1104_1000_EN

INSTALLATION INSTRUCTIONS
OPTION 1xxx

Comfort Regulation (Carel pCO)
Detailed instructions

RZAHUC program version 1.1
Regulation for Reznor Air Handling Units

INDEX

1. Introduction

1.1. Main features

Reznor OP1XXX comfort regulation is the digital integrated solution for Reznor air handling units (such as Preeva, RP, ...). This regulation features:

- Control of gas heating (one stage, two stages or modulating)
- Control of (reversible) condensing unit (up to two stages)
- Control of combined water coil (cooling/heating) with reversible chiller control
- Control of (speed controlled) supply and return fans
- Control of air mixing dampers
- Control of heat recovery system
- Room and duct temperature control
- Free cooling / free heating
- Setpoint compensation
- pLan network between controllers
- Connection to BMS systems as slave (Modbus, Carel, Bacnet, Lon)
- Easy configuration through graphic display
- No extra switches or relays necessary

1.2. Components

The following list describes most common parts (and Reznor part numbers) that are used in this comfort regulation.

- Transformer 230V/400V-24V 30VA (03 25070 030)
- pCO Compact controller
  - Type A without display (03 25020 04)
  - Type B without display (03 25020 05)
  - Type A with integrated pGD1 display (03 25025 04)
  - Type B with integrated pGD1 display (03 25025 05)
- pGD1 graphic display
  - wall mounted (03 25028)
  - panel mounted (03 25027)
- Room temperature probe NTC (03 25039 02)
- Duct temperature probe NTC (03 25042 02)
- Outside temperature probe NTC (03 25045 02)
- CO_2-sensor (03 25048 06)

1.3. Configurations

Depending of the configuration of the air handling unit, the regulation will be matched to this configuration.

OP1110	Two stage gas heater with modulating mixed air regulation (and free-cooling), dirty filter control, flow control. The capacity is regulated at room and duct temperature and compensated with the outside air temperature.
OP1120	Modulating gas heater with modulating mixed air regulation (and free-cooling), dirty filter control, flow control. The capacity is regulated at room and duct temperature and compensated with the outside air temperature.
OP1111	Two stage gas heater en two stage (reversible) regulation for condensing unit with modulating mixed air regulation (and free cooling), dirty filter control, flow control. The capacity is regulated at room and duct temperature and compensated with the outside air temperature.
OP1121	Modulating gas heater and two stage (reversible) regulation for condensing unit with modulating mixed air regulation (and free cooling), dirty filter control, flow control. The capacity is regulated at room and duct temperature and compensated with the outside air temperature.
OP1112	Two stage gas heater and (reversible) regulation for chiller (with modulating water valve) with modulating mixed air regulation (and free cooling), dirty filter control, flow control. The capacity is regulated at room and duct temperature and compensated with the outside air temperature.
OP1122	Modulating gas heater and (reversible) regulation for chiller (with modulating water valve) with modulating mixed air regulation (and free cooling), dirty filter control, flow control. The capacity is regulated at room and duct temperature and compensated with the outside air temperature.
OP1210	Two stage gas heater with cross flow heat exchanger (with modulating bypass), dirty filter control, flow control. The capacity is regulated at room and duct temperature and compensated with the outside air temperature.
OP1220	Modulating gas heater with cross flow heat exchanger (with modulating bypass), dirty filter control, flow control. The capacity is regulated at room and duct temperature and compensated with the outside air temperature.
OP1211	Two stage gas heater and two stage (reversible) regulation for condensing unit with cross-current heat exchanger (with modulating bypass), dirty filter control, flow control. The capacity is regulated at room and duct temperature and compensated with the outside air temperature.
OP1221	Modulating gas heater and two stage (reversible) regulation for condensing unit with cross-current heat exchanger (with modulating bypass), dirty filter control, flow control. The capacity is regulated at room and duct temperature and compensated with the outside air temperature.
OP1212	Two stage gas heater and (reversible) regulation for chiller (with modulating water valve) with cross current heat exchanger (with modulating bypass), dirty filter control, flow control. The capacity is regulated at room and duct temperature and compensated with the outside air temperature.
OP1222	Modulating gas heater and (reversible) regulation for chiller (with modulating water valve) with cross flow heat exchanger (with modulating bypass), dirty filter control, flow control. The capacity is regulated at room and duct temperature and compensated with the outside air temperature.

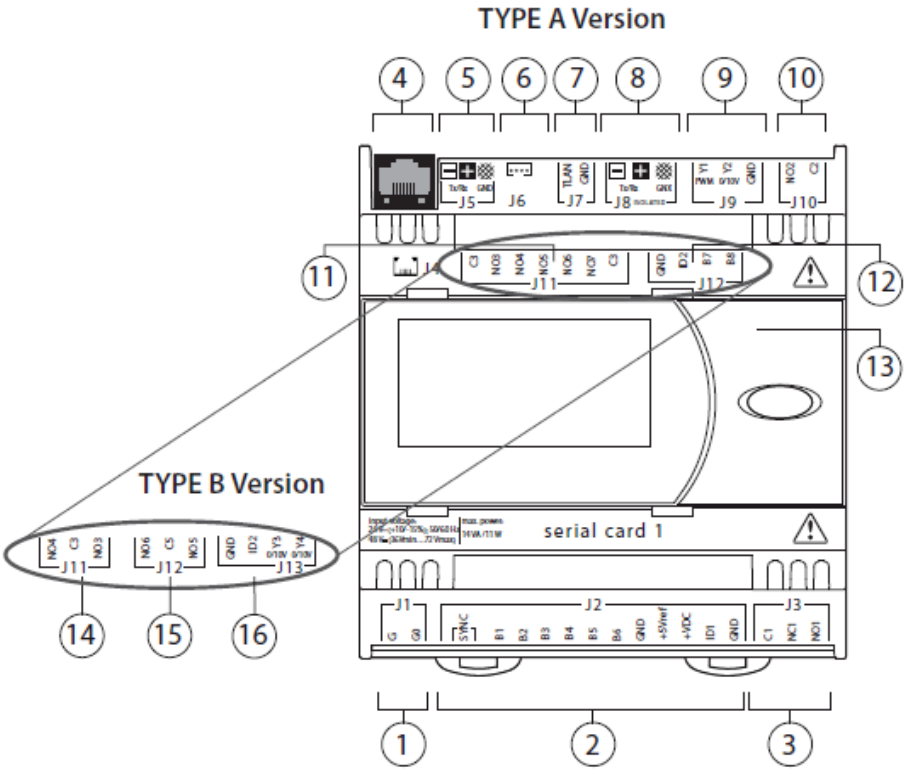
	1110	1120	1111	1121	1112	1122	1210	1220	1211	1221	1212	1222
Dirty filter control	■	■	■	■	■	■	■	■	■	■	■	■
Flow control	■	■	■	■	■	■	■	■	■	■	■	■
CO_2 control	●	●	●	●	●	●						
Fan speed control	●	●	●	●	●	●	●	●	●	●	●	●
Gas heating												
One stage	■	■	■	■	■	■	■	■	■	■	■	■
Two stage	■		■		■		■		■		■	
Mod. gas		■		■		■		■		■		■
Cooling/HP												
Condensing unit 2st			■	■					■	■		
Water coil mod.					■	■					■	■
Damper mng.												
Air mixing	■	■	■	■	■	■						
Heat recovery							■	■	■	■	■	■

■: standard

●: optional

2. Hardware and installation

2.1. Controller specifications

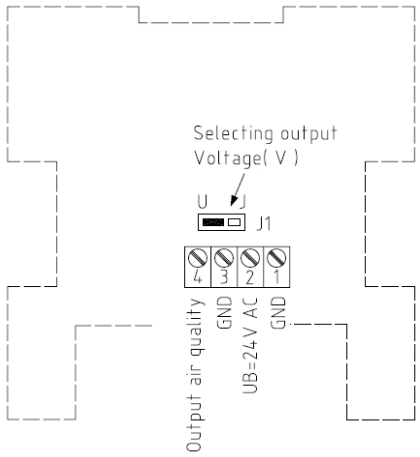


Legenda:	
1	power supply connector (G, G0) 24 Vac or 48 vdc (36 Vdc min...72 Vdc max)
2	"SYNC" synchronicity inputs for phase control and NTC, 0...1 V, 0 to 5 V, 0 to 20 mA, 4 to 20 mA +5 Vref for probe power supply, 5 V ratiometric and + VDC (+21 Vdc) for active probes
3	digital output
4	connector for all pCO series standard terminals and downloading the application program
5	pLAN connector
6	pLD terminal connector
7	tLAN connector
8	opto-isolated "Field-Bus" serial connector
9	0 to 10 V and PWM (phase control) analogue outputs
10	digital output
11	digital outputs (Type A)
12	NTC analogue inputs and digital inputs (Type A)
13	removable door to access the USB ports
14	digital outputs (Type B)
15	digital outputs (Type B)
16	digital input and analogue outputs 0 to 10 V (Type B)

2.2. Probe installation

The passive temperature probes (room, duct and outside temperature) consist of a simple NTC sensor. The two NTC probe wires are equivalent (as there is no polarity), therefore no special order needs to be followed when connecting to the terminal block.

