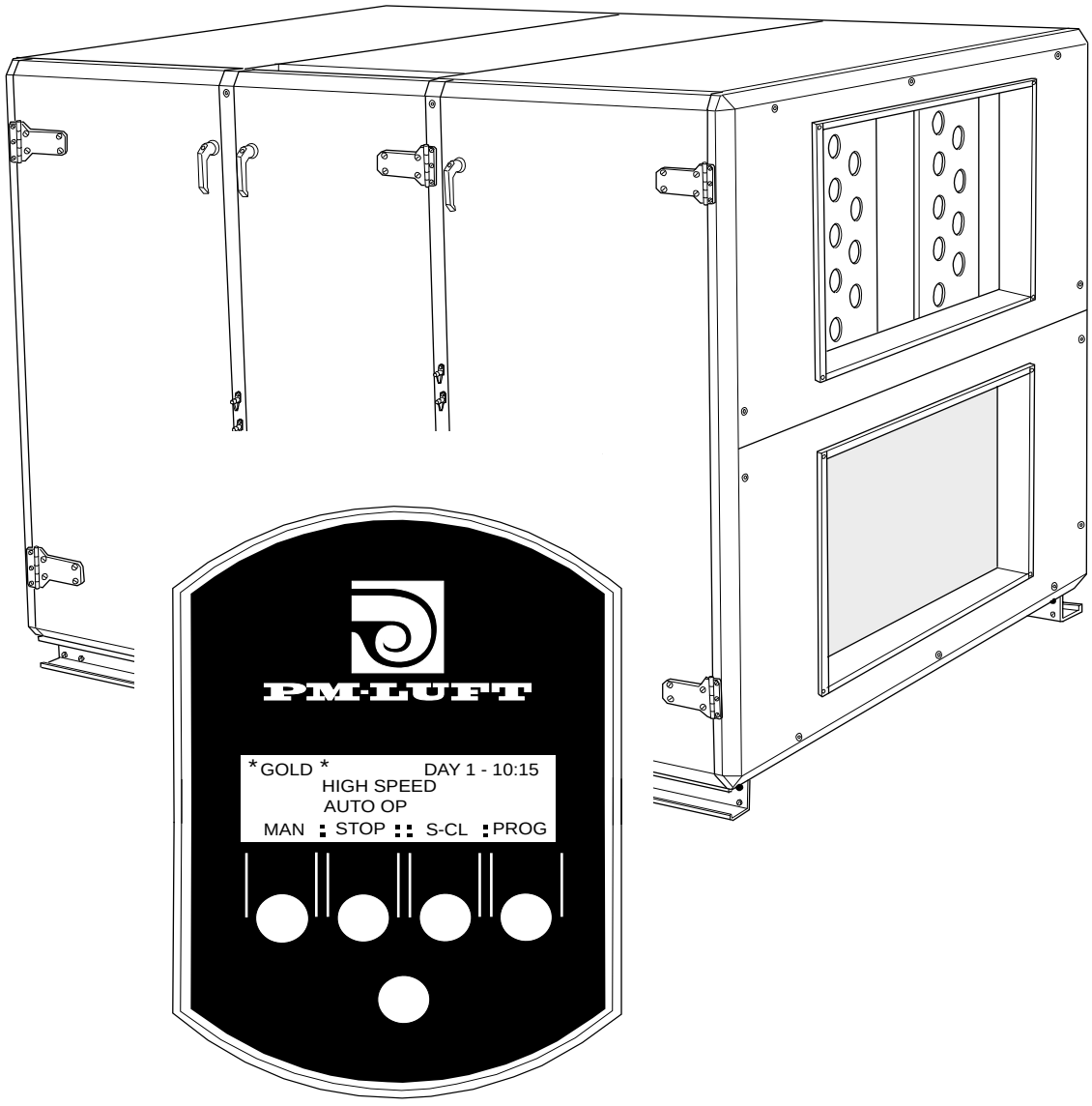
PM-LUFT

The GOLD Air Handling Unit, version 4

Operation and Maintenance instructions



PM-LUFT

Range of applications

The GOLD air handling unit

The GOLD air handling system is primarily designed for the comfort ventilation of public premises, such as offices, schools and day nurseries, municipal premises, shops, etc.

The GOLD system is also suitable for use in institutional kitchens and restaurants provided that the air handling unit ventilates spaces, in which similar activity is pursued.

To obtain all the benefits that the GOLD system has to offer, it is important that all the special features of the air handling unit be taken into account when designing the project, and when installing, commissioning, adjusting and operating the units.

The product identification label with unit type designation is situated on the control equipment cubicle of the size 1-3 GOLD units and on the right-hand end wall of the size 4 and 5 GOLD units. The unit designations and serial numbers specified on the plate are very important and should be handy when you get in touch with PM-LUFT for servicing or spare parts.

Scope of this document

This operation and maintenance instructions are applicable to the PM-LUFT GOLD air handling units.

The document is intended for use by those who operate and service the air handling unit.

N.B! Always read the safety precautions in Section 3, with regard to possible risks and who is authorised to service the unit. Carefully follow the instructions that are specified in each section.

After completed installation

The unit must be installed in accordance with the installation instructions for the size 1 – 3 or 4 and 5 GOLD units

Separate technical information is available only for service personnel trained by PM-LUFT.

Special instructions are also available for accessories and supplementary components.

Document location

The documents shall be kept in the document pocket inside the inspection door in the middle section.

Contents

Section

PM-LUFT

1. GOLD Air handling system – survey

1.1 General

The Air handling unit

The size 1 – 3 GOLD air handling units are supplied in the form of single-casing units.

The size 4 and 5 GOLD air handling units are supplied as one assembled unit consisting of three main sections: two combined filter/fan sections and one heat recovery section. The air handling unit can be dismantled into the three main sections for transporting them through narrow openings at the site.

The function of the fans either as a supply air fan or an exhaust air fan can easily be switched depending on whether the unit will be used as a right-hand or a left-hand unit.

Fans

The size 1 GOLD unit has two direct-driven centrifugal fans with backward-curved blades, whereas the size 2 – 5 GOLD units have two direct-driven type GOLD Wing axi-centrigugal fans. The GOLD Wing fans offer excellent power-efficiency, high performance, uniform air flow and low sound emission. The flow characteristics of the GOLD Wing fan make it possible to connect components such as air coolers and silencers directly to the unit, thus saving on space in the fan room.

The fan motors are equipped with frequency converters and the fans have tappings for flow measurement. This equipment provides continuous, stepless measurement and control of the air flow. The measuring accuracy is 5 %.

Heat recovery unit

The GOLD is equipped with a type Turbo rotary heat recovery unit that has a temperature efficiency range up to 84%. The heat recovery performance of the unit can be regulated by automatically and variably controlling the speed of the rotor drive motor.

Connection to the ducting

The size 1 – 3 GOLD units have circular duct connection openings designed for connection to the ducting across insertion joints fitted with a rubber gasket. The Size 4 and 5 GOLD units have rectangular duct connections with a permanently mounted connection frame for slip-clamp connection.

The unit is equipped with an integrated throttling damper designed to ensure that the heat exchanger rotor will be purged as intended. This damper is used for setting the correct pressure balance, so that the purging air flow will pass in the right direction, i.e. from the supply air passage to the exhaust air passage.

Control system

The integrated control system is a microprocessor-based system. It controls and regulates the fans, heat exchanger, temperatures, air flow, operation times, and a considerable number of internal and external functions.

Adjustments, settings, checks and fault tracing are entered in clear text on the control display. The alarm functions for filter replacement and functional faults are indicated by a warning lamp and explanations in clear text.

The system has been preset at the factory. Therefore, the air handling system is ready to run when the unit has been connected to the mains power supply.

Control display

All air flow settings, control functions, temperatures, operation times and other functions are entered in clear text on the display by pressing buttons to display different menus and sub-menus.

Built-in control of the functions

The control system adjusts automatically the speed of the fans so that the preset air flows will always be obtained.

The preset temperatures and air flows, operation times, filter status, etc. can be easily checked at any time.

Alarm functions

All alarm functions are specified in clear text in the alarm menu while the alarm lamp is lit and the buzzer alarms, A and B, are activated.

External checks and control

The most important functions can be coupled to an external system. Wiring is carried out on terminals for each function.

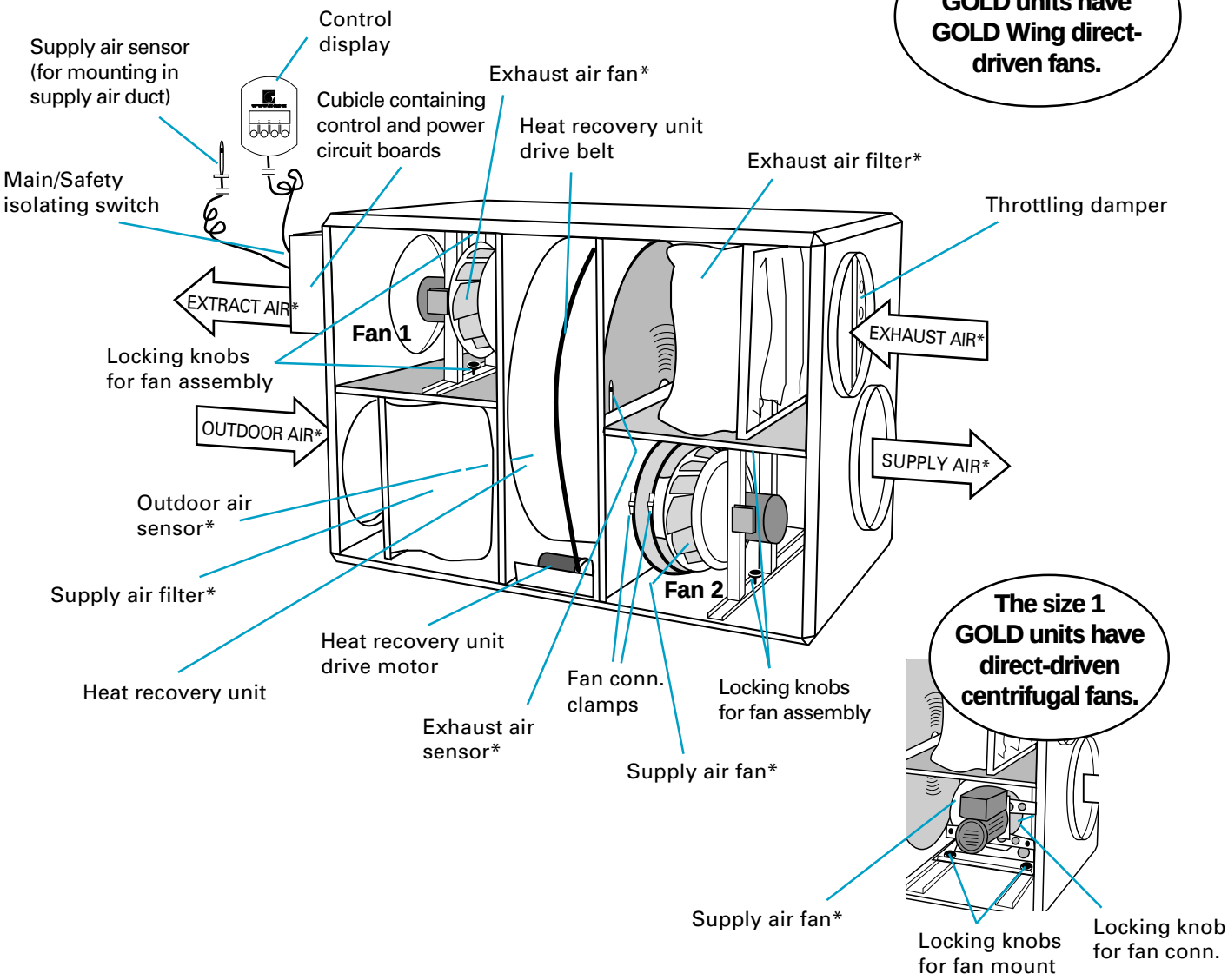
Communication

The GOLD-LON Communication unit (accessory) makes it possible to access a multitude of readings and enter settings across a Lon-Works communication network.

1.2 The components of the air handling unit

1.2.1 GOLD, sizes 1–3

The size 2 and 3 GOLD units have GOLD Wing direct-driven fans.



The size 1 GOLD units have direct-driven centrifugal fans.

*The direction of air flow can easily be altered

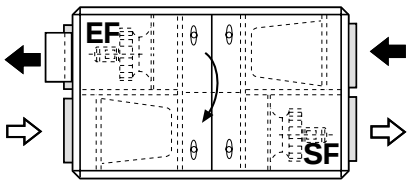
The size 1 – 3 GOLD units are supplied as shown in the adjacent sketch (right-hand version, i.e. the inspection doors are on the right-hand side, viewed in the direction of supply air flow).

An air handling unit can be changed to the left-hand version at the building site simply by moving a contact on the power circuit board. This will change the function of the components marked by an asterisk.

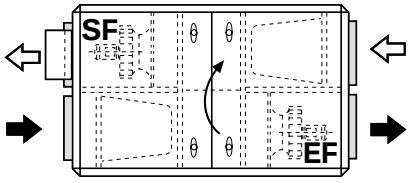
The size 1 – 3 GOLD units can also be turned upside down or upended for further flexibility.

See Installation instruction for GOLD, sizes 1–3, chapter 4.2 and 4.3.

Right-hand version



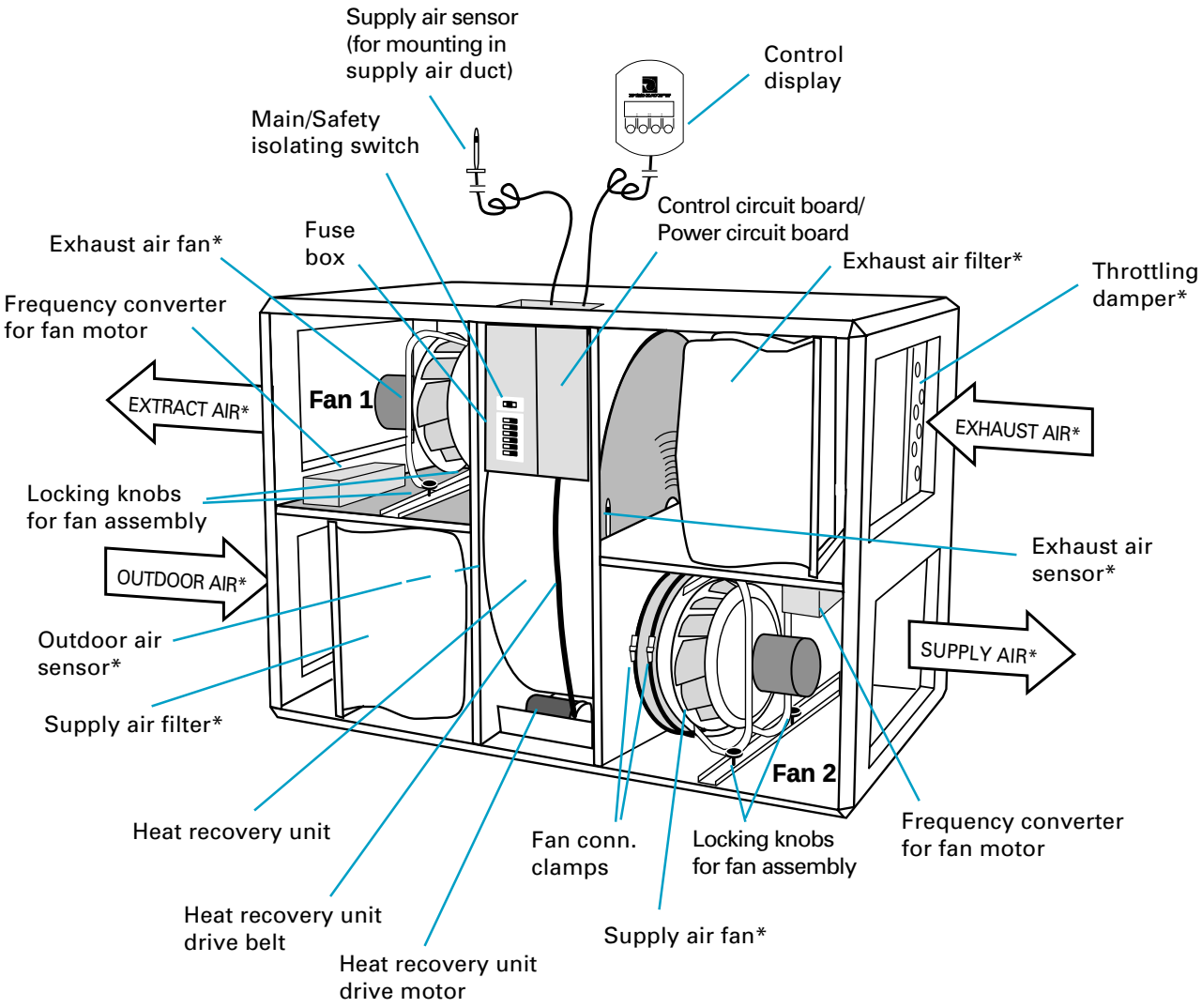
Left-hand version



SF = Supply air fan
EF = Exhaust air fan

= Supply air = Exhaust air

1.2.2 GOLD, sizes 4–5



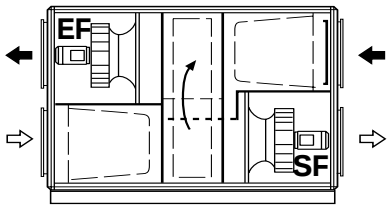
*The direction of air flow can easily be altered

The GOLD units are supplied as shown in the adjacent sketch (right-hand version, i.e. the inspection doors are on the right-hand side, viewed in the direction of supply air flow).

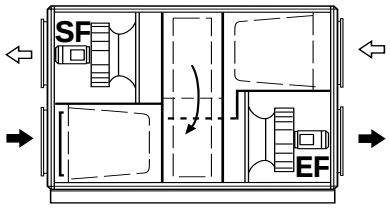
An air handling unit can be changed to the left-hand version at the building site simply by moving a contact on the power circuit board. This will change the function of the components marked by an asterisk.

See Installation instruction for GOLD, sizes 4–5, chapter 4.5.

Right-hand version



Left-hand version



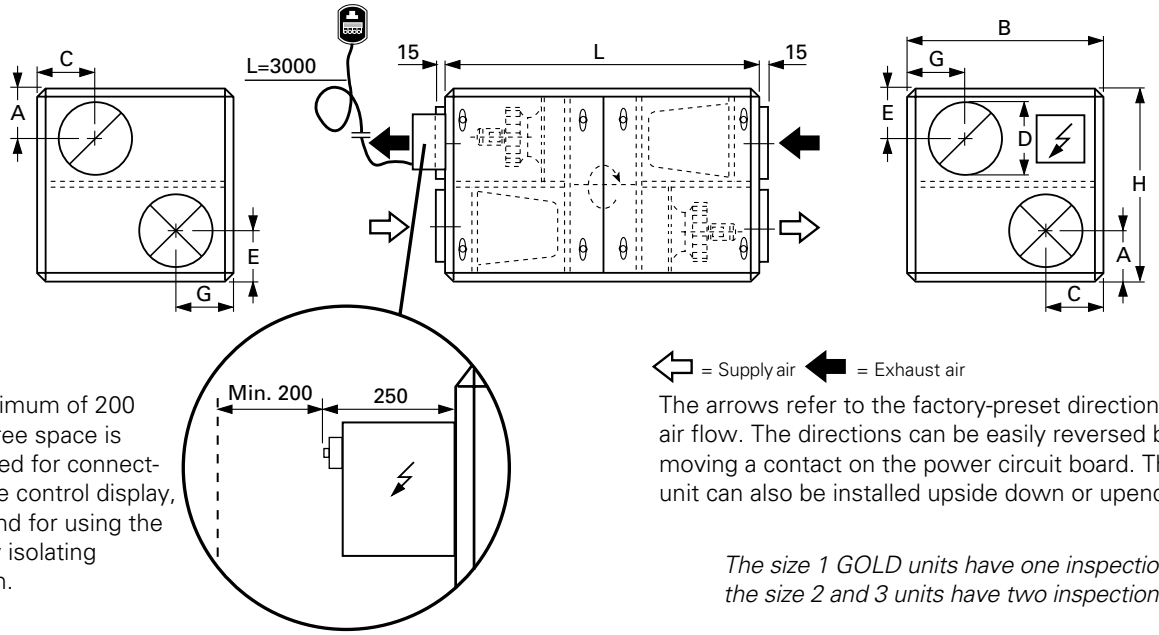
SF = Supply air fan
EF = Exhaust air fan

⇦ = Supply air ⇦ = Exhaust air

2. Technical data

2.1 Design

GOLD, sizes 1–3



A minimum of 200 mm free space is required for connecting the control display, etc. and for using the safety isolating switch.

⇦ = Supply air ⬅ = Exhaust air

The arrows refer to the factory-preset directions of air flow. The directions can be easily reversed by moving a contact on the power circuit board. The unit can also be installed upside down or upended.

The size 1 GOLD units have one inspection cover; the size 2 and 3 units have two inspection doors.

Size	A	B	C	D	E	G	H	L	Weight
1	184	690	203	250	234	214	690	1075	92
2	232	830	240	315	232	225	830	1295	140
3	275	1000	285	400	275	265	1000	1430	210

Dimensions and weights
(All dimensions in mm.) See table above.

Casing
The casing consists of cover panels and inspection doors. The outer wall of the casing is made of 0,7 mm thick painted sheet steel (protected by plastic foil packaging on delivery). The inner casing wall is made of 0,7 mm thick galvanised sheet steel. The intervening insulation consists of a 30 mm thick mineral wool slab.

Connection to the ducting
The air handling unit has circular duct connection openings designed for connection to the ducting across insertion joints fitted with a rubber gasket (not included).

Filter
The GOLD unit has a class F85/EU7 bag filter on both the exhaust and supply air sides.

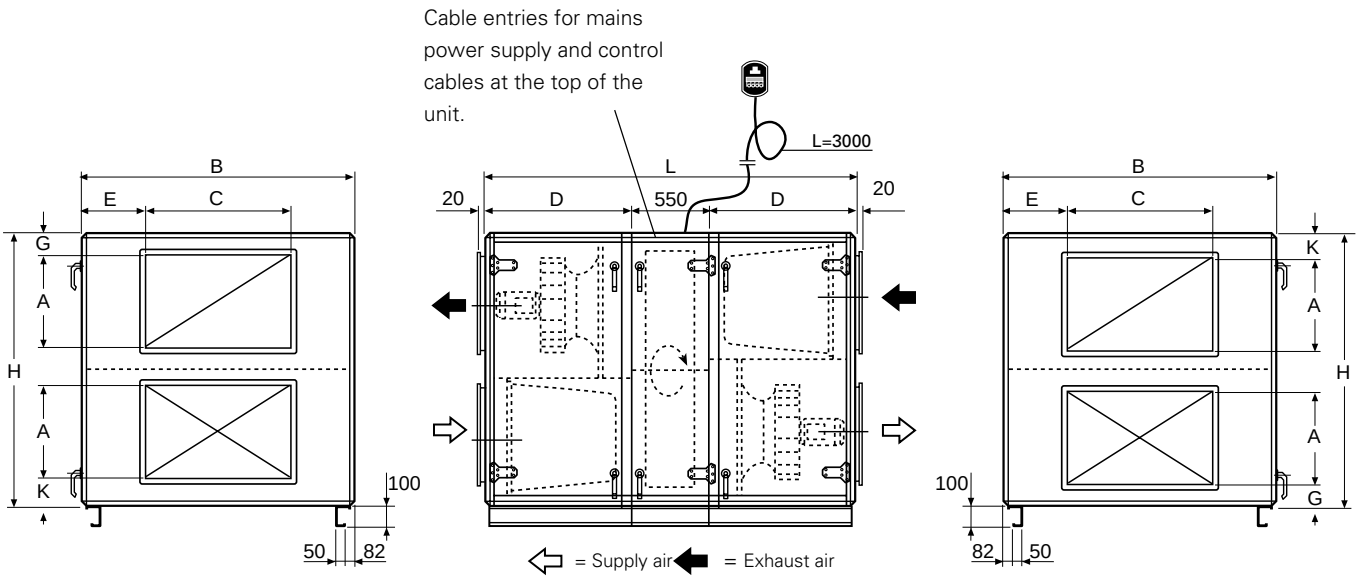
The filter medium is made of glass fibre. The material is flame resistant in accordance with F1 DIN 53438 and is temperature resistant up to +110 °C.

The filter holder has an expanding locking device which seals effectively to prevent leakage.

Fans
The fans are effectively isolated from the casing by means of flexible connections made of woven plastic and by anti-vibration mountings. The entire fan assembly can be withdrawn from the unit.

Heat recovery unit
The air handling unit is equipped with the Turbo rotary heat recovery unit. The heat recovery unit has a purging sector. The rotor can be removed for servicing.

GOLD, sizes 4–5



Refers to the air flow direction on delivery. Can easily be altered by moving a contact on the control card.

Size	A	B	C	D	E	G	H	K	L	Wgt, kg
4	500	1455	800	770	328	84	1455	122	2090	762
5	600	1885	1200	870	343	120	1885	192	2290	1096

Dimensions and weights

(All dimensions in mm.) See table above.

Weight, separate parts

Separate parts weight, kg	Size 4	Size 5
Package	32	40
Heat exchanger	210	300
Fan	260	378
Fan	260	378
Total weight	762	1096

Casing

The casing consists of cover panels and inspection doors. The outer wall of the casing is made of 1 mm thick painted sheet steel (protected by plastic foil packaging on delivery). The inner casing wall is made of 1 mm thick galvanised sheet steel. The intervening insulation consists of a 50 mm thick mineral wool slab.

Connection to the ducting

The unit has fixed rectangular connecting sections for connection to the ducting.

Filter

The GOLD unit has a class F85/EU7 bag filter on both the exhaust and supply air sides.

The filter medium is made of glass fibre. The material is flame resistant in accordance with F1 DIN 53438 and is temperature resistant up to +110 °C.

The filter holder has an expanding locking device which seals effectively to prevent leakage.

Fans

The fans are effectively isolated from the casing by means of flexible connections made of woven plastic and by anti-vibration mountings. The entire fan assembly can be withdrawn from the unit.

Heat recovery unit

The air handling unit is equipped with the Turbo rotary heat recovery unit. The heat recovery unit has a purging sector. The rotor can be removed for servicing.

2.2 Electrical data

Air handling unit

The power supply connections must be made to terminal blocks in the electrical equipment cubicle.

GOLD – 1:

1 x 230 V ± 10 %; 50 Hz; Wire across one 10 A fuse.

GOLD – 2:

1 x 230 V ± 10 %; 50 Hz; Wire across one 10 A fuse.

GOLD – 3:

2 x 230 V ± 10 %; 50 Hz; Wire across two 10 A fuses.

GOLD – 4:

3 x 400 V ± 10%; 50 Hz; Wire across three 16 A fuses.

GOLD – 5:

3 x 400 V ± 10%; 50 Hz; Wire across three 20 A fuses.

GOLD 4-5: The power supply should be connected across a five-conductor system run from above through a cable gland and must be wired directly to the main switch. A zero conductor is required.

Fans

GOLD – 1, per fan motor:

1 x 230 V, 50/60 Hz; 0.25 kW.

GOLD – 2, per fan motor:

1 x 230 V, 50/60 Hz; 0.55 kW.

GOLD – 3, per fan motor:

1 x 230 V, 50/60 Hz; 1.1 kW.

GOLD – 4, per fan motor:

3 x 400 V, 50 Hz; 2.2 kW; 4.7 A

GOLD – 5, per fan motor:

3 x 400 V, 50 Hz; 4 kW; 8.2 A.

Heat recovery unit

GOLD – 1:

Drive motor: 1 x 230 V, 6 W, 50/60 Hz, 0.8 µF.

GOLD – 2 and 3:

Drive motor: 1 x 230 V, 25 W, 50/60 Hz, 1.2 µF.

GOLD – 4 and 5:

Drive motor: 1 x 230 V, 70 W, 50/60 Hz, 6.0 µF.

Fuse box for unit sizes 4 and 5

Safety isolating switch: 45 A

Fuses for the fans:

Size 4	three 10 A fuses per fan
Size 5	three 16 A fuses per fan

Control fuse rating: 10 A

Control circuit board cubicle, sizes 1 – 3

Safety isolating switch: 16 A

There are 3 fine-wire fuses on the power circuit board:

F1	1 AT	Heat exchanger motor
F2	63 mAT	Actuator
F3	63 mAT	Controller

Control circuit board cubicle, sizes 4–5

There are 4 fine-wire fuses on the power circuit board:

F1	125 mAT	Frequency converter
F2	63 mAT	Actuator
F3	63 mAT	Controller
F4	2 AT	Heat exchanger motor

Outputs

Terminals 1 and 2. 10 V DC, max. permissible load 10 mA.

Terminals 7 and 9. 24 V AC, max. permissible load 8 VA.

Control system

The control system is entirely integrated in the air handling unit. The microprocessor-based equipment controls and regulates all motors, temperatures, air flows and other functions. A large number of functions are integrated in the system and can be easily activated.

