OUTDOOR MONOBLOC AIR CONDITIONING UNIT FOR INSTALLATION ON SHELTERS AND PRE-FABRICATED BUILDINGS

WMA/WMF

0121- 0181 - 0251 - 0281 - 0331
0551 - 0661

OPERATION AND MAINTENANCE MANUAL

GB

Before installing or working on the unit, read this instruction manual carefully. Follow all instructions and safety procedures contained in this manual and displayed on the unit

Some characteristics of special versions of these units may differ from those described in this manual.

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Contents

IMPORTANT: the description of the Control System and the operating logic of the unit are given in the mP20W Control System instruction manual.

Family	Unit type	Function mode	Model	Number of Compressors	Version	Control System
W: wall mounted	M: monobloc	F: mech.+ free. cooling A: mech. cooling only			C: Basic version T: With electric re-heat	W: mP20W microprocessor
W	**M**	**F**	**066**	**1**	**T**	**W**

GENERAL DESCRIPTION

DOCUMENTATION ENCLOSED WITH THE UNIT

Every unit is supplied complete with the following documents:

- Unit instruction manual
- Microprocessor control instruction manual
- Electrical diagrams
- Spare parts list
- CE declaration listing the directives and norms to which the unit conforms
- Guarantee certificate

UNIT DESCRIPTION AND INTENDED USE

The WM is an autonomous monobloc direct expansion air conditioning unit with air-cooled condenser, designed for the air conditioning of telephone exchanges, shelters and technological applications. The unit is pre-charged and tested in the factory and has its own built-in condenser. Installation consists of simply fixing the unit to the wall, connecting the air ducting and making the electrical connections.
All essential components can be inspected and removed from the front (with the exception of the damper motor in WMF units from 0121 to 0331), in multiple installations units can therefore be fitted very close together *(see installation manual)*.

ACTIVE SAFETY
The control system provides monitoring and prevention functions via:

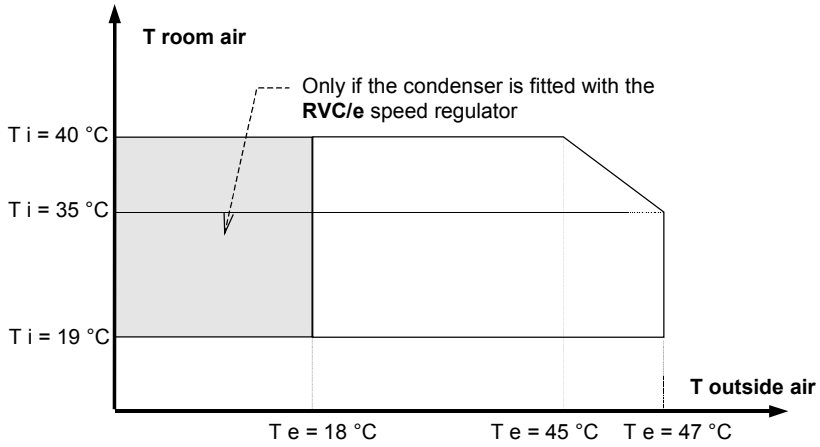
- Function status indication
- Continuous reading and display of the temperature measured by the sensors
- Indication of fault and alarm situations
- Automatic stopping of unit components in the event of risk
- Compressor management to reduce start-up frequency.

PASSIVE SAFETY
The essential functions of the units are protected against faults and potentially dangerous conditions; WM units are fitted with:

- High and low-pressure pressostats to protect the refrigerant circuit (HP with manual re-set)
- Low airflow differential pressostat
- Dirty filter differential pressostat (optional)
- Safety thermostat on units with electric heater
- Compressor electric motor protection
- Phase sequence relay on units with 400V/3N/50Hz power supply (models 0331 to 0661).

PERSONAL SAFETY
The design and wiring of Uniflair air conditioning units conform to 73/23/CEE. The electrical panels are equipped with an auxiliary 24V circuit and include individual short circuit protection using automatic circuit breakers. The axial fans are protected by metal grilles.

FUNCTION LIMITS



MODELS WM 0551-0661

DESCRIPTION OF MAIN COMPONENTS

SELF-SUPPORTING FRAME in 1.2 mm galvanised steel
EXTERNAL PANELS in 1.2 mm, galvanised steel with RAL9001 cream-coloured epoxy powder paint and internally lined in self-extinguishing abrasion-resistant sound and heat insulation material. Units are also available with aluminium external panels
FILTER in self-extinguishing material with EU2 efficiency (doc. Eurovent 4-5) fitted in rigid metal frame
SINGLE INLET RADIAL FANS in the evaporator section
AIRFLOW SENSOR for activating a low airflow alarm
COOLING COIL: hydrophilic -treated large frontal area manufactured in copper tubing mechanically expanded into aluminium fins, stainless steel tray with flexible condensate drain tube
ELECTRICAL HEATERS (optional) with finned aluminium elements and safety thermostat for cutting off the power supply and activating the alarm in the event of overheating
ELECTRICAL PANEL housed in a compartment isolated from the airflow and which conforms to norms 73/23/CEE - 89/336/CEE with:

- auxiliary 24V transformer
- main switch
- magnetothermal protection
- remote command switches

SCROLL COMPRESSOR with high energy efficiency, low noise levels and built-in thermal.
FREE COOLING (WMF units): managed by the microprocessor which controls a motorised damper for the introduction of fresh air.
REFRIGERANT CIRCUIT including:

- filter drier and flow sight glass
- thermostatic expansion valve
- high and low-pressure pressostats (HP with manual reset)

mP20W MICROPROCESSOR CONTROL: includes room, outdoor and air delivery temperature sensors
'TORX' anti-tamper external screws

ACCESSORIES

The following optional accessories can be added to the basic version of the unit:

RVC/e: condenser fan speed regulation with **SPC** pressure sensor
USER TERMINAL for the setting and display of unit function parameters; to special order the terminal can be housed inside the unit's electrical panel on a hinged plate or a wall fitting kit can be supplied for remote installation
CLOCK CIRCUIT for the management of time and date events
LAN BOARD for the local network connection of two units
LAN & CLOCK BOARD
RS485 SERIAL OUTPUT for data transmission to a centralised supervision system
BLOCKED FILTER ALARM SENSOR consisting of a dirty filter pressostat
EU4 high-efficiency filter (replacing standard EU2 filter)
R407C REFRIGERANT (replacing standard R22)
DOUBLE ELECTRICAL POWER SUPPLY - normal function uses mains power, emergency function uses UPS 230V/1N/50Hz for the fan, microprocessor control and free-cooling damper
DOUBLE ELECTRICAL POWER SUPPLY WITH 48V DC FROM INVERTER: normal function uses mains power, emergency function uses UPS 48V DC for evaporator fan, microprocessor control and free-cooling damper motor
DC FANS
TEMPERATURE AND HUMIDITY SENSOR (in place of standard temperature-only sensor)
SPRING-RETURN DAMPER to special order on WMF units

FUNCTION PRINCIPLES

(basic version – mechanical cooling)

Air from the room is taken in by the recirculating fan through opening (**I**), cooled by the evaporator coil and delivered into the room through opening (**M**). In "T" versions, the air may be heated by the electric elements (**H**) before being delivered into the room.