The CO_2-sensor (OP1007 C 13) is an active probe with a 0-10V DC output. The sensor is connected with 3 wires (U_B, GND, Output). It is important that the output jumper is placed on *Voltage (V)* for 0-10V output.



All probes can be installed with the following types of cables:

- Up to 20m: LIYCY 0,34mm²
- Up to 50m: LIYCY 0,5mm²

One pair is required for the passive probes and two pairs for the active probes (CO_2-sensor)

The following connections must be made (see electrical diagram for more info):

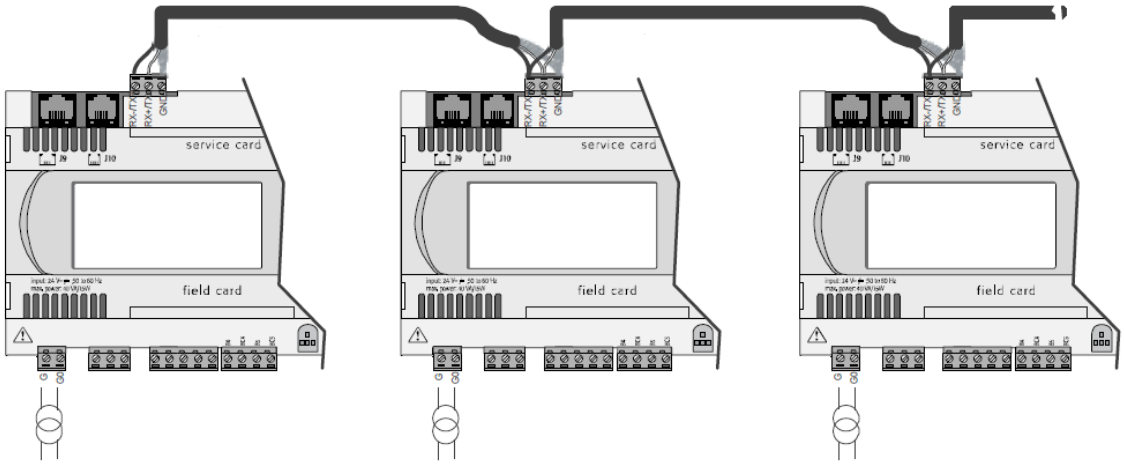
- Room temperature sensor
  - 54→NTC A
  - 57→NTC B
- Outside temperature sensor
  - 53→NTC A
  - 57→NTC B
- Duct temperature sensor
  - 52→NTC A
  - 57→NTC B
- CO_2-sensor (optional)
  - 51→4 Output air quality
  - 59→3 GND
  - 61→2 U_B 24V AC

Warning: Separate as much as possible the probe signal cables from the cables carrying inductive loads and power cables to avoid possible electromagnetic disturbance.

2.3. Graphic display and pLan network installation

The graphic display is connected via the proprietary pLan protocol directly to the pCO controller (connector J4) with a RJ12 (6-wires) telephone connector. This connection includes the power supply for the display.

The pLan connection between multiple Reznor units with OP1XXX is made with a three wire connection (connector J5). It is important that the shield of the cable is always connected to the GND pin.



The following cable types may be used:

- Up to 20m: LIYCY 0,34mm²
- Up to 200m: LIYCY 0,5mm²

One pair is required for the pLan network connection between units (without power supply) and three pairs are required for the connection of the graphic display.

Warning: Separate as much as possible the pLan network cables from the cables carrying inductive loads and power cables to avoid possible electromagnetic disturbance.

2.4. BMS installation

When an option for the connection to building management systems is ordered, an add-on card will be installed in the controller (serial card 1).
The wiring depends on the type of add-on card that was ordered. The documentation for these add-on cards is delivered separately.

It is recommended to use LIYCY 0,5mm² cable to connect the units to the building management systems.
For the pCOWeb add-on card a UTP CAT-5/6 ethernet cable with RJ11 connector can be used.

3. User interface

3.1. Graphic terminal

The user interface for the Reznor comfort regulation is the pGD1 graphic terminal (wall or panel mounted), or alternatively the built-in terminal directly on the pCO controller (optional). This interface is used to control one or more Reznor units with comfort regulation.

This terminal, illustrated in the figure above, features six buttons, with the following meanings:

 Alarm: Display the list of active alarms.

 Prg: Enter the main menu tree.

 Esc: Return to the previous screen.

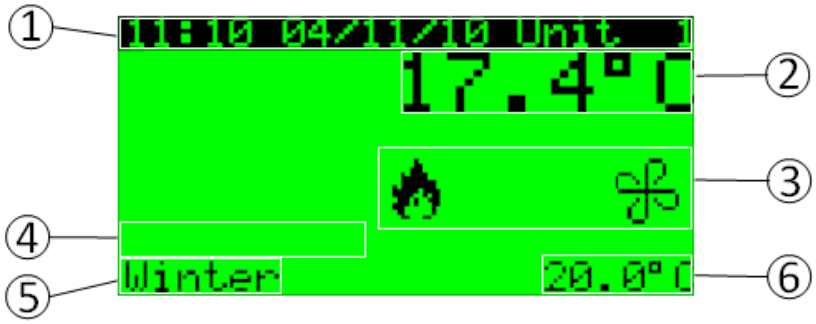
 Up: Scroll a list upwards or increase the value shown on the display.

 Down: Scroll a list downwards or decrease the value shown on the display.

 Enter: Enter the selected submenu or confirm the set value.

3.2. Main screen

The main screen shows information on the current ambient conditions and unit status.

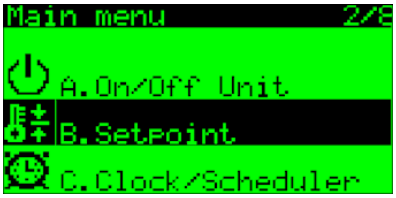


1. Time, date and connected unit (in pLan network)
2. Current room temperature
3. Main functions that are active (in this case gas heating and main fan)
4. Unit status (only displayed if unit is not on)
5. Current summer/winter status
6. Current room temperature setpoint

3.3. Main menu

The main menu can be accessed from the main screen by pressing the *Prg* key. An item from the menu can be selected by using the *Up* and *Down* keys. The selected menu item can then be accessed by pressing the *Enter* key.

The main menu consists of 8 menu items. The *Service* and *Manufacturer* also feature a number of submenus for easy configuration of the unit. All underlined menus require a password for access. The service password (*PW1*) to access the secured service settings can be obtained through a Reznor representative. The manufacturer menus are secured by the manufacturer password (*PW2*) and are only available for Reznor.



Main menu tree:

- A. On/Off Unit
- B. Setpoint
- C. Clock/Scheduler
- D. Input/Output
- E. History
- F. Board switch
- G. Service
  - a. Change Language
  - b. Information
  - c. Summer/Winter
  - d. Working hours
  - e. BMS config.
  - f. Service settings (PW 1)
    - a. Working hour set
    - b. Probe adjustment
    - c. Thermoregulation
    - d. User DEV/Change PW1
  - g. Manual management
- H. Manufacturer (PW 2)

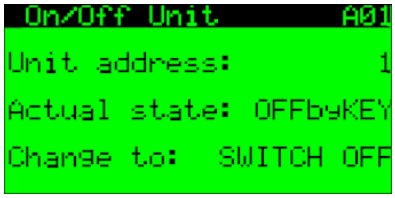
3.4. *Parameter screens*

The parameter setting screens always shows the name of the menu, the current screen number and the description of the parameters that can be changed.
In the top right corner the screen number (*Gfc03* in this case) is shown.
The parameters can be changed by pressing *Enter* to move the cursor to a settable parameter and by using the arrow keys to change the parameter. Pressing *Enter* again will confirm the change.