The air handling unit is designed to be controlled automatically between high speed and low speed operation via the built-in timer function. However, the unit can also be operated manually.

Control accuracy

Temperature: ± 1°C.

Air flow: ± 5%.

Energy efficiency

The design and performance of the air handling system make it possible to satisfy the demands on energy efficiency to max. 2.5 kW per m^3/s.

EMC

The air handling unit conforms to the requirements in accordance with the EMC Directive and has been tested to International Standards EN 50081-1 and EN 50082-2.

2.3 Other particulars

Characteristics

Every air handling unit has a specific serial number which in combination with the product code forms a unique type number for the relevant air handling unit. This number is specified on the product identification plate.

Typical serial number:

S/NR G4 1051 = Serial No.GOLD-4 1051

Typical product code GOLD-4-5-cc:

4 = Air handling unit version
4 = Size of the air handling unit
cc = Language version

The computer program version is also specified on the product identification plate.

Typical program version:

PV 4.24:2106 = Program version 4.24:2106.

Noise and vibrations

The GOLD Wing fans in the air handling unit generate a low level of sound. In many cases, no silencer is needed inside the air handling unit itself, but only in the supply air ducting.

Nevertheless, a correct sound calculation for both the area surrounding the installation and the ducting system should always be carried out. Only this can provide reliable information as to whether or not the fan room will require additional insulation and about the number and type of silencers necessary in the air handling units and in the ducting.

3. Safety precautions

3.1 Safety isolating switch/Main switch

On the size 1 – 3 units, the safety isolating switch is situated on the outside of the electrical equipment cubicle, whereas on the size 4 and 5 units it is situated on the inside of the inspection door of the heat recovery unit (centre section).

The safety isolating switch must not be used for starting and stopping the unit. Press the stop button on the control display to shut down the unit.

Always switch off the safety isolating switch whenever you service the unit, if not advised otherwise in the relevant instruction.

3.2 Risks to consider when servicing

WARNING! Before carrying out work, make sure that the power supply to the unit is switched off.

Positive pressure in the filter/fan section

The inspection doors of the filter/fan sections must not be opened while the unit is in operation.

During normal operation, the stop button on the control display should be used to shut down the unit.

Wait until the fans have stopped before opening the door.

Risk areas in which there are moving parts

Typical moving parts are fan impellers and the rotor drive pulley in the heat recovery unit. Typical moving parts are fan impellers and the rotor drive pulley in the heat recovery unit. The heat exchanger in the GOLD has been equipped with a guard that is secured by screws. The lockable inspection doors on the unit casing serve as guards for the fan.

Risk areas in which parts conduct electric current

The open areas, where personnel risk coming into contact with energised components, are the power circuit board and the control circuit board inside the electrical equipment cubicle. The cover that is secured by screws to the cubicle serves as the guard for these areas. Other electric equipment and components have guards to prevent physical contact.

3.3 Guards

The cover of the electrical equipment cubicle serves as a guard.

The guards may only be removed by an authorised electrician or trained service personnel.

Switch off the electrical power supply to the unit by means of the safety isolating switch before removing any of the guards.

Whenever the unit is in operation, the guards must always be secured and the inspection doors must be closed.

3.4 Who is authorised to service the unit

Only an authorised electrician or trained service personnel is/are permitted to dismantle the guards (cover) and carry out electrical installations or wire external functions inside the unit.

Only personnel trained by PM-LUFT are permitted to carry out work inside the air handling unit.

If the air handling unit should require repair, get in touch with a PM-LUFT representative. A list of representatives by country, city and phone number is on the backside of this manual.

4. COMMISSIONING

4.1 Basic settings and adjustments

A description of the procedures and the order in which they are to be carried out when operating the air handling unit for the first time, is given below. **N. B.**The door lock handles, the keys that open the cylinder locks and the control display can be found behind the throttling damper.

The control display is used to program the operation of the air handling unit. The air handling unit control system is preset at the factory. Thus, the unit is ready to run as soon as it has been wired to the electric power supply. The procedure for using the control display is described in more detail in Section 5.

4.1.1 Adjustment Report

All the adjustments, that are made on the unit, should be entered in an Adjustment Report. An example of this report is shown in Section 4.4. The report can also be used as a check list to see which functions can be adjusted. The report provides particulars of the values that have been preset at the factory and the section in the instructions, in which the relevant menu is described.

4.1.2 Selecting the language

When the unit is connected to the mains power supply and the main switch is switched on for the first time, a language selection menu will be displayed in the control display. (This menu is described in Section 7.2.9)

Select the language desired.

4.1.3 Selecting the type of operation

After having selected a language, the display will change menu to the main menu. (The main menu is described in Section 6.1.)

The third line in the menu indicates the type of operation selected. In this case, no type of operation has been selected and "STOP" is displayed.
- The type of operation can be altered by pressing the "MAN" or "AUTO" buttons.

The unit should normally run in the "AUTO OP" mode. In this mode, the integrated switching clock will manage the switching between high and low speed operation.

4.1.4 Setting the switching clock

Press the S-CL button to go on to the switching clock menu. (The switching clock menu is described in Section 6.2.)
- First program the correct week day, time and date.
- Then program the switch-on and switch-off times required.

4.1.5 Further settings

Use the adjustment report as a guide for setting the air flows, temperatures, set points for air flow control required, etc.

All of the functions are listed in alphabetic order in Section 5.4.

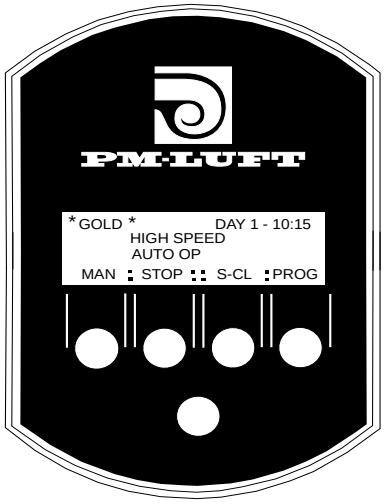
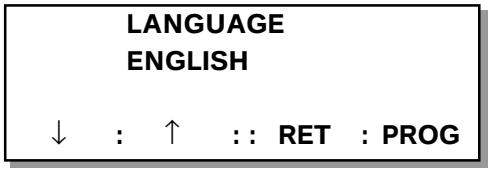
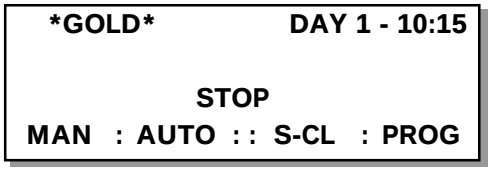
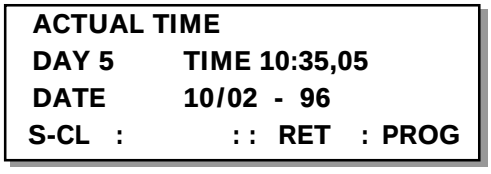


Fig. 2







4.2 Duct calibration

Duct calibration must be carried out three times while the air handling unit is being commissioned – before the ducting system is adjusted – after complete adjustment of the ducting system – after setting the throttling damper. CAUTION! The filters must be clean.

To activate the duct calibration function, go to the start menu for function, test and cooling, described in Section 7.1. Press the FUNCT button and then press the arrow buttons go forward to the menu, which is described in Section 7.2.16.

4.3 Adjusting the ducting

N.B. *Duct calibration must be carried out before the throttling damper can be adjusted. See Section 4.2 above.*

If duct adjustment and commissioning are not carried out at the same time, a temporary adjustment of the throttling damper must be made. Further particulars are given in Section 4.3.2.

Prerequisites for adjustment

– First switch off the unit by pressing the stop button on the control display.
– Wait until the fans have stopped before opening the inspection doors (allowing the pos. pressure to diminish)
– Open the inspection door of the exhaust air filter/ fan section.
– The throttling damper should be in the fully open position. Slide the damper plates all the way to the side so that no section of the plates sticks out the exhaust air inlet.
– Close the inspection door.
– Start the unit by pressing the MAN or AUTO button.

To preset the supply and exhaust air flows of the unit

Go to the start menu for temperature and flow (see Section 6.3).

– Press the FLOW button and preset the values required.

4.3.1 Proportionality method

N:B: If the supply air flow has been controlled to a lower flow setting (during severely cold weather), this must be taken into account when carrying out adjustments.

The GOLD unit has a unique control system which regulates the speed of the fans automatically to obtain the preset air flows. This "self-adjusting" system makes it possible to also maintain the preset air flows when dust has accumulated in the filters.

To prevent the fans from consuming energy at an excessively high rate, it is important to keep the pressure drop in the system at the lowest possible level. Therefore, when adjusting the air devices and the ducting in conjunction with commissioning the GOLD unit, it is advisable to use the proportionality method.

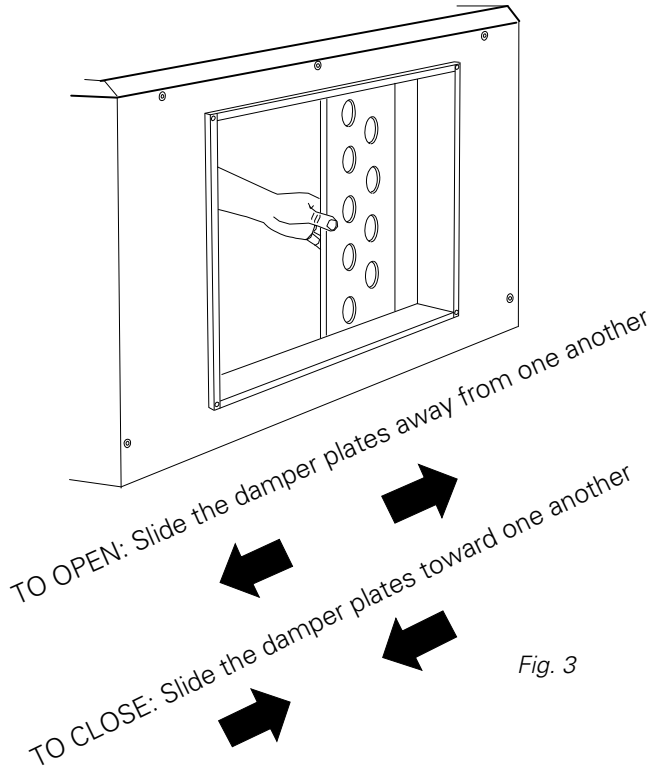


Fig. 3

This method presupposes that the ratio between the flows in the duct branches will remain constant even if the flow in the main ducts has been altered. The same ratio applies to the air devices in the installation.

When adjusting the ducting, the speed of the fans in the unit can be locked at a specific preset flow. See Section 7.2.14.

Order of adjustments

Adjustments to the system should be carried out in the following order:
1: Adjustment of the air devices in each branch duct.
2: Adjustment of the branch ducts.
3: Adjustment of the main ducts.

Work procedure

1. Set all the air devices and dampers in the fully open position.
2. Calculate the ratio between the air flow reading and design air flow of all of the air devices, branch ducts and main ducts. The air device in each branch duct that has the **lowest ratio** must be completely open. This air device is called the index air device. The same is applicable to the branch ducts and the main ducts.

Thus, when this adjustment has been completed, one air device in every branch , one branch damper and one main damper will be completely open.

$$\text{Ratio} = \frac{\text{Air flow reading}}{\text{Design air flow}}$$

Continue to item 3 on the next page.

Begin by adjusting the main duct that has the highest ratio, and the branch in this main duct that has the highest ratio. Adjustments are made at this end first in order to "advance" along the diminishing range of air pressures toward the components of the system that receive the least air volume.

Adjust the last air device on the branch duct so that it will have the same ratio as that of the index air device. This air device is called the reference air device. The last air device on the branch is often the one which has the lowest ratio and must therefore be fully open. In this case, the same air device serves as the index air device and the reference air device.

Throttle the air flow through the other air devices so that they will have the same ratio as that of the reference air device.

N.B. The ratio of the reference air device will change every time another air device is throttled. Thus, in practice, the ratio may be set slightly higher than that called for by the reference air device. The air flow through the reference air device will have to be re-measured between every air device that is throttled.

Proceed to the branch that had the next highest ratio and adjust the air devices there, etc.

N.B. All of the branch dampers must be set to the fully open position until all of the air devices have been adjusted.

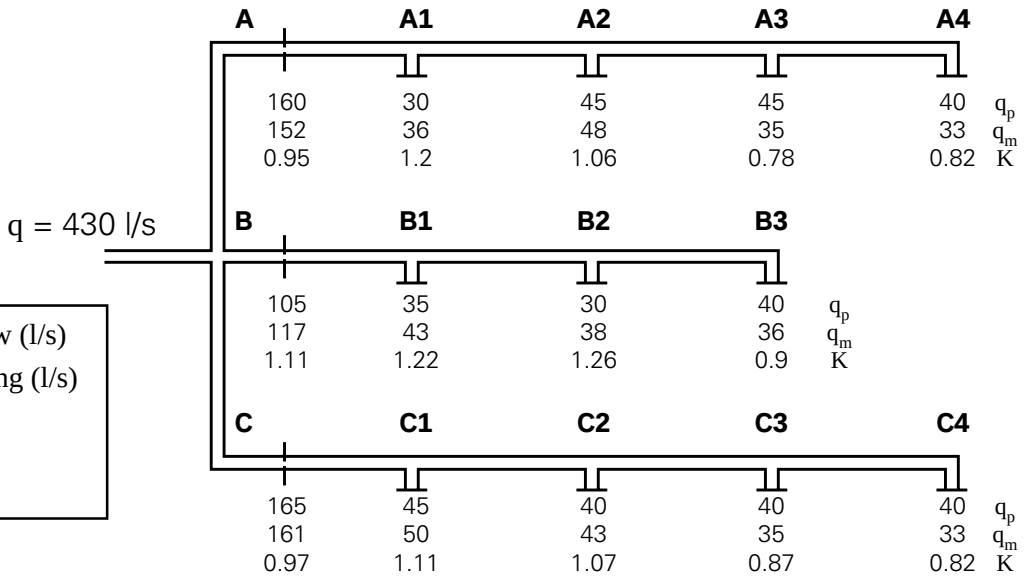
Throttle the branch damper that had the highest ratio, so that it will have the same ratio as the branch that had the lowest ratio.

N.B. Keep in mind that the ratio of the reference damper will vary. Continue as described in item 5.

When all of the branches have been adjusted, throttle the main in-duct dampers in the same manner.

See the adjustment example below.

Example



q_p = design air flow (l/s)

q_m = air flow reading (l/s)

$$K = \frac{q_m}{q_p}$$

Adjustment example

See the figure above.

– Begin adjusting branch B since it has the highest ratio.

– The last air device, B3, has the lowest ratio and should be fully open. Adjust the other air devices, B1 and B2, so that these will have the same ratio as B3 (see item 5 above).

– Adjust the air device in branch duct C. Air device C4 should be fully open, the other air devices should be throttled to the same ratio.

– Adjust the air device in branch duct A. Here, air device A3 is the index air device, which means that air device A4 (the reference air device) must be throttled to the ratio of air device A3 first. The other devices must then be throttled to the same ratio as air device A4.

– Throttle branch damper B to the same ratio as branch damper A, throttle branch damper C to the same setting as branch damper A. Check that the ratios of all the dampers are equivalent.

When the adjustments have been completed, three air devices and one branch damper should be fully open to provide the lowest possible pressure in the system.

Temporary modification of the air flow

The switch-over between high speed and low speed fan operation takes place at the times, which have been preset on the control display. However, the air flow can be altered by means of signals transmitted from a physical presence detector, control button, external timer or the like.

If there are any spaces in the installation, which are to be climate controlled temporarily by means of a timer and boosted air flow dampers (for example, conference rooms), the following applies: The ducting system and the air devices should be sized according to the design air flows, with the exception that all of the air devices, though not those in the space in which the climate is to be boosted, must be able to cope with a specific excess capacity.

The installation should be adjusted for the design air flow with the boosted air flow dampers open. The automatic control equipment in the GOLD unit will maintain the flow at a constant rate.

When the timer and the dampers return to their settings for normal operation, the air flow supplied to the other premises will be slightly higher than the project designed air flow. When the timer transmits a signal to open the boosted air flow damper for air supply to the conference room, the other rooms in the premises will have to "share" their portion of the air flow with this room.

4.3.2 To adjust the throttling damper

To adjust the pressure balance

The pressure balance in the unit can be adjusted by means of the throttling damper. This is required so that the purged air flow in the heat recovery unit will pass from the supply air side to the exhaust air side.

There are two pressure measurement tappings on the outside of the filter/fan sections of the air handling unit. Their location is shown in Fig. 5 below. The tappings are used for measuring the negative pressure in the supply air and exhaust air sections of the unit respectively. The tappings are marked with a **+** for the pressure in the supply air section and a **–** for the pressure in the exhaust air section.

– Connect hoses from the + and – tappings to a manometer or another type of pressure gauge and measure both of the pressures.

Note! Both tappings are used for measuring negative pressure.

Pressure readings

The negative pressure reading in the exhaust air section (–) should be higher than or equivalent to that in the supply air section (+).

If the values are correct

If the negative pressure in the exhaust air section (–) is equivalent or up to 20 Pa higher than the negative pressure in the supply air section (+), then no further adjustment will be necessary.

If the values deviate

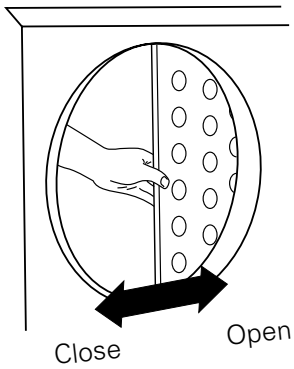
If the negative pressure in the exhaust air section (–) is lower than that in the supply air section (+), the throttling damper will have to be adjusted.

– First switch off the power supply to the unit by pressing the stop button at the control display.
– Wait until the fans have stopped running before opening the inspection door (allowing the pos. pressure to diminish).
– Open the inspection door of the exhaust air filter/ supply air fan section.
– Slightly slide the damper plates toward one another in the exhaust air inlet.
– Close the inspection door.
– Restart the air handling unit by pressing the MAN or AUTO button.
– Measure the differential pressure. Repeat this procedure until the negative pressure in the exhaust air section is equivalent or up to 20 Pa higher than the negative pressure in the supply air section (0 – 20 Pa).

If the negative pressure in the exhaust air section is more than 20 Pa higher than the negative pressure in the supply air section, despite the throttle damper being in the completely open position, then it will be necessary to relocate the throttling damper to the outdoor air inlet.

Finish by calibrating the ducting.

Sizes 1–3



Sizes 4–5

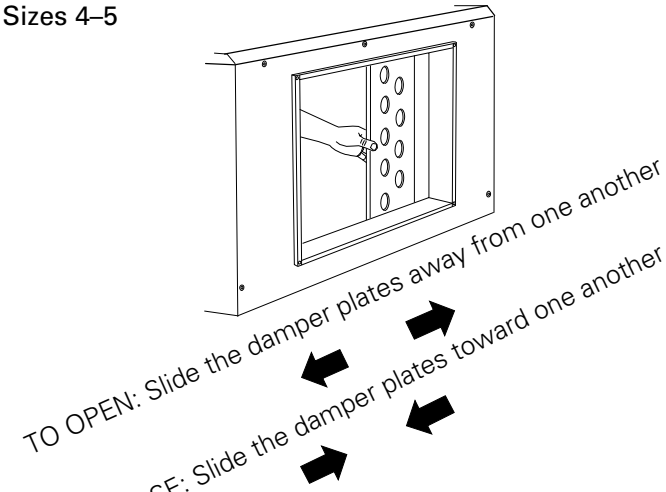
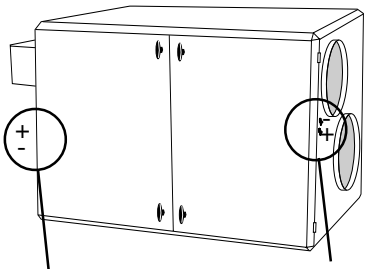


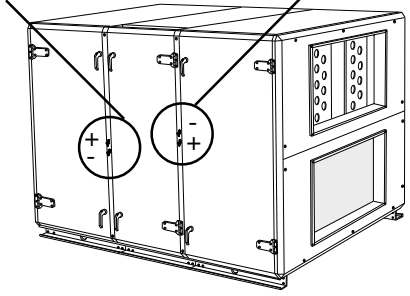
Fig. 4



Sizes 1–3

These measurement tappings can be used for an air handling unit with a right-hand flow configuration = Factory setting.

(These measurement tappings can be used for an air handling unit with a left-hand flow configuration.)



Sizes 4–5

Fig. 5

PM-LUFT

4.4. Adjustment Report, page 1

Item, location, air handling unit, etc.

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.....

.....

.....

Switching clock, current time preset ☐

Program version .....

Times for high level (high speed or low speed)

No. 1 ..... – ..... DAY .....
No. 2 ..... – ..... DAY .....
No. 3 ..... – ..... DAY .....
No. 4 ..... – ..... DAY .....
No. 5 ..... – ..... DAY .....
No. 6 ..... – ..... DAY .....
No. 7 ..... – ..... DAY .....
No. 8 ..... – ..... DAY .....
No. 9 ..... – ..... DAY .....

Factory preset values are specified in this report. 0 denotes that the function has not been selected; 1 denotes that it has been selected. A dash indicates that the function has not been preset at the factory. The values in [ ] are preset values if the function has been selected.

Function		Factory-preset value	Project design value	Adjusted value
Display	Language	English	.....	.....
Temperature	Control function	ERS	.....	.....
	Set point value, °C	—	.....	.....
	Min. temp., °C	—	.....	.....
	Max. temp., °C	—	.....	.....
	Diff. temp., °C	3.0	.....	.....
	Increment	2	.....	.....
	Break point, °C	22.0	.....	.....
		The values refer in order of appearance to size 1/2/3/4/5 units.		
Air flows	High speed, supply air, m^3/s	0.25/0.4/0.7/1.6/2.8	.....	.....
	Low speed, supply air, m^3/s	0.1/0.2/0.4/0.8/1.4	.....	.....
	High speed, exhaust air, m^3/s	0.25/0.4/0.7/1.6/2.8	.....	.....
	Low speed, exhaust air, m^3/s	0.1/0.2/0.4/0.8/1.4	.....	.....
	[Max. speed, exhaust air, m^3/s]	[0.3/0.5/0.9/2.1/3.5]	.....	.....
	[Max. speed, supply air, m^3/s]	[0.3/0.5/0.9/2.1/3.5]	.....	.....
	[VAV Set point value]	[50%]	.....	.....
Air flow control	Supply air	Air flow (Constant)	.....	.....
	Exhaust air	Air flow (Constant)	.....	.....
	[VAV/boosted]	[SA+EA VAV/Boosted]	.....	.....
Switching clock	Operation	Low speed – High speed	.....	.....

PM-LUFT

4.4. Adjustment Report, page 2

Function		Factory-preset value	Project design value	Adjusted value
Functions	Summer night cooling	0	.....	.....
	Switches on at exhaust air temp:	24°C	.....	.....
	Switches off at exhaust air temp:	16°C	.....	.....
	Switches off at outdoor air temp:	10°C	.....	.....
	Time	0.00	.....	.....
	Outdoor air temp. compensation	0	.....	.....
	Winter compensation	3°C	.....	.....
	Summer compensation	2°C	.....	.....
	Set point value displacement	0	.....	.....
	External high/low speed input delayed switch-off, hour:min	0:00	.....	.....
	Time of filter test	22:59	.....	.....
	Filter monitor alarm limit, supply air	10 (units*)	.....	.....
	Filter monitor alarm limit, exhaust air	10 (units*) *) Equiv. to rec. final pressure drop	.....	.....
	Service period, months	12	.....	.....
	Internal fire protection	0	.....	.....
	Exh. air setting in the event of a fire	0	.....	.....
	Alarm block 1	0	.....	.....
	2	0	.....	.....
	3	0	.....	.....
	4	0	.....	.....
	5	0	.....	.....
	6	0	.....	.....
	7	0	.....	.....
	8	0	.....	.....
	Cooling operation			
	In service	1 = Stop	.....	.....
	Function	1 = GOLD Cooler	.....	.....
	Forced cooling	0	.....	.....
	Min. chilled air flow, m^3/s	0.0	.....	.....
	Restart time	10 min.	.....	.....
	Neutral zone	2°C	.....	.....
	Duct calibration carried out	—	.....	.....

Comments:

.....

.....

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Installation work carried out by:

Date .....

Company .....

Name .....

Project design work carried out by:

Date .....

Company .....

Name .....

Adjustments carried out by:

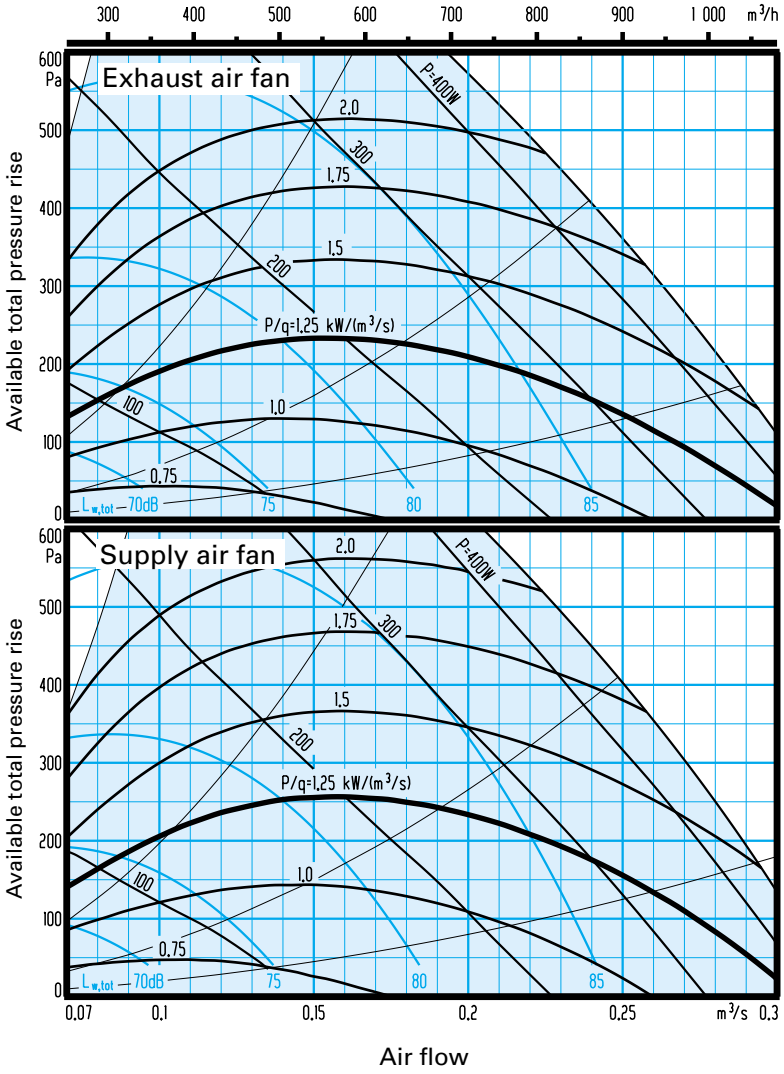
Date .....

Company .....

Name .....

4.5 Sizing

4.5.1 GOLD, size 1



The sizing chart shows the min. and max. available total pressure rise required to cover the pressure drop in the ducting in relation to:

— the air flow
— power demand of the fan motor (P)
— P/q Is specified in kW / (m^3/s), i.e. power demanded by the fan motor/air flow.
Is used as a measurement of the power efficiency of the fan.

— $L_{w, tot}$ Total sound power level emitted to the ducting connected to the fan outlet, dB (relative to 10^{-12} W), in the 125 – 8,000 Hz octave bands.

This is specified for both the supply air and the exhaust air fans.

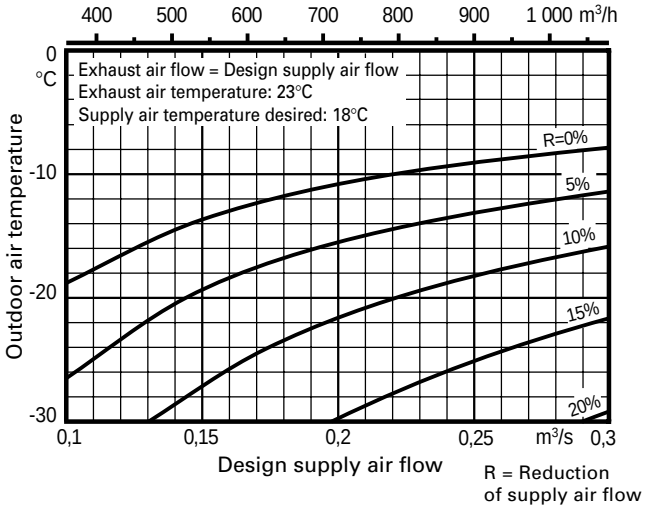
In the case of the exhaust air fan, consideration has been given to the purging air flow at a pressure ratio that is equivalent to that in a normal installation at a specific available pressure.

The supply air and exhaust air fan charts are both based on a design pressure drop across the filter that is equivalent to the initial pressure drop, which is + 30 Pa.