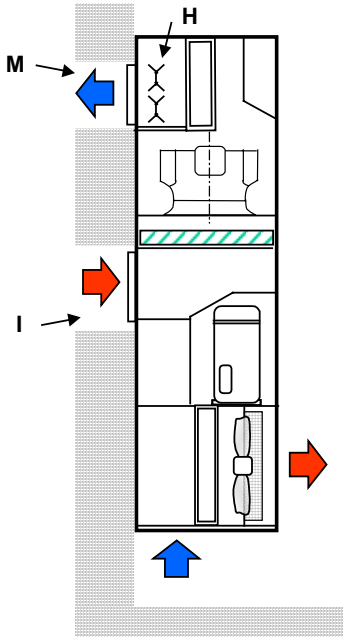


Fig. 1

FREE COOLING

(WMF UNITS)

The free cooling cycle consists of the introduction into the room of fresh air when this is sufficiently cold to absorb the thermal load of the room. The unit is fitted with a butterfly damper and two air intakes:

- recycled air intake (on left hand diagram)
- external air intake (on right hand diagram).

A. **NORMAL FUNCTION** (figs. 2a and 3a)

During normal function the damper (**S**) is positioned to take in air only from the room (arrow on the left), closing the external air intake.
The air is filtered (**F**), cooled and dehumidified in the cooling coil (**E**) and returned to the room by the fan (**MVE**). Cooling is via the cooling cycle, starting the compressor (**CP**).

B. **FREE COOLING (free cooling)** (figs. 2b and 3b)

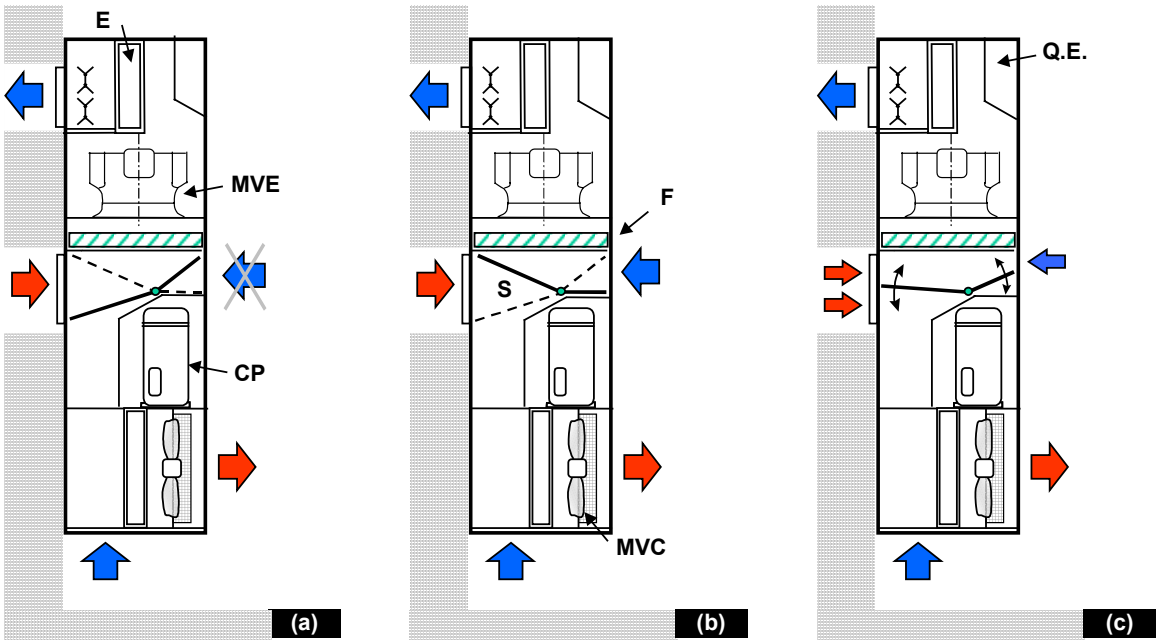
As soon as the external air is of a low enough temperature to maintain the temperature in the room at the desired level, the damper (**S**) changes position, delivering fresh air into the room instead of recycled. During free cooling function, the compressor is off.

C. **MODULATING FUNCTION** (fig. 2c and 3c)

When the outside temperature falls further, the control system therefore changes the damper position to mix fresh and recycled air to maintain room temperature at the required level. In any case, the temperature of the air taken in is maintained above a pre-set minimum.

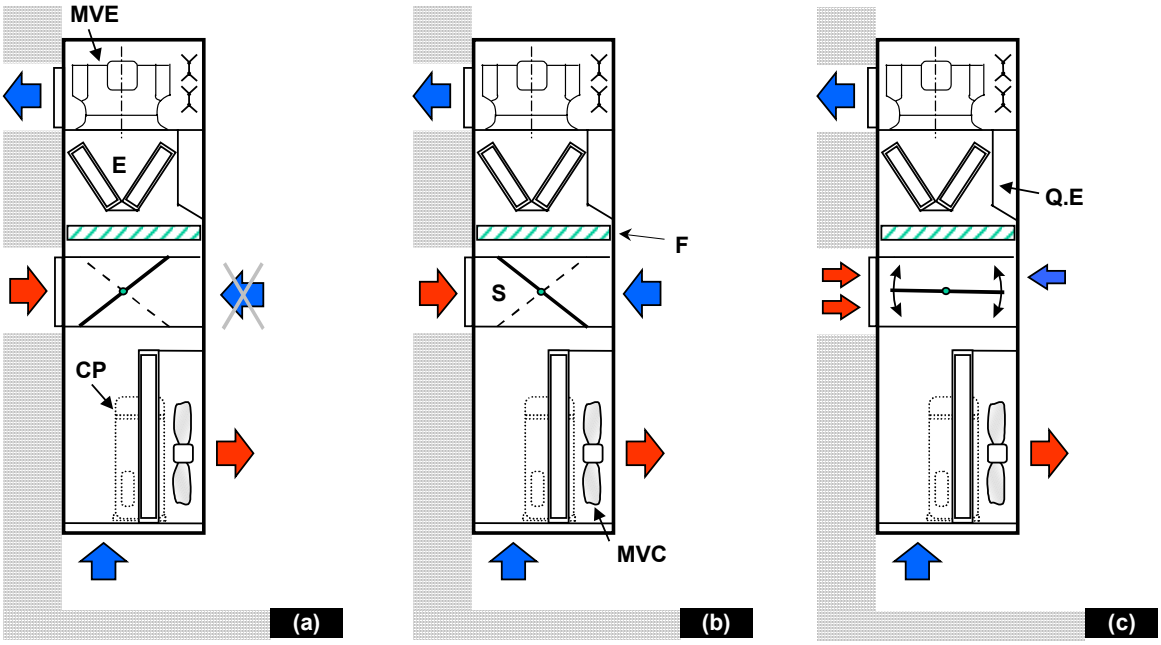
MINIMUM QUANTITY OF FRESH AIR

It is possible to pre-set a minimum opening position on the damper to allow the introduction of a proportion of fresh air in any operating mode.



MODELS WMF 0121-0181-0251-0281-0331

Fig. 2



MODELS WMF 0551-0661

Fig. 3

INTELLIGENT FREE-COOLING

This system gives dynamic control of the free-cooling phase, maximising energy-saving performance at all times. The result is the ability to provide much greater energy saving (and therefore economy of operation) than the common fixed-point free-cooling systems.

The microprocessor compares the thermal load present at that moment in the air conditioned environment with the outside temperature, calculating the optimum temperature at which to start free-cooling. In this way the temperature at which free-cooling starts is not fixed but changes to adapt to the load conditions present at that moment in the air conditioned environment

If required, fixed point or fixed differential free-cooling cycles can also be activated; this type of function does not consider the heat load in the room.

DATA PLATE

The data plate is in the electrical panel housing and shows:

- Unit model and serial number
- Power supply (voltage, number of phases and frequency)
- Power absorption of the unit and of the main components
- Current absorption of the unit and of the main components:
    - OA (Operating current)
    - FLA (Full load current)
    - LRA (Locked rotor current)
- Setting values of the refrigerant circuit pressostats (HP and LP) and of the other regulation and safety devices
- Refrigerant type and refrigerant circuit charge in kg.