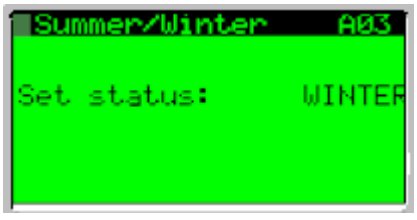
4. Description of menus

4.1. A. ⏻ *Unit on/off – Summer/winter mode*

The following screen displays the current unit that is controlled (pLan address) and the current state it is in. On the last line of the screen the current state of the unit can be changed.
However, if an alarm is present, or the unit is shut off externally (BMS or digital input), it will not be possible to switch on the unit.

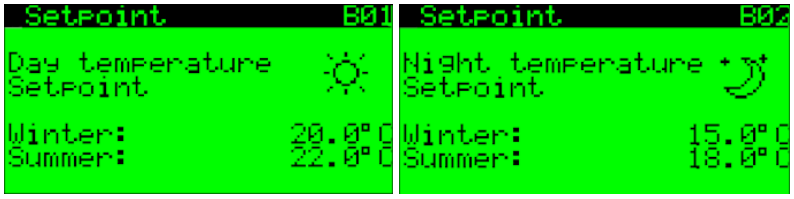


A02 Summer/winter screen gives the possibility to change the winter mode into summer mode manually or automatically.



4.2. B. Setpoint

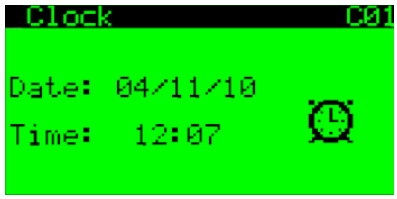
If the temperature setpoints are controlled locally, these can be changed on these screens. The *winter* setpoints are used for (free) heating and the *summer* setpoints are used for (free) cooling.
It must be noticed that (for example) when (non free) cooling is disabled during the night, that the summer setpoint during the night is used only for free cooling.



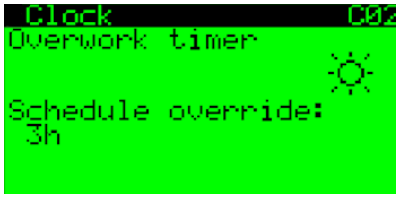
If temperature setpoints are controlled externally (through a BMS or pLan master unit), these screens will only display the current setpoints. In this case these screens will be read-only.

4.3. C. Clock/Scheduler

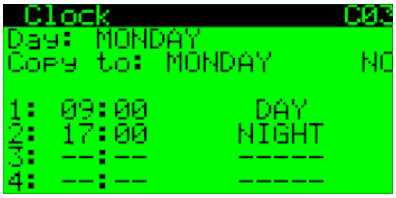
In these screens it is possible to change the current date and time, to activate the overwork timer and to program the day scheduler.
In the first screen *C01* the current date and time can be changed.



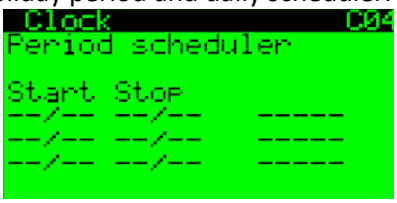
The overwork timer *C02* overrides the current schedule for a specified time. During this time the *day*-schedule is used. This screen can also be accessed directly from the main screen by pressing *Prg* + *Enter* simultaneously.

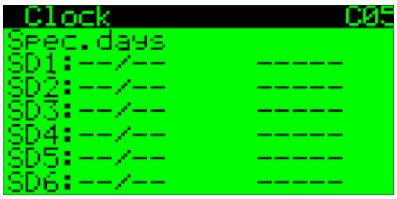


The day scheduler *C03* makes it possible to program up to 4 different time zones for each day of the week. For each zone it is possible to choose between “OFF”, “DAY”, “NIGHT”. “OFF” means that the entire unit is off, “DAY” means the “day”-setpoint is used and “NIGHT” means that the “night”-setpoint is used.
It is possible to copy the schedule of each day to another day (for faster programming). This is done by moving the cursor to the “Copy to:” field, then using the arrow keys to select the desired day (or “ALL” days), pressing *Enter* to move the cursor to “NO”, then changing this to “YES” with the arrow keys and confirming with *Enter*.



The next screen *C04* allows to program up to 3 holiday periods. This holiday program takes priority over the daily scheduler.
The last screen *C05* allows to program up to 6 special days. Special day programming takes priority over holiday period and daily scheduler.





4.4. D. Input/Output

In this menu it is possible to display the physical status of the inputs and outputs, both digital and analog. It is also possible to view the status of possible devices that are connected through Modbus (such as a frequency converter).
All data can be viewed in sequence (scroll with arrow keys).

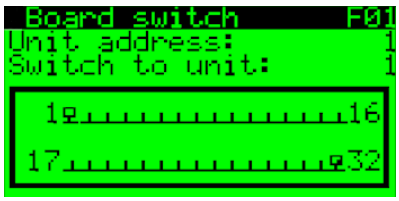
The values corresponding the analog outputs are expressed as a percentage.

4.5. E. History

In this menu the logged alarms can be viewed in sequence. The alarms are displayed with the alarm code (see paragraph 8 Alarms), together with their corresponding date and time of occurrence.
The *Alarm* button is only used to view the current alarms and to mute the buzzer (if present).
See 8.2 for more information.

4.6. F. Board switch

This screen can be used to view the status of the pLan network (between controllers and terminals). It is also possible to change the unit that this terminal is controlling (if it is a shared terminal). This functionality makes it possible to control multiple units with a single graphic terminal.

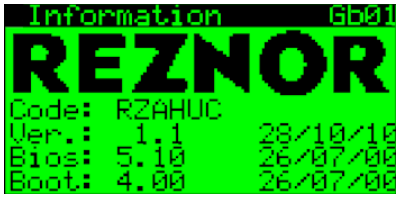


4.7. G. Service

The service menu contains information about the unit and installer access for advanced settings. These advanced settings (*Ge*, *Gf*, and *Gg*) require a service password (PW1 - default 7396).

Ga. Change Language: Select one of the languages loaded in the application.

Gb. Information: View information relating to the application code (and corresponding version) on the first screen, while the second shows information concerning the pCO controller hardware.



Gc. Summer/Winter: Displays the current summer/winter status of the unit as well as a possibility to change the current status (depending on changeover mode). If the changeover mode is set on *manual*, the status can be changed directly. If the unit uses automatic changeover, the changeover temperatures can be changed here.

If the room temperature drops below the *Winter changeover setpoint*, the unit is put into winter mode. If the room temperature rises above the *Summer changeover setpoint,* the unit is put into summer mode.

It is recommended to put the *Winter changeover setpoint* to a value close to the *Winter night temperature setpoint* and to put the *Summer changeover setpoint* to a value a little higher than the *Summer day setpoint*.

Gd. Working hours: Displays the operating hours for the entire unit and the main devices that need periodical maintenance.

Note: From this point on in the submenu, access requires a password (installer password PW1 – default 7396).

Ge. BMS Config: This screen is used to configure the supervisor (building management system). This functionality requires an additional add-on card. The protocol that is selected here is actually the protocol to communicate to the add-on card. The actual translation is done by the add-on card. All add-on cards can be used with the *RS485* protocol (for example the Bacnet card translates the RS485 protocol to Bacnet). To communicate directly to the unit via Modbus (Reznor unit as slave), it is necessary to use the *Modbus RS485* protocol and the RS485 supervisor add-on card (OP1002 B 11).

Gf. Service settings: This submenu is used by the installer for the following purposes:

- **Gfa. Working hour set**: Reset working hours after maintenance and specify when a maintenance alarm should be generated
- **Gfb. Probe adjustment**: Used to set an offset to be added to or subtracted from the reading made by the probe in question. Once the offset (Adj) value has been confirmed, pressing *Enter* automatically updates the reading of the corresponding probe.
- **Gfc. Thermoregulation:** These screens are used to change the advanced parameters of the unit regulation. Here it is possible to change temperature differentials, minimum and maximum openings for air dampers, setpoint compensation, duct temperature

limits, … If a clear description of the unit has been delivered together with the order, all these parameters will be pre-adjusted in the factory. The installer then just has to verify the parameters and change them slightly if the installation requires.

- **Gfd.** User DEV/ Change PW1: On these screens it is possible to return to the previously saved standard parameters (saved before leaving the factory) and to change the installer password PW1 (default 7396).

Gg. Manual management: Used to switch the individual actuators on the unit from automatic to manual.

4.8. H. Manufacturer

This menu is used by the manufacturer (manufacturer password *PW2* is required). The manufacturer can use this menu to change the configuration of the unit.