The shaded area indicates the working range.The fan should not operate outside this range.

Example – Supply air flow

The conditions charted below can be used to check the outdoor temperature at which a reduction of the supply air flow will begin and how large the reduction (R) will be.



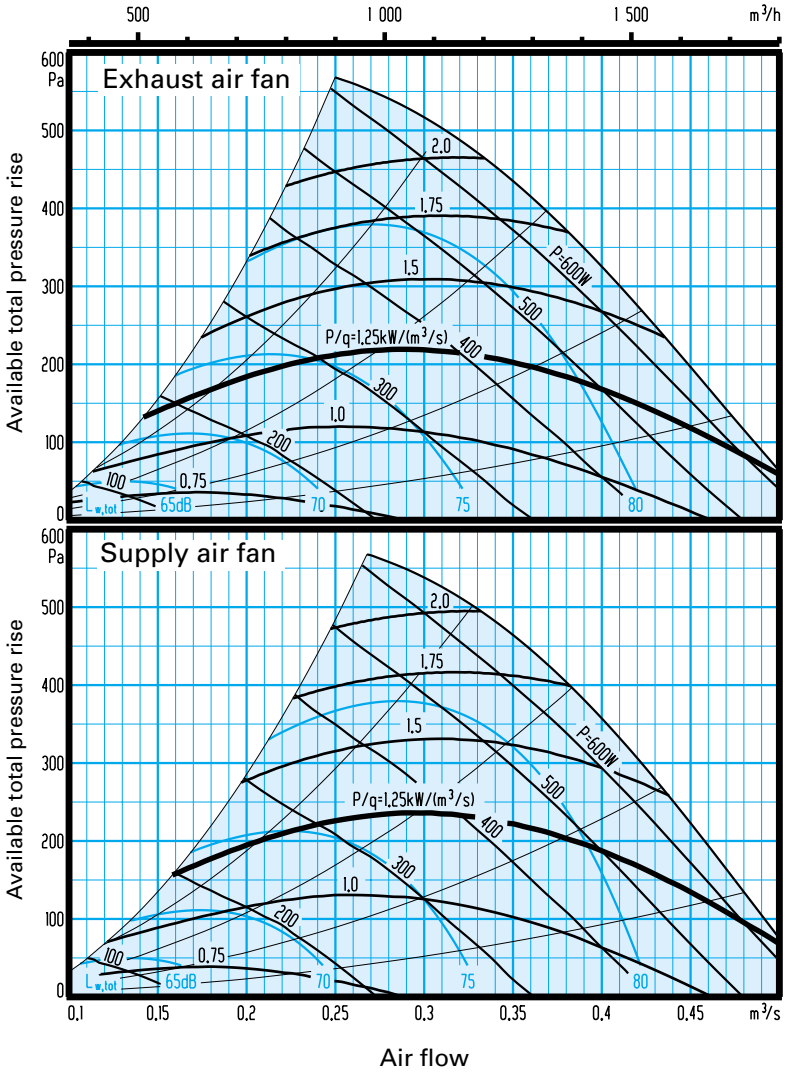
Correction factor K_{OK} for different sound paths and octave bands

	Octave band no./mid-frequency, Hz							
	1	2	3	4	5	6	7	8
SOUND PATH	63	125	250	500	1000	2000	4000	8000
To the outlet ducting	0	–4	–9	–7	–9	–15	–16	–20
To the inlet ducting *	–13	–14	–20	–26	–29	–37	–40	–48
To the surroundings **	–26	–22	–25	–36	–40	–42	–42	–47

* The insertion losses of the the filters and the rotary heat exchanger have been taken into account.

** The total sound power level of the sound emitted to the surroundings is the sum of the levels in the supply air and the exhaust air.

4.5.2 GOLD, size 2



The sizing chart shows the min. and max. available total pressure rise required to cover the pressure drop in the ducting in relation to:

— the air flow
— power demand of the fan motor (P)
— P/q Is specified in kW / (m³/s), i.e. power demanded by the fan motor/air flow.
Is used as a measurement of the power efficiency of the fan.

— $L_{w, tot}$ Total sound power level emitted to the ducting connected to the fan outlet, dB (relative to 10^{-12} W), in the 125 – 8,000 Hz octave bands.

This is specified for both the supply air and the exhaust air fans.

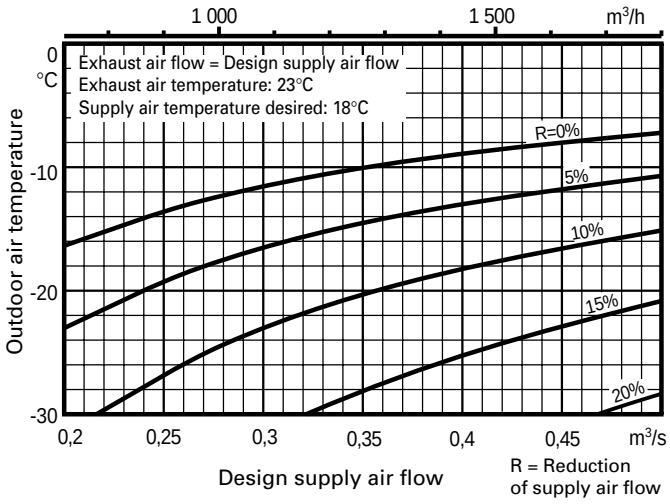
In the case of the exhaust air fan, consideration has been given to the purging air flow at a pressure ratio that is equivalent to that in a normal installation at a specific available pressure.

The supply air and exhaust air fan charts are both based on a design pressure drop across the filter that is equivalent to the initial pressure drop, which is + 30 Pa.

The shaded area indicates the working range.The fan should not operate outside this range.

Example – Supply air flow

The conditions charted below can be used to check the outdoor temperature at which a reduction of the supply air flow will begin and how large the reduction (R) will be.



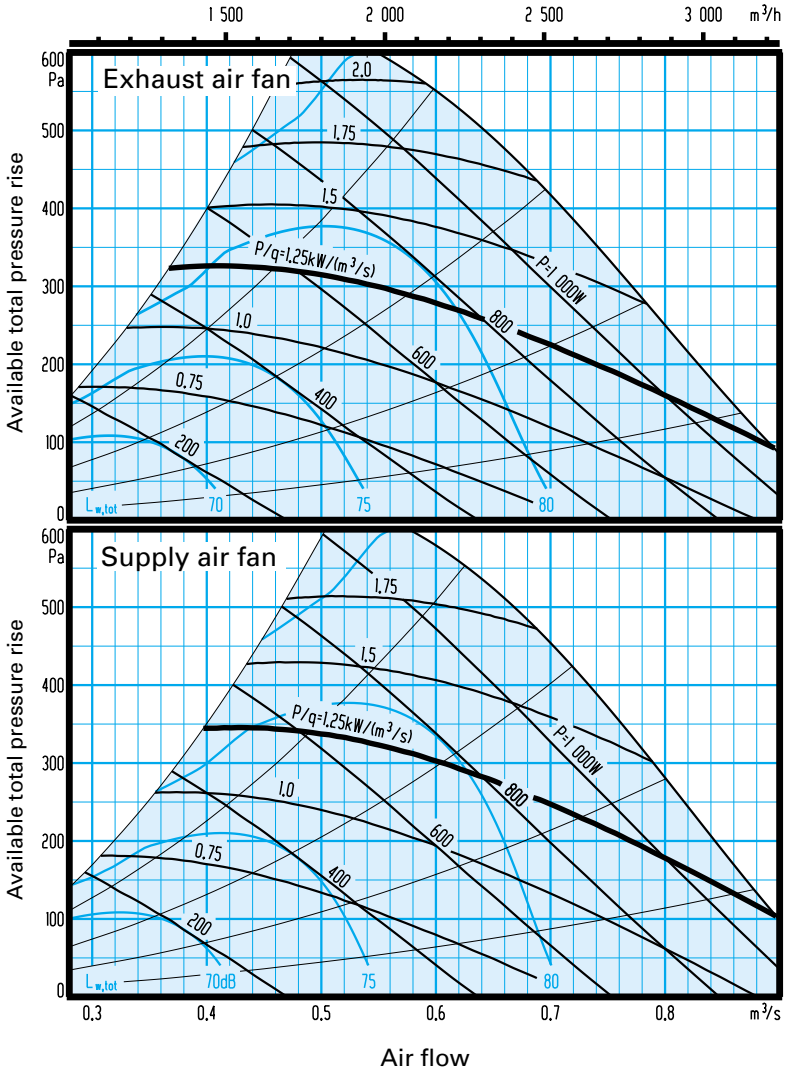
Correction factor K_{OK} for different sound paths and octave bands

	Octave band no./mid-frequency, Hz							
	1	2	3	4	5	6	7	8
SOUND PATH	63	125	250	500	1000	2000	4000	8000
To the outlet ducting	0	–8	–13	–7	–8	–6	–8	–16
To the inlet ducting *	–5	–11	–17	–16	–26	–34	–33	–44
To the surroundings **	–12	–11	–26	–26	–35	–34	–37	–46

* The insertion losses of the the filters and the rotary heat exchanger have been taken into account.

** The total sound power level of the sound emitted to the surroundings is the sum of the levels in the supply air and the exhaust air.

4.5.3 GOLD, size 3



The sizing chart shows the min. and max. available total pressure rise required to cover the pressure drop in the ducting in relation to:

— the air flow
— power demand of the fan motor (P)
— P/q Is specified in kW / (m³/s), i.e. power demanded by the fan motor/air flow.
Is used as a measurement of the power efficiency of the fan.

— $L_{w,\,tot}$ Total sound power level emitted to the ducting connected to the fan outlet, dB (relative to 10^{-12} W), in the 125 – 8,000 Hz octave bands.

This is specified for both the supply air and the exhaust air fans.

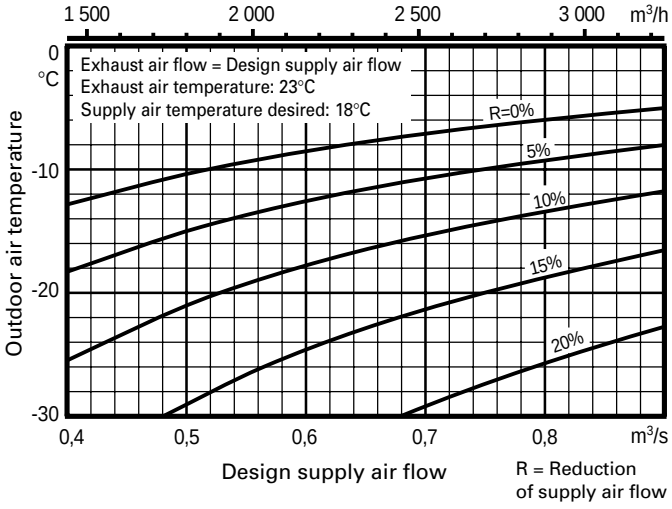
In the case of the exhaust air fan, consideration has been given to the purging air flow at a pressure ratio that is equivalent to that in a normal installation at a specific available pressure.

The supply air and exhaust air fan charts are both based on a design pressure drop across the filter that is equivalent to the initial pressure drop, which is + 30 Pa.

The shaded area indicates the working range.The fan should not operate outside this range.

Example – Supply air flow

The conditions charted below can be used to check the outdoor temperature at which a reduction of the supply air flow will begin and how large the reduction (R) will be.



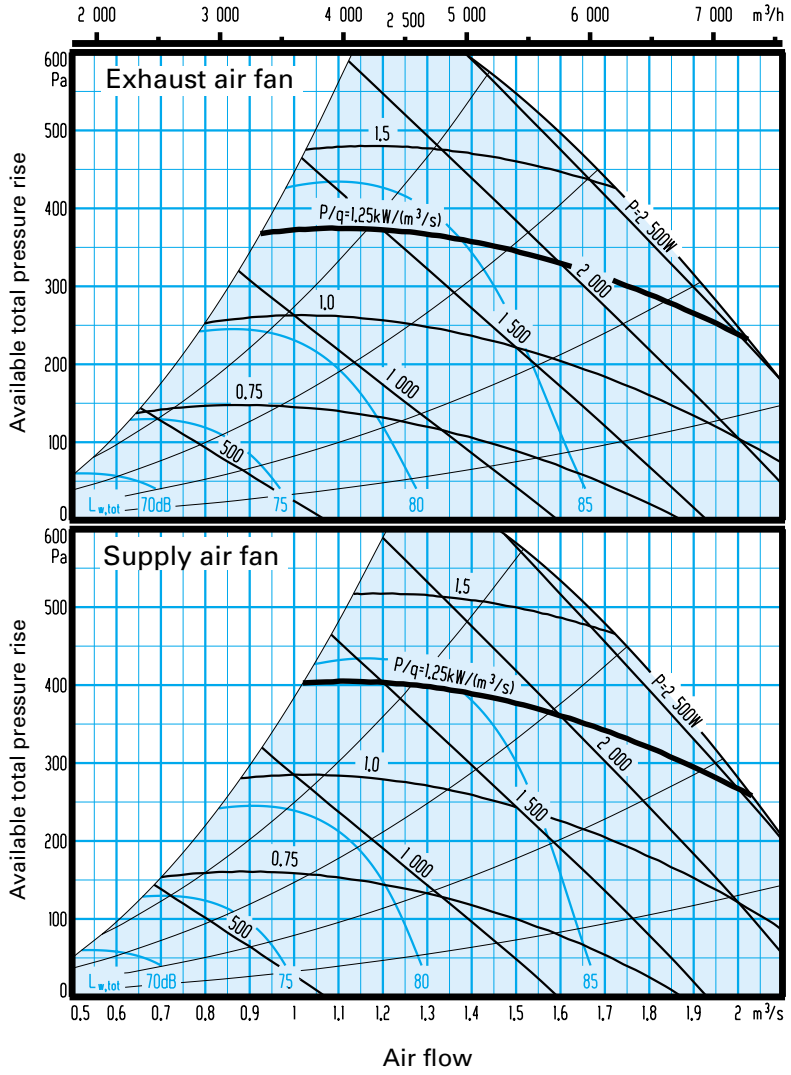
Correction factor K_{OK} for different sound paths and octave bands

	Octave band no./mid-frequency, Hz							
	1	2	3	4	5	6	7	8
SOUND PATH	63	125	250	500	1000	2000	4000	8000
To the outlet ducting	1	–6	–12	–10	–8	–5	–10	–17
To the inlet ducting *	–4	–10	–15	–17	–30	–32	–35	–42
To the surroundings **	–13	–9	–25	–29	–35	–33	–39	–47

* The insertion losses of the the filters and the rotary heat exchanger have been taken into account.

** The total sound power level of the sound emitted to the surroundings is the sum of the levels in the supply air and the exhaust air.

4.5.4 GOLD, size 4



The sizing chart shows the min. and max. available total pressure rise required to cover the pressure drop in the ducting in relation to:

— the air flow
— power demand of the fan motor (P)
— P/q Is specified in kW / (m³/s), i.e. power demanded by the fan motor/air flow.

Is used as a measurement of the power efficiency of the fan.

— $L_{w, tot}$ Total sound power level emitted to the ducting connected to the fan outlet, dB (relative to 10^{-12} W), in the 125 – 8,000 Hz octave bands.

This is specified for both the supply air and the exhaust air fans.

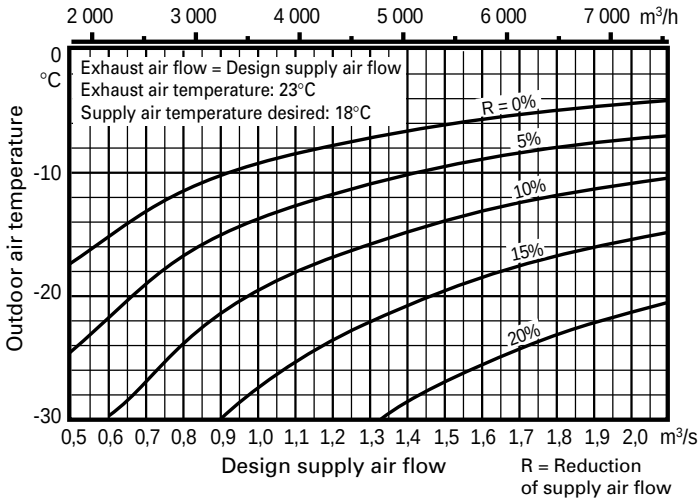
In the case of the exhaust air fan, consideration has been given to the purging air flow at a pressure ratio that is equivalent to that in a normal installation at a specific available pressure.

The supply air and exhaust air fan charts are both based on a design pressure drop across the filter that is equivalent to the initial pressure drop, which is + 30 Pa.

The shaded area indicates the working range.The fan should not operate outside this range.

Example – Supply air flow

The conditions charted below can be used to check the outdoor temperature at which a reduction of the supply air flow will begin and how large the reduction (R) will be.



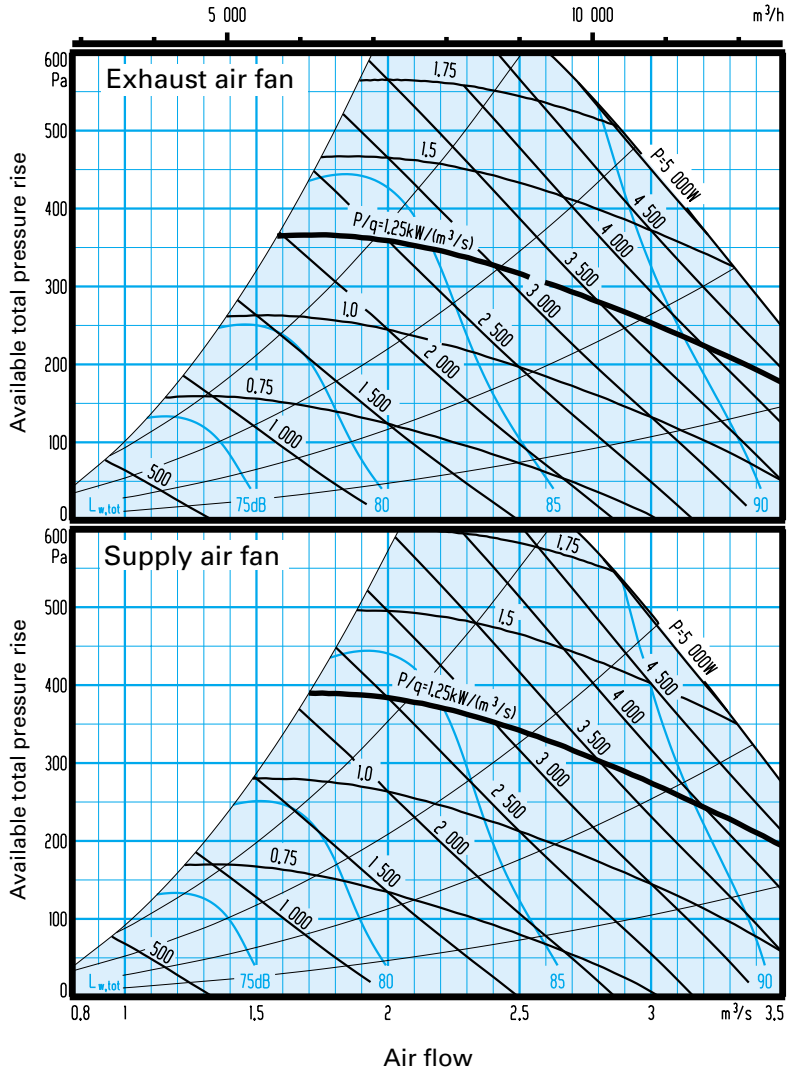
Correction factor K_{OK} for different sound paths and octave bands

	Octave band no./mid-frequency, Hz							
	1	2	3	4	5	6	7	8
SOUND PATH	63	125	250	500	1000	2000	4000	8000
To the outlet ducting	–6	–15	–6	–6	–7	–9	–12	–17
To the inlet ducting *	–10	–13	–12	–17	–26	–29	–35	–45
To the surroundings **	–17	–25	–32	–28	–24	–23	–44	–41

* The insertion losses of the the filters and the rotary heat exchanger have been taken into account.

** The total sound power level of the sound emitted to the surroundings is the sum of the levels in the supply air and the exhaust air.

4.5.5 GOLD, size 5



The sizing chart shows the min. and max. available total pressure rise required to cover the pressure drop in the ducting in relation to:

— the air flow
— power demand of the fan motor (P)
— P/q Is specified in kW / (m^3/s), i.e. power demanded by the fan motor/air flow.
Is used as a measurement of the power efficiency of the fan.

— $L_{w, tot}$ Total sound power level emitted to the ducting connected to the fan outlet, dB (relative to 10^{-12} W), in the 125 – 8,000 Hz octave bands.

This is specified for both the supply air and the exhaust air fans.

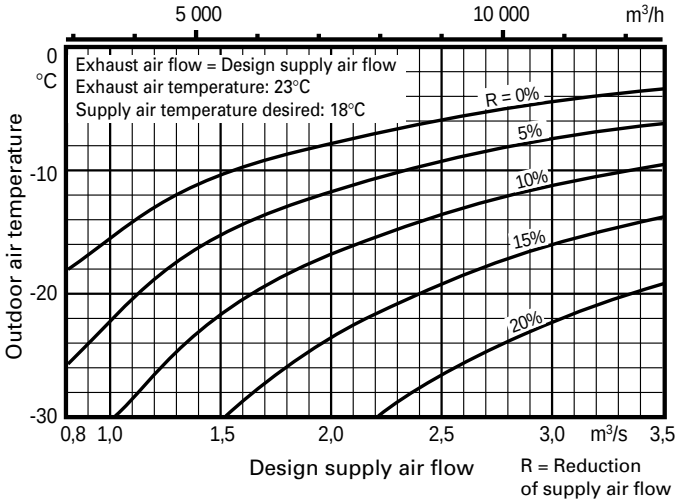
In the case of the exhaust air fan, consideration has been given to the purging air flow at a pressure ratio that is equivalent to that in a normal installation at a specific available pressure.

The supply air and exhaust air fan charts are both based on a design pressure drop across the filter that is equivalent to the initial pressure drop, which is + 30 Pa.

The shaded area indicates the working range.The fan should not operate outside this range.

Example – Supply air flow

The conditions charted below can be used to check the outdoor temperature at which a reduction of the supply air flow will begin and how large the reduction (R) will be.



Correction factor K_{OK} for different sound paths and octave bands

	Octave band no./midfrequency, Hz							
	1	2	3	4	5	6	7	8
SOUND PATH	63	125	250	500	1000	2000	4000	8000
To the outlet ducting	–4	–9	–5	–5	–8	–12	–15	–20
To the inlet ducting *	–9	–12	–13	–21	–27	–30	–34	–44
To the surroundings **	–15	–19	–21	–27	–25	–26	–37	–44

* The insertion losses of the the filters and the rotary heat exchanger have been taken into account.

** The total sound power level of the sound emitted to the surroundings is the sum of the levels in the supply air and the exhaust air.

5. Programming and handling the menus

5.1 The control display

5.1.1 General

The control display is enclosed in a control box and has a 3 metre long cable with quick connector for connection to a socket located at the top of the air handling unit casing.

The control display has 4 buttons and one alarm indicating lamp.

5.1.2 Display and buttons

All the settings, e.g. for air flow, control functions, temperatures and operation times, can be read in plain text on the display.

The information is presented in various menus.

The buttons are used both for going on to the various menus and for altering values or for activating functions in the different menus.

Normally, the main menu is displayed if no other menu has been selected. If another menu is displayed and no button has been pressed for return to the main menu, the display will automatically return to the main menu after a 30 minute pause.

The functions of the four buttons change and are contingent to the menu displayed. The functions of the buttons are explained by the heading or symbol displayed just above each button. These headings and symbols are described in Section 5.3.

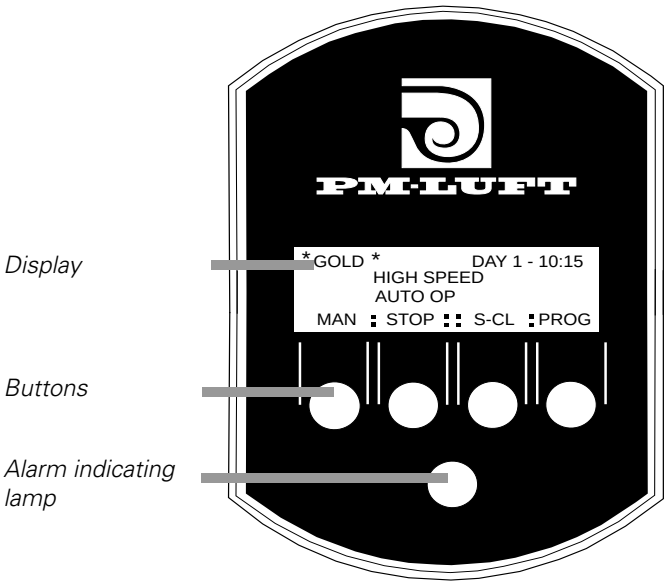
5.2 Menu groups and levels

The display menus are divided into different menu groups and levels. The procedure for handling the menus is of a logical nature and only the actual parameters for the function selected are displayed.

All of the menus available are described separately in Sections 6 and 7. The menus are described in their order of presentation on the display.

The menu groups are arranged according to application. The structure of the menus is presented in the introduction in Sections 6 and 7.

There are several types of menus: the main menu, start menus, menu groups, read-only menus and sub-menus.



5.3 Button headings and symbols displayed in the menus

The most common button functions are described below. (In the cases, in which the buttons have different functions in a particular separate menu, an explanation is given in the section for the relevant menu.)

↓	Go (1 step) on to the next menu in the group.
↑	Go (1 step) back to the previous menu in the group.
RET	Return to the previous menu level (main or start menu).
PROG	Changes display to the sub-menu of the menu displayed (alteration)
+	Increases the value of the flashing figures.
-	Decreases the value of the flashing figures.
➜	Go ahead one step, new flashing figures/ line will be displayed. After the last figures/ line are displayed, the display will return to the menu in the read-only mode.
←	Go back one step, new flashing figures/line will be displayed. After the first figures/line are displayed, the display will return to the menu in the read-only mode

Example of the button headings and symbols

AIRFLOW LOW SPEED
SA 0.55 m³/s
EA 0.55 m³/s
↓ : ↑ : : RET : PROG

5.4 List of functions

The list contains the control system functions arranged in alphabetical order with reference to the section, in which each menu is described.

6. Menus for operation, temperature and flow

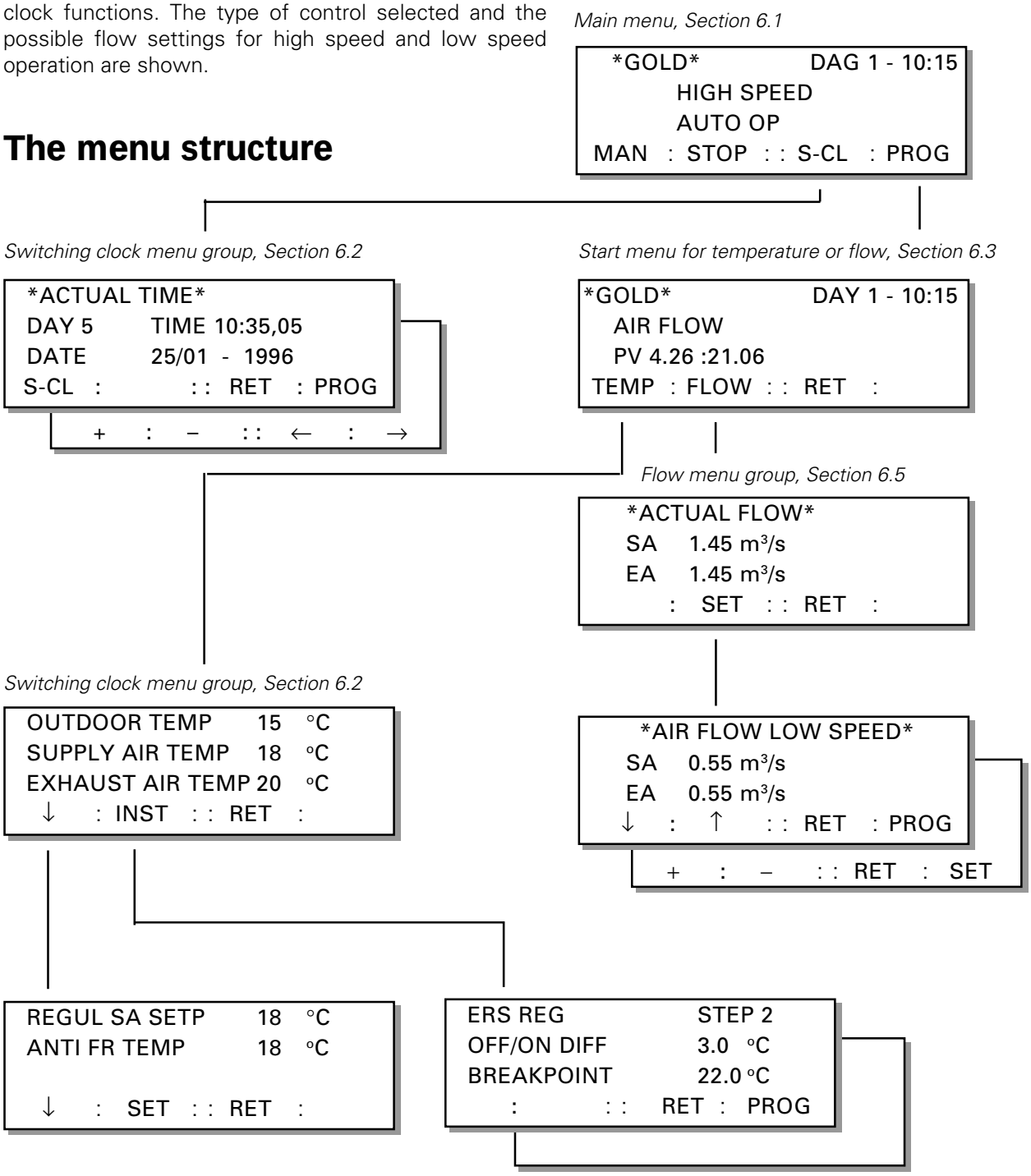
This menu section is also called the user level and is intended for the personnel who operate the air handling unit.