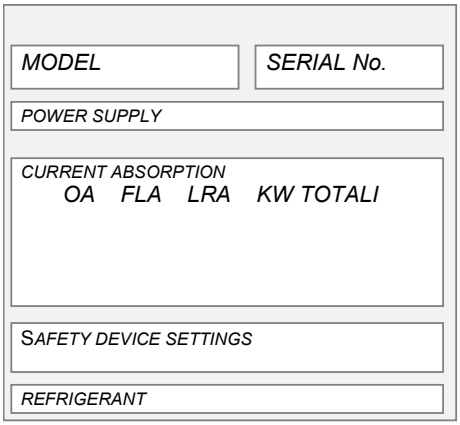


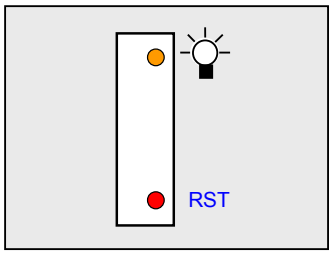
Fig. 4

START-UP AND TESTING

START-UP PROCEDURE

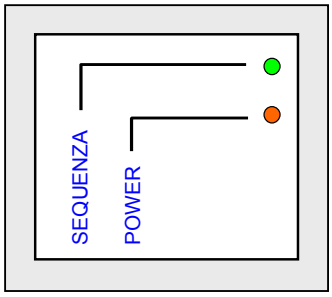
Having connected the power supply cables to the **IG** main switch as described in the Installation Manual, switch on the power supply to the unit electrical panel.

1. - Arm the IM automatic switch
2. - *(in units with double power supply)* **arm** automatic auxiliary switch **IM2** (230V/1N/50Hz from UPS)
3. - Move the main switch IG to the on position "I"
4. – Check that the yellow mains LED (on the microprocessor control board) and the user terminal display are both on (see mP20/W control instruction manual)
5. - *(for units with tri-phase power supply)* if the RSF phase sequence relay intervenes; disconnect the power supply, invert two of the phases L1, L2, L3 and continue with the start-up procedure.
WM units can be fitted with two types of RSF phase sequence relay:



a) model: **CDC GZ90F33 (UNIFLAIR code MERE074X1A)**
Check that the two orange mains power LEDs and the red RSF LED are on. If the red RST LED (shown in the diagram) does not come on, disconnect the power supply to the unit and swap two phases on the power supply cable.

b) model: **CISE 131 - V2R (UNIFLAIR code MERE070X1A)**
CISE 131 - V2 (UNIFLAIR code MERE072X1A)
Check that the two orange mains power LEDs and the green Sequence LED on the RSF relay are on. If the green LED is off, disconnect the power supply to the unit and swap two phases of the power supply cable



6. – Close the electrical panel cover and tighten the screws;

7. - Start the unit by pressing the ON/OFF button on the control terminal; after a short delay the fan will start and the green LED on the control panel will come on. Alternatively the unit can be started by:
- closing the contact between terminals 20 and 50 on the electrical panel if the microprocessor control is programmed for remote control (see *mP20/W instruction manual*)
- the supervision system
8. - Check that the protection devices do not intervene
9. - Check that the mP20 control is not displaying an alarm;
An alarm is signalled by:
- the warning buzzer
- activation of the alarm repay and switching on of the red LED on the user terminal
- description of the alarm on the terminal display (see *mP20/W instruction manual*)
10. – Set the required room parameters (see *mP20/W instruction manual*) or set the remote control contacts of an external control system is being used (see attached electrical diagrams); the unit components required to achieve the set conditions (compressor or free-cooling damper) will be activated.
11. - Check that there are no unusual noises or vibrations
12. - Check that current absorption is within the limits given in the section 'Current Absorption'
13. – Check that the unit has not lost refrigerant charge. If one of the safety devices intervenes check the evaporation and condensation pressure values with a manometer.

FUNCTION AND REGULATION

MICROPROCESSOR CONTROL

(see mP20 microprocessor control instruction manual)

The control board provides the following functions:

- Control of room temperature
- Display of room relative humidity (with optional temperature and humidity sensor)
- Maximum room humidity setting which, when reached, closes the free-cooling damper and forces compressor start-up (with optional humidity sensor)
- Management of electrical re-heat (optional)
- Management of alarms
- Management of stand-by if two or more units are connected (with LAN board)
- Alarm system with visual and acoustic signals
- Signal contacts for each type of alarm
- Programmable general alarm signal for the signalling of specific selectable alarms
- Programmable automatic re-start after a power failure
- Programmable re-start delay in multiple installations
- Compressor activation control (limits frequency of start-ups)
- Programmable control (remote control or supervision)
- Control of delivery air minimum temperature limit (WMF)
- Control of free-cooling damper position (special units)
- 2 levels of password programming (setting / hardware & software configuration)
- RS422 or RS485 serial output (optional)
- Clock/calendar circuit (optional)
- Run hour counter for main components
- Service scheduling with clear information on necessary actions
- Memorisation of last 30 alarms (with date and time if optional clock circuit fitted)
- Detailed display of function mode and active components (with optional user terminal)
- Weekly on/off time bands (with optional clock circuit) for weekdays, pre-holidays, holidays
- Set-back function where the unit is in stand-by but maintains room temperature between two pre-set limits and relative humidity below a pre-set limit (with optional temperature and humidity sensor).
- Distinct setting of heating and cooling set point
- Override function for the manual control of main components without excluding remote control.
- Optimised control algorithm which constantly monitors the temperature of the room, of the air outside and of the delivery air for optimised management of both the direct expansion and the intelligent free cooling functions. Free cooling can therefore start earlier and continue for longer and at higher external temperatures since it takes into account the thermal load in the room at that moment.
- Advanced free-cooling management of two units with stand-by function to maximise energy saving.

MEASUREMENT AND ALARM DEVICES

The safety and regulation functions of the unit are performed by the microprocessor control. The unit is equipped with the following temperature, humidity and pressure sensors, as shown in the figure below:

RVC/e. Modulates condenser fan speed to control condensation pressure (optional).
TSR. Electric heating element safety thermostat with re-set button under the coil;
SM. Delivery air temperature sensor;
SE. External air temperature sensor;
ST-STU. Room temperature (or optional temperature and humidity) sensor. The ST sensor is installed in the unit as shown in the diagram; the STU sensor is supplied with a 3 metre cable and must be installed in the room.
FS. Air flow sensor (differential pressostat) to detect low airflow and fan function.
PFS. Dirty filter sensor (differential pressostat).
AP-BP. Fixed setting high / low pressure switches (HP with manual re-set).
SPC. Condensation pressure sensor.
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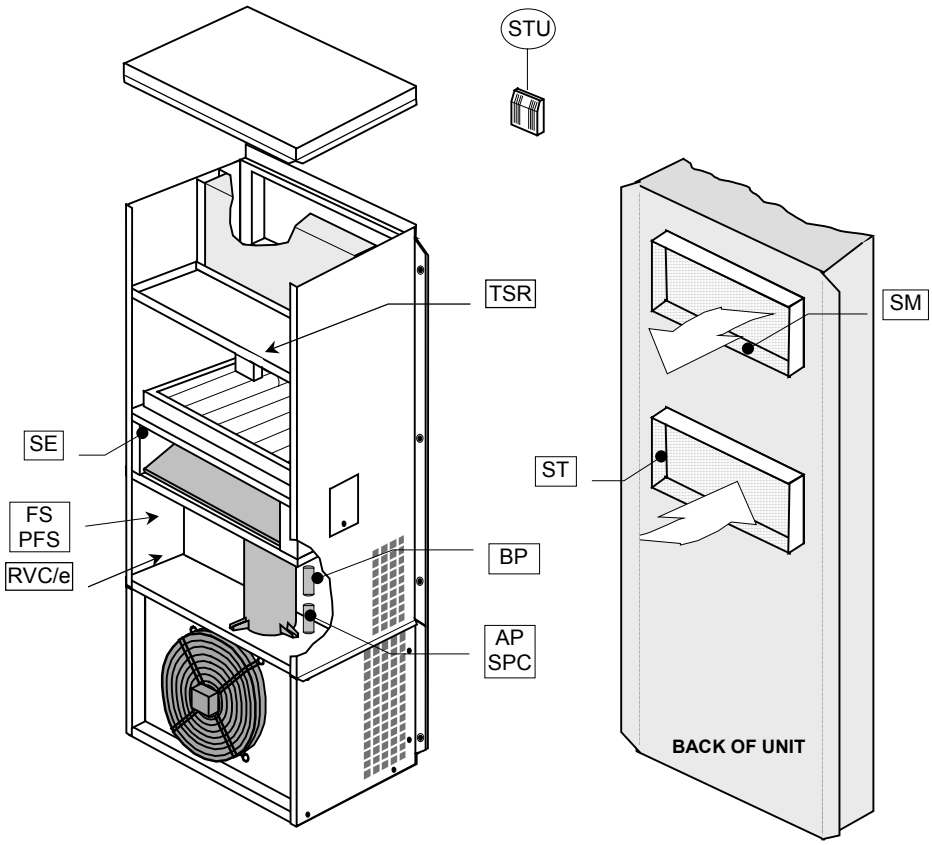


Fig. 5.a.

MODELS WM* 0121-0181-0251-0281-0331

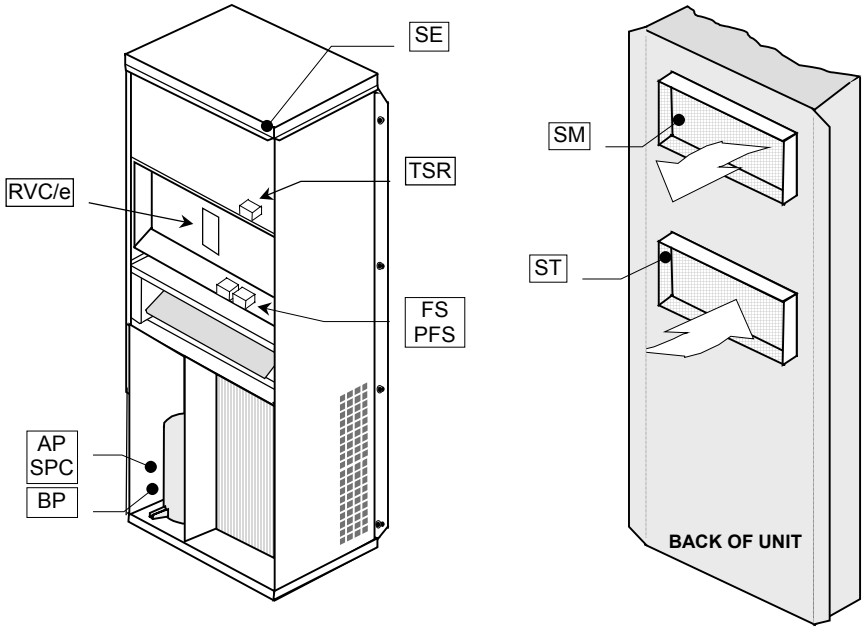


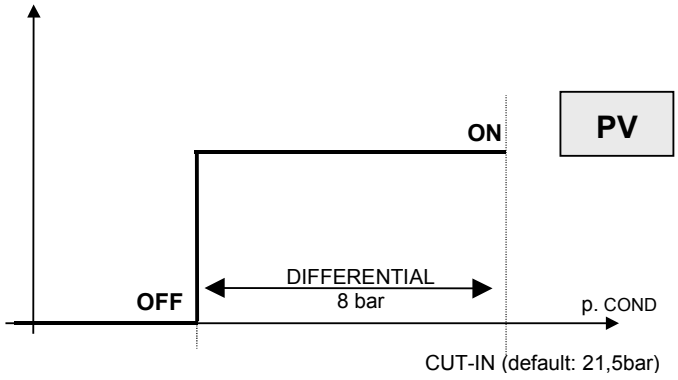
Fig. 5.b.

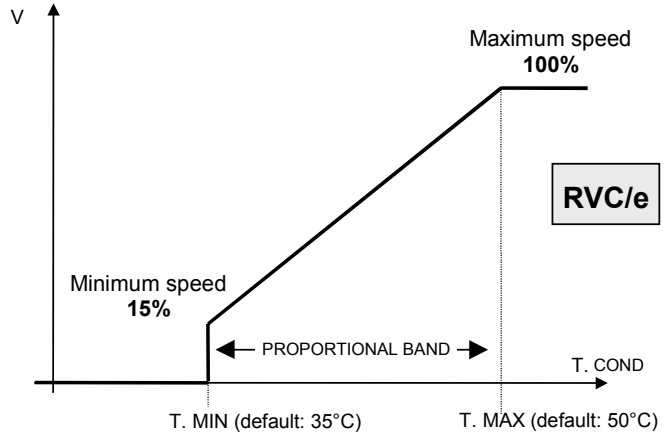
MODELS WM* 0551-0661

REGULATION OF CONDENSATION PRESSURE

Standard units are fitted with an On/Off pressostat.

As an alternative, condensation pressure can be controlled by a TRIAC voltage regulator on the condenser fan power supply. The regulator is optional (see Function Limits) and has the code **RVC/e**; it is controlled by the microprocessor as a function of the condensation temperature read by the SPC condensation pressure sensor.
The setting - done on the user terminal - has the following standard values:

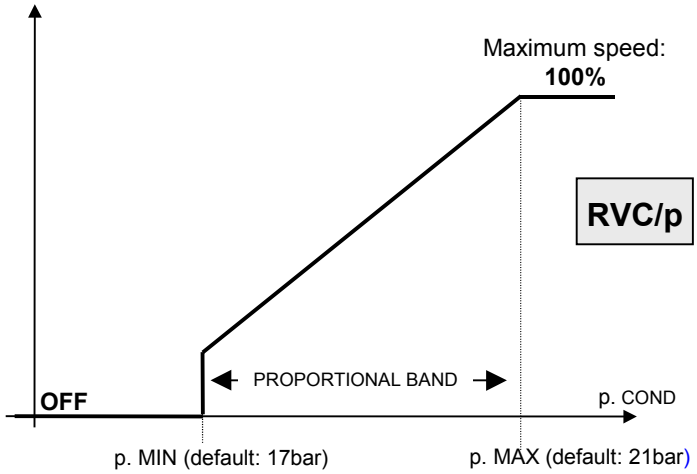




- maximum speed for 18,5 bar-r condensation pressure (50°C saturated condensation temperature with R22 and 47.5°C with R407C)
- minimum speed for 35°C saturated condensation temperature, corresponding to delivery pressure of 12,7 bar with R22 and 14,5 bar with R407C
- minimum fan power supply voltage (cut-off voltage) of 15% of mains voltage.

Wall Mounted 0121…0661

Some special units can be fitted with an RVC/p pressostatic speed regulator which is not controlled by the microprocessor.



SETTING THE REGULATION AND SAFETY DEVICES

After starting the unit make the following settings:
- **Room temperature**: see microprocessor control instruction manual
- **Room relative humidity**: see microprocessor control instruction manual;
- **Dirty filter differential pressostat:** see section on Setting the Dirty Filter Sensor.