5. Functions

5.1. Scheduler and setpoints

5.1.1. Scheduler

The scheduler features the ability to program 4 time zones for each day of the week. Additionally, it is possible to program holiday periods and special days.
For each zone there are 4 possibilities: *Off, Day, Night,* ---.

- When the unit is off, there is no heating or cooling, fans are off and dampers are closed. However, if *frost protection* is enabled, this will also work when the unit is off. In this case the gas heaters fire up, the dampers stay closed and the fans start running.
- In *day* or *night* mode, those respective setpoints are used, and depending on the settings the unit is running.
- When --- is displayed, the setting of the previous time zone is taken over.

The scheduler also features an overwork timer. It is possible to specify a certain amount of time, and during this time, the scheduler is overruled by the *Day* setpoints.

Schedule optimization (experimental) is a feature to make sure that the room temperature is at the setpoint as soon as the *Day*-setpoint would be activated.
During the last 5 days, the time it takes to reach the setpoint is saved. Depending on the current room temperature the time it will take to reach the setpoint will be predicted. This time is then used to change the schedule earlier, so the room setpoint will be achieved earlier.

5.1.2. Setpoints

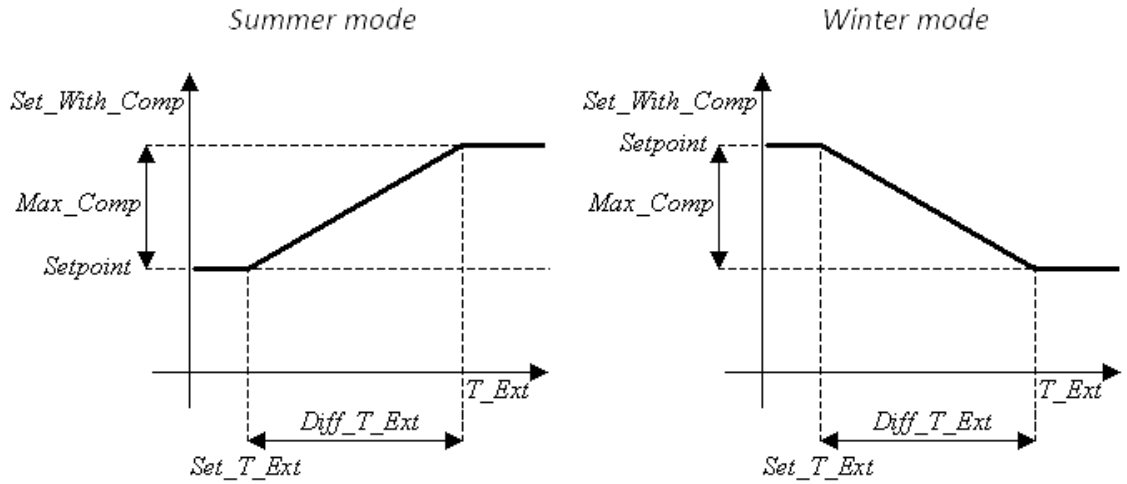
It is possible to have different temperature setpoints for both day and night, as well as during the summer and during the winter.

Cooling can be disabled during the night (only free cooling).

Minimum and maximum air damper openings can be adjusted depending on *day* or *night* schedule.

5.1.3. Setpoint compensation

When an outside temperature probe is connected, the current setpoint is adjusted according to the outside temperature. This is to maximize comfort and to minimize energy consumption. All these parameters can be adjusted in the *Service* menu.
In winter mode, when it gets hotter outside, the temperature setpoint will drop.
In summer mode, when it gets hotter outside, the setpoint will rise.



5.2. Main fans

It is possible to control the supply (and return fans) with this comfort regulation. Either the fan always runs when the unit is on, or the fan only runs when there is a demand. A demand can be a heating demand, cooling demand or damper opening demand.
On and off delays are settable to have a comfortable regulation.

When standard on/off fans are chosen, both the supply and return air fans are controlled together.

It is also possible to use frequency converter. In this case the speed of both the supply and return fan can be controlled separately. The communication between the comfort regulation and the frequency converters is done through the internal Modbus protocol. All wiring and parameterization is done by the manufacturer.

If speed controlled fans are used there are several possibilities to control the speed of the fans.

Supply fan:

- Always maximum speed
- Constant temperature rise: predicts temperature rise and compensates with duct temperature measurement (only on heating)

Return fan:

- Main fan speed
- Air damper position: when more fresh air is used, the speed of the return air fan increases

For both the supply fan and the return fan it is possible to lower the speed when there is no demand (if the fan is constantly running).

These control possibilities need to be mentioned together with the order as this functionality can only be introduced by the manufacturer to ensure safe operation of the unit.

5.3. Gas heating

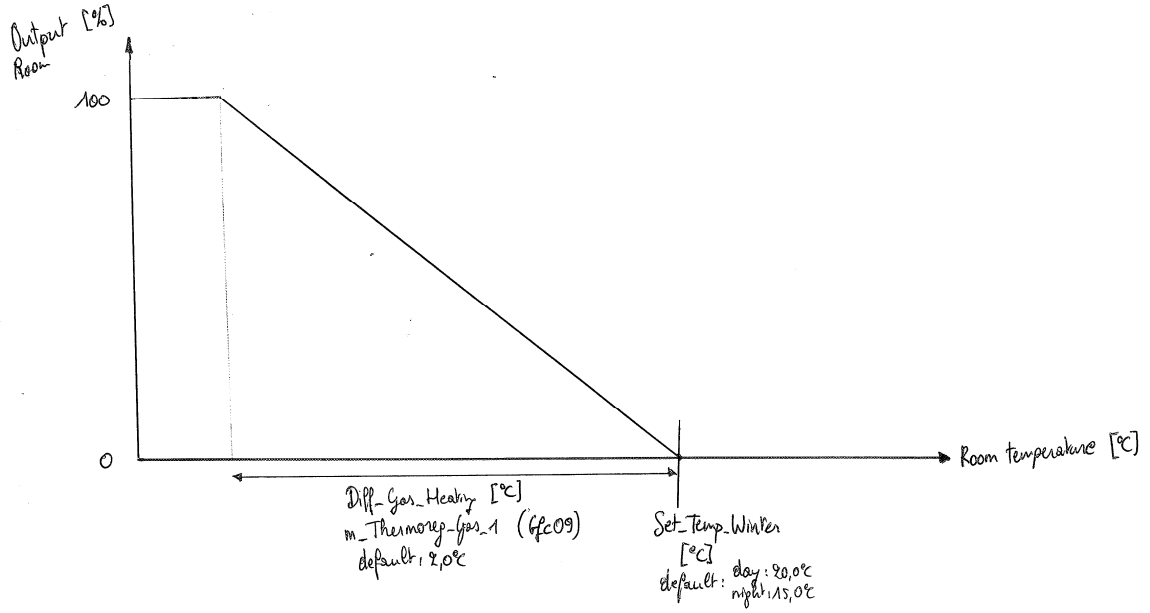
Gas heating control can be *one stage*, *two stage* or *modulating*. For one stage control, a single digital output is used. For two stage control two digital outputs are used (1 output on: low fire; 2 outputs on: high fire). For modulating control, a digital contact is used to allow heating and an additional analog output (0-10V DC) is used for modulation control.

All these controls make use of various delays to ensure that the gas heater will not cycle. This protection will prevent condensation (on non-condensing units) and useless gas usage during startups.