The menus under "PROG" (for temperature and flow) and under "S-CL" in the main menu are described in this section.

These menus make it possible to control the unit (manually, automatically or stop). See the actual time and the switching clock functions. The type of control selected and the possible flow settings for high speed and low speed operation are shown.

N.B. *Unless otherwise specified in the relevant menu section, the menu buttons will function normally, as described in Section 5.3.*

The menu structure



6.1 Main menu

The content of the menu varies depending on the type of operation selected, the other functions that influence the current air flow and the alarms that have been initiated, if any.

The first line shows the day of the week (expressed as a number) and the actual time.

The second line shows the relevant fan speed operation mode: HIGH SPEED or LOW SPEED or if any other function has an influence on the air flow, e.g. filter test, summer night cooling, zero-point calibration, calibration, speed monitor test, external high speed setting, external stop setting, etc.

The third line indicates the type of operation selected: STOP, AUTO OP or MANUAL OP.

To change the type of operation

The "MAN" button starts the unit in the "MANUAL OP" mode. In the manual operation mode, the switching clock will not be activated for handling the automatic switching from high to low speed operation and vice versa.

The "AUTO" button starts the unit in the "AUTO OP" mode. Under normal conditions, the unit should operate in the "AUTO OP" mode, since switching between high and low speed operation are then handled by the timer.

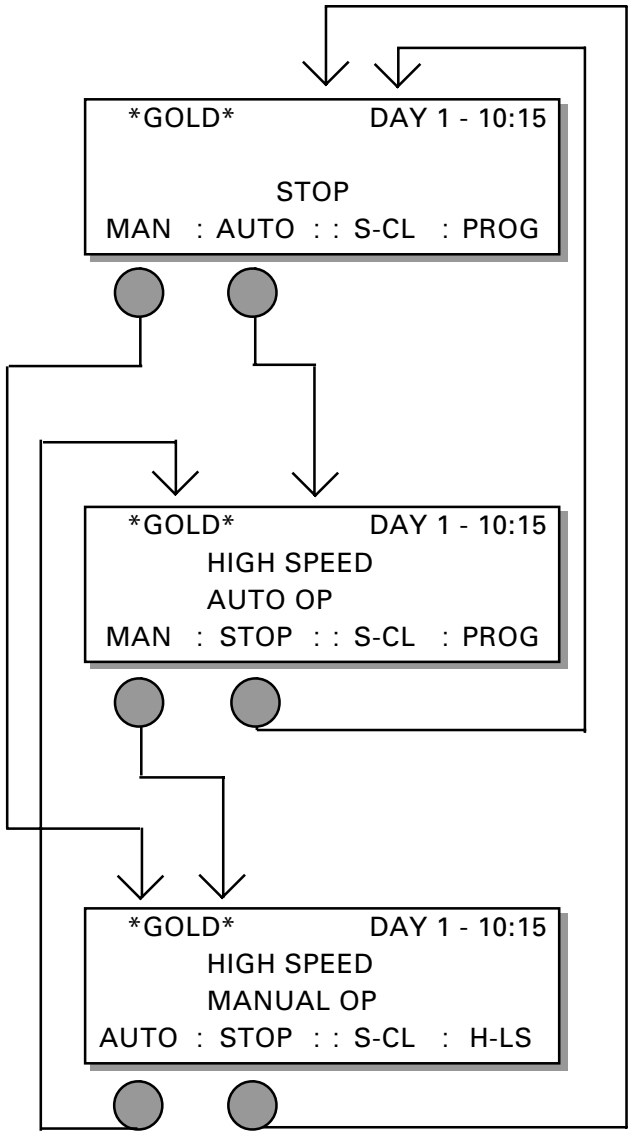
The "STOP" button is used for switching off the unit.

The "H-LS" button is used for switching between manual high speed and manual low speed operation.

To leave the menu

The **"PROG"** button is used for changing the display to a start menu (described in Section 6.3). It is then possible to go on from this menu to the temperature, flow, function, test or cooling menus. The **"PROG"** button function is not accessible when the unit is operated manually.

The **"S-CL"** button is used for changing the display to the menu group for the timer. See Section 6.2



6.2 Switching clock menu group

This menu group can be reached by pressing the "S-CL" button in the main menu. See Section 6.1.

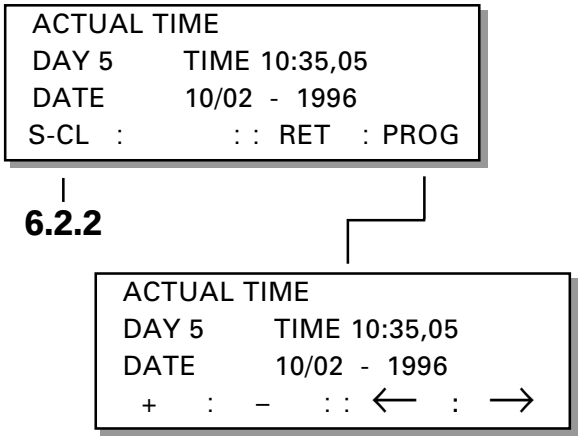
6.2.1 Actual current time

The actual time, i.e. the day of the week (1 - 7), the time and the date, is shown in this menu.

The switching clock is programmed to automatically switch between summer and winter time on the relevant changeover dates. No manual resetting is needed. See Section 7.2.14.

To change the actual time

The **"PROG"** button changes the display to show the sub-menu, in which the settings can be altered.



6.2.2 Switching clock, high speed

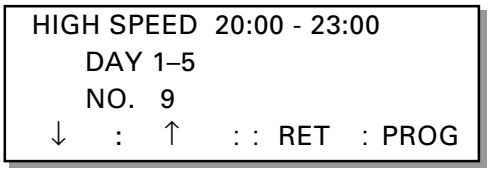
The switching clock switch-on and switch-off times are shown in the menu.

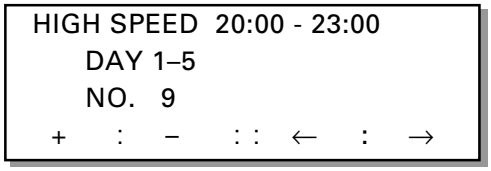
"DAY" indicates the day(s) to which the times entered in the program apply.

When "SWITCHED OFF" appears on the display, the display is not activated, even though the times have been programmed.

If "S-CL FUNCTION" is selected for switching between low-speed and high-speed operation, "HIGH SPEED" will be displayed adjacent to the switching times. If the function is selected for switching between stop and low-speed operation, "LOW SPEED" will be displayed. See the menu images to the right.

For selecting whether the unit should be set for switching between low speed - high-speed operation or for switching between stop - low speed operation, go to the "SWITCHING CLOCK FUNC" Menu Section 7.2.4 in the Menu group for functions.



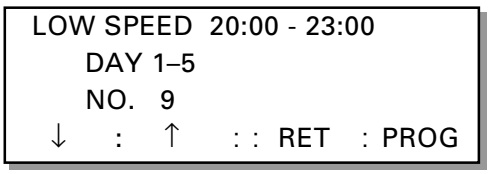


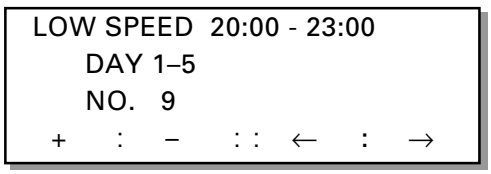
To program the switching clock

The **"PROG"** button is used to change displays to a sub-menu, in which the switching clock switch-on and switch-off times can be preset.

There are 9 programming displays for the switch-on and switch-off times and the day(s) on which the times shall apply:

SHUT-OFF
DAY 1 - 5; denotes Monday to Friday
DAY 1 - 7; denotes the entire week.
DAY 1, 2, 3, 4, 5, 6 or 7; denotes the relevant week day.





6.3 Start menu for temperature and flow settings

(and change-display menu for function/ test)

This menu can be reached by pressing the "PROG" button in the main menu as described in Section 6.1.

Start menu

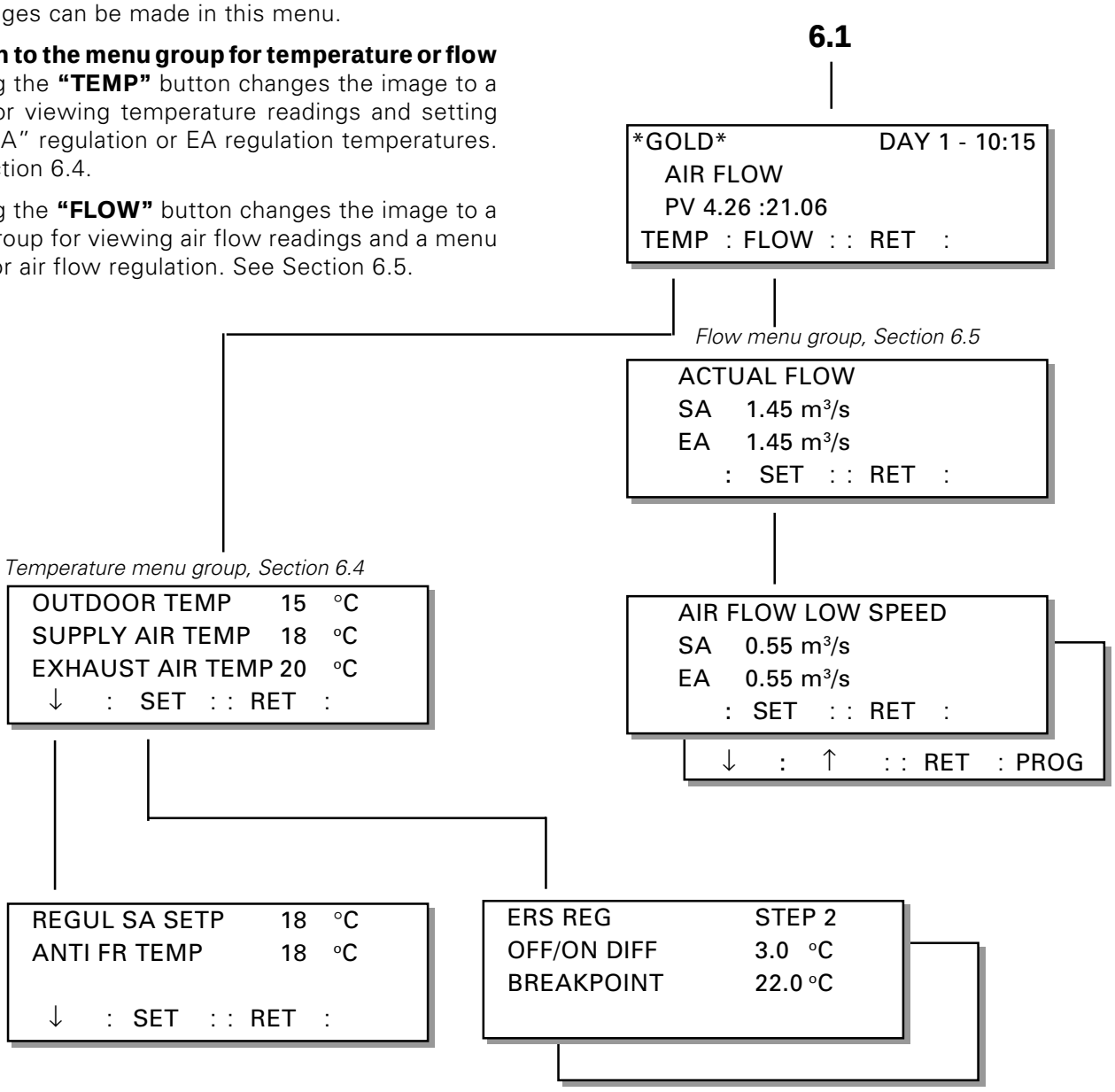
This menu is used as a start menu for selecting menu groups for "TEMP" and "FLOW", and for going on to the start menu for the functions, test and cooling.

PV indicates the program verson and the language/text version.

No changes can be made in this menu.

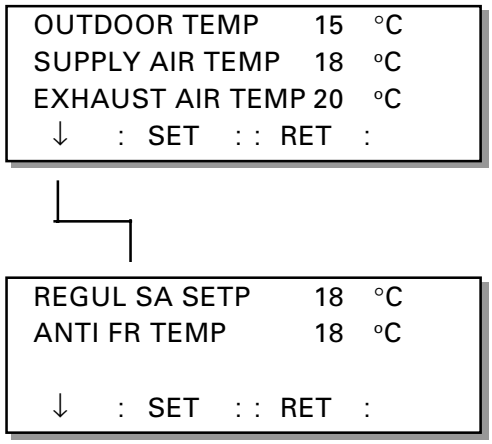
To go on to the menu group for temperature or flow
Pressing the **"TEMP"** button changes the image to a menu for viewing temperature readings and setting "ERS, SA" regulation or EA regulation temperatures. See Section 6.4.

Pressing the **"FLOW"** button changes the image to a menu group for viewing air flow readings and a menu group for air flow regulation. See Section 6.5.



6.4 Temperature menu group

This menu can be reached by pressing the "TEMP" button in the start menu for temp. and flow, as described in Section 6.3.



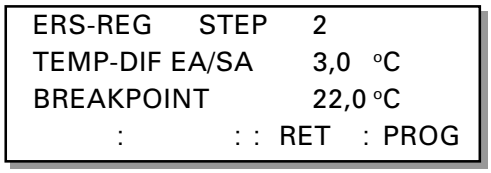
6.4.1 Temperature menus, general

The current temperature readings such as those of the outdoor temperature, supply air temperature and exhaust air temperature can be viewed in the temperature menu. "REGUL SA SETP" indicates the temperature that the controller is programmed to maintain in the supply air. If a heater for hot water is included in the system, "ANTI FR TEMP" indicates the water temperature in the return water pipe.

Any of the following three separate functions can be used for temperature regulation: ERS regulation, supply air regulation or exhaust air regulation.

The temperature control function can be selected in the menu "TEMP REGUL FUNCTION" in the Menu group for functions (Section 7.2.1).

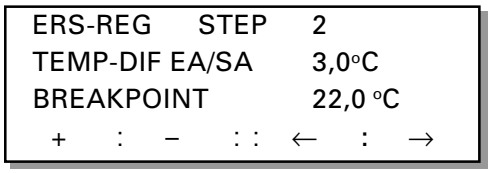
The temperature setting for the function selected can be entered in one of the three following menus depending on which one is available.



6.4.2 ERS regulation

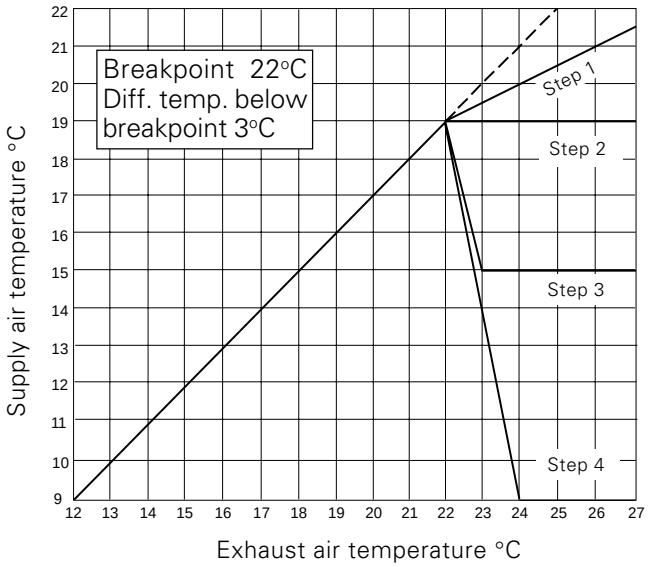
This menu is only displayed when ERS regulation has been selected in Menu Section 7.2.1 in the Menu group for functions.

ERS regulation stands for "Exhaust air temperature Related Supply air temperature regulation). This type of regulation involves controlling the supply air temperature in relation to the exhaust air temperature. The GOLD unit is at first hand designed for operating with this type of regulation. IMPORTANT! If the minimum air flow rate has been preset, the control unit will not be able to regulate the supply air fan to run at a lower speed. See also Section 8.16.



"STEP" shows the temperature curve that has been selected. Step 1, 2, 3 or 4 can be selected by going into the chart in Figure 6. Step 2 is the factory-preset value.

Fig. 6



"TEMP-DIF EA/SA" is the difference between the supply air temperature and the exhaust air temperature below the break point in the chart. The chart has been plotted for a 3 °C differential.

The "BREAKPOINT" is the point in the chart, from which the different steps in the chart radiate. It is defined by the exhaust air temperature. The breakpoint in the chart is 22 °C.

To change setting

Press the **"PROG"** button to change the display over to a sub-menu, in which the settings can be altered.

6.4.3 Exhaust air regulation

This menu is displayed only if exhaust air regulation has been selected in Menu Section 7.2.1 in the Menu group for functions.

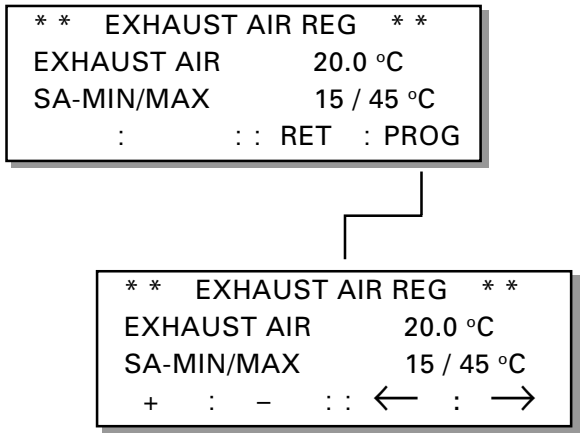
When exhaust air regulation is selected, a constant temperature is maintained in the exhaust air ducting (premises) by increasing and decreasing the supply air temperature.

"EXHAUST AIR" is the temperature required in the exhaust air ducting.

"SA-MIN" is the lowest temperature and "SA-MAX" is the highest permissible supply air temperature when the controller is set for maintaining a constant exhaust air temperature.

To change setting

Press the **"PROG"** button to change the display over to a sub-menu, in which the new settings can be made.



6.4.4 Supply air regulation

This menu is displayed only if supply air regulation has been selected in Menu Section 7.2.1 in the Menu group for functions.

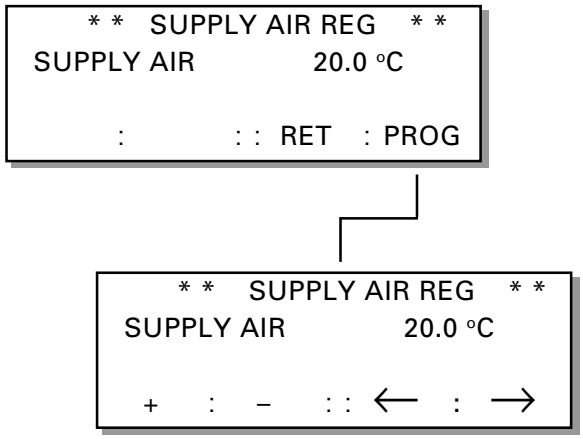
When supply air regulation is selected, a constant supply air temperature is maintained without taking the load in the premises into account.

"SUPPLY AIR" is the temperature required in the supply air ducting. IMPORTANT! If the minimum air flow rate has been preset, the control unit will not be able to regulate the supply air fan to run at a lower speed. See also Section 8.16.

To change setting

Press the **"PROG"** button to change the display over to a sub-menu, in which the settings can be altered.

Size	Min. air flow		Max. air flow		Shortest step	
	m³/h	m³/s	m³/h	m³/s	m³/h	m³/s
GOLD 1	250	0,07	1100	0,30	10	0,01
GOLD 2	360	0,10	1800	0,50	20	0,01
GOLD 3	1020	0,28	3240	0,90	30	0,01
GOLD 4	1000	0,27	7600	2,11	100	0,03
GOLD 5	2000	0,55	12700	3,53	100	0,03



6.5 Flow menu group

This menu can be reached by pressing the "FLOW" button in the start menu for temp. and flow as described in Section 6.3.

6.5.1 Current air flow

Read-only menu for reading the current supply air and exhaust air flows. Press the "SET" button for reading the air flow settings and entering new flow settings in the program at the various levels.

6.5.2 Flow, low speed

"SA" shows the preset value for supply air flow.

"EA" shows the preset value for exhaust air flow.

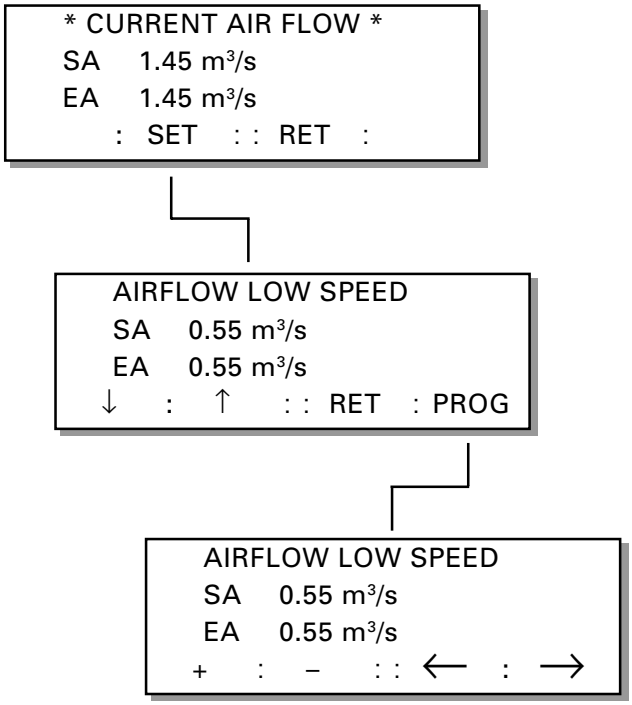
m^3/s shows pre-set flow unit. To alter the flow unit, see section 7.2.14.

To change setting

Press the **"PROG"** button to change the display over to a sub-menu, in which the new settings can be made.

The air flow generated when the fans are running at low speed may not be higher than the air flow when the fans run at high speed.

This air flow generated at low speed can also be set to 0 m^3/s, which is equivalent to the fan not running during the period programmed for low speed operation.



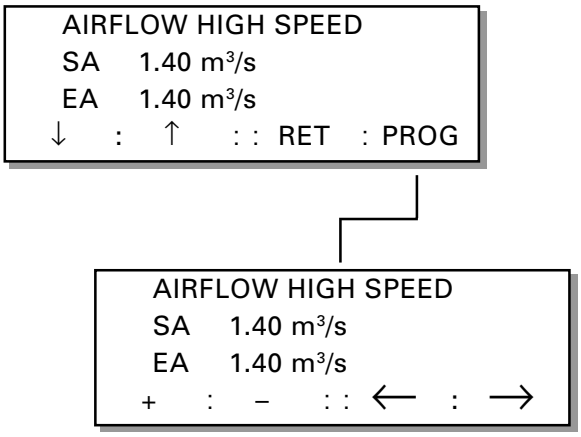
6.5.3 Flow, high speed

"SA" shows the preset value for supply air flow.

"EA" shows the preset value for exhaust air flow.

To change setting
Press the **"PROG"** button to change the display over to a sub-menu, in which the new settings can be made.

The air flow when the fans are running at high speed may not be lower than the air flow when the fans are running at low speed.



6.5.4 FLOW, max. speed

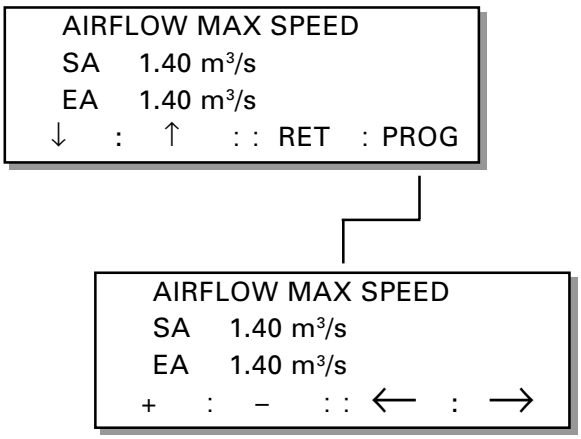
This menu is accessible only if the VAV control function or forced air flow has been selected in Menu Section 7.2.2 under "Menu group for functions" or if the forced cooling function has been selected in Menu Section 7.4.2 under "Cooling menu group".

"SA" shows the preset value for supply air flow.

"EA" shows the preset value for exhaust air flow.

To change setting
Press the **"PROG"** button to change the display over to a sub-menu, in which the new settings can be made.

The max. air flow may not be lower than air flow when the fans are running at high speed.



6.5.5 VAV control, set value

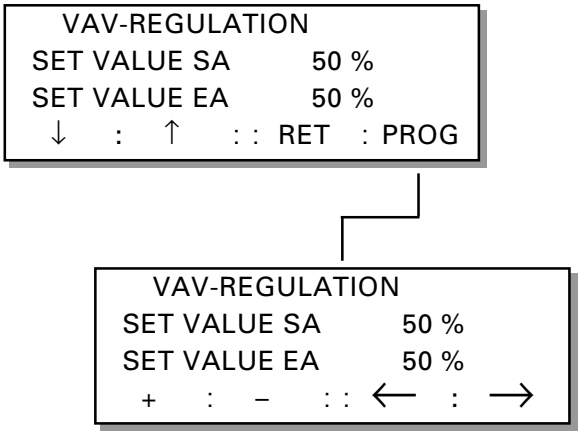
This menu is accessible only if the VAV control function has been selected in Menu Section 7.2.2 under "Menu group for functions".

" SET VALUE SA" shows the set value for supply air flow.

"SET VALUE EA" shows the set value for exhaust air flow.

To change setting
Press the **"PROG"** button to change the display over to a sub-menu, in which the new settings can be made.

N.B. The high fan speed air flow setting and max. air flow setting are the min. and max. limits of the working range of the controller.



7. Menus for function, test and cooling

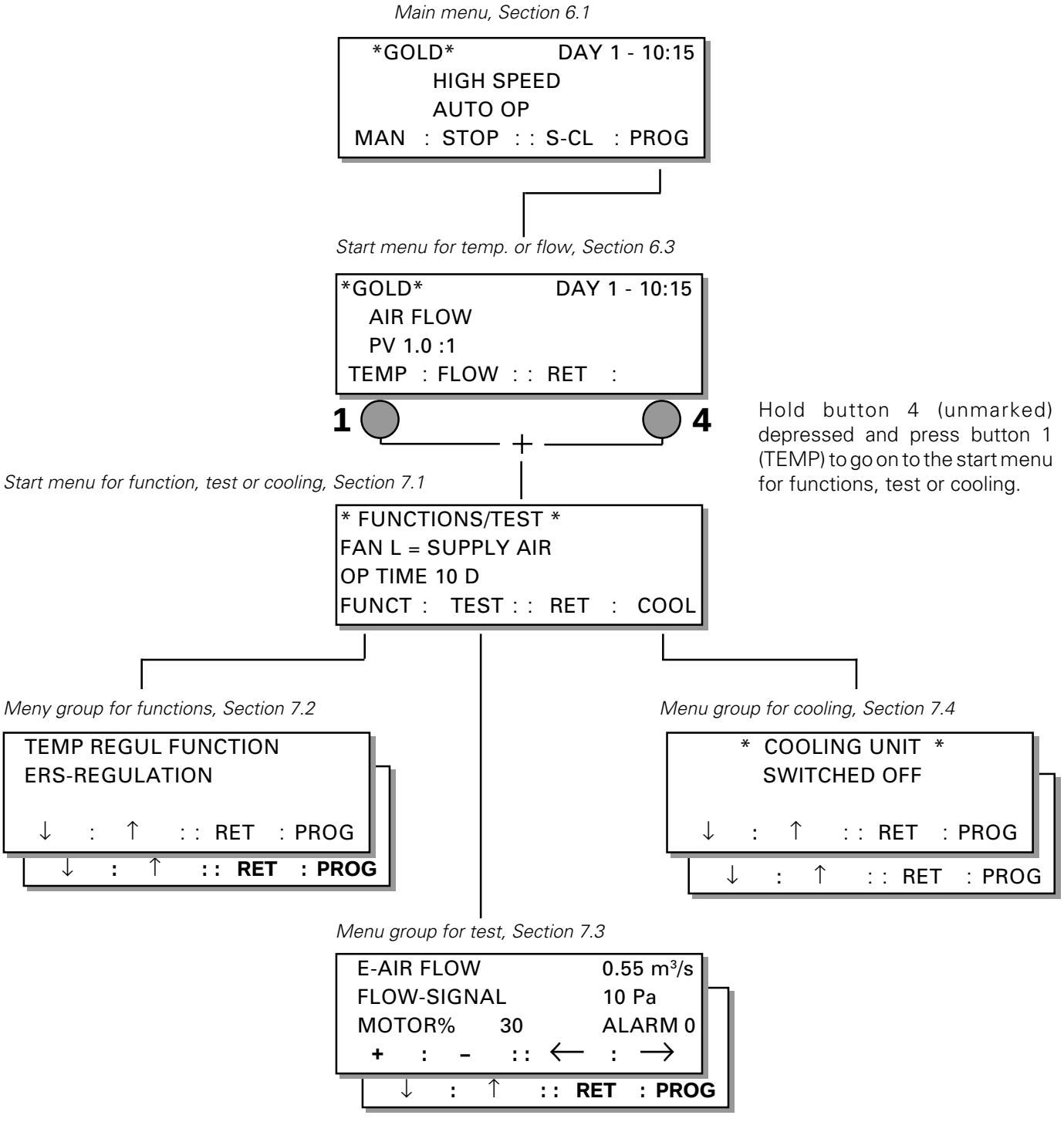
This level is designed for use by skilled personnel who know the ventilation trade.

