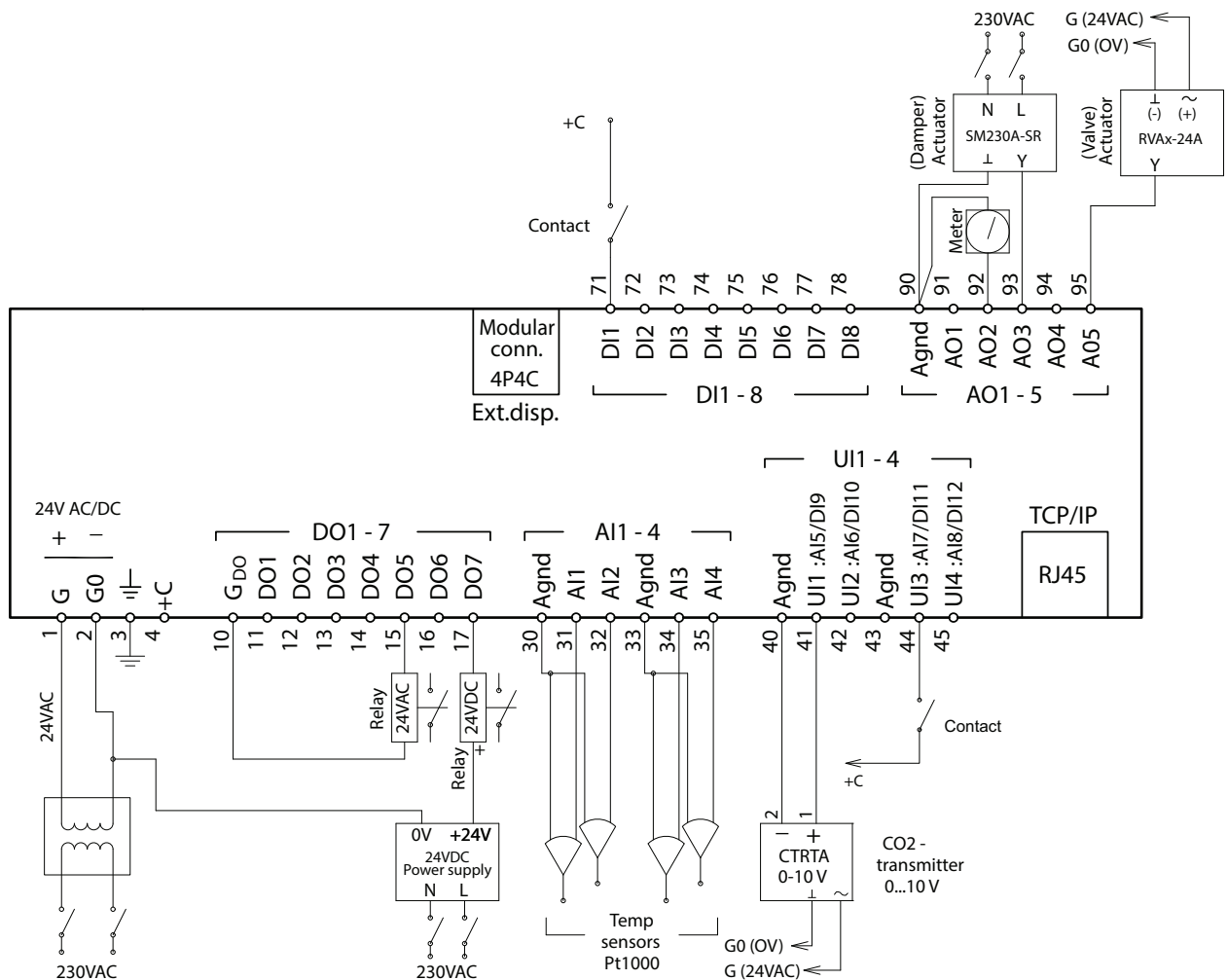


Figure 5-2 Wiring

## Inputs and outputs

There is a list of input and outputs in *Appendix C Input and output lists* that can be used to help you keep track of which inputs and outputs you need to configure.

## Analog inputs

Analog inputs must refer to an **Agnd** terminal.

Analog inputs can, depending on the configuration, be used for either PT1000 / Ni1000 temperature sensors or for 0...10 V DC analog 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 analog input or as a digital input.

A universal input configured as an analog input can, depending on the configuration, be used for either PT1000 / Ni1000 temperature sensors or for 0...10 V DC analog input signals, for example from a pressure transmitter.

Universal inputs configured as an analog input must refer to an **Agnd** terminal.