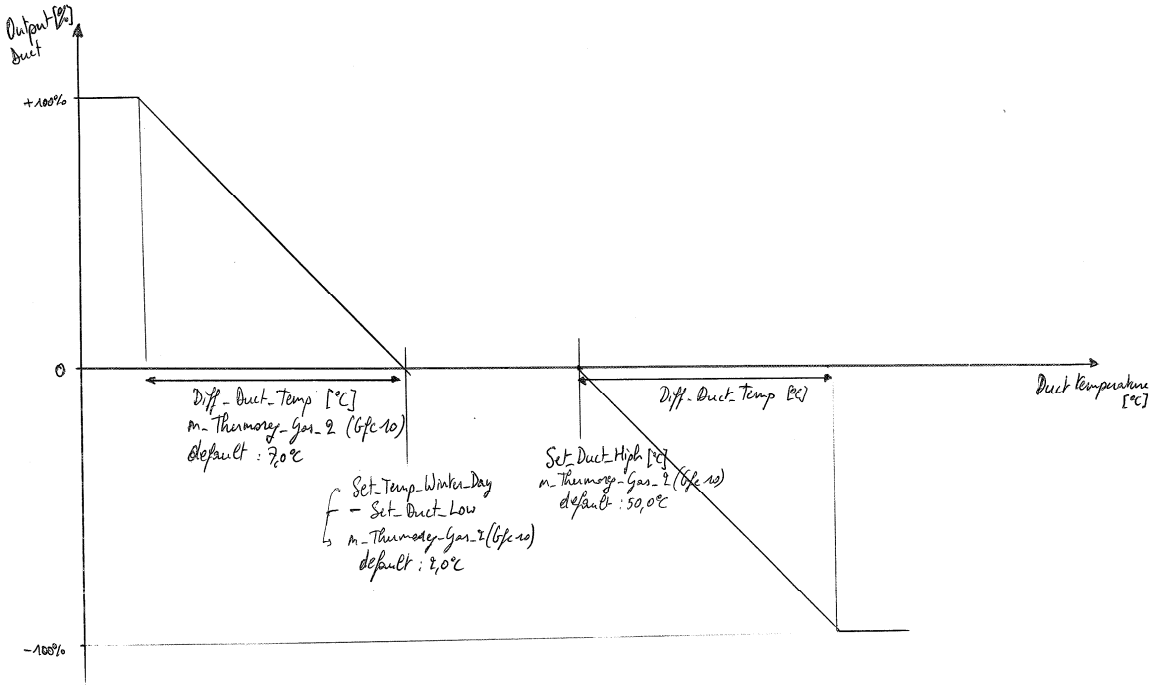
The gas heating regulation is based on both room temperature and duct (supply) temperature. The two regulation types are combined to give an output percentage. On staged heaters, this output percentage is then recalculated to the different stages.

This type of regulation, based on both room and duct temperature will ensure a proper regulation for both heating and ventilation devices.

The room temperature regulation depends on the current room temperature and setpoint. This control can be either completely proportional (standard) or proportional+integral (optional).



The duct temperature regulation depends on the high and low duct temperature limits. The high temperature limit is a fixed limit and the low temperature limit depends on the current room heating setpoint. This means that with a different day/night temperature setpoint, the duct temperature low limit changes accordingly. An additional differential makes sure that there is a smooth proportional limitation. Of course, by changing these parameters, the behavior of the unit can be changed entirely (ventilation, heating, heat recuperation …).



The actual gas heating output is the sum of the *Room regulation output* and the *Duct regulation output*. This output is used directly for modulating control or recalculated for staged heating.

5.4. Cooling/heat pump

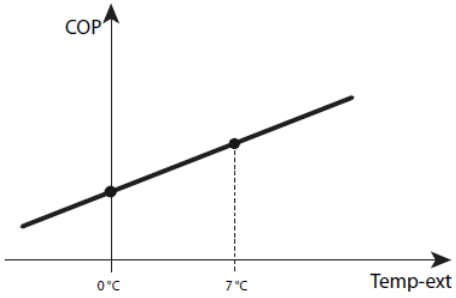
This comfort regulation features controls for either a (reversible) condensing unit or a (reversible) chiller.

The changeover between summer and winter mode can be done manually, automatically or by a pLan master.

Both heating and cooling is regulated proportionally (or proportion + integral) depending on room temperature, current setpoints and regulation differentials.

In winter mode the regulation automatically chooses whether the heat pump or the gas heater should be used. This can be managed in two ways:

- By outside temperature: When the outside temperature drops below the changeover setpoint (adjustable by installer), the heat pump will be disabled and the gas heater will be used.
- By energy cost: When gas and electricity prices are known, the current cost of gas heating or heat pump heating is calculated (depending on heater efficiency and heat pump COP in function of outside temperature). For this regulation it is necessary to know the heat pump COP at 0°C and 7°C outside temperature.



Additionally to this changeover regulation there is an additional protection based on the duct temperature measurement. A minimal temperature rise (duct temperature – room temperature) may be used. If this temperature rise is not reached, the gas heater will start running for 10 minutes.

5.4.1. Condensing unit

Condensing units with 1 or 2 compressors can be controlled with this regulation. An additional output manages the reversing valve on reversible condensing units.

Reznor condensing units RZMHA 15-302 are controllable without any change to the regulation. Of course third-party condensing units are also supported.

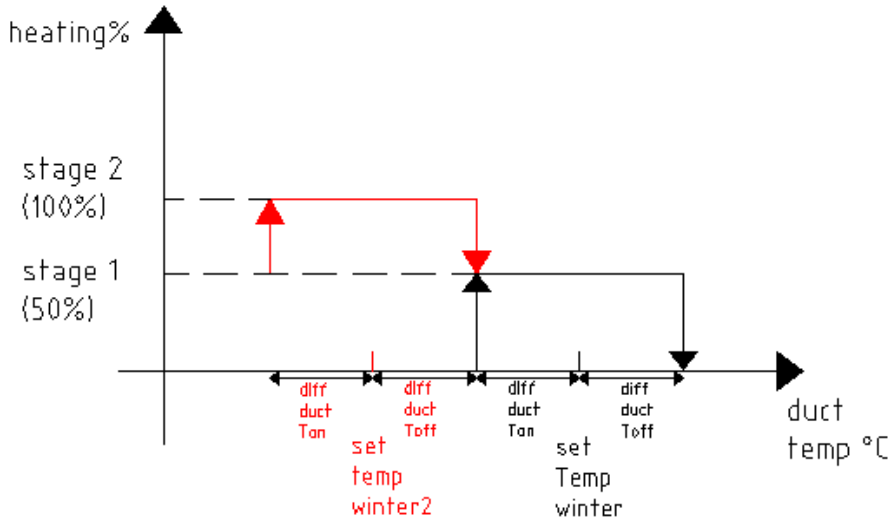
All necessary delays and timers are integrated in the regulation.

5.4.2. Chiller

This configuration is mostly used to have a single unit to supply multiple air handlers. Reznor RZCHA 91-604 chillers/heat pumps are supported, as well as third party chillers/heat pumps.
The control regulates a modulating water valve (2- or 3-way) on a single water coil for each air handler. This means that either cold water or hot water is flowing through the same circuit. Thus it is necessary that the control knows in what mode the circuit is in. This data can be obtained through the pLan network or from a supervisor.
It is possible to control the reversing valve by the master unit (pLan address 1) and to send the status to the other slave units (units 2-8).
It is assumed that the chiller/heat pump is always on to make sure all integrated safety functions work. If there is no demand (all valves closed), the power consumption will be negligible.

5.4.3. Duct temperature compensation

When there is a minimum percentage fresh air required, the duct sensor is taken in to account. The duct temperature regulation depends on the winter set point, and a on-difference and off-difference.
Depending of the differential, heating will be ON-OFF (even when the room temp. is maintained)



set Temp winter2= set temp winter - diff duct Ton- diff duct Toff

(In case u have a unit with only one step than stage2 = 100%)

Of course, by changing these parameters, the behaviour of the unit can be changed entirely.

5.5. Air mixing, free cooling, free heating and air quality

The regulation can control a modulating servomotor to open/close an air damper. This air damper is used to mix return air with fresh air and is controlled with an analog output of the regulation (2-10V or 5V PWM).

It is possible to specify a minimum and maximum opening percentage for the air damper during the day and during the night. Thus it is possible to have a minimum (adjustable) amount of ventilation during the day, and to have only heating during the night. The maximum opening can also be adjusted to limit the overpressure in the building in case that there is no return blower.

Between this minimum and maximum opening of the air damper, other types of regulation are possible.