Check that the safety devices are set to the values shown in the table below.
The regulation and safety devices are set in the factory and must not be changed without good reason.

·	Description	Intervention	Differential	Re-set
AP	High pressure air delivery pressostat	27,5 bar	---	manual
BP	Low pressure air intake pressostat	2,0 bar	1,5 bar	3,5 bar
TSR	Heating element safety thermostat	320 °C	---	manual

SETTING THE AIRFLOW SENSOR

The FS differential pressostat should intervene if the fan is not working (if the unit has one fan only) or if one of the fans is not working (in the case of multiple fans).
The setting of the airflow differential pressostat is 1.0 mbar (100 Pa). Since the difference in pressure between the fan intake and delivery depends on the airflow, it is necessary to set the pressostat after installation, making sure that the contact closes when the fan is in normal operation. To set the pressostat:

- simulate a fan fault (stop the fan, or one of the fans if multiple); check that the pressostat intervenes
- if the pressostat does not intervene, gradually **increase** the setting until it does.

The FS differential pressostat can be set on a scale from 0.5 to 5.0 mbar (from 50 to 500 Pa).

SETTING THE OPTIONAL DIRTY FILTER SENSOR

The PFS pressostat must be set as a function of the pressure drop; this depends not only on how dirty the filter is but also on the airflow and therefore on the setting of the fan speed regulator. The setting must be done when the filter is clean:

- set the PFS pressostat to 1.5 mbar;
- gradually cover the surface of the air filter and check that the pressostat intervenes when the filter is about 50-60% covered

If the pressostat does not intervene, gradually lower its setting; if it cuts in too soon, increase the setting.

TECHNICAL DATA

GENERAL CHARACTERISTICS

This information refers to standard models and may vary for special or modified units.

MODELLO		0121	0181	0251	0281	0331	*MODEL*
POTENZA FRIGORIFERA- R22							***COOLING CAPACITY- R22***
Raffreddamento Meccanico							***Mechanical cooling***
Ambiente: 26 °C, 40%UR;T_{ext}=35°C							*Room at 26 °C, 40%RH, T_{ext}=35°C*
Resa frigorifera totale	kW	4.1	5.6	7.7	8.5	10.0	*Total cooling capacity*
Resa frigorifera sensibile	kW	4.1	5.6	7.7	8.5	10.0	*Sensible cooling capacity*
POTENZA FRIGORIFERA							***COOLING CAPACITY***
Raffreddamento in free-cooling							***Free-cooling***
Ambiente a 26 °C- T_{ext}=14°C							*Room at 26 °C- T_{ext}=14°C*
Sensibile	kW	5.0	5.8	8.5	8.5	9.2	*Sensible*
TENSIONE DI ALIMENTAZIONE	V/ph/Hz	230/1N/50				400/3/50	**POWER SUPPLY**
COMPRESSORE FRIGORIFERO							***COOLING COMPRESSORS***
Numero / Tipo		1 / ROTARY	1 / SCROLL				*Number of compressors / Type*
Potenza nominale							*Nominal power*
(Ambiente a 26°C - Text=35°C)	kW	0.94	1.53	1.90	2.35	2.86	*Room at 26 °C 40%RH, T_{ext}=35°C*
RISCALDAMENTO ELETTRICO (1)							***ELECTRICAL RE-HEAT*** (1)
Numero di stadi		1	1	1	1	1	*Number of stages*
Potenza totale	kW	2,6	4	4	4	6	*Total power*
VENTILATORI sez. RICIRCOLO							
Portata d'aria nominale	l/s	344	406	622	622	742	*Nominal airflow*
(raffreddamento meccanico)	m³/h	1240	1460	2240	2240	2670	*(mechanical cooling)*
Portata d'aria nominale	l/s	342	397	583	583	633	*Nominal airflow*
(free-cooling)	m³/h	1230	1430	2100	2100	2280	*(free cooling)*
Numero di ventilatori (evaporatore)		1	1	2	2	2	*Number of fans (evaporator)*
VENTILATORI sez. CONDENSANTE							***CONDENSER FANS***
Portata d'aria nominale	l/s	794	794	800	800	825	*Nominal air volume*
	m³/h	2860	2860	2890	2890	2970	
Numero di ventilatori / n. di poli (condensatore)		1 / 6	1 / 6	1 / 6	1 / 6	2 / 6	*Number of fans (condenser)*
FILTRO DELL'ARIA							***AIR FILTER***
Efficienza - filtro standard				EU2			*Efficiency (standard air filter)*
Efficienza - filtro opzionale				EU4			*Efficiency (optional air filter)*
Dimensioni	mm	570 x 350 x 48		850 x 400 x 48			*Frontal dimensions*
LIVELLO di PRESSIONE SONORA (2)	dB(A)	40.5	44.0	45.5	45.5	49.0	***SOUND PRESSURE LEVEL*** (2)
DIMENSIONI E PESI							***DIMENSIONS AND WEIGHTS***
Altezza	mm	1790	1790	1940	1940	1940	*Height*
Larghezza	mm	650	650	930	930	930	*Width*
Profondità	mm	400	400	450	450	450	*Depth*
Peso (unità senza imballo)	kg	135	152	190	190	210	*Weight (unit without packaging)*

(1) Opzionale — *Optional (1)*

(2) In campo libero, a 5 metri di distanza frontale nelle condizioni nominali — *Free field at 5 m from front of unit under nominal conditions (2)*

EUROVENT CERTIFIED PERFORMANCE

MODELLI WM* 0121-0181-0251-0281-0331

MODELLO		WMF0551	WMF0661		MODEL
POTENZA FRIGORIFERA – R22					***COOLING CAPACITY – R22***
Raffreddamento Meccanico					***Mechanical cooling***
Ambiente a 26 °C- 40%UR- T_{ext}=35°C					*Room at 26 °C- 40%RH- T_{ext}=35°C*
Resa frigorifera totale	kW	15.8	17.5	kW	*Total cooling capacity*
Resa frigorifera sensibile	kW	15.8	17.5	kW	*Sensible cooling capacity*
POTENZA FRIGORIFERA					***COOLING CAPACITY***
Raffreddamento in free-cooling					***Free-cooling***
Ambiente a 26 °C- T_{ext}=14°C					*Room at 26 °C- T_{ext}=14°C*
Sensibile	kW	17.4	17.4	kW	*Sensible*
TENSIONE DI ALIMENTAZIONE	V/ph/Hz	400/3+N/50 (*)	400/3+N/50 (*)	V/ph/Hz	***POWER SUPPLY***
COMPRESSORE FRIGORIFERO					***COOLING COMPRESSORS***
Numero / Tipo		1 / SCROLL	1 / SCROLL		*Number / Type*
Potenza nominale					*Nominal power*
(Ambiente a 26°C - Text=35°C)	kW	4.01	4.88	kW	*Room at 26 °C 40%RH, T_{ext}=35°C*
RISCALDAMENTO ELETTRICO (1)					***ELECTRICAL RE-HEAT*** *(1)*
Numero di stadi		1	1		*Number of stages*
Potenza totale	kW	6	6	kW	*Total power*
VENTILATORI sez. RICIRCOLO					
Portata d'aria nominale	l/s	1270	1270	l/s	*Nominal airflow*
(raffreddamento meccanico)	m³/h	4580	4580	m³/h	*(mechanical cooling)*
Portata d'aria nominale	l/s	1200	1200	l/s	*Nominal airflow*
(free cooling)	m³/h	4310	4310	m³/h	*(free cooling)*
Numero di ventilatori		1	1		*Number of fans*
VENTILATORI sez. CONDENSANTE					***CONDENSER FANS***
Portata d'aria nominale	l/s	1650	1650	l/s	*Nominal air volume*
	m³/h	5940	5940	m³/h	
Numero di ventilatori		1	1		*Number of fans*
FILTRO DELL'ARIA					***AIR FILTER***
Efficienza - filtro standard		EU2		mm	*Efficiency (standard air filter)*
Efficienza - filtro opzionale		EU4			*Efficiency (optional air filter)*
Dimensioni	mm	965 x 590 x 48	965 x 590 x 48	mm	*Dimensions*
LIVELLO DI PRESSIONE SONORA (2)	dB(A)	51.0	51.0	dB(A)	***SOUND PRESSURE LEVEL*** *(2)*
DIMENSIONI E PESI					***DIMENSIONS AND WEIGHTS***
Altezza	mm	2250	2250	mm	*Height*
Larghezza	mm	1050	1050	mm	*Width*
Profondità	mm	625	625	mm	*Depth*
Peso (unità senza imballo)	kg	300	320	kg	*Weight (unit without packaging)*