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

### Analog outputs

Analog outputs must refer to a **Agnd** terminal.

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

- ✓ 0...10 V DC
- ✓ 2...10 V DC
- ✓ 10...0 V DC
- ✓ 10...2 V DC



**Caution!** If the controller and its connected actuators share the same transformer, it is essential that the same transformer pole is used as reference for all the equipment. The equipment may otherwise not function as intended and may also suffer damages.

### Digital outputs

Digital outputs should normally refer to **G<sub>DO</sub>** on terminal 10. **G<sub>DO</sub>** 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 with **G<sub>0</sub>** and can deliver max 2 A per output. However, the total power for all the DOs must not exceed 8 A.

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

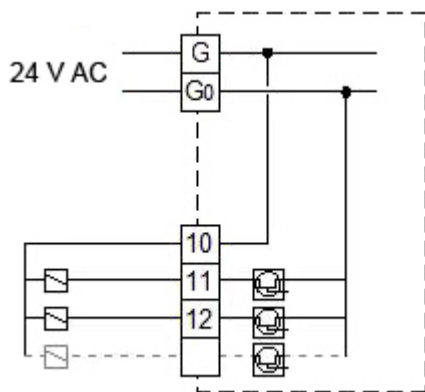


Figure 5-3 24 V AC supply and 24 V AC relays

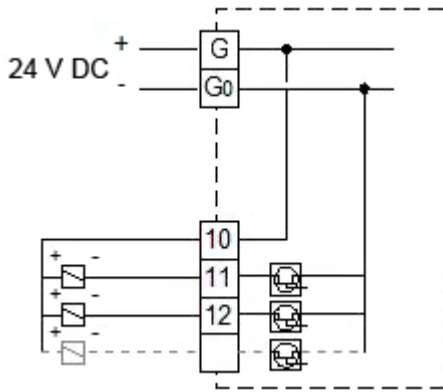


Figure 5-4 24 V DC supply and 24 V DC relays

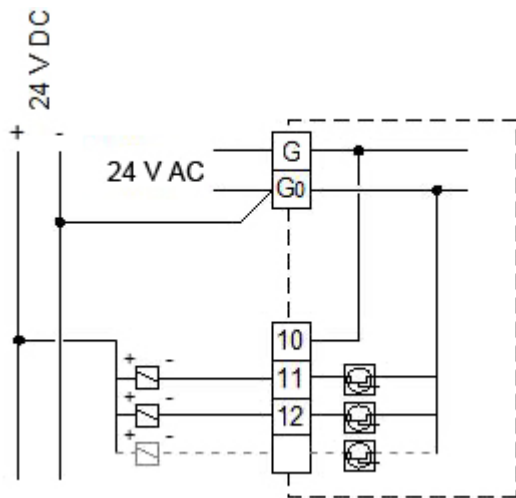


Figure 5-5 24 V AC supply and 24 V DC relays

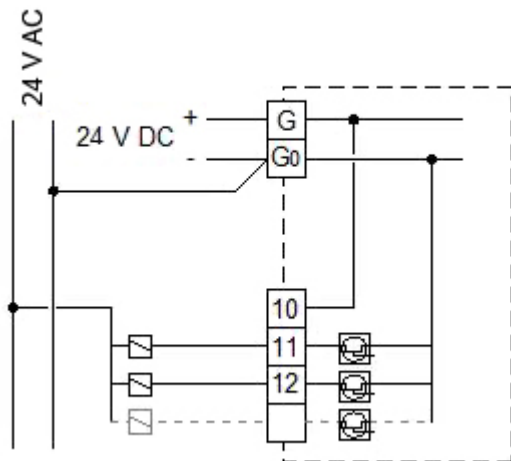


Figure 5-6 24 V DC supply and 24 V AC relays



## 5.2 Commissioning

To commission the controller, start by selecting a configuration suitable for your application.

Some of the parameters in the configuration can be changed, for example temperature setpoints. Change the setpoints if needed.

## 5.3 Resetting the controller

Reset the controller by pressing the reset button, using for example a paper clip.