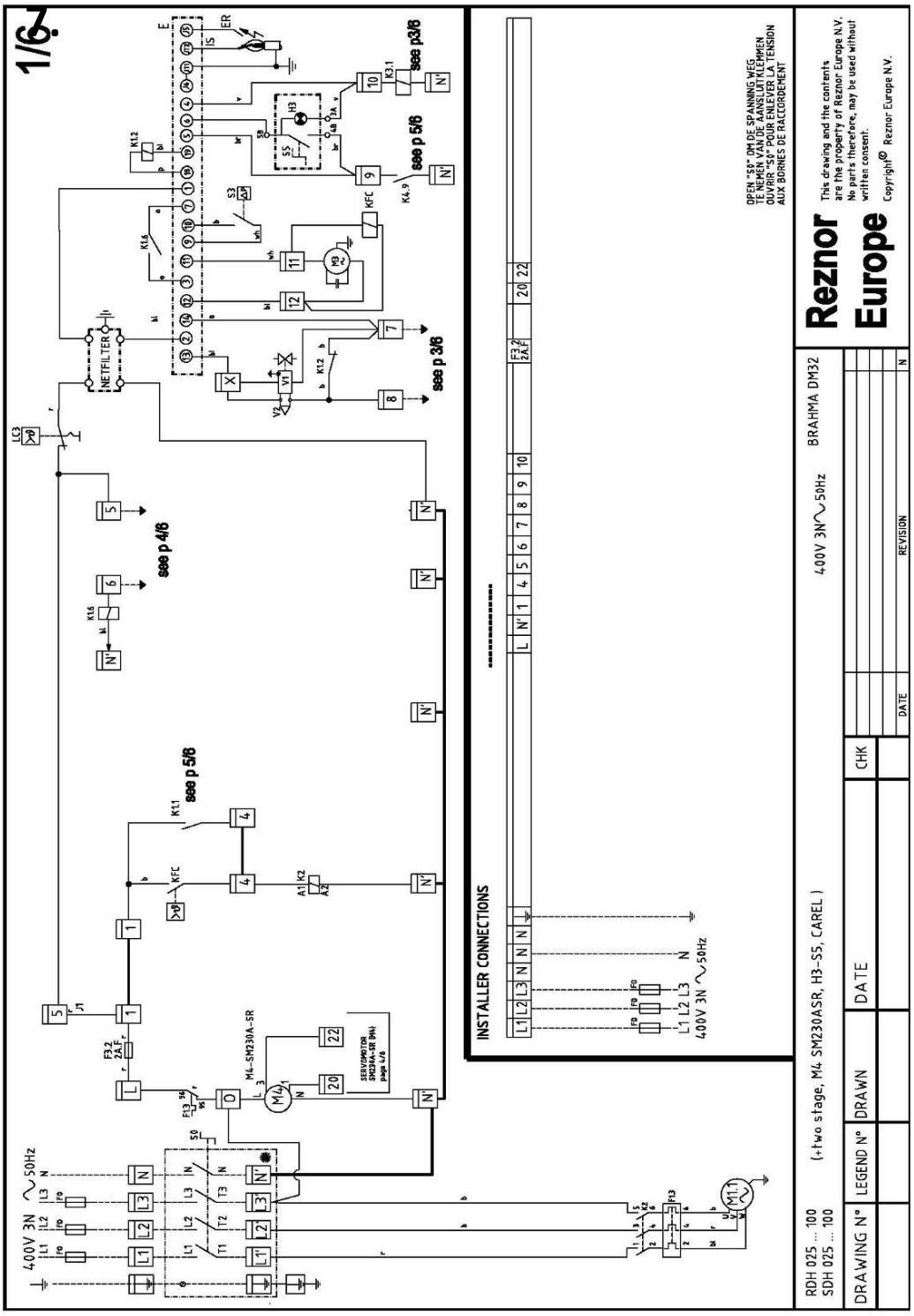
- **Free cooling**: In case the air outside is cooler than the air inside and the room temperature is above the current setpoint, the dampers open gradually.
- **Free heating**: In case the air outside is warmer than the air inside and the room temperature is colder than the day setpoint for heating, the dampers open gradually
- **Air quality control**: In case a CO_2-sensor is installed, the dampers will open gradually to keep the room CO_2 levels below the specified setpoint.

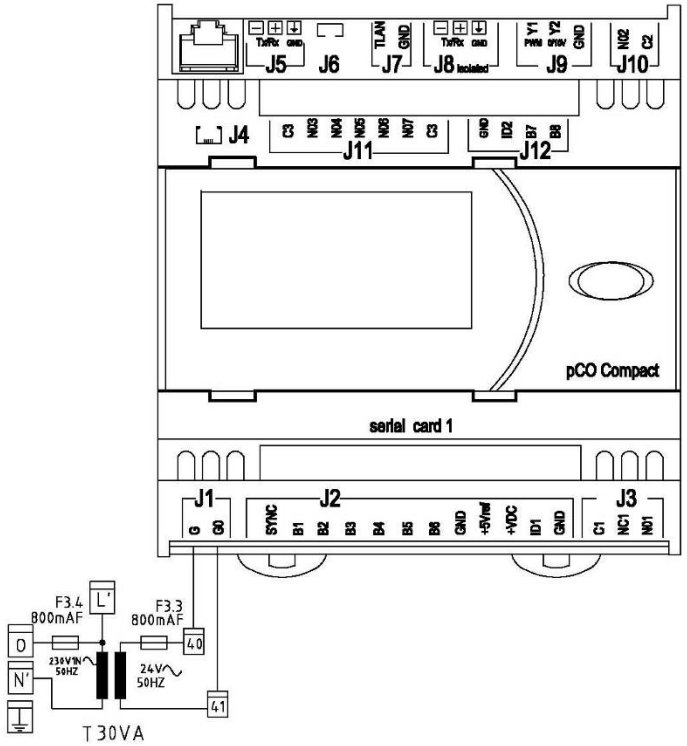
The use of these 3 regulations can reduce the operating costs significantly, as only ventilation is used when it is necessary.

5.6. Heat recovery

In case a cross flow heat exchanger is installed, it is possible to control the modulating bypass of the heat recovery module. The bypass of the heat recovery module will open when free cooling or free heating is possible (see 5.5 for more information).