The menus, that are available under the headings, "FUNCT, TEST, COOL" in the start menu, are described in this section.

This menu can be used for setting the various functions, entering manual inputs and outputs, test running the GOLD Cooler, reading operational status on all inputs, selecting the type of cooling function and boosting the cooling capacity. If the GOLD Cooler is installed, the operational status, temperatures and pressure of this component can be read.

N.B. *Unless otherwise specified in the relevant menu section, the menu buttons will function normally, as described in Section 5.3.*

Menu structure



7.1 Start menu for function, test and cooling

Start menu

This menu can be reached by holding button 4 (unmarked) depressed (in the start menu for temp. and flow) and press button 1 (TEMP), as described in Section 7.

The start menu for three different menus will appear. These three menus are: function, test and cooling respectively.

"FAN" indicates the direction of air flow through the unit selected.

"OP TIME" indicates the number of 24 hour days that the unit has been in operation.

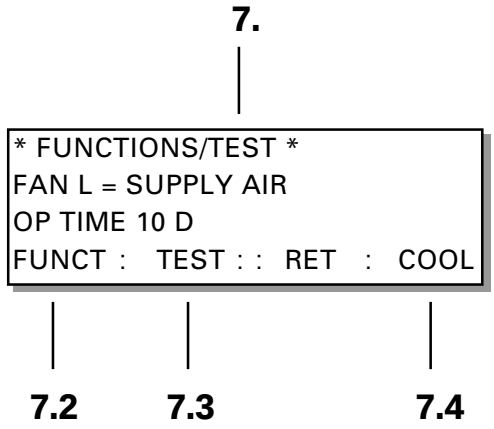
To go further

Select the group: FUNCT, TEST or COOL

"FUNCT" is a menu group used for setting the various functions, for example summer night cooling and control function. It is also possible to block and activate certain alarms and read temperatures transmitted from sensors and set points. This menu group is described in Section 7.2.

"TEST" is a menu group for manually entering inputs and outputs for, e.g. fans and heat recovery units, test running the GOLD Cooler (if one is wired), and read the operational status of all the inputs. All control is disconnected when the unit is run manually. This menu group is described in Section 7.3.

"COOL" is a menu group intended only for the cooling functions. Using this menu, the type of cooling function and forced cooling can be selected. If the GOLD Cooler is installed, the operational status, temperatures and pressure of this component can be read. This menu group is described in Section 7.4



7.2 Menu group for functions

This menu can be reached by pressing the "FUNCT" button in the start menu for function, test or cooling, as described in Section 7.1.

7.2.1 Temperature regulation function

This menu shows the temperature regulation function that has been selected.

To change control function

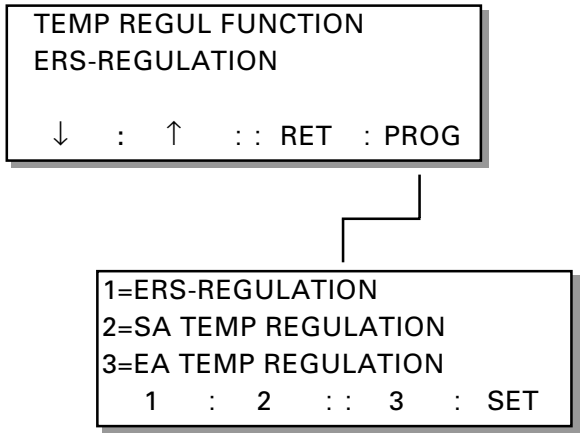
Press the **"PROG"** button to change the display over to a sub-menu, in which the settings can be altered.

Three different types of temperature regulation can be selected: ERS regulation, exhaust air regulation and supply air regulation.

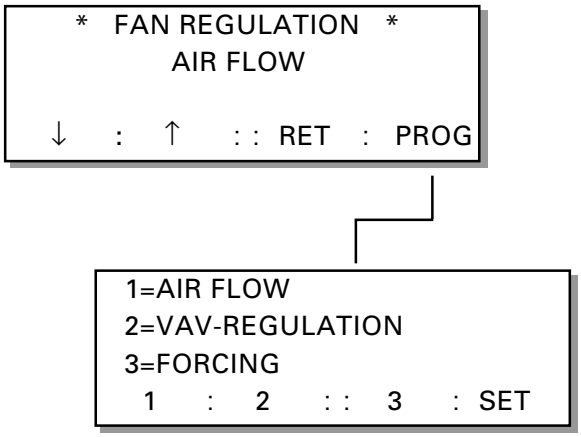
Select the function required by pressing button **1, 2** or **3**.

Then press the **"SET"** button to confirm the change.

The current temperature set value settings within the type of control selected are entered in the temp. menu group, as described in Section 6.4.



7.2.2 Fan speed regulation



This menu shows the function selected, according to which the fans are controlled. For further particulars about air flow control, see Section 8.12.

When "AIR FLOW" (normal flow control) is indicated in the display, the flow is controlled so that the preset value will be maintained.

When "VAV REGULATION" is selected, the fans are controlled via an external signal. The air handling unit then controls the fan speeds in order to maintain the programmed percentages for each 0 - 10 V DC input.

When "FORCING" is selected, the fans are controlled via an external signal. The speed of the fans can then be controlled by means each 0 - 10 V DC input.

To change control function

Press the **"PROG"** button to change the display over to a sub-menu, in which the settings can be altered.

Three different types of control can be selected: Constant air flow, VAV regulation or forced air flow.

Select the function by pressing button **1**, **2** or **3**.

Then press the **"SET"** button to confirm the change.

N.B. If VAV regulation or forced air flow has been selected, go on to the next menu entitled: "VAV/FORCING" Section 7.2.3.

7.2.3 Fan performance when VAV control or forced air flow is selected.

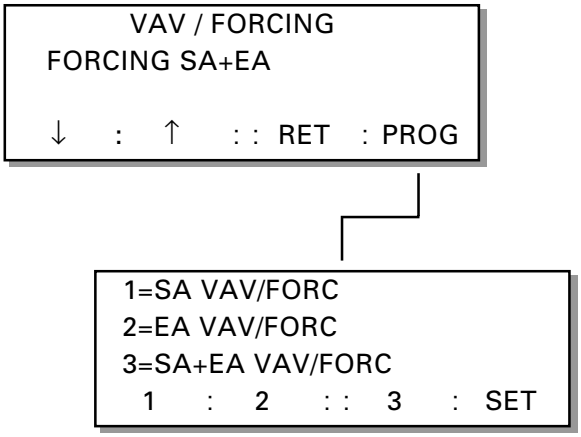
This menu is displayed only if VAV regulation or forced air flow has been selected in the previous menu, Section 7.2.2.

The menu shows the control function selected and which fan(s) is/are being controlled, i.e. the supply air fan (SA), the exhaust air fan (EA) or both fans (SA + EA).

"SA" indicates that the supply air fan has been selected for VAV regulation or forced air flow. The exhaust air fan is then run at normal air flow control.

"EA" indicates that the exhaust air fan has been selected for VAV regulation or forced air flow. The supply air fan is then run at normal air flow control.

"SA + EA" indicates that both the supply air fan and the exhaust air fan have been selected for VAV control or forced air flow.



To change control function

Press the **"PROG"** button to change the display over to a sub-, in which the settings can be altered.

Select the function by pressing button **1**, **2** or **3**.

Then press the **"SET"** button to confirm the change.

N.B. The values for flow (low, high and max. speed) can be preset in the menus under "Flow function group". See Section 6.5.

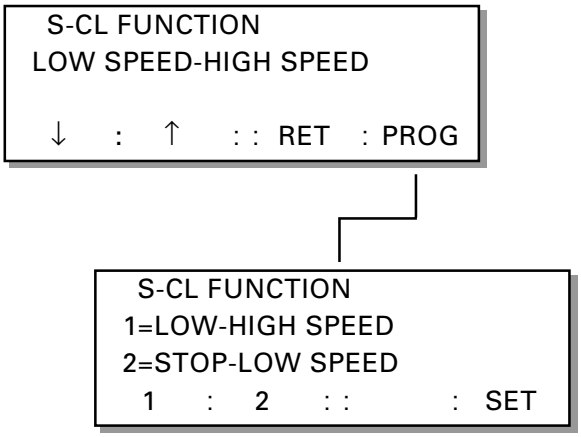
N.B. If VAV control or forced air flow have been selected, the set points for "SA" and "EA" can be preset in the Menu Section 6.5.4 under "Flow function group".

7.2.4 Switching clock function

This menu shows the function selected for the integrated switching clock: low speed - high speed or stop - low speed.

"LOW-HIGH SPEED" indicates that low speed - high-speed operation has been selected.

"STOP - LOW SPEED" indicates that stop - low speed operation has been selected.



To change control function

Press the **"PROG"** button to change the display over to a sub-menu, in which the settings can be altered.

Select the function by pressing button **1**, **2** or **3**.

Then press the **"SET"** button to confirm the change.

7.2.5 Summer night cooling

The digit to the right of the "SUMMER NIGHT COOLING" indicates whether the function has been selected. To enable and set the starting times and temperatures, press the button below "PROG" and select "SUMMER NIGHT COOLING = 1". Then press the button below the right-hand arrow to advance one step to the next menu.

1 = On (function selected)

0 = Off (function not selected)

The summer night cooling "START TIME" can be set between 00:10 and 06:59 hours.

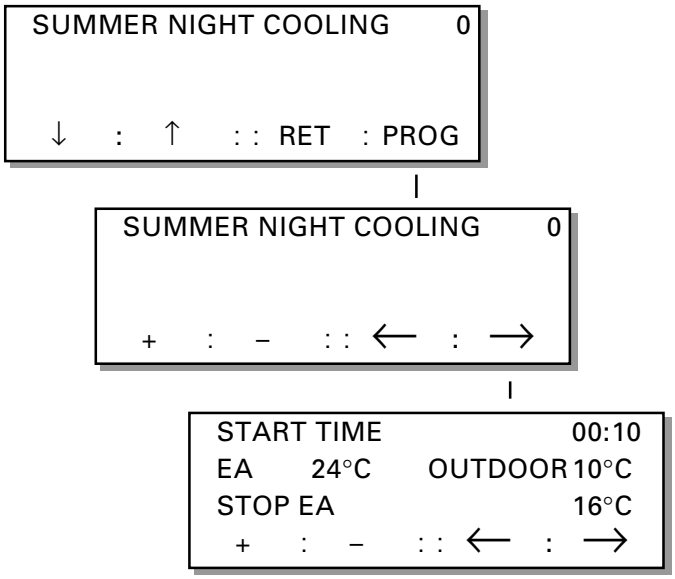
"EA" denotes the exhaust air temperature that must be maintained for the function to start.

"OUTDOOR" denotes the temperature that the outdoor air must have before the function can be enabled.

"STOP EA" denotes the exhaust air temperature at which summer night cooling operation will switch out.

For detailed particulars of summer night cooling, see Section 8.6.

To alter the function
On pressing the **"PROG"** button, the image will switch to a sub-menu, in which settings can be altered.



7.2.6 Outdoor air temperature compensation

Outdoor air temperature compensation involves using the outdoor air temperature for altering the supply air or exhaust air temperature set value. The supply air temperature set value will be influenced if supply air temperature regulation is utilised; whereas the exhaust air temperature set value will be influenced if exhaust air temperature regulation is utilised.

The temperature set value will be influenced if the outdoor air temperature drops below +10°C as indicated by the winter compensation curve and if it rises above +25°C as indicated by the summer compensation curve. See the adjacent chart (Fig. 7).

If ERS regulation is utilised, it will override the outdoor air temperature compensation function.

Negative summer compensation can also be preset.

The menu indicates whether the outdoor air temperature compensation functions have been selected.

1 = On (function selected).

0 = Off (function not selected)

"OUTDOOR TEMP COMP" indicates whether the function has been selected. To enable and set the values, press the button below "PROG", select "OUTDOOR TEMP COMP = 1". Then press the button below the right-hand arrow to advance one step to the next menu.

"WINTER COMP" denotes the temperature displacement that the breakpoint has at -20 °C. Adjustable between 0 – 10 °C.

"SUMMER COMP" denotes the temperature displacement that the breakpoint has at +40 °C. Adjustable between -10 °C – +10°C.

To alter the function
On pressing the **"PROG"** button, the image will switch to a sub-menu, in which settings can be altered.

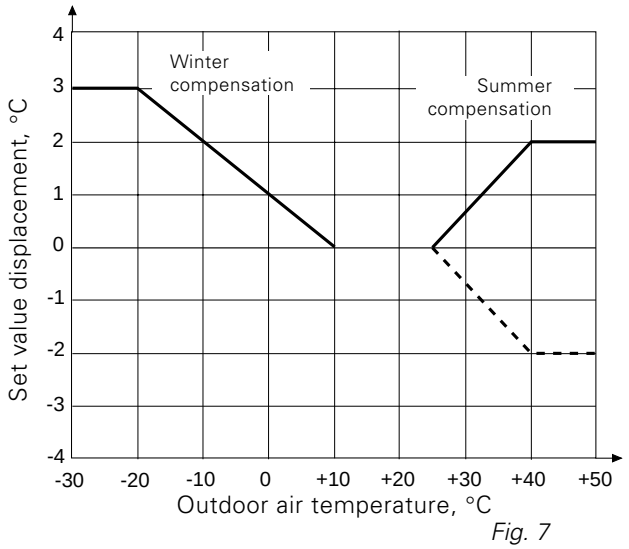
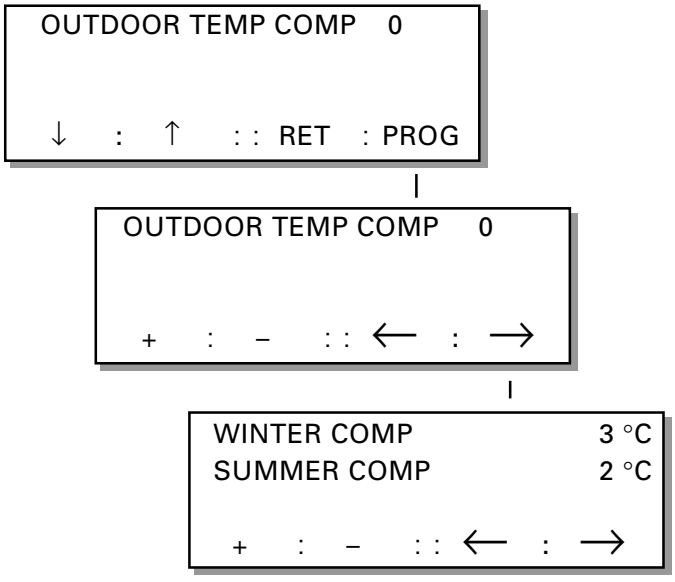
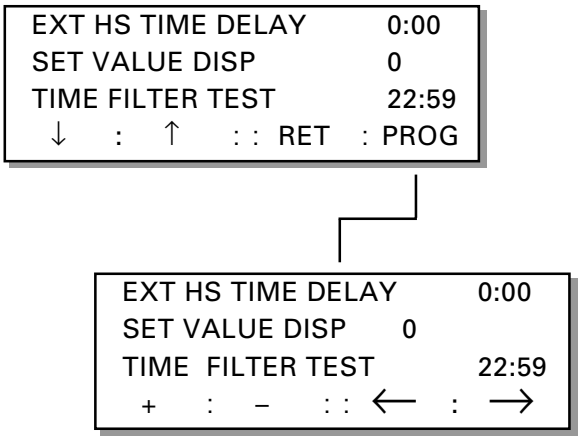


Fig. 7



7.2.7 External HS time delay, closed contacts mode and time - filter test



The time delay for externally activated high speed operation, whether set value displacement has been enabled and the starting time of the filter test are shown in the menu.

Press the **"PROG"** button to change the display over to a sub-menu, in which changes can be made with regard to the functions selected.

"EXT HS DELAY" delays return to low speed operation when the input for external switching alternates between high speed and low speed operation. Typical applications are, e.g., prolonged operation (button-activated) or extra running times after normal running time activated by one or more physical presence detectors.

The period of operation can be set from 0:00 to 3:59 (hours and minutes). The function cannot be activated at 0:00 hours.

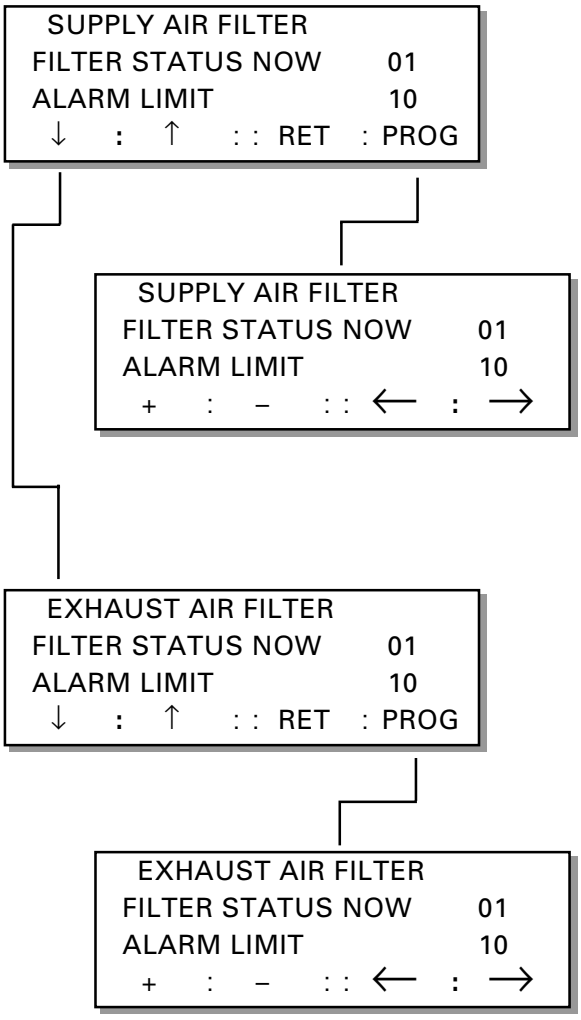
"SET VALUE DISP" indicates whether the function has been selected. For detailed particulars of set value displacement, see Section 8.8.

"TIME FILT TEST" can be set between 0:00 and 22:59 hours (the factory-preset starting time is 22:59). Select a time that will cause the occupants the least amount of inconvenience, since the unit must first be stopped and then be run at a fan speed that is suitable for testing the filters, no matter what air flow has been programmed.

The filter test is carried out once every 24-hour period to test that the pressure drop in the system has not risen above the alarm limit. The filter test will not be carried out during the periods when external stop has been activated.

The duct system must have the same conditions at the daily filter test.

7.2.8 Filter status



There are separate menus for the supply air filter and the exhaust air filter. The menus show the filter status and the alarm limit.

Filter test

The filter test is carried out once daily as a means for ensuring that the pressure drop in the system will not exceed the alarm limit.

The starting time for the filter test can be preset. This is carried out in the previous menu, Section 7.2.7.

"FILTER STATUS NOW" indicates the current degree of contamination of each filter registered during the previous test. The level contamination can be compared to the value entered as the alarm limit.

The "ALARM LIMIT" is the level of contamination in the filter necessary for tripping the filter alarm.

To change the alarm limit

Press the **"PROG"** button to change the display over to a sub-menu, in which the alarm limit can be preset.

The alarm limit can be set between 0 and 99. The factory setting is 10, i.e. a 10% reduction in air flow measured from the reading registered when the ducting was calibrated.

When the value displayed exceeds the alarm limit, the alarm is tripped. The relevant LED in the control display then flashes and the display indicates in clear text which filter has exceeded the contamination limit.

7.2.9 Language

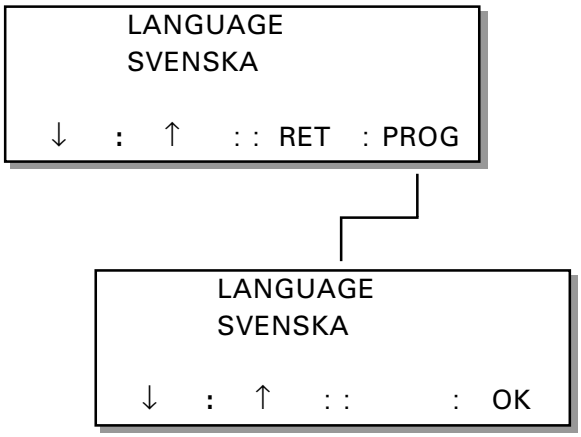
This menu indicates the languages that are available. The language displayed can be changed at any time to one of the following: Swedish, Norwegian, Danish, Finnish and English.

To change the language used in the display

Press the **"PROG"** button to change the display over to a sub-menu, in which the language can be altered. Select the language required by pressing the buttons marked with an arrow to go upward or downward through the displays.

Then press the **"OK"** button to confirm the change.

The new language will appear in the display on returning to the main menu.



7.2.10 Service period and internal fire protection

"SERVICE-PERIOD" indicates the number of months left until the alarm for concluded service period is tripped.

The alarm can be reset by reprogramming the number of months forward for the next service interval.

"INT FIRE PROT" indicates if the function is activated (=1) or if the function is not activated (= 0).

"EA ON AT FIRE" indicates if the function is activated (=1) or if the function is not activated (= 0).

When "int fire prot" is activated:

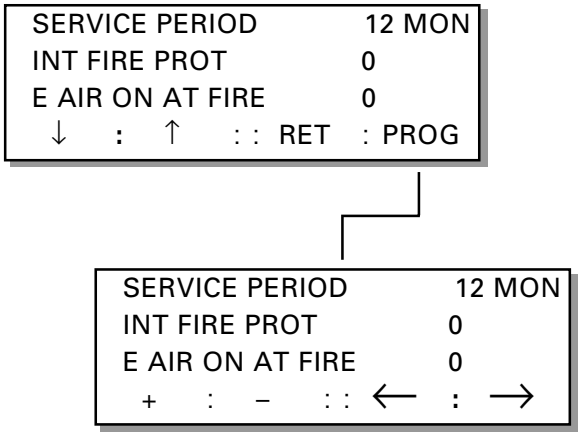
If the supply air temperature rises higher than 70 °C or the exhaust air temperature rises higher than 50 °C, the "INT FIRE ALARM RELEASED" alarm will be displayed and the unit will be switched off.

When "EA on at fire" is activated:

If this function is activated, the exhaust air fan will continue to run as a combustion gas evacuation fan when the internal or external fire alarm has been tripped.

For other settings

Press the **"PROG"** button to change the display over to a sub-menu, in which the functions selected can be changed.



7.2.11 Alarm and alarmblock

"ALARM" indicates whether any alarm (Alarm No.) is beyond the alarm limit or is about to trip. In this case, the alarm is shown without any time delay. The sum alarm is not energised. For particulars of each of the alarms in numerical order, see Section 9.

"ALARM BLOCK NO." indicates the alarm block (Group No. 1 – 8) and whether the alarm block is activated or blocked. If the alarm is blocked a "1" is displayed. If the alarm block is not blocked, a "0" is displayed.

A list of the different alarms, arranged according to relevant alarmblock, is given in Section 9.

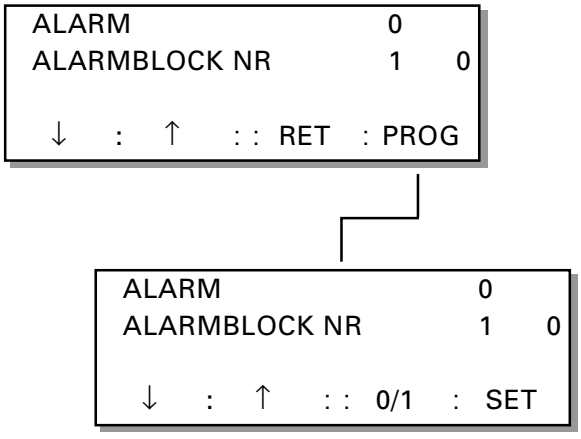
CAUTION! Only temporary blocking of alarms is permissible.

To change the setting

Press the **"PROG"** button to change the display over to a sub-menu, in which the alarmblock can be altered. Under normal conditions, all of the groups should be set to "0" in order for the alarms to be activated.

Press the ↓ and ↑ buttons to scroll upward or downward to display the alarm block to be altered. Then press the **"0 / 1"** button to change the status.

Press the **"SET"** button to confirm the change. The display will then change back to the previous display.



7.2.12 Alarm limits for temperature alarms

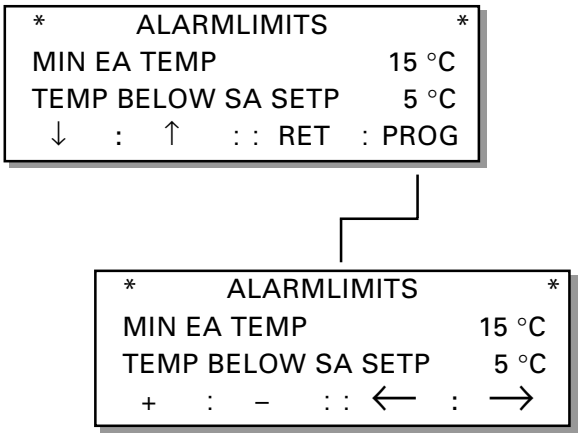
"MIN EA TEMP" denotes the min. permissible exhaust air temperature.

"TEMP BELOW SA SETP" denotes how much the supply air temperature is permitted to be below the supply air temperature set value.

To alter the setting

On pressing the **"PROG"** button, the image will switch to a sub-menu, in which alarm settings can be altered.

Press the **"+"** or **"-"** buttons when setting "MIN SA TEMP" or "TEMP BELOW SA SETP" to the desired temperature.



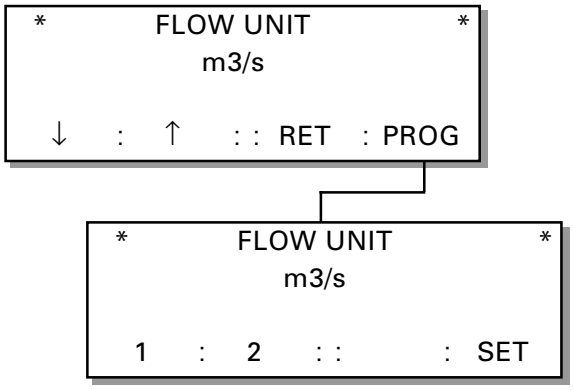
7.2.13 Alteration of flow unit

The menu shows pre-setted unit for air flows.

To change the setting

Press the **"PROG"** button to change the display over to a sub-menu, in which the setting can be altered.

Choose if the flow unit shall be m^3/h or m^3/s by pressing button **1**, **2** or **3**. Push **"SET"** to confirm the alteration.



7.2.14 Changeover between summer and winter time

"AUTO S/W TIME" indicates whether the function for automatic changeover between summer and winter time is enabled (= 1) or disabled (= 0).

If automatic changeover between summer and winter time is enabled:

Automatic changeover from summer time to winter time and vice versa will take place at the preset dates (see also Section 6.2.1), as follows:

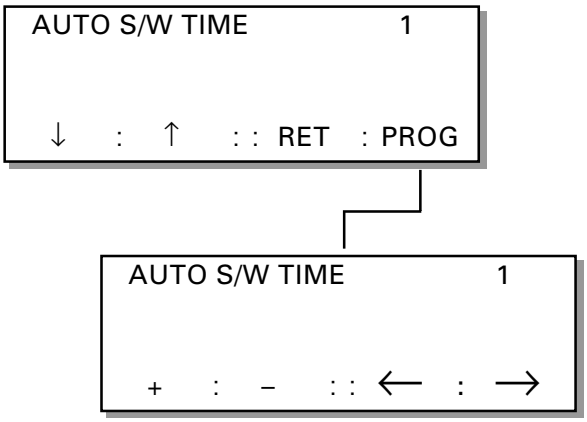
On the last Sunday in March, the clock will automatically set itself ahead one hour and on the last Sunday in October, the clock will automatically set itself back one hour.