**Note!** If the factory settings and user settings have been saved, a reset will not clear them.

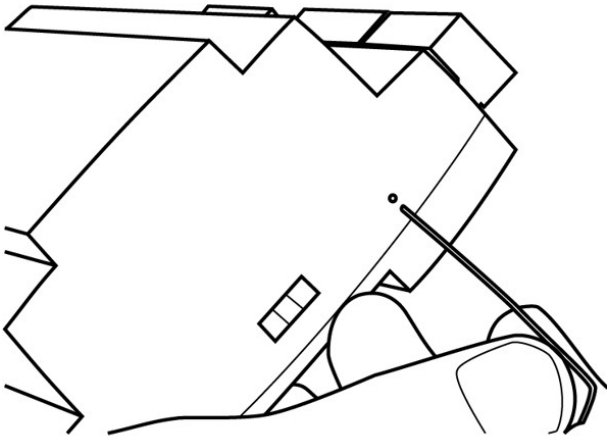


Figure 5-7 Resetting the controller

## Appendix A technical data

### A.1 Optigo<sup>Ardo</sup>

#### A.1.1 General data

Supply voltage	24 V AC (21...27 V AC) 50...60 Hz / 20...36 V DC
Power consumption	See <i>Table B-1 Optigo Ardo Models</i> in <i>Appendix B Model overview</i>
Ambient temperature	0...50 °C
Ambient humidity	Max. 95 % RH
Storage temperature	-20...70 °C
Protection class	IP20
Connection	Disconnectable terminal strips, 4 mm <sup>2</sup>
Memory backup	Built-in long life battery gives long backup time of all settings incl. real time
Display	Backlit LCD, 4 rows of 20 characters
Mounting	DIN-rail or cabinet
Casing	Standard Euronorm (8.5 modules wide)
Dimensions (WxHxD)	149 x 121 x 60 mm incl. terminals
Battery type	CR2032 replaceable Lithium cell
Battery life	Min. 5 years
Operating system	EXOrealC

#### A.1.2 Ethernet port data

Port type	Ethernet
Default protocol	EXOline-TCP
Supported protocols	EXOline-TCP

#### A.1.3 Inputs & outputs

Analog inputs (AI)	For PT1000 or Ni1000 sensors (accuracy $\pm 0.4$ °C) or 0...10 V DC (accuracy $\pm 0.15$ % of full output signal). 12 bit resolution in the A/D conversion.
Digital inputs (DI)	For potential-free contacts
Universal inputs (UI)	Can be set to act as either analog input or digital input with specifications as above
Analog outputs (AO)	0...10 V DC, 5 mA, short-circuit protected
Digital outputs (DO)	Mosfet outputs, 24 V AC or DC, 2 A continuous. Max. 8 A in total.

## Appendix B Model overview

Name	Supply voltage	Description
OPA151D-4	24 V	Ardo controller with 15 IOs
OPA281D-4	24 V	Ardo controller with 28 IOs

Table B-1 Optigo Ardo Models

Name	AI	DI	UI*	AO	DO	RS485 ports	Ethernet ports	Display	Power consumption (VA)
OPA151D-4	4	4	0	3	4	0	1	Yes	9 VA
OPA281D-4	4	8	4	5	7	0	1	Yes	9 VA

\* Universal inputs can be configured to function as either analog or digital inputs.

## Appendix C Input and output lists

The lists below are intended to be used as a memory aid during configuration, in order to help keep track of the desired input and output functions.

The left column contains a description of the in-/output signal and the right column shows the text displayed in the controller.

### C.1 Analog inputs

✓	Description	Name in display
	Outdoor temperature sensor	Outdoor temperature
	Supply air temperature sensor	Supply air temperature
	Extract air temperature sensor	Extract air temperature
	Room temperature sensor	Room temperature
	De-icing temperature heat exchanger	Defrosting temperature
	Frost protection temperature sensor	Freeze protection temperature
	CO2/VOC sensor	CO2 room/extract air
	External supply setpoint (PT1000)	External setpoint temperature

### C.2 Digital inputs

✓	Description	Name in display
	Supply air fan motor protection/run indication	Feedback supply air fan
	Extract air fan motor protection/run indication	Feedback extract air fan
	Extended operation low speed	Extended operation low speed
	Extended operation normal speed	Extended operation normal speed
	Extended operation high speed	Extended operation high speed
	Fire alarm	Fire alarm
	Electric heating is overheated	Overheated electric heater
	External stop	External stop
	Flow switch	Flow guard
	change-over signal, switches between heating=0 and cooling=1 on the output signal	Cooling/(heating) Change-over
	Filter guard 1 supply air	Filter guard supply air
	Filter guard 2 extract air	Filter guard extract air
	Summer mode	Summer/(Winter) mode

### C.3 Universal inputs

Universal inputs on the controller can be individually configured as either analog inputs, using any of the analog inputs in *C.1 Analog inputs*, or as digital inputs, using any of the digital inputs in *C.2 Digital inputs*.