(1) Opzionale — *Optional (1)*

(2) In campo libero, a 5 m di distanza frontale nelle condizioni nominali — *Free field at 5 m from front of unit under nominal conditions (2)*

(*) in alcune versioni, oltre all'alimentazione principale 400V/3ph+N/50Hz, può essere prevista l'alimentazione secondaria 230V/1N/50Hz (UPS).

AIR FLOW

RECIRCULATION (1)

MODEL		WM∗0121	WM∗0181	WM∗0251	WM∗0281	WM∗0331
Nominal air flow @ 0 Pa	l/s	344	406	622	622	742
	m³/h	1240	1460	2240	2240	2670
Air flow @ 50 Pa	l/s	308	372	556	556	675
	m³/h	1110	1340	2000	2000	2430
Air flow @ 100 Pa	l/s	267	333	478	478	603
	m³/h	960	1200	1720	1720	2170
Air flow @ 150 Pa	l/s	214	286	381	381	519
	m³/h	770	1030	1370	1370	1870

MODEL		WM∗0551	WM∗0661
Nominal air flow @ 0 Pa	l/s	1270	1270
	m³/h	4580	4580
Air flow @ 50 Pa	l/s	1208	1208
	m³/h	4350	4350
Air flow @ 100 Pa	l/s	1139	1139
	m³/h	4100	4100
Air flow @ 150 Pa	l/s	1067	1067
	m³/h	3840	3840

(1) Without delivery and intake grilles, clean filters, no electric heater or re-heat

FREE-COOLING (1)

MODEL		WMF0121	WMF0181	WMF0251	WMF0281	WMF0331
Nominal air flow @ 0 Pa	l/s	342	397	583	583	633
	m³/h	1230	1430	2100	2100	2280
Air flow @ 50 Pa	l/s	308	372	508	508	575
	m³/h	1110	1340	1830	1830	2070
Air flow @ 100 Pa	l/s	258	325	422	422	506
	m³/h	930	1170	1520	1520	1820
Air flow @ 150 Pa	l/s	208	278	333	333	439
	m³/h	750	1000	1200	1200	1580

MODEL		WMF0551	WMF0661
Nominal air flow @ 0 Pa	l/s	1200	1200
	m³/h	4310	4310
Air flow @ 50 Pa	l/s	1137	1137
	m³/h	4092	4092
Air flow @ 100 Pa	l/s	1071	1071
	m³/h	3857	3857
Air flow @ 150 Pa	l/s	1003	1003
	m³/h	3612	3612

(1) Without delivery and intake grilles, clean filters, no electric heater or re-heat

ELECTRICAL CHARACTERISTICS

COMPONENTI DELL'UNITÁ — *UNIT COMPONENTS*

50 Hz	C COMPRESSORE / COMPRESSOR						MVE VENTILATORI sez. RICIRCOLO / RADIAL FANS					
	VOLT	No.	kW (2)	OA (2)	FLA	LRA	VOLT	No.	kW	OA	FLA	LRA
WM∗ 0121	230/1ph/50	1	0.94	4,4	8,5	32	230/1ph/50	1	0,13	0,6	0,67	1,45
WM∗ 0181	230/1ph/50	1	1.53	7,1	11,4	47	230/1ph/50	1	0,23	1,0	1,11	2,22
WM∗ 0251	230/1ph/50	1	1.90	9,0	13,6	61	230/1ph/50	2	0,13	0,6	0,67	1,45
WM∗ 0281	230/1ph/50	1	2.35	11,2	15,3	76	230/1ph/50	2	0,13	0,6	0,67	1,45
WM∗ 0331	400/3ph/50	1	2.86	5,1	6,6	46	230/1ph/50	2	0,23	1,0	1,11	2,22
WM∗ 0551	400/3ph/50	1	4.01	7.8	10.0	66	230/1ph/50	1	0.70	3.2	3.56	7
WM∗ 0661	400/3ph/50	1	4.88	8.6	11.4	74	230/1ph/50	1	0.70	3.2	3.56	7

	MVC VENTILATORI sez. CONDENSANTE / CONDENSER FANS						RR RESISTENZE ELETTRICHE (opzionali) / ELECTRICAL HEATERS (optional)			
	VOLT	No.	kW (2)	OA (2)	FLA	LRA	VOLT	No.	kW	OA
WM∗ 0121	230/1ph/50	1	0,14	0,5	0	0	230/1ph/50	2	1,3	5,6
WM∗ 0181	230/1ph/50	1	0,14	0,5	0	0	230/1ph/50	2	2.0	8,7
WM∗ 0251	230/1ph/50	1	0,14	0,5	0	0	230/1ph/50	2	2.0	8,7
WM∗ 0281	230/1ph/50	1	0,14	0,5	0	0	230/1ph/50	2	2.0	8,7
WM∗ 0331	230/1ph/50	2	0,09	0,4	0	0	230/1ph/50	2	3.0	8.7
WM∗ 0551	230/1ph/50	1	0.34	1.5	2,56	7	400/3ph/50	1	6.0	8.7
WM∗ 0661	230/1ph/50	1	0.34	1.5	2,56	7	400/3ph/50	1	6.0	8.7

UNITÁ COMPLETE — *COMPLETE UNITS*

SENZA RESISTENZE / WITHOUT EL. HEATERS			RAFFREDDAMENTO MECCANICO / *MECHANICAL COOLING*					CICLO DI FREE-COOLING / *FREE-COOLING CYCLE*				
	mm²	FUS	VOLT	kW	L1	L2	L3	VOLT	kW	L1	L2	L3
WM∗ 0121 C	1,5	30A	230/1ph/50	1.21	5.5	0	0	230/1ph/50	0.13	0.6	0	0
WM∗ 0221 C	1,5	30A	230/1ph/50	1.9	8.6	0	0	230/1ph/50	0.23	1.0	0	0
WM∗ 0251 C	2,5	40A	230/1ph/50	2.30	10.7	0	0	230/1ph/50	0.26	1.2	0	0
WM∗ 0281 C	2,5	40A	230/1ph/50	2.75	12.9	0	0	230/1ph/50	0.26	1.2	0	0
WM∗ 0331 C	1,5	30A	400/3ph/50+N	3.49	7.9	5,1	5,1	400/3ph/50+N	0.46	2.0	0	0
WM∗ 0551 C	4	40A	400/3ph/50+N	5.05	12.5	7.8	7.8	400/3ph/50+N	0.70	3.2	0	0
WM∗ 0661 C	4	40A	400/3ph/50+N	5.92	13.3	8.6	8.6	400/3ph/50+N	0.70	3.2	0	0