6. Wiring diagrams





230V 1N ∿ 50Hz

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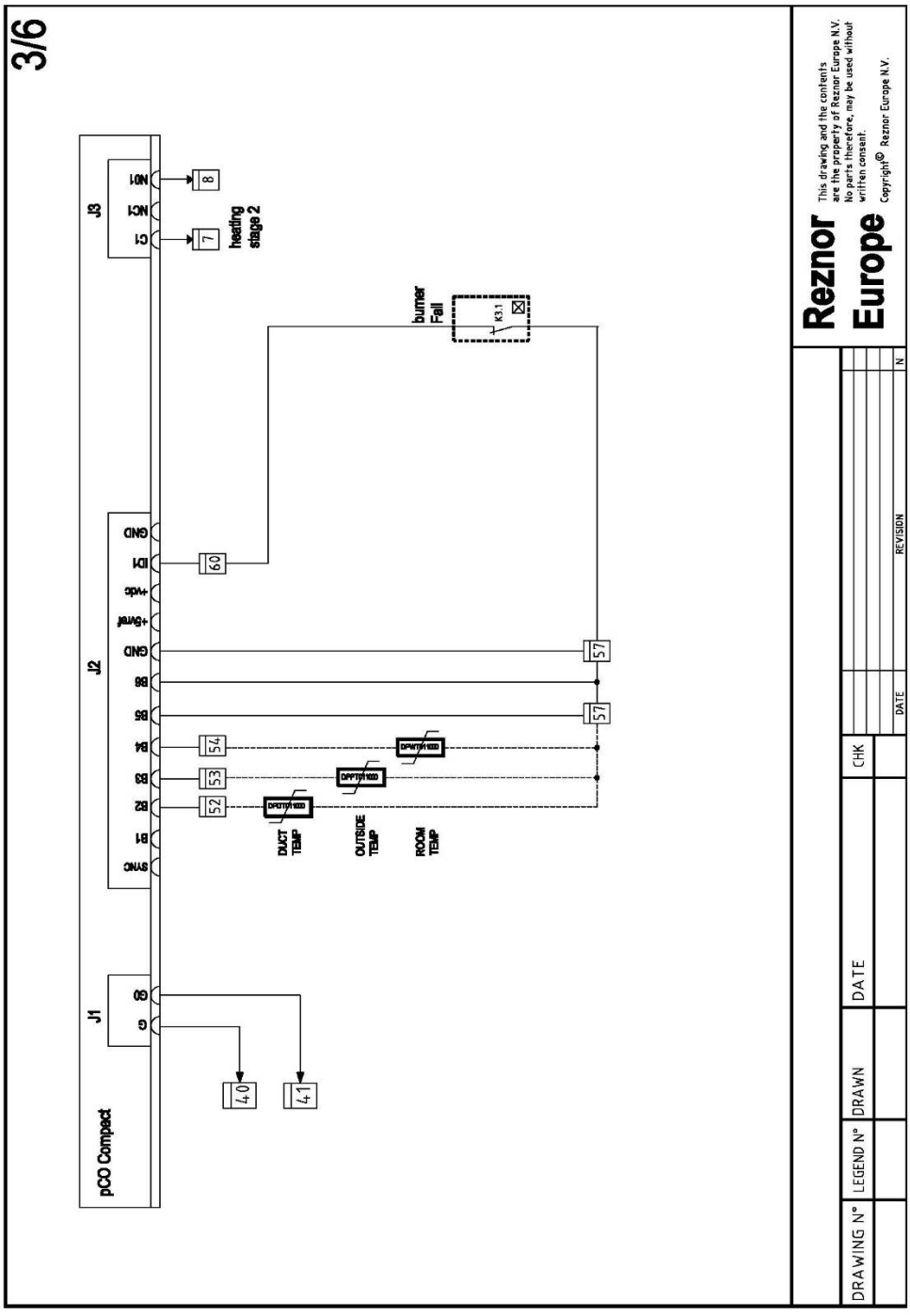
3/6
pCO Compact
J1
J2
J3
G0
G
SYNC
B1
B2
B3
B4
B5
B6
GND
+5Vref
+Vdc
ID1
GND
NO1
NC1
C1
40
41
52
53
54
57
60
7
8
DUCT TEMP
OUTSIDE TEMP
ROOM TEMP
burner Fail
K3.1
heating stage 2
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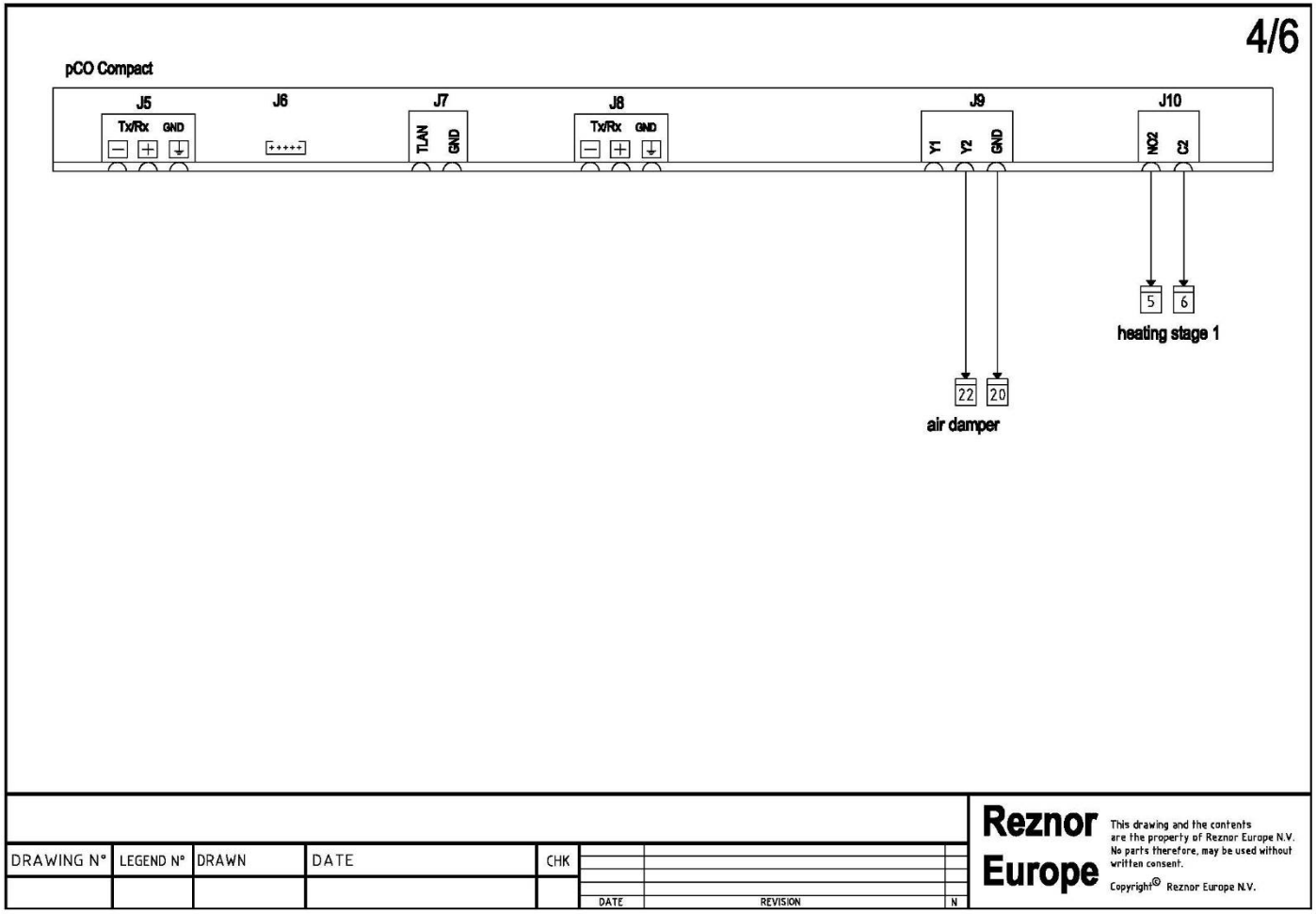
4/6
pCO Compact
J5
Tx/Rx
GND
J6
J7
TLAN
GND
J8
Tx/Rx
GND
J9
Y1
Y2
GND
J10
NO2
C2
5
6
heating stage 1
22
20
air damper
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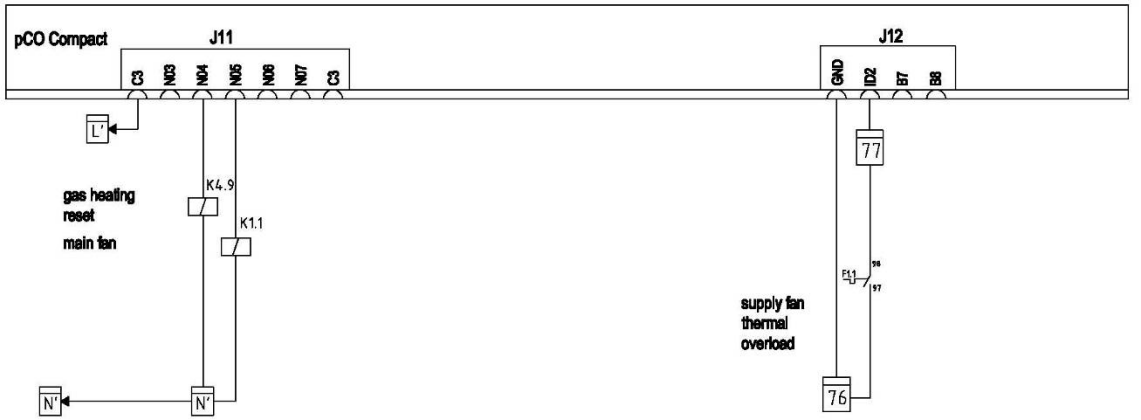

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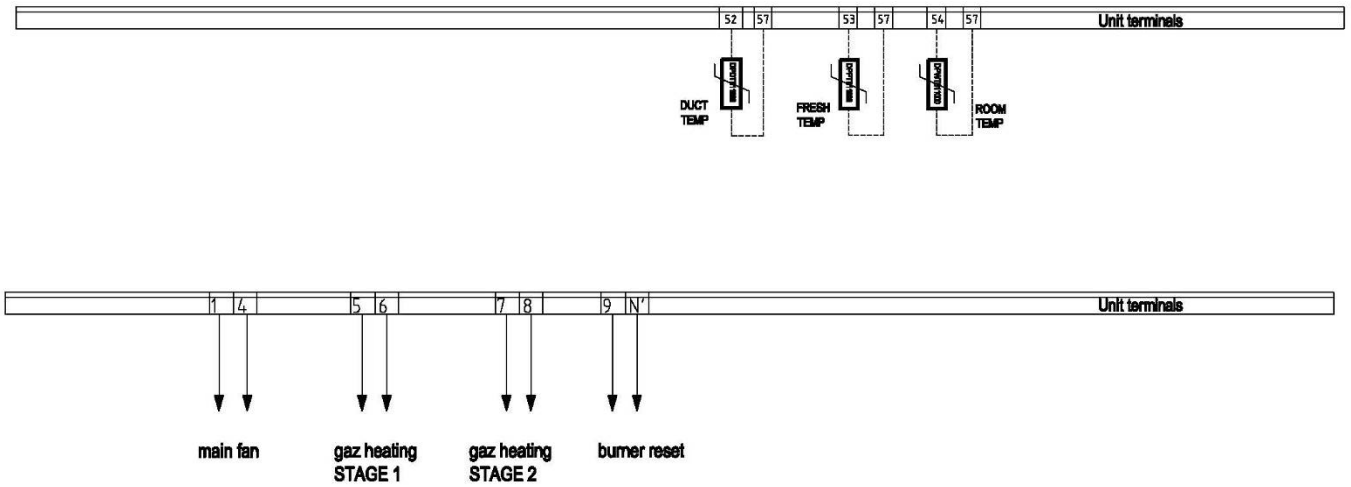
INSTALLER CONNECTIONS ----------