## C.4 Analog outputs

✓	Description	Name in display
	Sequence A output in (%)	Sequence A
	Sequence B output in (%)	Sequence B
	Sequence C output in (%)	Sequence C
	Sequence D output in (%)	Sequence D
	change-over (%)	Change-over
	Control signal Supply air fan in (%)	Supply air fan
	Control signal Extract air fan in (%)	Extract air fan

## C.5 Digital outputs

✓	Description	Name in display
	Sequence A Pump Start	Sequence A pump
	Sequence B Pump Start	Sequence B pump
	Sequence C Pump Start	Sequence C pump
	Sequence D Pump Start	Sequence D pump
	Sequence A PWM	Sequence A PWM
	Sequence B PWM	Sequence B PWM
	Sequence C PWM	Sequence C PWM
	Sequence D PWM	Sequence D PWM
	Start supply air fan / Start step 1 supply air fan	Supply air fan start / step 1
	Start step 2 supply air fan	Supply air fan step 2
	Start extract air fan/ Start step 1 extract air fan	Extract air fan start/step 1
	Start step 2 extract air fan	Extract air fan step 2
	Outdoor air close-off damper	Outdoor air damper
	Exhaust air close-off damper	Exhaust air damper
	Sum alarm	Sum alarm
	Time Channel 1	Extra time channel 1
	Free Cool Run	Free cooling indication
	Run indication	Running indication
	Start change-over	Changeover start

## Appendix D Alarm list

The alarm text, priority and delay columns show the factory set values.