If automatic changeover between summer and winter time is <u>disabled</u>:

Automatic changeover from summer time to winter time and vice versa will not take place. The preset time will apply (see Section 6.2.1).

To alter the setting

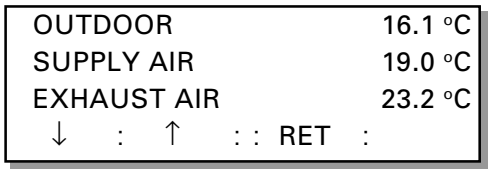
On pressing the **"PROG"** button, the image will switch to a sub-menu, in which automatic changeover can be enabled or disabled. Press the **"+"** or **"-"** buttons when setting "AUTO S/W TIME".



7.2.15 Temperature sensor, read-off menu

This menu indicates the current temperatures sensed by the sensors; the outdoor temperature, supply air temperature and exhaust air temperature sensors.

The menu is used only for reading. The temperature sensors cannot be calibrated from this menu.



7.2.16 Duct calibration, air adjustment and SA temp. set value

The GOLD units are equipped with fans of the type "axiradial".

These fans have instable working points at high duct pressures and low air flowe rates.

The area left of the fan diagram is not allowed working area.

The duct calibration in the GOLD units has three functions:

1. To check that the unit operates within the given allowed working area.
2. To sense the fan load in order to be able to correct the exhaust air flow regarding the purging air flow.
3. To establish the "zero value" for the filter test.

The duct calibration must be carried out for all units when starting up, adjusting and replacing filter. This can also be read in the Installation Instruction as well as in the Operating and Maintenance Instruction.

If duct calibration is not carried out or if the calibration is "tricked" in order not to trig alarm 45, warranties regarding motor and fan are not valid.

The salesmen or service technicians, who have given the contractor a hint or participated in getting round alarm 45 will carry the full responsibility.

The duct calibration is carried out as below:

- The fans are speeded up to 80% of the max speed.
- The flow for each fan is read.
- The flow is compared to the smallest allowed calibration flow for each unit size. If any flow is too small, alarm 45 is trigged.
- The flow is saved as a reference for the filter test flow.
- Set exhaust air flow is up-calculated with the calculated purging flow.

If alarm 45 is trigged, it depends on too tight duct system, that air diffusors are too throttled or that the unit is not correct dimensioned.

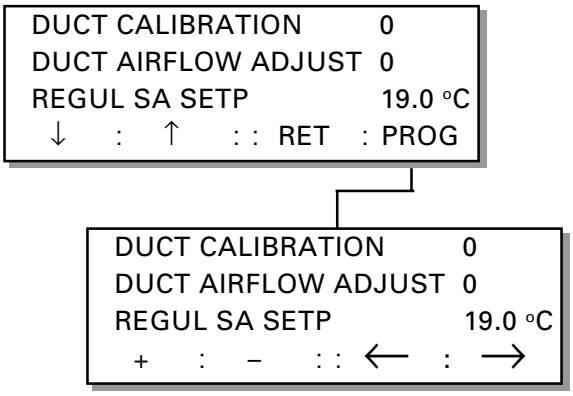
Actions can be taken to solve the problem.

If the ducts are too tight or if the unit is prepared for possible expansion, a "by pass" can be arranged.

A connection is made between supply air and exhaust air. The, in the display, set value must be up-calculated with the "by pass"flow, both for exhaust air as well as for supply air. The "by pass"duct must be permanent.

If the air diffusors are too throttled, the customer might, in order to solve the problem, accept a higher flow than the designed.

At VAV-regulation the duct calibration shall be carried out with the duct system in its most throttled position.



"DUCT CALIBRATION" is normally set at 0 (off). If duct calibration is activated (1 = on), the fans in the air handling unit will run at a fixed speed and the controller will measure where the duty point of the unit is in the flow chart with regard to the connected ducting system. Duct calibration provides the reference used for determining the alarm limit of the filter test. The filters must therefore be clean while the ducting is being calibrated.

The ducting must always be re-calibrated whenever alterations in the ducting system have been carried out or after every filter replacement.

"DUCT AIRFLOW ADJUST" is normally set to "0" (off). When air adjustments are carried out (1 = on), the current motor speed is locked, and all control is put out of function in order to permit air flow adjustments employing the proportionality principle to be employed.

"REGUL SA SETP" indicates the current SA temperature set value, at which the control equipment is working. The set value displacement, outdoor air compensation, summer night cooling and the influence that the neutral zone has on the temperature set value can be read in this display.

To activate the function

Press the "PROG" button to change the display over to a sub-menu, in which the function can be activated.

For duct calibration

Re-set "duct calibration" to = 1 and go to "Auto. or Manual" operation the main menu.

The duct calibration is carried out and the "1" is automatically replaced with a "0" when the unit has stored the value calibrated. Then the unit will return to normal operation. (Duration: approx. 5 min.)

For air adjustment

Re-set the air adjustment to = 1. The function will lock the current motor speed and the motor will run at this speed until the function has been interrupted manually. The temperature control function will continue to work but the speed of the supply air fan and all the flow control functions as well as the switching between high and low speed will be blocked.

N.B. This function must be manually reset by setting "DUCT AIRFLOW ADJUST" to zero (= 0).

7.3 Test menu group

This menu can be reached by pressing the "TEST" button for "function, test or cooling" in the start menu. See Section 7.1.

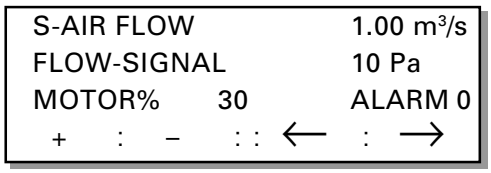
The menu group contains menus for manual operation and test functions outside the normal control function to facilitate checks and fault tracing. When "TEST" is activated, all control functions are switched off. All outputs are steered manually.

N.B. The responsibility for inconvenience caused by altered flow or temperature rests completely on the person who has activated this function.

To change menus

Go on to the next menu by pressing the → button, or go back to the previous menu by pressing the ← button.

7.3.1 S-Air flow



"S-AIR FLOW" shows the set supply air flow.

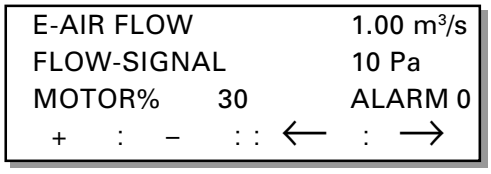
"FLOW-SIGNAL" shows the pressure sensed by the SA pressure sensor (air flow meter).

"MOTOR" shows the modulation expressed as a percentage that the converter calls for to maintain the preset flow.

"ALARM" shows whether or not the frequency converter indicates any alarm function.

To change S-Air flow
Press the plus (+) button or the minus (-) button to set "SA FLOW" to the supply air flow required.

7.3.2 E-Air flow



"E-AIR FLOW" shows the set exhaust air flow.

"FLOW-SIGNAL" shows the pressure sensed by the EA pressure sensor (air flow meter).

"MOTOR" shows the modulation expressed as a percentage that the converter calls for to maintain the preset flow.

"ALARM" shows whether or not the frequency converter indicates any alarm function.

To change the E-Air flow

Press the plus (+) button or the minus (-) button to set "E-Air FLOW" to the supply air flow required.

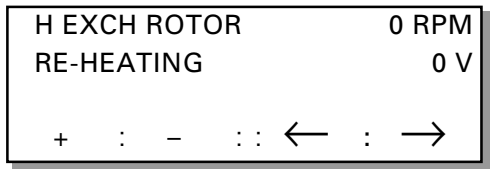
7.3.3 Heat exchanger rotor and reheating

"H EXCH ROTOR" shows the rotor speed setting required.

For GOLD, size 1, 2, 3 and 5: 0 - 6 RPM

For GOLD, size 4: 0 - 8 RPM

"REHEATING" shows the control signal setting desired for reheating. The signal can be preset in 1 V increments between 0 – 10 V.



To change the preset value

Press ←button or the →button to scroll to the function that is to be altered.

Then press the plus (**+**) button or the minus (**-**) button to change the value.

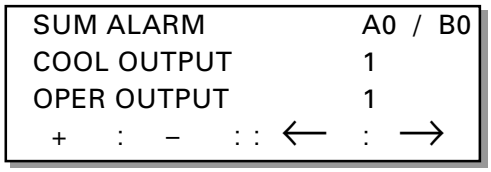
7.3.4 Sum (group) alarm and relay outputs

"SUM ALARM", "COOL OUTPUT", "OPER OUTPUT" show the setting at the relevant relay output.

Value 1 = On (closed output)

Value 0 = Off (open output)

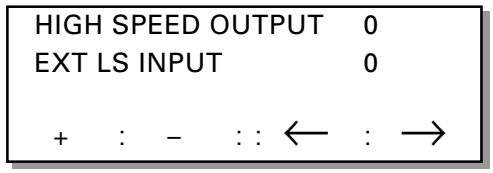
When the sum alarm is initiated, the red lamp on the control display is also lit.



To change the preset value

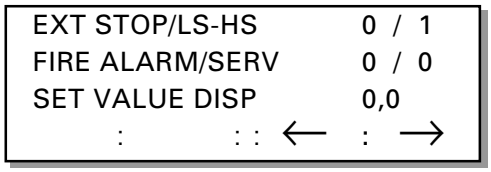
Press ←button or the → button to scroll to the function that is to be altered.

Then press the plus (**+**) button or the minus (**-**) button to change the value.



7.3.5 External inputs

"EXT LS INPUT", "EXT STOP", "LS-HS", "FIRE ALARM" and "SERV" show the status at the relevant external input.



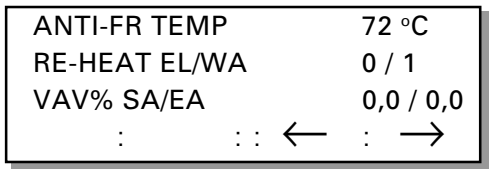
Value 1 = On (closed input)

Value 0 = Off (open input)

"SET VALUE DISPL" shows the voltage supplied (0 - 10.0 V DC).

No changes can be made in this menu.

7.3.6 Input values



"ANTI-FR TEMP" shows the temperature registered by the anti-freeze guard sensor, if any. If no sensor nor heating coil is connected, 72 °C will be displayed. If an electric air heater is connected, -19,4 °C will be displayed as long as the thermal overload protection has not tripped. If the thermal overload protection has tripped, 72 °C will be displayed.

"RE-HEAT EL/WA" indicates whether or not the air reheater (electric or water coil) is connected.

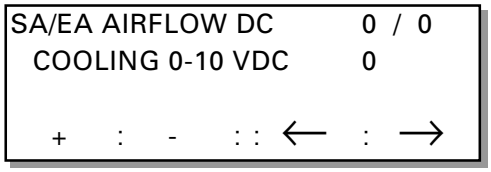
Value 1 = Connected. Value 0 = Not connected.

"VAV% SA/EA" shows the input for supply air and exhaust air respectively, which controls the "VAV/FORC" input.

0 - 10 V in = 0 - 100 % display.

No changes can be made in this menu.

7.3.7 Output values



"SA/EA AIRFLOW DC" shows the preset output voltage 0 - 10 V DC, which controls the outputs for flow readings. The signal can be controlled in increments of 1 V between 0 - 10 V.

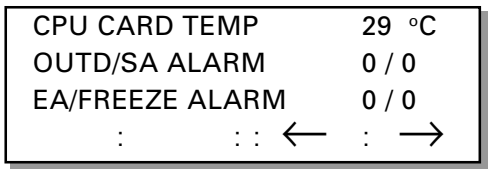
"COOLING 0-10 V DC" shows the preset output voltage for outputs, which control analogue cooling. The signal can be controlled in increments of 1 V between 0 - 10 V.

To change the preset value

Press ←button or the → button to go on to the function that is to be altered.

Then press the plus (**+**) button or the minus (**-**) button to change the value.

7.3.8 Temperature control card and temperature sensor alarm



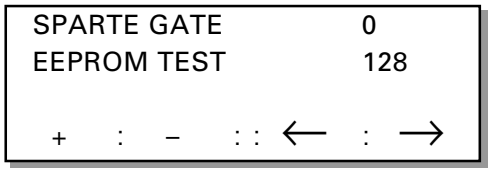
"CPU CARD TEMP" shows the temperature on the control card.

"OUTD, SA, EA and FREEZE ALARM" show the temperature sensor alarm.

The temperature alarm has the value = 1 if any sensor input senses a temperature that is outside the working range of the sensor (below -70 °C or above +100 °C).

No changes can be made in this menu.

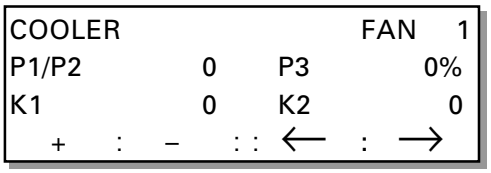
7.3.9 Auxiliary input and EEPROM test



"SPARE GATE" (aux. input) shows the status of the auxiliary input.

"EEPROM TEST" is activated when the menu is displayed and the test is run to check lines 0 through 128 in the EEPROM. The test can be interrupted by leaving the menu.

7.3.10 GOLD Cooler, inputs, outputs



This menu is displayed only if the GOLD Cooler is chosen and selected under the cooling menu group.

The menu shows the setting for inputs to the cooling unit.

Value 1 = On
Value 0 = Off.

"FAN" indicates the setting for an external fan, if any.

"P1/P2" shows the common setting for output to pumps 1 and 2.

"P3" shows the setting for the output signal (expressed as a percentage) to speed-controlled pump no. 3. The value can be set between 0 - 99 %.

"ON" shows the status of the cooling unit operational input.

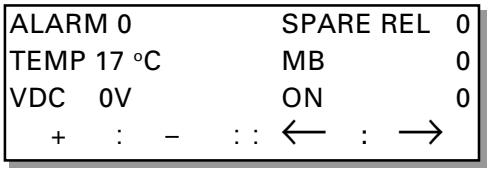
"K1" indicates the setting for compressor 1. (Can only be used if P1/P2 = 1)

"K2" indicates the setting for compressor 2. (Can only be used if P1/P2 = 1)

"MB" indicates if the motor thermal overload switch has tripped = 1.

To change the preset value
New settings for each of the following outputs can be made: FAN, P1/P2, P3, K1 and K2.

7.3.11 GOLD Cooler, inputs, actual values



This value is show only if the GOLD Cooler is connected and has been selected under the cooling menu group.

The menu shows different settings for operation with the cooling unit.

Value 1 = On
Value 2 = Off

"ALARM" indicates the setting for the alarm relay.

"SPARE REL" indicates the setting for the spare relay.

"TEMP" indicates the temperature sensed by the temperature sensor.

"PRESS" indicates the pressure reading on the low pressure sensor.

"HP LIMIT" indicates the level on the high pressure side at which a limiting function will be enabled. The circulation pump used for controlling the cooling capacity, will decelerate to a lower rpm to reduce the load and lower the pressure in the circuit.

"HP STOP" indicates the level on the high pressure side at which the compressors must stop to prevent the pressure from becoming too high.

"PRESS HP/LP" indicates the current pressure.

To change the preset value
New settings can be made for ALARM and SPARE RELAY.

7.4 Cooling menu group

This menu can be reached by pressing the "COOL" button in the start menu for function, test or cooling. See Section 7.1.

The menus are used for settings and information about cooling unit control and the cooling functions.

7.4.1 Cooling function

The menu indicates which cooling function has been selected.

To change the cooling function
Press the **"PROG"** button to change the display over to a sub-menu, in which the cooling function can be activated.

To leave the menu
The other buttons of the menu have normal function.

Selection of alternatives for cooling operation

Either "STOP, OPERATION or CHOICE COOL FUNC" can be selected in the sub-menu.

Select the appropriate alternative by pressing button **1**, **2** or **3**. Then press the **SET** button to confirm the change.

When alternatives 1 = STOP or 2 = OPERATION are selected, the display will change back to the previous menu.

When alternative 3 = CHOICE COOL FUNC is selected, the display will change on to another sub-menu for changing the type of cooling function.

Selection of options for cooling function

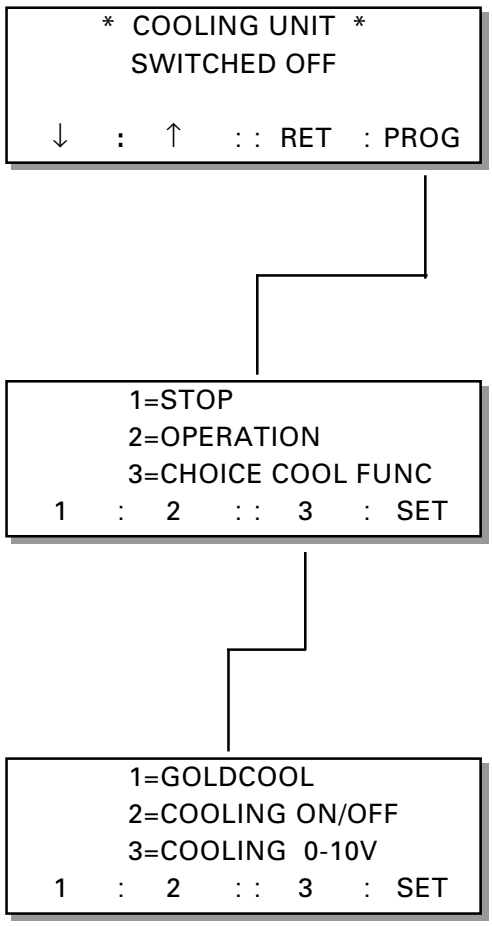
Select the appropriate option by pressing button **1**, **2** or **3**. Then press the **SET** button to confirm the change.

Selection of "GOLDCOOL" presupposes that it is possible to communicate with a PM-LUFT GOLD Cooler, otherwise an alarm will be activated. When operating the unit with the GOLD Cooler connected, the relay and 0 - 10 V DC output are not used.

A series of displays to shown the status of the GOLD Cooler unit will now become accessible.

If "COOLING ON/OFF" is selected, only the cooling relay will function. The relay is energised when the need for cooling arises and de-energised when the room temperature has fallen below the set point + neutral zone, or if the SA temperature falls below the min. limit.

If "COOLING 0 - 10 V is selected, the cooling relay is energised when there is a need for cooling and the 0 - 10 V DC control signal is modulated in relation to the actual cooling requirement.



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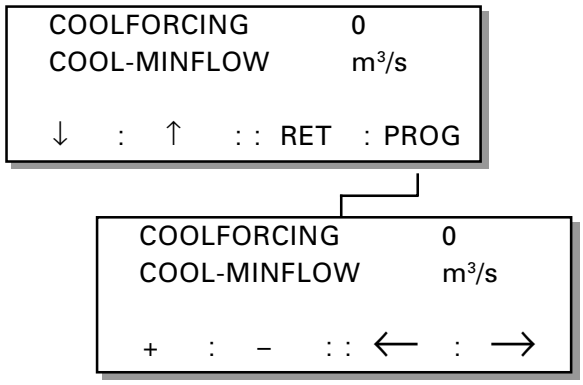
7.4.2 Boosted cooling, restarting time, neutral zone



"COOLFORCING" (boosted cooling) indicates which of the boosted cooling options listed below is activated:

0 = No boosted cooling

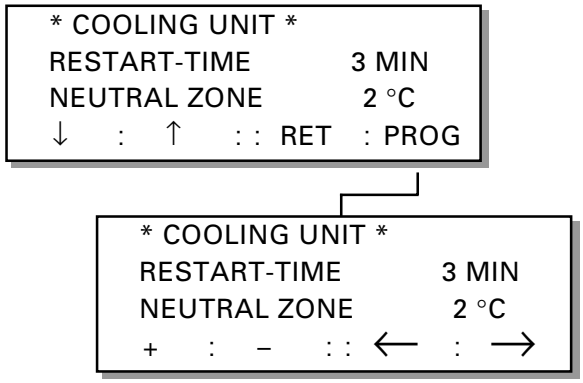
1 = Boosted cooling – comfort setting (the output of the cooling unit will be boosted before the air flow is boosted)

2 = Boosted cooling – economy setting (air flow will be boosted before the output of the cooling unit is boosted)

This function can only be used if exhaust air temperature regulation is employed.

The current air flow will be increased to the preset max. air flow rate. If boosted cooling has been activated, the "AIRFLOW MAX SPEED" setting will be available under "FLOW".

When the function is enabled, "COOLFORCING" and the ordinary text will alternately flash in the display.



Boosted cooling – comfort setting

If cooling is needed, an output signal will be transmitted to the cooling unit.

As the temperature of the supply air discharged in the premises approaches the preset "SA-MIN" temperature, the flow rate will be increased to transport more cooling energy without the temperature in the premises dropping below the min. permissible temperature setting.

If the cooling load is modest, the air flow will first be reduced to the normal rate.

Boosted cooling - economy setting

If cooling is needed, the air flow will be slowly increased up to the preset "FLOW MAX SPEED" rate.

If the air flow rate is at maximum and more cooling is required, output signals will be transmitted to the cooling unit.

"COOL-MINFLOW" indicates the preset min. exhaust air flow rate required for transmission of an output signal to start the cooling unit. This value can be set between 0 and the half max. flow setting of the air handling unit.

When this function is activated, the cooling function will be blocked if the air flow is below the preset value.

"RESTART-TIME" denotes the period from when the "COOLING" relay has been de-energised until it can be re-energised. This is a delayed function so that e.g. the cooling unit won't continuously start and stop.

"NEUTRAL ZONE" denotes the temperature at which the cooling set value is higher than the heating set value.

To alter the setting

On pressing the **"PROG"** button, the image will switch to a sub-menu, in which settings can be altered.

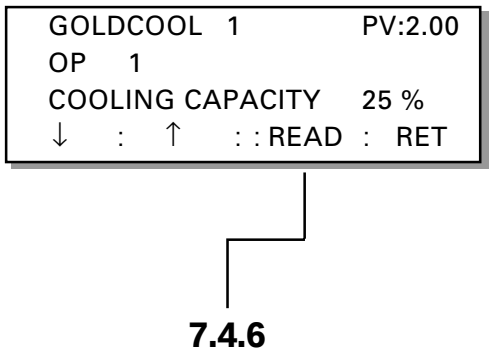
7.4.3 GOLD Cooler, status

This menu is displayed only if the GOLD Cooler is selected.

"GOLDCOOL" indicates the type of unit and the program version.

"OP" indicates whether the unit is in operation (= 1) or switched off (= 0).

"COOLING CAPACITY" indicates the cooling load (in %)



7.4.6

To read the values

When the **"READ"** button is pressed, three sub-menus become accessible. The cooling capacity, pressure and temperature values registered on the three latest dates for alarm readings, can be read in these menus. The read-off menus are described in Sections 7.4.6 and 7.4.8.

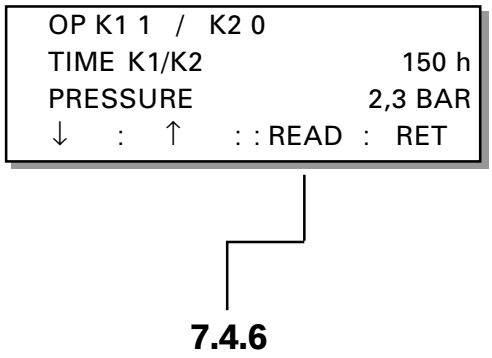
7.4.4 GOLD Cooler, type 2 - status

This menu is displayed only if the type 2 GOLD Cooler is selected.

"OP K1 and K2" respectively indicate the operating status of the compressors.

"TIME K1/K2" indicates the time, at which any compressor has been in operation.

"PRESSURE" indicates the pressure at the operational pressure switch (in BAR).



7.4.6

To read the values

When the **"READ"** button is pressed, three sub-menus become accessible. The cooling capacity, pressure and temperature values registered on the three latest dates for alarm readings, can be read in these menus. The read-off menus are described in Sections 7.4.6 and 7.4.8.

7.4.5 GOLD Cooler, type 1 - status

This menu is displayed only if the GOLD Cooler is selected.

"OP COOL COMP" indicates the operational status of the type 1 compressor.

"TIME COOL COMP" indicates the operating time of the compressor (in hours).

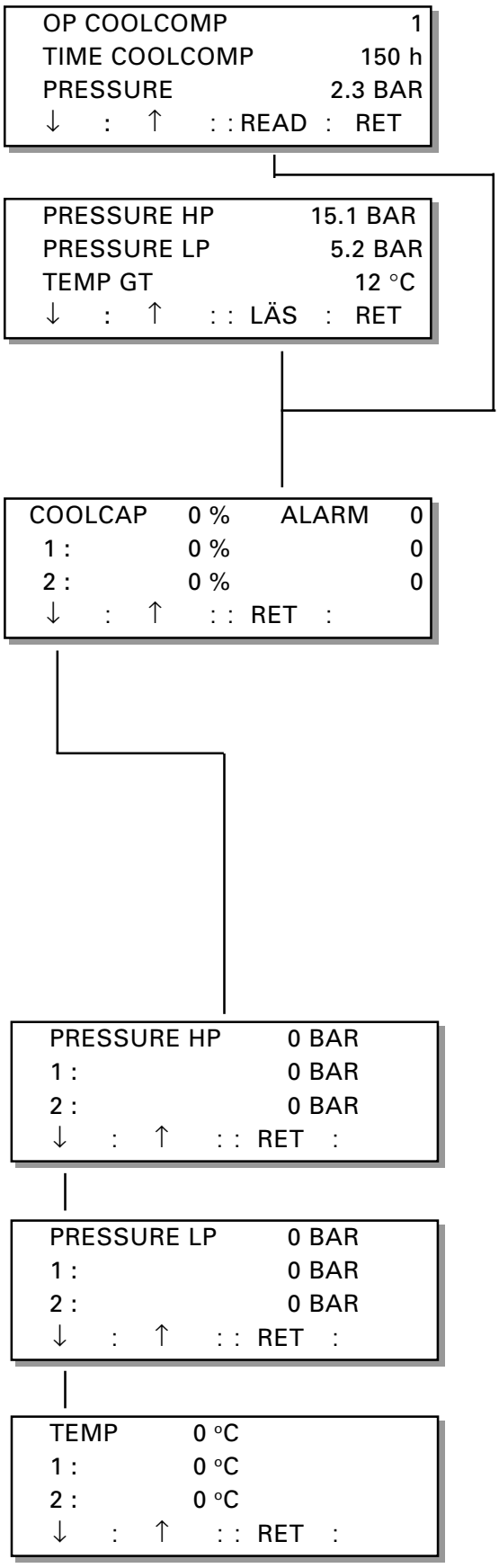
"PRESSURE" indicates the pressure (in BAR).

"PRESSURE HP" is the high pressure reading (in BAR).

"PRESSURE LP" is the low pressure reading (in BAR).

"TEMP GT" indicates the water temperature (in °C).

To read the values
When the **"READ"** button is pressed, three sub-menus become accessible. The cooling capacity, pressure and temperature values registered on the latest dates for alarm readings, can be read in these menus. The read-only menus are described in Sections 7.4.6 through 7.4.8.



7.4.6 Read-only menu for cooling capacity and type of alarm

This menu can only be reached via any of the GOLD Cooler operation menus. See Section 7.4.3 - 7.4.5.

"COOLCAP" indicates the cooling capacity that was registered on the three latest dates for alarm readings.

The top line indicates the most current value.

To leave the menu
Press the **arrow buttons** to go on to other menus.

The **"RET"** button changes the display back to the previous GOLD Cooler operation menu.

7.4.7 Read-only menu for pressure

This menu can only be reached via any of the GOLD Cooler operation menus. See Section 7.4.3 - 7.4.5.

"PRESSURE" indicates the pressure that was registered on the three latest dates for alarm readings.

The top line indicates the most current value.

7.4.8 Read-only menu for temperature

This menu can only be reached via any of the GOLD Cooler operation menus. See Section 7.4.3 - 7.4.5.

"TEMP" indicates the temperature that was registered on the three latest dates for alarm readings.

The top line indicates the most current value.

8. Description of the other functions

8.1 Cooling energy recovery function

Cooling energy recovery is an automatic function, which enables the unit to utilise the relative "cooling energy" that is present indoors, when the outdoor temperature is high and the need arises for cooling. The heat exchanger rotates at maximum speed and in this way recovers the relative cooling energy or chilled air that is in the exhaust air.

The conditions required in order for this function to be activated, are that there is a need for cooling energy and that the outdoor temperature is 1 °C higher than the exhaust air. The function stops when there no longer is a need for cooling or when the outdoor temperature is the same as that of the exhaust air.

The text: "COOL RECOVERY" and ordinary test flash alternately in the main menu.

8.2 Purging function

The purpose of this function is to prevent the heat recovery rotor from remaining stationary in the air streams over a longer period of time when there is no need for heating.

This function will start when the unit has been in operation for approx. 3.5 hours, and the rotor has not rotated. The heat recovery unit will then be run for 1 minute to permit the air to pass through the rotor in both directions and thus remove any dust deposits in the rotor passages.