6/6



CONNECTIONS RDH-SDH

CONNECTIONS CLINT

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7. Supervisor parameters

7.1. Analog values

BMS Address	Description	Default	UOM	Min	Max	Read/Write	Variable name
21	Probe B1	0	---	-99.9	99.9	R	AIN_1
22	Probe B2	0	---	-99.9	99.9	R	AIN_2
23	Probe B3	0	---	-99.9	99.9	R	AIN_3
24	Probe B4	0	---	-99.9	99.9	R	AIN_4
25	Probe B5	0	---	0	99.9	R	AIN_5
26	Probe B6	0	---	0	99.9	R	AIN_6
27	Probe B7	0	---	0	99.9	R	AIN_7
51	Temperature setpoint during day for heating (winter)	20.0	°C	5.0	30.0	R/W	Set_Temp_Winter_Day
52	Temperature setpoint during night for heating (winter)	15.0	°C	5.0	30.0	R/W	Set_Temp_Winter_Night
53	Temperature setpoint during day for cooling (summer)	22.0	°C	18.0	30.0	R/W	Set_Temp_Summer_Day
54	Temperature setpoint during night for cooling (summer)	18.0	°C	15.0	30.0	R/W	Set_Temp_Summer_Night
55	Setpoint for changeover to winter (heating)	16.0	°C	5.0	25.0	R/W	Set_Winter_Changeover
56	Setpoint for changeover to summer (cooling)	24.0	°C	15.0	35.0	R/W	Set_Summer_Changeover
57	Setpoint for low limit duct temperature (relative below room setpoint)	2.0	°C	0	20.0	R/W	Set_Duct_Low
58	Setpoint for high limit duct temperature (absolute)	50.0	°C	0	99.9	R/W	Set_Duct_High
61	Gas heating temperature differential	2.0	°C	0	30.0	R/W	Diff_Gas_Heating
62	Heating temperature differential for heatpump	3.0	°C	0	20.0	R/W	Diff_Heating_HP
63	Cooling temperature differential	3.0	°C	0	20.0	R/W	Diff_Cooling
64	Duct temperature differential	7.0	°C	0	50.0	R/W	Diff_Duct_Temp
65	Freeheating and freecooling differential	5.0	°C	0	20.0	R/W	Diff_Freeheatcool
66	Heat recovery differential	5.0	°C	0	20.0	R/W	Diff_Heatrecovery
71	Neutral zone for free heating/cooling	2.0	°C	0	20.0	R/W	Neutralzone_Freeheatcool
72	Neutral zone for heat recovery	0	°C	0	20.0	R/W	Neutralzone_Heatrecovery
101	Room temperature	0	°C	-99.9	99.9	R	Room_Temperature
102	Duct temperature	0	°C	-99.9	99.9	R	Duct_temperature

BMS Address	Description	Default	UOM	Min	Max	Read/Write	Variable name
103	Outside temperature	0	°C	-99.9	99.9	R	Outside_Temperature
104	Room humidity	0	%rH	0	99.9	R	Room_Humidity
105	Outside humidity	0	%rH	0	99.9	R	Outside_Humidity

7.2. Integer values

BMS Address	Description	Default	UOM	Min	Max	Direction	Variable name
41	Analog output Y1	0	---	0	9999	R	AOUT_1
42	Analog output Y2	0	---	0	9999	R	AOUT_2
43	Analog output Y3	0	---	0	9999	R	AOUT_3
44	Analog output Y4	0	---	0	9999	R	AOUT_4
59	High level on air quality level	1500	Ppm	0	2000	R/W	High_Level_Air_Quality
69	Air quality differential	50	---	0	500	R/W	Diff_Air_Quality
106	Air quality level	0	---	0	9999	R	Air_Quality

7.3. Digital values

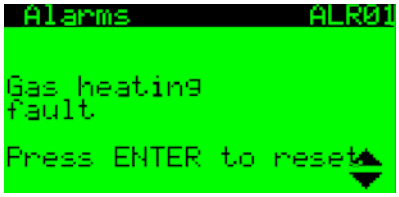
BMS Address	Description	Default	UOM	Min	Max	Direction	Variable name
1	Reset alarms to Supervisor	0	---	0	1	R/W	Reset_Al_BMS
11	Digital input 1 (ID1)	0	---	0	1	R	DIN_1
12	Digital input 2 (ID2)	0	---	0	1	R	DIN_2
31	Digital output 1 (NO1)	0	---	0	1	R	DOUT_1
32	Digital output 2 (NO2)	0	---	0	1	R	DOUT_2
33	Digital output 3 (NO3)	0	---	0	1	R	DOUT_3
34	Digital output 4 (NO4)	0	---	0	1	R	DOUT_4
35	Digital output 5 (NO5)	0	---	0	1	R	DOUT_5
36	Digital output 6 (NO6)	0	---	0	1	R	DOUT_6
37	Digital output 7 (NO7)	0	---	0	1	R	DOUT_7
110	Selection of mode by the supervision	0	---	0	1	R/W	Winter_Summer_by_Supervision

8. Alarms

8.1. Alarm management

The regulation can manage all alarms mentioned in 8. Depending on the type of alarm the unit may be stopped completely or partially. For example, if there is a fault on the heat pump, an alarm will be displayed and the gas heater will take over.

If an alarm is present the *Alarm* key will be flashing red. Pressing this key will display the current active alarms and pressing the key again will reset the active alarms. Of course, it is also necessary to find the cause of the alarm, to be able to reset it.



This screen displays the alarm code in the upper right corner as well as a brief description of the alarm. If an external reset is possible, this can be done by pressing *Enter*. In this example, pressing *Enter* will reset the burner relay.

8.2. Alarm log

From the main menu, entering the *History* menu or at the end of the list of alarms described above, the following alarm log screen can be accessed.

A maximum of 50 alarms can be logged; over this limit new events overwrite the older ones, which are deleted.

8.3. Table of alarms

Alarm Code	**Description**
ALG01	Clock Board fault or not connected
ALG02	Extended memory fault
ALF01	Fan thermal overload
ALR01	Gas heating fault Press ENTER to reset
ALR02	Cooling fault
ALF02	Flow switch
ALR03	Dirty filter Supply air
ALR04	Dirty filter Return air
ALA01	Unconnected Probe B1
ALA02	Unconnected Probe B2
ALA03	Unconnected Probe B3
ALA04	Unconnected Probe B4
ALW01	High value Duct temperature
ALW02	Low value Duct temperature
ALW03	High value Outside temperature
ALW04	Low value Outside temperature

Alarm Code	Description
ALW07	High value Room temperature
ALW08	Low value Room temperature
ALW09	High value Room humidity
ALW10	Low value Room humidity
ALW11	High value Room CO2/VOC
ALT01	Maintenance Unit
ALT02	Maintenance Main fan
ALT03	Maintenance Return fan
ALT04	Maintenance Gas heating
ALT05	Maintenance Condensing unit compressor 1
ALT06	Maintenance Condensing unit compressor 2
ALT07	Maintenance Condensing unit compressor 3
ALT08	Maintenance Condensing unit compressor 4
ALS01	Humidity probe broke - Serial probe n
ALS02	Probe Offline - Serial probe n
ALS03	Temperature probe broken - Serial probe n
ALS04	Humidity probe broken - Serial probe n
ALS05	Probe Offline - Serial probe n
ALS06	Temperature probe broken - Serial probe n
ALS07	Humidity probe broken - Serial probe n
ALS08	Probe Offline - Serial probe n
ALS09	Temperature probe broken - Serial probe n
ALS10	Humidity probe broken - Serial probe n
ALS11	Probe Offline - Serial probe n
ALS12	Temperature probe broken - Serial probe n
ALS13	Humidity probe broken - Serial probe n
ALS14	Probe Offline - Serial probe n
ALS15	Temperature probe broken - Serial probe n
ALS16	Humidity probe broken - Serial probe n
ALS17	Probe Offline - Serial probe n
ALS18	Temperature probe broken - Serial probe n
ALS19	Humidity probe broken - Serial probe n
ALS20	Probe Offline - Serial probe n
ALS21	Temperature probe broken - Serial probe n
ALV01	Device Offline - VFD n
ALV02	Serious fault - VFD n
ALV03	Not Serious fault - VFD n
ALV09	Device Offline - VFD n
ALV10	Serious fault - VFD n
ALV11	Not Serious fault - VFD n

Subject to modifications