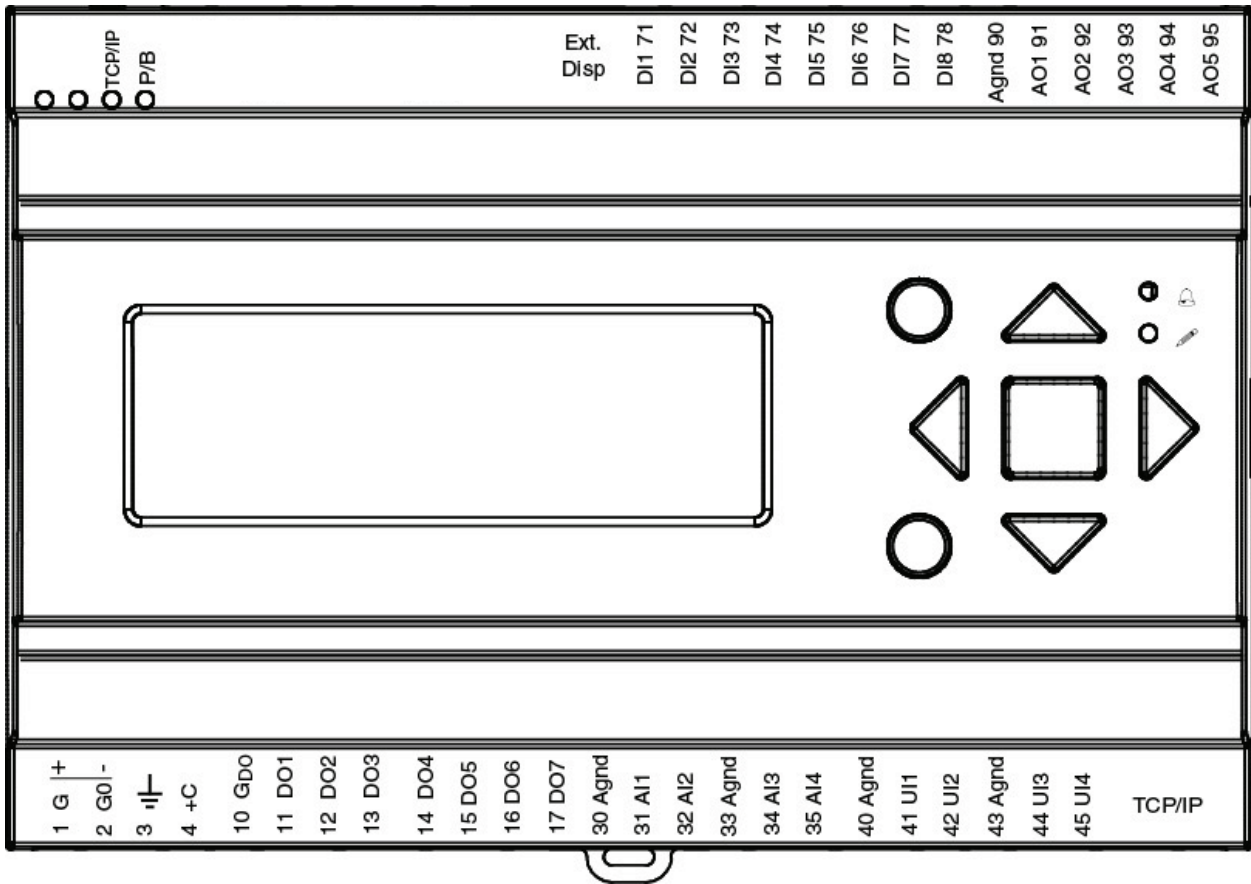
### D.1

Alarm text	Prio	Delay	Limit	Description
Malfunction supply air fan	B	120s		Malfunction supply air fan
Malfunction extract air fan	B	120s		Malfunction extract air fan
Filter alarm supply air	B	180s		Filter alarm supply air pressure switch
Filter alarm extract air	B	180s		Filter alarm extract air pressure switch
Fire alarm	A	0s		Fire alarm activated
Electric heating is overheated	A	0s		Heater high temperature limit switch activated
Warning freeze protection	B	0s		Frost protection function is overriding the control of the heater output
Defrosting alarm	-	2s		Exchanger deicing activated by deicing sensor
Internal battery error	A	0s		Internal battery needs replacing
Restart blocked after power on	B	0s		Restart blocked due to earlier power failure
Deviation alarm supply air temp.	B	30min	10 °C	Supply air temp deviates too much from the setpoint
Freeze protection alarm	A	0s		Frost protection temperature below frost limit value
Manual operation air handling unit	C	0s		The unit is in manual mode
Manual operation supply air	C	0s		Supply air temp controller in manual control
Manual operation supply air fan	C	0s		Supply air fan in manual control
Manual operation extract air fan	C	0s		Extract air fan in manual control
Manual operation heater	C	0s		The heater is in manual mode
Manual operation exchanger	C	0s		Heat exchanger output in manual control
Manual operation cooler	C	0s		Cooling output in manual control
Manual operation damper	C	0s		Damper output in manual control
Manual operation pump heater	C	0s		Heating circulation pump in manual control
Manual operation pump cooler	C	0s		Cooling circulation pump in manual control
Manual operation damper outdoor air	C	0s		Fresh air damper in manual control
Manual operation damper exhaust air	C	0s		Exhaust air damper in manual control
Manual control sequence A	-	0s		Manual control of sequence A
Manual control sequence B	-	0s		Manual control of sequence B
Manual control sequence C	-	0s		Manual control of sequence C

Alarm text	Prio	Delay	Limit	Description
Manual control sequence D	-	0s		Manual control of sequence D
Output in manual operation	C	0s		Analog or digital output in manual mode
Sensor error outdoor air temperature	B	5s		Malfuction in connected sensor
Sensor error supply air temperature	B	5s		Malfuction in connected sensor
Sensor error extract air temperature	B	5s		Malfuction in connected sensor
Sensor error room temperature	B	5s		Malfuction in connected sensor
Sensor error defrosting temperature	B	5s		Malfuction in connected sensor
Sensor error freeze protect. temp.	B	5s		Malfuction in connected sensor
Sensor error CO2 room/ extract air	B	5s		Malfuction in connected sensor
Sensor error external temp. setpoint	B	5s		Malfuction in connected sensor
Internal error	C	60s		Internal error

## Appendix E Terminal lists

### E.1 Optigo<sup>Ardo</sup>



Terminal	I/O	Hardware model		Notes
		A15	A28	
1	Power supply G+	✓	✓	
2	Power supply G0-	✓	✓	
3	Earth	✓	✓	
4	DI common +C	✓	✓	
10	DO common GDO	✓	✓	
11	DO1	✓	✓	
12	DO2	✓	✓	
13	DO3	✓	✓	
14	DO4	✓	✓	
15	DO5	-	✓	
16	DO6	-	✓	
17	DO7	-	✓	
30	Analog ground	-	✓	
31	AI1	✓	✓	
32	AI2	✓	✓	
33	Analog ground	✓	✓	
34	AI3	✓	✓	
35	AI4	✓	✓	
40	Analog ground	-	✓	



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41	UAI1	-	✓	
42	UAI2	-	✓	
43	Analog ground	-	✓	
44	UAI3	-	✓	
45	UAI4	-	✓	
71	DI1	✓	✓	
72	DI2	✓	✓	
73	DI3	✓	✓	
74	DI4	✓	✓	
75	DI5	-	✓	
76	DI6	-	✓	
77	DI7	-	✓	
78	DI8	-	✓	
90	Analog ground	✓	✓	
91	AO1	✓	✓	
92	AO2	✓	✓	
93	AO3	✓	✓	
94	AO4	-	✓	
95	AO5	-	✓	



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