CON RESISTENZE / WITH EL. HEATERS			RISCALDAMENTO ELETTRICO / *ELECTRICAL HEATING*					DEUMIDIFIC. & POSTRISC. ELETTRICO / *DEHUMIDIFICATION & ELECTRIC REHEAT*				
	mm²	FUS	VOLT	kW	L1	L2	L3	VOLT	kW	L1	L2	L3
WM∗ 0121 T	4	40A	230/1ph/50	2.73	11.8	0	0	230/1ph/50	3.81	16.7	0	0
WM∗ 0221 T	4	40A	230/1ph/50	4.23	18.4	0	0	230/1ph/50	5.90	26.0	0	0
WM∗ 0251 T	6	50A	230/1ph/50	4.26	18.6	0	0	230/1ph/50	6.3	28.1	0	0
WM∗ 0281 T	6	50A	230/1ph/50	4.26	18.6	0	0	230/1ph/50	6.75	30.3	0	0
WM∗ 0331 T	2,5	40A	400/3ph/50+N	6.46	10.7	8.7	8.7	400/3ph/50+N	9.49	16.6	13.8	13.8
WM∗ 0551 T	4	40A	400/3ph/50+N	6.70	11.9	8.7	8.7	400/3ph/50+N	11.05	21.2	16.5	16.5
WM∗ 0661 T	4	40A	400/3ph/50+N	6.70	11.9	8.7	8.7	400/3ph/50+N	11.92	22.0	17.3	17.3

kW	kW	Potenza Nominale (1)	*Nom. Absorbed Power (1)*
OA	A	Assorbimento nominale (1)	*Operating Current (1)*
FLA	A	Assorbimento massimo (1)	*Full Load Current (1)*
LRA	A	Corrente di spunto (1)	*Locked Rotor Current (1)*
		(1) per elemento	*(1) each Element*
		(2) Ambiente: 26°C/40%UR - Test.: 35°C	*(2) Room at: 26°C / 40% - Text.: 35°C*
L1-L2-L3	A	Assorbimento nominale per fase	*Operating Current per phase*
mm²	mm²	Sez. cavo di alimentazione consigliata	*Supply Wiring Section suggested*
FUS	A	Fusibile di linea consigliato	*Line Back-up Fuses suggested*

MAINTENANCE

REGULAR CHECKS

The following maintenance operations should be done regularly:

- check the set values of the control and regulation devices
- check that room conditions on the mP20/W terminal display are normal
- check normal condensation and evaporation pressures or saturated temperatures
- check the refrigerant charge; the sight glass should be clear (however the presence of a few bubbles is normal
- check the correct function of the external air damper
- check normal temperature and noise levels of compressor and fans
- check the air filters; clean or change the filters when the dirty filter alarm comes on
- check the flow of condensate to the drain
- check whether the condenser is dirty, removing any obstructing material with a jet of compressed air or water
- check that all electric terminal connections are tight
- check that power supply voltage is within design limits.

CLEANING AND CHANGING THE AIR FILTER

Inspect the filter cartridge at least once a month and whenever there is a blocked filter alarm: Clean or chage the filter as necessary.

models 0121-0331 open the central front panel

models 0551…0661 open the top front panel

- remove the filter cartridge (**F**), shake it to remove large particles then clean with a vacuum cleaner. Change the filter if it is blocked.

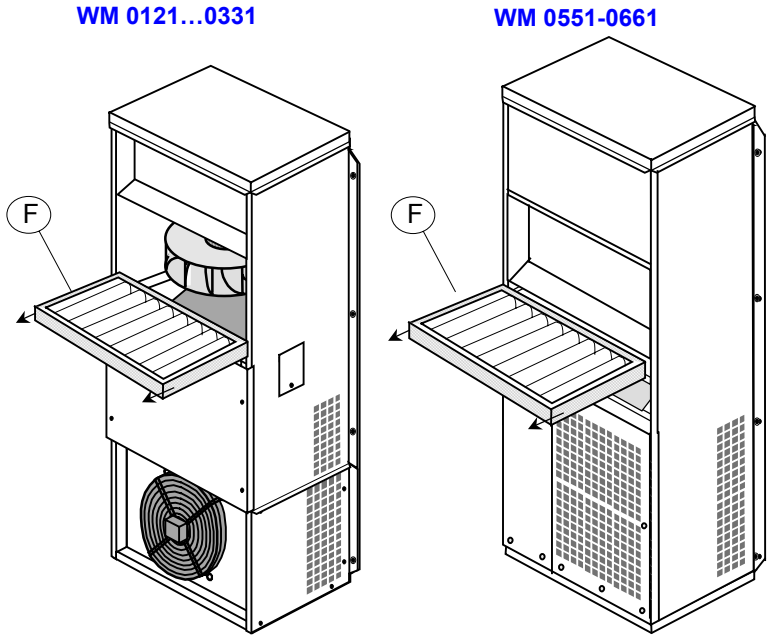


Fig. 6.

CLEANING THE FRESH AIR PRE-FILTRER

(only in units with free-cooling option)

To ensure sufficient flow of fresh air the metal pre-filter on the front air intake must be cleaned regularly, especially during the cooler seasons when free-cooling is used more often.
Free the pre-filter (**F**) from the air intake (**N**) and clean it using compressed air or water and detergent.
The free-cooling function should not be used without the pre-filter installed.

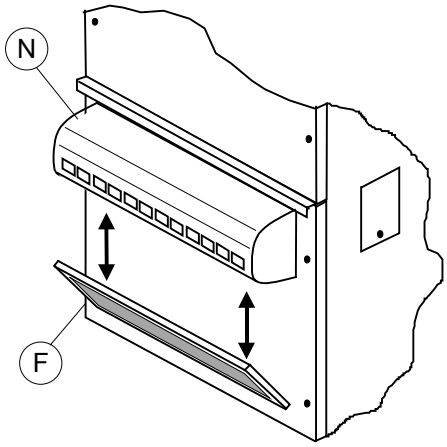


Fig. 7.

CLEANING THE CONDENSER

If the fins of the condenser coil are obstructed, remove all foreign bodies (leaves, seeds, dead animals, etc.) with compressed air.

CHANGING THE DAMPER MOTOR

Check the free flow of air through the damper and the condition of the neoprene rubber, making sure that the edges form a tight seal.
In an emergency (for example if the motor breaks) or for maintenance, press the motor release catch (*fig.8* **A**) to move the damper manually). The damper motor can be accessed after removing the side panel in models WM*0121 - 0331 or the top front panel in models WM*0551 - 0661. To take out the motor, undo fixing screws B completely and remove the motor from the damper shaft.