8.3 Heat exchanger speed detector

A heat recovery rotor rotation test is carried out once every 24-hour period in conjunction with the filter test. The test is carried out as an efficiency test and not as a means for verifying the speed, at which the rotor rotates.

The following conditions must be satisfied before a rotation test can be carried out: the outdoor air must be warmer than -15 °C, the strength of the output signal transmitted to the heat exchanger must be 100 % and there must be a 10 °C temperature difference between the outdoor air and the exhaust air.

The current air flow rate will be maintained while the heat exchanger speed detector is being tested. If the low speed setting is = 0 or if the switching clock is disabled, the test will start when the air handling unit is operating. The temperature regulation function will be locked at the current settings (regulation to a lower air flow and reheating). The heat exchanger rotor speed will be ramp-controlled down to stop in one minute. The supply air temperature should fall by at least 5 °C within 10 minutes. Otherwise an alarm will be initiated. The test will be interrupted as soon as SA temp. has fallen more than 5 °C. On completion of this test, the air handling unit will automatically carry out a filter test.

The rotation test is always activated and can be carried out whenever conditions permit. The heat exchanger motor tachosignal can also be continuously tested. An alarm will be initiated if the motor speed deviates more than 20 % from the set value of the heat exchanger. The heat exchanger motor will be switched off if no tachosignal has been obtained within 4 minutes.

8.4 Zero calibration

The zero value of the pressure transmitter will be checked immediately before duct calibration or filter test is carried out. The text "ZERO SET CALIBR" will flash in the main menu while the controller is carrying out a new calibration.

The fans cannot be started while calibration is in progress.

8.5 Switching between low speed and high speed

There are three means of switching between the preset low air flow and the high air flow rates:

Manual switching in the main menu, see Section 6.1.
Programmed switching in the switching clock integrated in the controller, see Section 6.2.
Via the external function on terminals 10 and 11.

Manual switching between low speed and high speed operation has priority over switching clock (timer) switching operations and switching input signals from an external source. An entered manual low speed operation setting will activate low speed operation.

High speed operation activated from an external source has priority over the stop or low speed switched in by the switching clock. For particulars of prolonged operation, see Section 8.9.

8.6 Summer night cooling

To activate the function, see Section 7.2.5.

The summer night cooling function uses the lower night temperature of the outdoor air to cool the building structure as a means of lowering the cooling load during the day.

If the summer night cooling function has been activated, the fans in the unit will be run at high speed to supply 10 °C air (set value) from the preset start time until the conditions for switching out the function have been met.

The outdoor air temperature, start/stop (switch-in/switch-out), exhaust air temperature and starting time settings can be altered in the summer night cooling sub-menu. The starting time can be preset between 00.10 and 06.59 hours.

Conditions that must be satisfied before the summer night cooling function will start at the preset time:

– The exhaust air temperature should be above the preset value (+24°C).
– The exhaust air must be at least 2 °C warmer than the outdoor air.
– The outdoor air temperature must be above the preset value (+10 °C).
– The need for heating must have not existed between 12:00 and 23:00 hours.
– The unit must not run at high speed or be shut down by means of pressing the manual stop button on the control display or external stop.

Conditions which must be satisfied before the summer night cooling function will stop:

– The exhaust air temperature must fall below the preset value (+16 °C).
– The outdoor temperature must fall below the preset value (10 °C).
– The timer or external input must call for high-speed operation.
– The buttons on the control display will be influenced.

8.7 Set value displacement

To activate the function, see Section 7.2.5.

Set value displacement is used for altering the set value for the supply air and exhaust air temperature by means of an external 0 - 10 V DC signal. The set value can be influenced +/- 5 °C.

When supply air control is selected, the supply air temperature is displaced and when exhaust air control is selected, the exhaust air temperature is displaced.

When the function has been activated, the set value will be displaced as plotted in the adjacent chart. 0 V DC will lower the temperature set point by 5 °C, a 5 V DC signal will not alter the set value and a 10 V DC signal will raise the set value by 5 °C. See the chart in Fig.8.

When ERS regulation is selected, the SA / EA differential will be influenced. This differential cannot be lower than 0 °C. The SA / EA differential will be lower on an increase of the input signal.

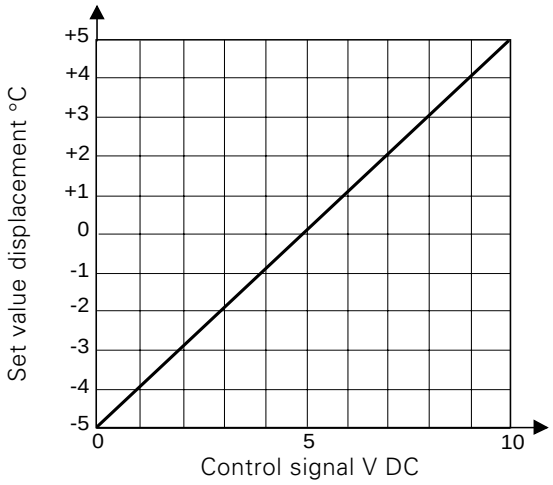


Fig. 8

8.8 High speed operating indication

The "HIGH SPEED" relay output will be energised whenever the air handling unit is operated at high speed, in the summer night cooling, VAV regulation or boosted flow function.

8.9 External input for high speed operation

If the air handling unit is running at low speed or if it has been switched out by the switching clock (timer), a closure of "EXT HS INPUT" will cause the unit to run at "HIGH SPEED",

8.10 External input for low speed operation

If the switching clock has switched out the unit (stop – low speed operation), a closure of "EXT LS INPUT" will cause the unit to run at "LOW SPEED".

8.11 Frosting protection monitor function

The frosting protection monitor function will always be active if a heater for hot water is connected.

When the function is active, the water temperature inside the air heater will be maintained at 13 °C while the air handling unit is operating and at 25 °C while the unit is switched off. The function contains a monitor that will switch out the unit and initiate an alarm if the temperature sensor senses a water temperature below 7 °C.

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8.12 Three types of air flow control

Constant flow

To activate the function, see Section 7.2.2.

Constant flow (specified only as "FLOW" in the menu) implies that the GOLD unit maintains a constant preset air flow rate. The control equipment controls the fan speed automatically so that the air flow will be correct even when the filters begin to be dust-laden, the air flow across air devices are blanked off, etc.

The constant air flow maintained in the system is of great benefit to the occupants since the air flow will always remain as preset when the unit was adjusted in conjunction with commissioning.

However, attention should be drawn to the fact that any condition in the ventilation system that gives rise to increase pressure drop, e.g. such as blanking off air devices, will also automatically increase the speed of the fans. This will in turn give rise to higher electric power consumption and can also give rise to indoor comfort problems such as draughts and excessive noise.

VAV control

To activate the function, see Section 7.2.2.

VAV stands for variable air volume. The control equipment maintains constant pressure in the ducting via a 0 - 10 V input signal from an external in-duct pressure sensor. The pressure required (set value) can be preset in the menu as a percentage of the range of the pressure sensor (Section 6.5.4).

The function of the pressure sensor can be limited so that the flow will not exceed or fall below the preset values in the menu.

At the time preset for low speed operation, for example at night, the VAV function will not have any effect.

VAV fan control can be selected for the supply air or exhaust air fan or for both (Section 7.2.3). If VAV control of only one of the fans is selected, the other fan will be controlled to provide constant air flow.

Forced air flow

To activate the function, see Section 7.2.2.

The control equipment controls the speed of the fans between two flow rates on receiving input signals from an external sensor (e.g. air quality sensor).

The basic air flow is preset in the menu for flow with the fans running at high speed (Section 6.5.2).

The max. air flow is preset in the menu for flow with the fans running at max. speed (Section 6.5.3).

During periods when the fans are set to run at low speed, at night for instance, the forced air flow function will not have any effect.

Forced air flow can be selected for the supply air or exhaust air fan or for both (Section 7.2.3). If only one of the fans is selected for forcing the air flow, the other fan will be controlled to provide constant air flow.

8.13 Service level

This level can only be reached after a special authorisation code has been entered. It is intended for use only by PM-LUFT service personnel or other personnel trained by PM-LUFT.

The settings of the following functions can be influenced and altered.

– The limit values for set values.
– Modification of set values and curves for specific functions.
– Calibrating the temperature sensor.
– Calibrating the pressure sensor.
– Changing the switching frequency of the frequency converter. Should motor noise problems arise, it is advisable to raise this frequency.
(Bearing wear will increase at higher frequencies.)

8.14 Communication

Provision is available for connection to a master system, either across external inputs and outputs or with a GOLD LON adapter across a LonWorks network.

8.15 Recooling

If the reheater has been operating, the coil is cooled off on min. flow during 3 minutes, despite if Stop has been ordered. The text "RECOOLING" flashes on the second line on the display.

8.16 Regulation of the supply air flow to a lower flow rate

Regulation of the supply air flow to a lower flow rate is the final stage in the heat control sequence. Whenever heating is required, first the heat exchanger will start. The air reheater, if fitted, will then be switched in and its output will be modulated to max. If the air temperature sensed by the supply air sensor is still too low, the control system will decelerate the supply air fan and thus regulate the flow of supply air down to a lower rate.

Only the supply air flow will be regulated to a lower flow rate. The purpose of this function is to alter the relationship between the supply air and the exhaust air flows in order to enhance the efficiency of the heat exchanger. The correct supply air temperature is given precedence over the programmed air flow.

This function regulates the supply air flow from the current programmed flow rate (high speed or low speed operation), down to half of this flow rate. The function is also limited by the min. flow setting of the unit. If the low-speed air flow setting is close to the min. flow rate, regulation to a lower flow rate will have little effect.

Conditions to be satisfied for enabling this function:

Fan regulation must be selected at FLOW. Regulation to a lower air flow rate cannot take place if the unit is set at VAV or FORCING. Temperature regulation must be set at SA or ERS regulation. If exhaust air regulation has been selected, regulation to a lower air flow rate cannot take place.

9. Alarms

The alarms are displayed in plain text on the control display. In addition, a red lamp located below the buttons on the control display will flash.

A typical alarm text in the menu displayed:

***** ALARM 4 *****
EXH AIR MOTOR RELEASED

Explanation of the alarms

All of the texts for alarm nos. 1 through 47 are described on pages 44 - 46. The following particulars are applicable to the descriptions:

Type A alarm or type B alarm:
Type A alarm, the unit has been shut down.

Type B alarm, the unit will continue to run.

Alarm reset:
Manual reset implies that the "RES" button in the display must be pressed to reset the alarm, unless otherwise specified.

Automatic reset implies that the alarm will be reset automatically as soon as the fault has been corrected.

Delay:
Delay implies that the alarm will not be initiated immediately when a fault has been registered, but instead first after the fault has existed during a specific period of time or has reoccurred a specific number of times.

Remedial measures:
The cause of the alarm is displayed. Whenever possible, the display will include some simple fault tracing points to check.

N.B. *If the fault still cannot be remedied, get in touch with PM-LUFT.*

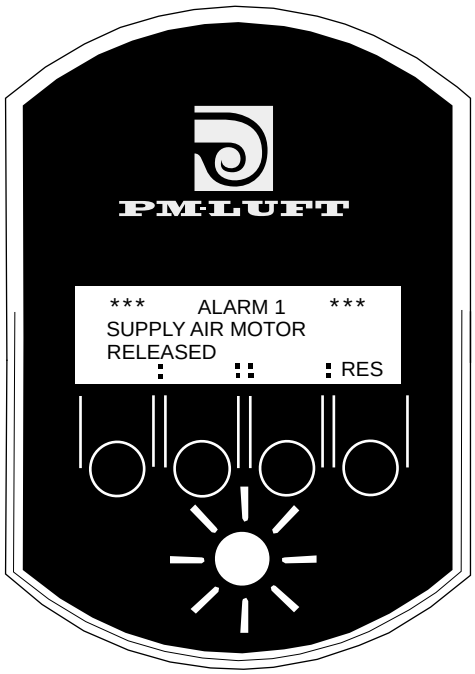
Alarm indications can be interrupted while faults still exist. If buttons 1,2 and 3 are all pressed at the same time, while an alarm is displayed, this will interrupt and delay re-initiation of the alarm for 4 minutes. This will allow time to go in the function menu group and block the alarm to facilitate fault tracing.

The delayed alarm mode will automatically return to the normal mode.

Other particulars
The alarms are not activated in the programming menus.

The fire alarm is the only alarm that is active in all the menu images. The other alarms are active in the main images only.

For particulars of how to block the alarms, see Section 7.2.11.



The control display with flashing alarm lamp.

Alarm blocks

Some of the alarms, which are divided in groups, can be blocked.

ALARM BLOCK 1 (Communication) Alarm nos. 1 - 4

ALARM BLOCK 2 (temperature sensor): Alarm nos. 5 - 9

ALARM BLOCK 3 (temp. min./max. limits): Alarm nos.10 - 13

ALARM BLOCK 4 (freq. converter): Alarm nos. 14 - 21*
Alarm nos. 41–42**

ALARM BLOCK 5 (reheat): Alarm nos. 22 and 23

ALARM BLOCK 6 (flow): Alarm nos. 26 - 29

ALARM BLOCK 7 (heat recovery unit): Alarm nos. 30 - 32

ALARM BLOCK 8 (filters): Alarm nos. 24 and 25.

ALARMS THAT CANNOT BE BLOCKED: Alarm nos. 33 - 47. (Alarm nos. 33 - 42 will be blocked automatically if the GOLD Cooler function is not selected.)

* *Applicable to the GOLD 4 and 5 only.*

** *Applicable to the GOLD 1,2 and 3 only.*

ALARM 1
SWITCHING CLOCK RELEASED
Type A alarm. Automatic reset. Delayed 10 times. Is tripped when communication with the internal timer circuit has not been possible after 10 attempts.

ALARM 2
GOLD-COOLER COMMUNICATION INTERRUPTED
Type A alarm. Automatic reset. Delayed 10 times. Is tripped when the GOLD Cooler has been selected, the cooling function is switched on and communication between the GOLD unit and the cooling unit has not been possible after 10 attempts.

ALARM 3
SUPPLY AIR MOTOR RELEASED
Type A alarm. Automatic reset. Delayed 10 times. Is tripped when communication with the frequency converter of the supply air fan motor has not been possible after 10 attempts. Check that the control cable of the converter is correctly connected. k the power supply cable and the fuses. Applicable to sizes 4 and 5 only.

ALARM 4
EXHAUST AIR MOTOR RELEASED
Type A alarm. Automatic reset. Delayed 10 times. Is tripped when communication with the frequency converter of the exhaust air fan motor has not been possible after 10 attempts. Check that the control cable of the converter is correctly connected. Check the power supply cable and the fuses. Applicable to sizes 4 and 5 only.

ALARM 5
OUTDOOR TEMP SENSOR DEFECT
Type A alarm. Automatic reset. Delayed 3 seconds. The temperature sensor is damaged or has measured a temperature below -70 °C or above +100 °C.

ALARM 6
SA TEMP SENSOR DEFECT
Type A alarm. Automatic reset. Delayed 3 seconds. The temperature sensor is damaged or has measured a temperature below -70 °C or above +100 °C

ALARM 7
EA TEMP SENSOR DEFECT
Type A alarm. Automatic reset. Delayed 3 seconds. The temperature sensor is damaged or has measured a temperature below -70 °C or above +100 °C

ALARM 8
ANTI FR G SENS DEFECT
Type A alarm. Automatic reset. Delayed 3 seconds. Is tripped when a water coil is connected, the anti-frosting function is activated and the sensor input senses a value below -70 °C or above +100 °C

ALARM 9
CONTROL CARD SENSOR FAULTY
Type A alarm. Automatic reset. Delayed 3 seconds. Is tripped when the sensor input senses a value below -37 °C or above +120 °C

ALARM 10
TEMPERATURE BELOW ALARM LIMIT
Type A alarm. Manual reset. Delayed 20 min. Is tripped if the exhaust air fan motor is running and the exhaust air sensor senses a temperature below the alarm limit (factory preset at 15 °C). The "MIN EA-TEMP" can be set under "FUNC".

ALARM 11
TEMPERATURE BELOW SET VALUE
Type A alarm. Manual reset. Delayed 20 min. Is tripped if the supply air fan motor is running and the supply air sensor senses a temperature below the set value (factory preset at 5 °C). The "TEMP BELOW SA-SETP" can be set under "FUNC".
See Section 10.2.3 To clean the heat recovery unit.

ALARM 12
CONT CARD SENS BELOW ALARM LIMIT
Type A alarm. Manual reset. Delayed 20 min. Is tripped when the sensor at the control card cubicle senses a constant temperature below 0 °C. Resets itself and starts the unit when the temperature has risen to above zero. Can only occur after a power failure of long duration.

ALARM 13
CONT CARD SENS ABOVE ALARM LIMIT
Type A alarm. Manual reset. Delayed 20 min. Is tripped when the sensor at the control card cubicle senses a constant temperature above 60 °C.

ALARM 14
ERROR LOWVOLT SECTIO SA FAN FREQUENCY CONV
Type A alarm. Manual reset. Delayed 6 sec. Is tripped when the low voltage section in the frequency converter senses voltage outside the alarm limits. Applicable to sizes 4 and 5 only.
Check the fuses and power supply to the unit.

ALARM 15
ERROR HIGHVOLT SECTI SA FAN FREQUENCY CONV
Type A alarm. Manual reset. Delayed 6 sec. Is tripped when the high voltage section in the frequency converter senses voltage outside the alarm limits. Applicable to sizes 4 and 5 only.
Check the fuses and power supply to the unit.

ALARM 16
OVERCURRENT IN SA FAN FREQUENCY CONV
Type A alarm. Manual reset. Delayed 6 sec. Is tripped when the intermediate section of the frequency converter senses voltage above the alarm limit. Applicable to sizes 4 and 5 only.
Check the fuses and power supply to the unit.

ALARM 17
TEMP ABOVE MAX IN SA FAN FREQUENCY CONV
Type A alarm. Manual reset. Delayed 6 sec. Is tripped when the sensor in the frequency converter senses a temperature above the alarm limit.Applicable to sizes 4 and 5 only.
Check the fuses and power supply to the unit.

ALARM 18

ERROR LOWVOLT SECTI EA FAN FREQUENCY CONV

Type A alarm. Manual reset. Delayed 6 sec. Is tripped when the high voltage section in the frequency converter senses voltage outside the alarm limits.Applicable to sizes 4 and 5 only.

Check the fuses and power supply to the unit.

ALARM 19

ERROR HIGHVOLT SECTI EA FAN FREQUENCY CONV

Type A alarm. Manual reset. Delayed 6 sec. Is tripped when the high voltage section in the frequency converter senses voltage outside the alarm limits. Applicable to sizes 4 and 5 only.

Check the fuses and power supply to the unit.

ALARM 20

OVERCURRENT IN EA FAN FREQUENCY CONV

Type A alarm. Manual reset. Delayed 6 sec. Is tripped when the intermediate section of the frequency converter senses voltage above the alarm limit. Applicable to sizes 4 and 5 only.

Check the fuses and power supply to the unit.

ALARM 21

TEMP ABOVE MAX IN EA FAN FREQUENCY CONV

Type A alarm. Manual reset. Delayed 6 sec. Is tripped when the sensor in the frequency converter senses a temperature above the alarm limit. Applicable to sizes 4 and 5 only.

Check the fuses and power supply to the unit.

ALARM 22

ANTI FR G W COIL RELEASED

Type A alarm. Manual reset. Delayed 3 sec. Is tripped when a water coil is connected, the anti-frosting monitor function is activated and the anti-frosting monitor sensor has sensed a temperature below 7 °C.

Check the water temperature and the flow rate.

ALARM 23

HIGH TEMP EL HEATER RELEASED

Type A alarm. Manual reset. Delayed 3 sec. Is tripped when an electric air heater is connected and the sensor has sensed an "interruption". An interruption occurs when the thermal overload protection has tripped or a power failure has occurred. The size 1 and 2 units will not initiate any alarm in the event of a power failure.

Check the cause of the fault and correct it. If the thermal overload protection has tripped, it must be reset at the air heater.

ALARM 24

SUPPLY AIR FILTER DIRTY

Type B alarm. Manual reset. Delayed 3 sec. Is tripped when the amount of dust collected in the filter has exceeded the alarm limit (FILTER STATUS NOW exceeds ALARM LIMIT). The flow pressure is measured at the fan speed for testing. This alarm can also be initiated if the air handling unit is new and the ducting has yet to be calibrated.

See Section 7.2.16 and 10.2.2.

ALARM 25

EXHAUST AIR FILTER IS DIRTY

For an explanation and remedial measures to be taken, see the corresponding particulars for the supply air filter, Alarm 24.

ALARM 26

SA FLOW BELOW SET VALUE

Type B alarm. Manual reset. Delayed 4 min. Is tripped when the supply air fan motor is in operation and the flow constant is less than 90 % of the set point.

Check that the flow rate selected is not too high in relation to the pressure drop in the ducting. Check the condition of the hoses connected to the supply air pressure meters and that the supply air fan and motor are running correctly. Check under the "TEST" function in Section 7.3.1, that the modulation and pressure are synchronised.

ALARM 27

SA FLOW ABOVE SET VALUE

Type B alarm. Manual reset. Delayed 4 min. Is tripped when the supply air fan motor is in operation and the flow constant is more than 110 % of the set point.

Check the hoses to the supply air pressure meters and that the supply air fan motor is running correctly.

ALARM 28

EA FLOW BELOW SET VALUE

Type B alarm. Manual reset. Delayed 4 min. Is tripped if the exhaust air fan motor is running, and the air flow rate constantly is 10 % lower than the set value.

Check that the flow rate selected is not too high in relation to the pressure drop in the ducting. Check the condition of the hoses connected to the exhaust air pressure meters and that the exhaust air fan and motor are running correctly. Check under the function "TEST" in Section 7.3.1, that the modulation and pressure are synchronised.

ALARM 29

EA FLOW ABOVE SET VALUE

Type B alarm. Manual reset. Delayed 4 min. Is tripped if the exhaust air fan motor is running, and the air flow rate constantly is 10 % higher than the set value.

Check the hoses to the supply air pressure meters and that the exhaust air fan motor is running correctly.

ALARM 30

ROTATION GUARD RELEASED

Type B alarm. Manual reset. Delayed 3 sec. Is tripped if the supply air temperature has not dropped 5 °C within 10 minutes during the test.

Check the drive belt and the heat exchanger motor.

Check the condition of the drive belt, heat exchanger motor and the air flow rate.

ALARM 31

HEAT EX SPEED BELOW SET VALUE

Type B alarm. Manual reset. Delayed 4 min. Is tripped when the heat exchanger motor is in operation and the speed constant is 20 % below the set point.

See Section 10.2.3 To clean the heat recovery unit.

ALARM 32
HEAT EX SPEED ABOVE SET VALUE

Type B alarm. Manual reset. Delayed 4 min. Is tripped when the heat exchanger motor is in operation and the speed constant is 20 % above the set value.

ALARM 33
LOW PRESSURE COOL RELEASED

Type B alarm. Manual reset. Delayed 10 sec. Is tripped when alarm no. 1 in the GOLD Cooler has tripped. The low pressure sensor has sensed pressure below the alarm limit.

ALARM 34
PRESSOSTAT HP COOL RELEASED

Type B alarm. Manual reset. Delayed 10 sec. Is tripped when alarm no. 3 in the GOLD Cooler has tripped. The high pressure switch has tripped. The pressure switch must also be reset.
For further particulars of fault tracing, see the documentation for the GOLD Cooler.

ALARM 35
OVERCURRENT COOL RELEASED

Type B alarm. Manual reset. Delayed 10 sec. Is tripped when alarm no. 2 in the GOLD Cooler has tripped. One or more of the motor thermal overload switches in the automatic control equipment cubicle of the Cooler has tripped.
For further particulars of fault tracing, see the documentation for the GOLD Cooler.

ALARM 36
TEMP ALARM COOL RELEASED

Type B alarm. Manual reset. Delayed 10 sec. Is tripped when alarm no. 4 in the GOLD Cooler has tripped. The temperature sensor has sensed a value below the alarm limit.
For further particulars of fault tracing, see the documentation for the GOLD Cooler.

ALARM 37
ROT DIRECTION COOL RELEASED

Type B alarm. Manual reset. Delayed 10 sec. Is tripped when alarm no. 5 in the GOLD Cooler has tripped. The compressor rotor has rotated in the wrong direction. Transpose the order of the power supply cable phase conductors on the terminals.
For further particulars of fault tracing, see the documentation for the GOLD Cooler.

ALARM 38
TEMP SENSOR COOL DEFECT

Type B alarm. Automatic reset. Delayed 10 sec. Is tripped when alarm no. 6 in the GOLD Cooler has tripped. The temperature sensor has sensed a temperature outside the alarm limit.
For further particulars of fault tracing, see the documentation for the GOLD Cooler.

ALARM 39
COOL PRESS TRANSM FAULTY

Type B alarm. Automatic reset. Delayed 10 sec. Is tripped if Alarm 7 in the GOLD Cooler has tripped. The pressure transmitter on the low pressure side has sensed a pressure beyond the alarm limit.
For further fault tracing, see the documentation of the GOLD Cooler.

ALARM 40
HP COOL PRESS TRANSM FAULTY

Type B alarm. Automatic reset. Delayed 10 sec. Is tripped if Alarm 8 in the GOLD Cooler has tripped. The pressure transmitter on the high pressure side has sensed a pressure beyond the alarm limit. For further fault tracing, see the documentation of the GOLD Cooler.

ALARM 41
SA FAN MOTOR TRIPPED

Type B alarm. Manual reset. Delayed 10 sec. Is tripped if the group alarm relay in the supply air fan motor has tripped.
Check to make sure that the motor wiring is correctly connected and that the motor is supplied with 230 V power.
Applicable to sizes 1 – 3 only.

ALARM 42
EA FAN MOTOR TRIPPED

Type A alarm. Manual reset. Delayed 10 sec. Is tripped if the group alarm relay in the exhaust air fan motor has tripped.
Check to make sure that the motor wiring is correctly connected and that the motor is supplied with 230 V power.
Applicable to sizes 1 – 3 only.

ALARM 43
INT FIRE ALARM RELEASED

Type A alarm. Manual reset. Delayed 3 sec. Is tripped when "INTERNAL FIRE PROTECTION" is activated and the supply air temperature sensor has sensed a temperature above +70 °C or the exhaust air temperature sensor has sensed a temperature above +50 °C.

ALARM 44
EXT FIRE ALARM RELEASED

Type A alarm. Manual reset. Delayed 3 sec. Is tripped when the external fire alarm input between terminals 14 and 15 has been opened.
Check for fire or smoke, if necessary.

ALARM 45
DUCT PRESSURE ABOVE ALARM LIMIT

Type A alarm. Manual reset. Delayed 3 sec. Is tripped while duct calibration is in progress if the flow sensors sense a pressure below 109 Pa in the GOLD – 2, 350 Pa in the GOLD – 3, 202 Pa in the GOLD – 4 and 254 Pa in the GOLD – 5. **See 7.2.16.**

ALARM 46
SERVICE ALARM FIRE RELEASED

Type B alarm. Manual reset. Delayed 3 sec. Is tripped when the contact between terminals 16 and 17 is closed.

ALARM 47
SERVICE PERIOD ABOVE ALARM LIMIT

Type B alarm. Manual reset. Delayed 3 sec. Is tripped when the count-down for the preset time interval until the next service, has reach zero.
Press the "RES" button to reset the alarm for 7 days. Get in touch with a service engineer who, on having completed the servicing work on the unit, will enter a new time, i.e. the number of months required until the next service call.

ALARM 48
S-CL FUNCTION FAULTY

Type A alarm. Automatic reset. Delayed 3 seconds.
Check fuse F2.

10. Maintenance

The safety instructions are specified in Section 3.

10.1 Filter replacement

10.1.1 General

When the filter alarm has been initiated, the filter should be changed.

The filters are disposable and when changed should be replaced by new class F85/EU7 bag filters.

10.1.2 To withdraw the filter

> **Warning!** When changing the filters:
> Switch off the unit by pressing the "STOP" button on the control display.
> Then switch off the safety isolating switch in the unit!

- Wait until the fans have stopped before opening the inspection doors (allowing the pos. pressure to diminish).
- Open the inspection door of the filter/fan section.
- Pull the two blue handles (A in Fig 9) at the upper and lower edges of the filter mounting bracket outward, to open the off-centre actuated list.
- Remove the filters.

It may be advisable to clean the filter space while the filters are removed. See Section 10.2.2.

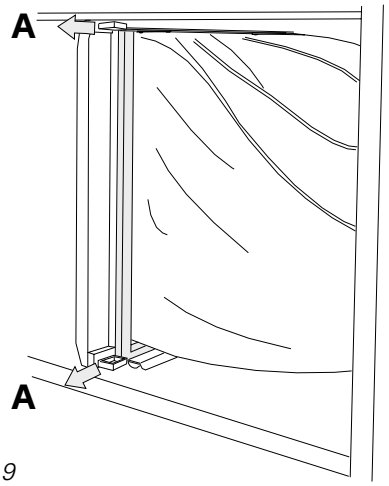


Fig. 9

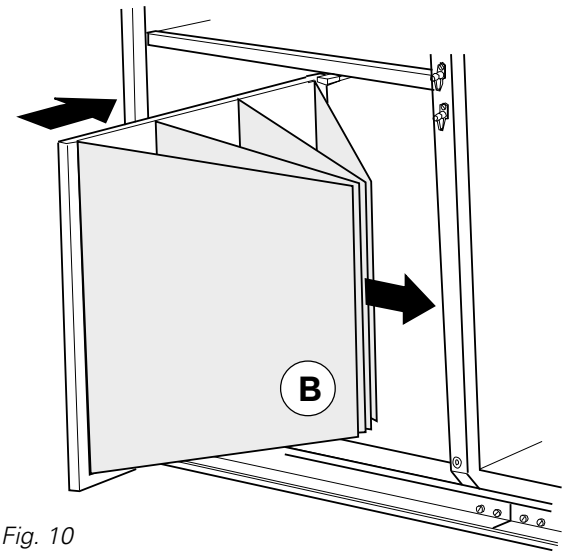


Fig. 10

10.1.3 To fit a new filter

- Fit new filters.

  Replacement filters (set):
  for GOLD, size 1: GOLZ-1-1-01
  for GOLD, size 2: GOLZ-1-2-01
  for GOLD, size 3: GOLZ-1-3-01
  for GOLD, size 4: GOLZ-1-4-01
  for GOLD, size 5: GOLZ-1-5-01.

  N.B. When fitting new filters, it is important to stretch the filter bags (B in Fig. 10), so that they will not catch or become folded.

- Push in each filter frame as far as possible into the unit. Slightly press against the filter frames to make them seal tightly against one another.
- Press the two blue handles (C in Fig. 11) at the upper and lower edges of the filter mounting bracket inward, to close the off-centre actuated list.
- Start the unit by pushing the "AUTO" or "MAN" button on the control display.
- **Duct calibration shall always be carried out when replacing filter.**

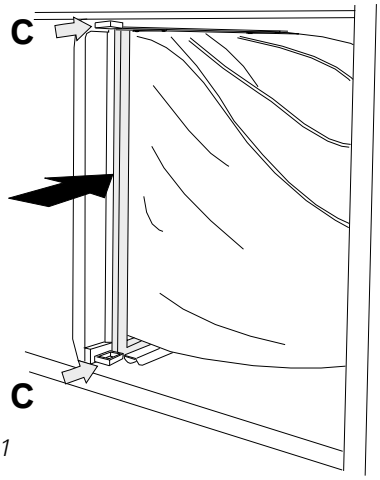


Fig. 11

10.2 Cleaning

Warning! Before cleaning:
Switch off the unit by pressing the "STOP" button on the control display.
Then switch off the air handling unit with the safety isolating switch!

10.2.1 General

Clean the surfaces inside the air handling unit whenever necessary.

Checks should be carried out in conjunction with changing the filters or at least every six months.

10.2.2 To clean the filter space

The filter space should be cleaned in conjunction with changing filters, when the old filters have been removed as described in Section 10.1.2.

- The unit must be stopped and then switched off.
- Wait until the fans have stopped before opening the inspection door (allowing the pos. pressure to diminish)
- Open the inspection doors of the filter/fan section.
- Clean the filter space by vacuuming.

10.2.3 To clean the heat recovery unit

- The unit must be stopped and then switched off.
- Wait until the fans have stopped before opening the inspection door (allowing the pos. pressure to diminish)
- Open the inspection doors of the filter/fan section.
- The heat recovery unit should at first hand be cleaned by vacuuming with a soft nozzle, so that the rotor surfaces will not be damaged.

  Clean the rotor from the filter space. Turn the rotor by hand to reach the entire surface.

  If the rotor is substantially fouled, blow the surfaces clean with compressed air.
- Inspecting and cleaning the leather fabric seal: Dismantle the cover plate in front of the rotor (sizes 1 through 3). Lift the edge of the leather fabric seal and inspect the underside. If it needs to be cleaned, turn the edge of the leather fabric over the rotor and brush it clean. Then turn it back. If the leather fabric is worn or extremely dirty, the leather fabric material will have to be replaced. The leather fabric must not be lubricated.
- Checking the belt tension:
  If the belt feels slack or worn and if it slips whenever it meets slight resistance, get in touch with PM-LUFT-trained service personnel.
- Check that the heat recovery unit rotor rotates faultlessly in its direction of rotation, indicated by the arrow on the decal.

Should the need arise, the rotor can be withdrawn out of the unit. This must only be done by service personal who are trained by PM-LUFT.

If the rotor has been removed from the unit, it can be washed in a solution containing a degreasing agent that will not corrode its aluminium foil structure. PM-LUFT cleaning compound is recommended and can be purchased from PM-LUFT.

10.2.4 To clean the fans

Cleaning

- The unit must be stopped and then switched off.
- Wait until the fans have stopped before opening the inspection door (allowing the pos. pressure to diminish)
- Open the inspection doors of the filter/fan section.
- Remove the guard located in front of the fan.
- The fan impellers should at first hand be cleaned by vacuuming.
- Remove any deposits on the impeller blades.
- Check that the impellers are not out of balance.
- The fan motor should be vacuum-cleaned or brushed off. It can also be cleaned by carefully wiping it with a damp cloth that has been dipped in a solution of water and dish washing detergent.
- After cleaning, do not forget to refit and secure the guard.

Should it be necessary to partially withdraw the fan for better accessibility for cleaning, see the continuation of these instructions on the next page.

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To withdraw the fan partially from the unit casing

Should it be necessary to partially withdraw the fan for cleaning, this can be done in the following manner:

- Remove the hose from tapping (A).
- Open the off-centre locking device (B) of the clamp on the fan inlet connection (the other off-centre locking device nearest to the fan wall must not be opened.
- The press the clamp into the round opening on the fan wall just enough to be able to turn the two plates that retain the fan inlet connection.
- Back off the 4 locking knobs (C) on the top and the bottom mounts.
- Partially withdraw the fan assembly, which slides in two guide rails, as much as necessary for cleaning.
- GOLD 1 – 3:
  The control cable and the power supply cable are jointed by the motor. The control cable can be pulled apart at its joint after pushing the mechanical locking piece across the contact. The locking tongue on the power supply cable must be pressed in, using a screwdriver, before the cable can be pulled apart. If the motor is replaced, the new conductors must be wired as shown in Fig. 12.

Should it be necessary to withdraw the fan completely, the electrical wiring must be disconnected in the following manner:

- Disconnect the electric cable wires between frequency converter and fan motor in the junction box (D) on the motor.
  N.B. This must be carried out only by an authorised electrician or by qualified service personnel.

To refit the fan

- Fit the fan in its proper position and tighten the locking knobs (C).
- Make sure that the fan inlet connection clamp fits tight. Close the off-centre locking device (B).
- Connect the hose to tapping (A).
- If the electric wires have been disconnected, it is important that the connection end of the cable with the shield rolled back over the rubber bushing, be fitted as shown in the enlarged detailed figure (D) below.

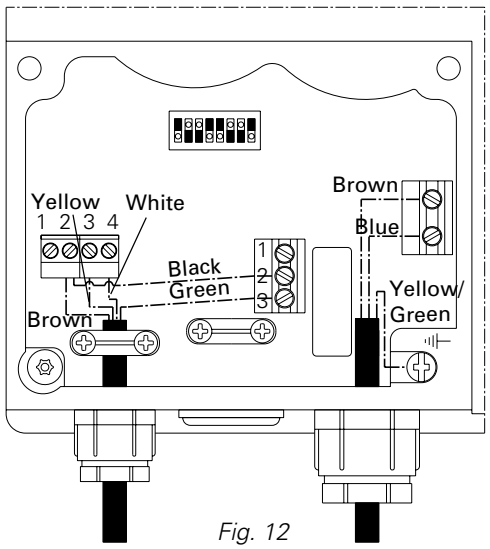

Fig. 12

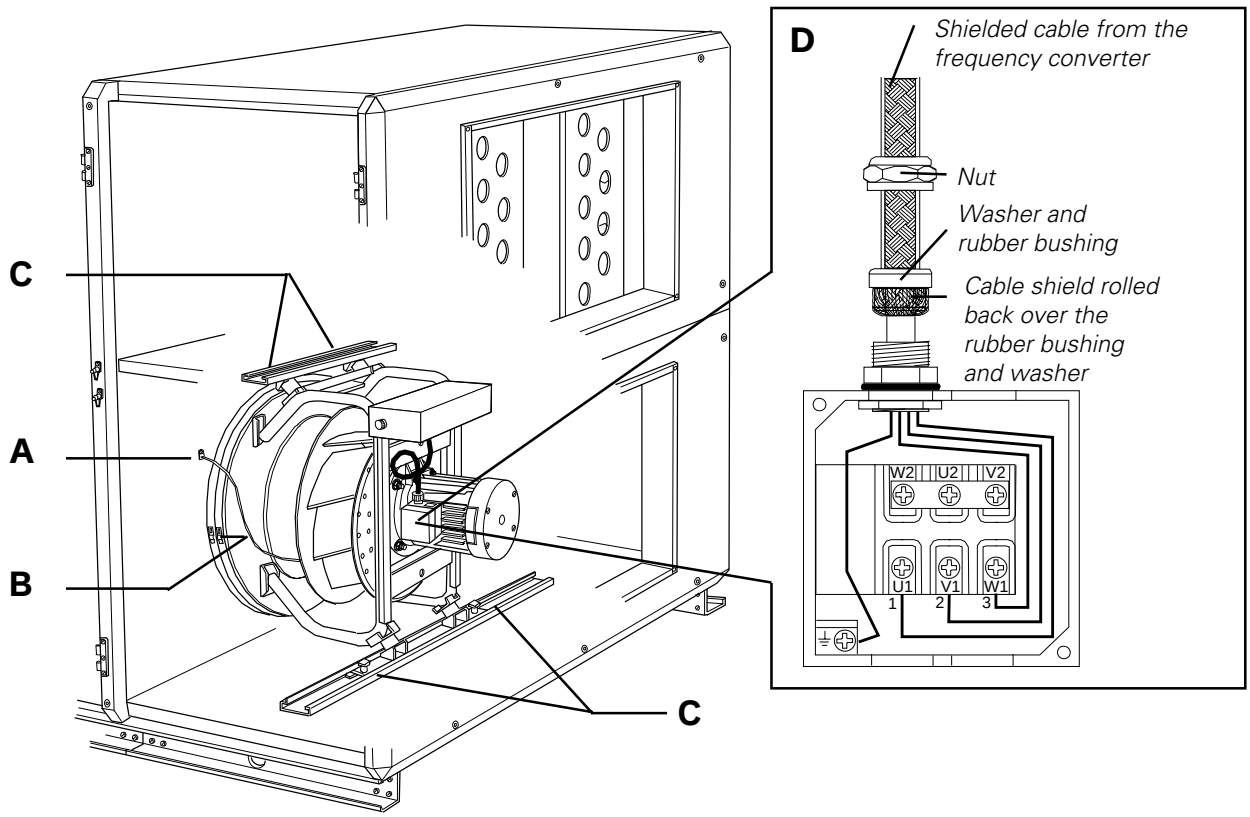

Fig. 13

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11.1 Electrical equipment cubicle, sizes 1, 2 and 3

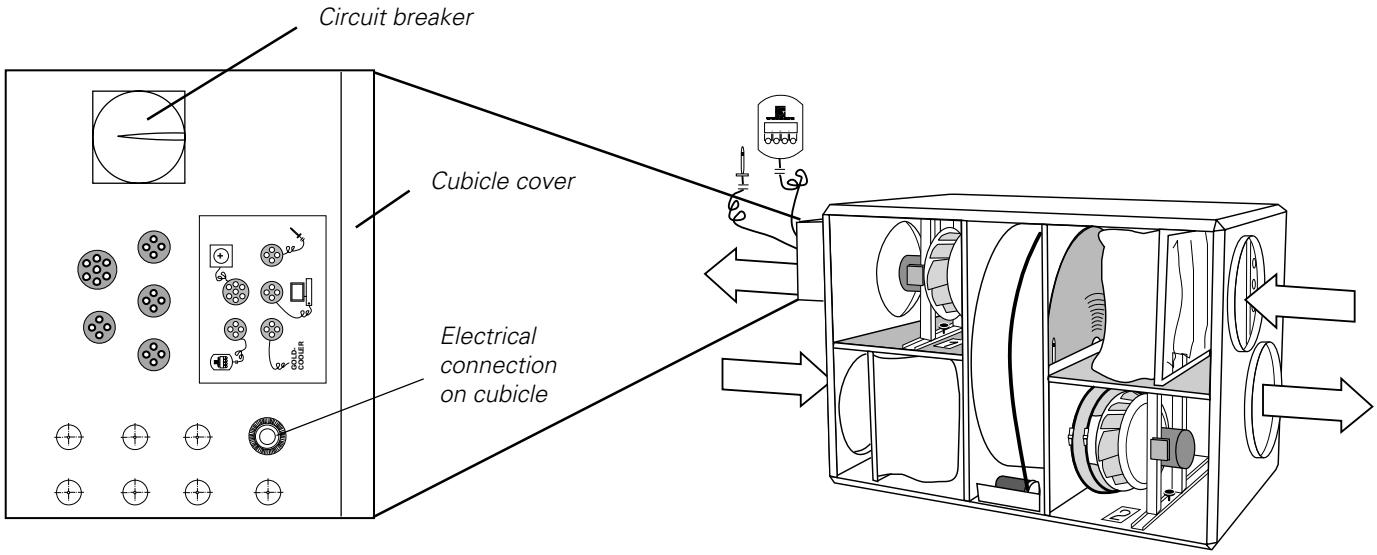

Fig. 14

To reach the control and power circuit boards, proceed as follows:

- Open the safety isolating switch.
- Remove the cover from the cubicle.
- Back off the stop screws (A).
- Withdraw the power/control circuit board.

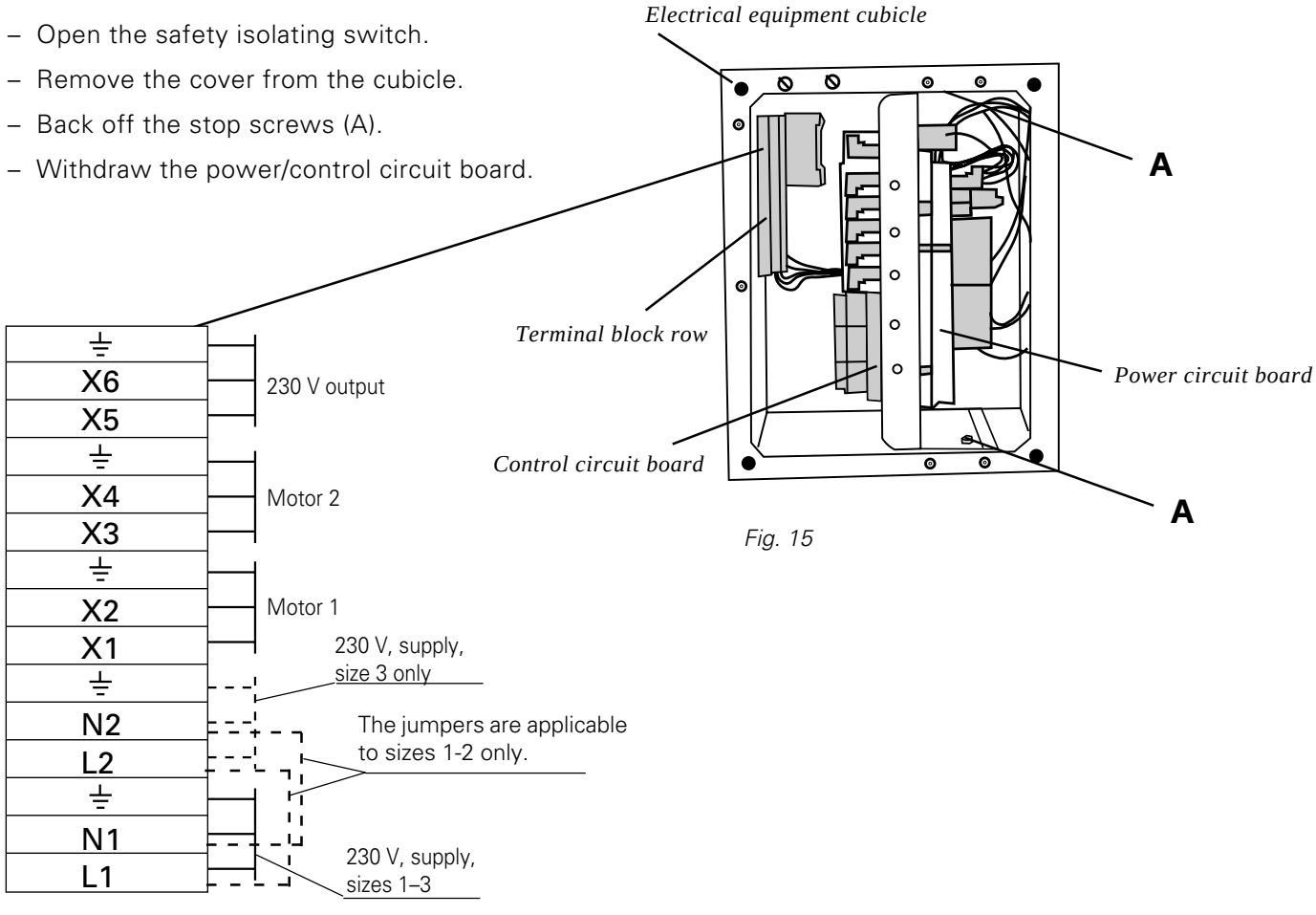

Fig. 15

PM-LUFT

11.2 Wiring diagram, sizes 1, 2 and 3
(See section 6 in the installation instructions)

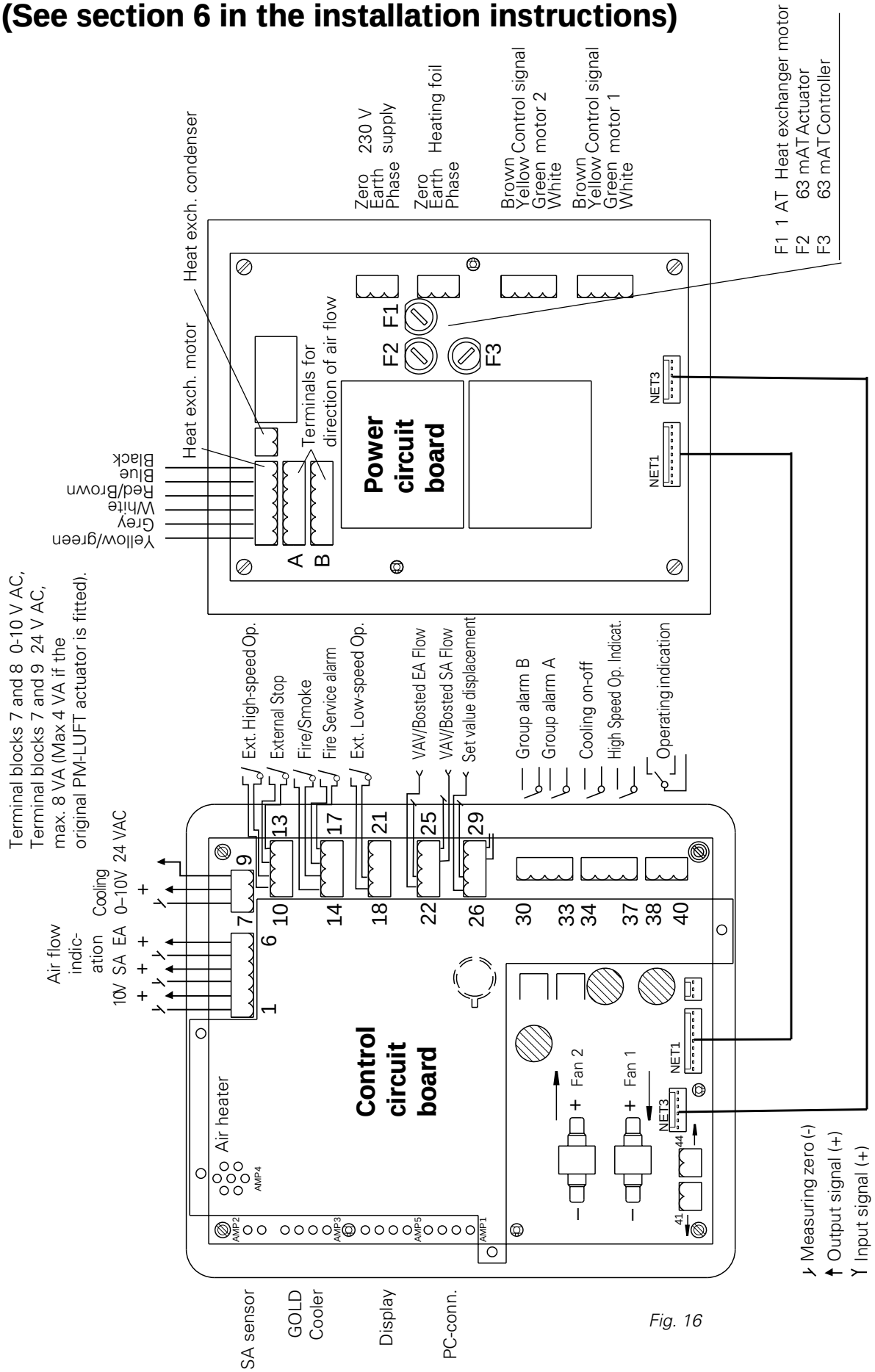

Fig. 16

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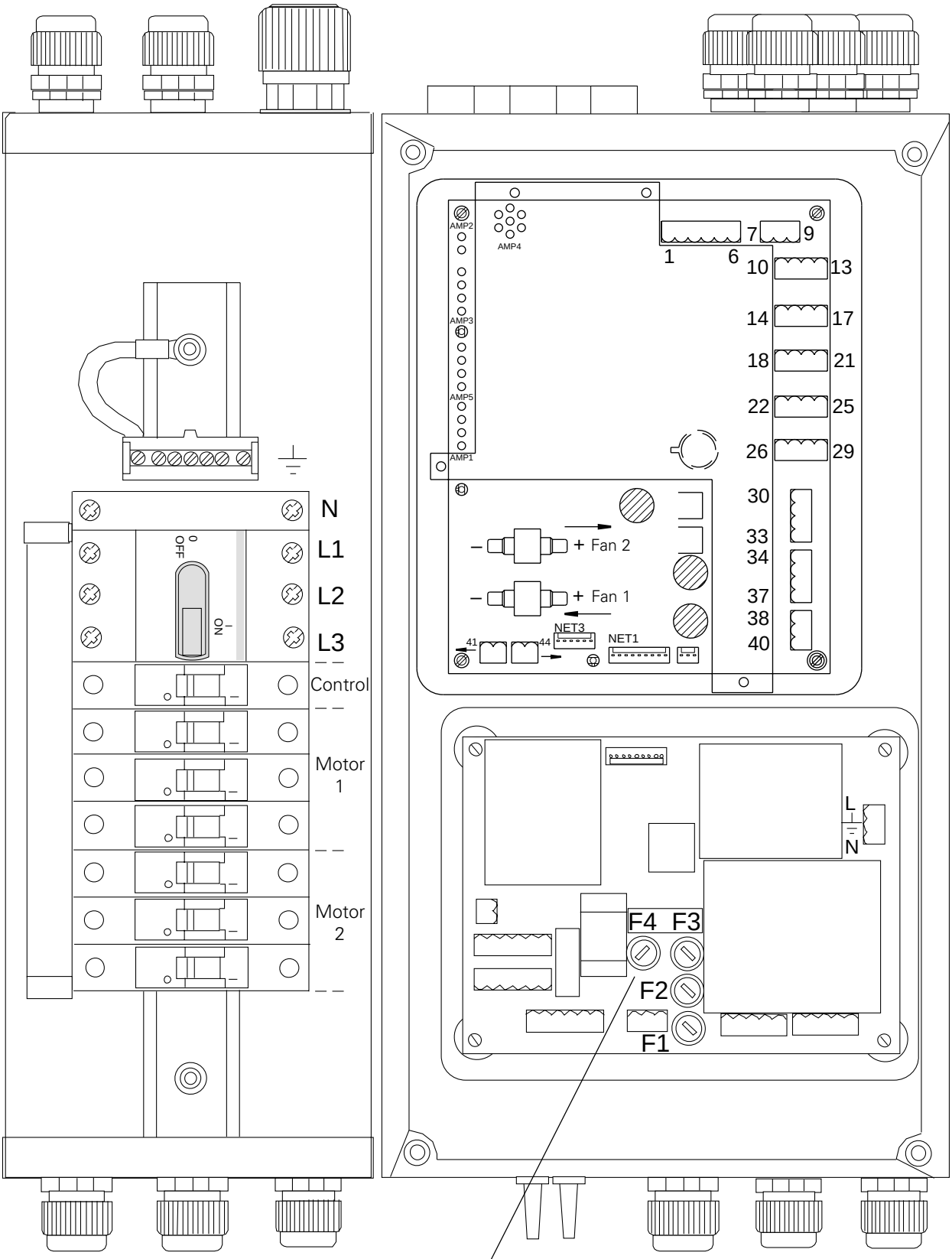
11.3 Fuse box and control circuit board cubicle, Sizes 4 and 5



F1	125 mAT	Frequency converter
F2	63 mAT	Actuator
F3	63 mAT	Controller
F4	2 AT	Heat exchanger motor

Fig. 17

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11.4 Wiring diagram, sizes 4 and 5

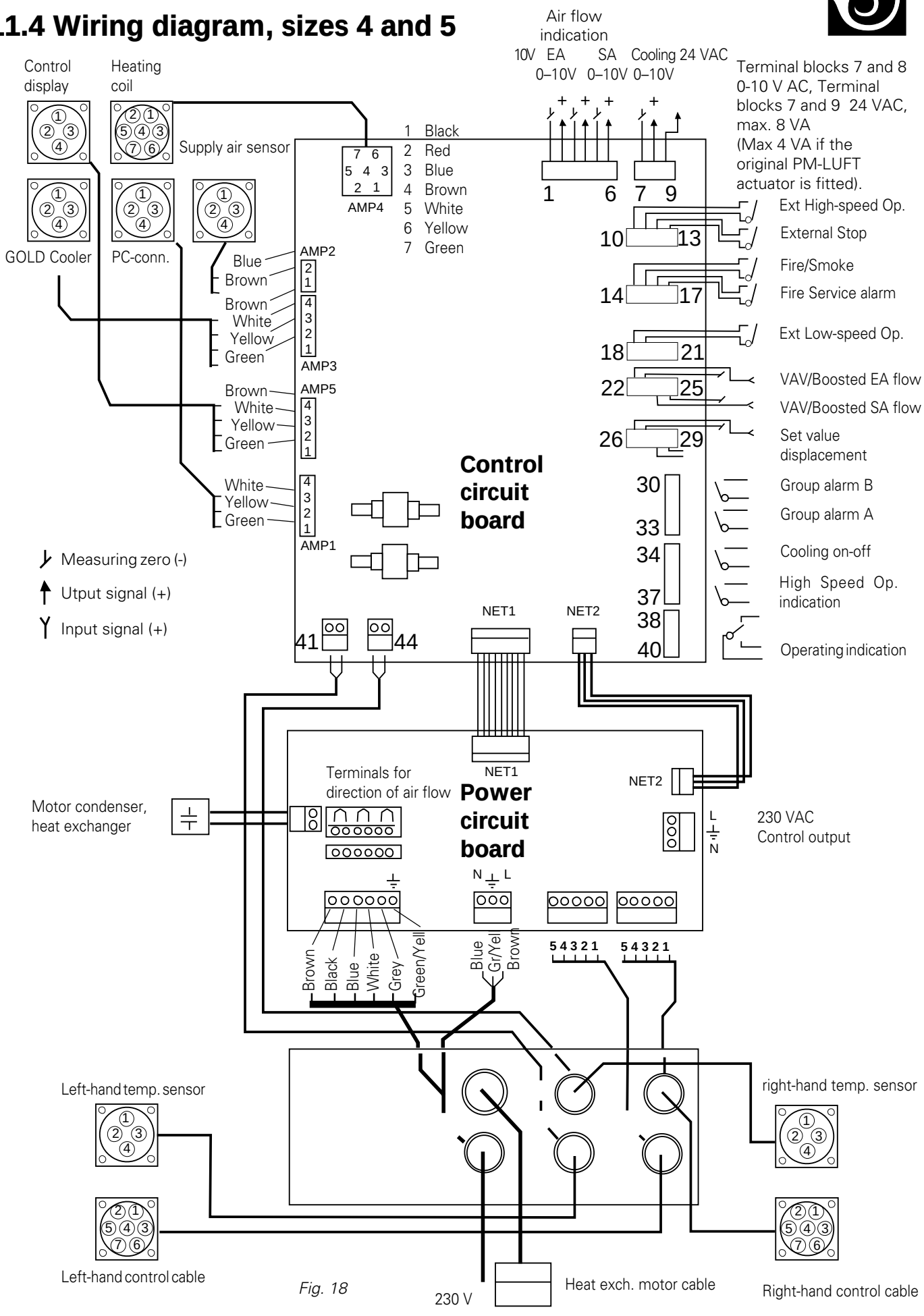

Fig. 18