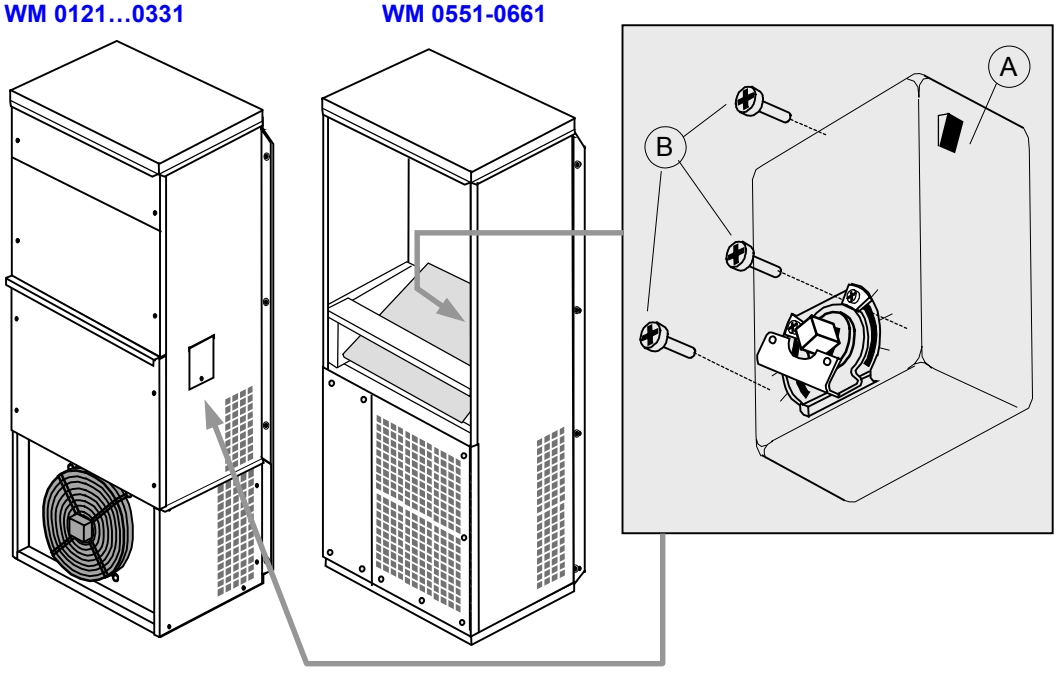


Fig. 8.

CHANGING THE ELECTRIC HEATING ELEMENTS

(models WM* 0551-0661)

The heater elements are in front of the MVE radial fan: for access, remove the top front panel of the unit and the safety cover.

IMPORTANT: before working on the electric heating element, switch off the power supply by moving the main switch to the OFF position (O) and wait for the element to cool.

CLEANING AND CHANGING THE CONDENSATE DRAIN TUBE

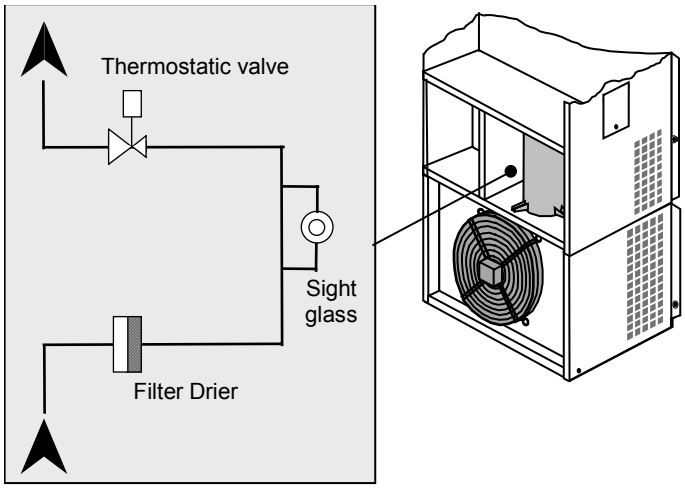
If necessary, change the condensate drain tube starting from the drain tray under the evaporator coil. To clean the tube, disconnect it from the tray and use a use a jet of water.

ADJUSTING THE REFRIGERANT CHARGE

The unit's refrigerant circuit is supplied already charged with R22 or R407C.

Check the type of refrigerant to use on the data plate of the unit and of the compressor.

If necessary, top up the charge using only the refrigerant and oil specified in the unit manual. Drain the refrigerant circuit completely, making sure that no refrigerant gas leaks into the environment, then create a vacuum in the circuit. A pressure of less than 100 Pa absolute (0,7 mm Hg) must be maintained in order to evacuate all air and moisture traces.
Start the compressor and slowly charge the refrigerant circuit via the special valve until the pressure in the line stabilises and the bubbles in the sight glass disappear. This valve is on the vertical section of piping immediately downstream of the thermostatic valve



The charge must be done under room conditions and with a discharge pressure of around 18 bar (equivalent to a saturation temperature of 48°C for R22).
Check that the super-cooling of the liquid at the intake of the thermostatic valve is between 3 and 5°C less than the condensation temperature reading on the manometer scale and that the superheating of the vapour at the evaporator output is around 5-8°C.
Oil: the average dilution is around 5% by weight of the refrigerant charge. If it is necessary to add oil, use only the recommended type below:

Refrigerant	Recommended oil		
R22 (Mineral oil)	Suniso 3 GS	Texaco WF 32	Fuchs KM
R407C (POE)	Mobil EAL Arctic 22 CC	ICI EMKARATE RL 32S	

PROBLEM SOLVING

Identifying and solving problems is made easier by the microprocessor control which, in the event of an alarm:

- activates the alarm relay as well as the red LED and buzzer on the user terminal
- displays an alarm condition on the user terminal
- describes, via the appropriate routine, the nature of the alarm and the possible solution.

If the HP pressostat or electric heater safety thermostat intervene they must be re-set manually using the button on the device.

Many problems can be caused by loose terminal connections. In the event of an alarm, check that all wires are securely fixed in the terminals.

If there is a fault, contact the nearest authorised Service Centre, giving the nature of the fault and any probable causes. Always consult the Microprocessor Control Manual included with the unit - many problems which seem to be faults are simply a question of incorrect or incomplete programming of the control.

PROBLEM	POSSIBLE CAUSE	CHECK / REMEDY
NO POWER (The yellow LED on the mP20 board is off).	A) No power to the unit electrical panel and/or no power to the auxiliary circuit.	1) Check that power is on and the unit main switch on the electrical panel is closed; check that the IM automatic circuit breaker is set.. 2) Check the auxiliary circuit 24V fuse and the fuse on the mP20 board
The message appears: WARNING! PHASE SEQUENCE ERROR	The phase sequence is inverted (models with 400V/3N/50Hz power supply).	Check that both LEDs on the RSF phase sequence relay are on. If not, disconnect the power supply then swap two of the power supply phases. If the alarm comes when the unit is operating the LP pressostat may have tripped: Check the pressure in the refrigerant circuit in the sec tion subject to evaporation pressure.
THE UNIT DOES NOT WORK	The control panel does not start the unit.	Check that the control panel connectors are correctly located in their sockets; see *mP20/W* control panel instruction manual..
	Check the control panel for alarms	See *mP20/W* control panel instruction manual
	The circuit does not receive the function command in remote control mode	With a remote control system, check that the contact between terminals 20 and 50 is closed

TEMPERATURE CONTROL

PROBLEM	POSSIBLE CAUSE	CHECK / REMEDY
ROOM TEMPERATURE TOO HIGH (high room temperature alarm)	The parameter settings on the control panel are not correct	Check the room temperature setting; see control panel instruction manual.
	Lack of air flow.	See ”Lack Of Air Flow”.
	The compressor does not work when called by the control panel.	See ”The Compressor Does Not Work”.
	Insufficient compressor output	See ”Compressor High Output Pressure”, ”Compressor Low Intake Pressure”.
	The control system does not work properly	See the control panel instruction manual; check that the control panel and sensors work properly.
	Heat load higher than expected.	Check: fresh air conditions and volume, external air infiltration and latent load, particularly with dehumidification.
ROOM TEMPERATURE TOO LOW (Low room temperature alarm)	The parameter settings on the control panel are not correct.	Check the room temperature setting; see the control panel instruction manual
	Electric heater does not work.	1) Check electric heater operation
		2) Check electric heater power supply
		3) If there is a heater alarm, remove the cause and re-set the safety thermostat
	The control system is not working.	See control panel instruction manual; check that control panel and/or sensors work properly.
	Thermal leakage higher than expected	Check thermal leakage and entry of external air.

HUMIDITY CONTROL

PROBLEM	POSSIBLE CAUSE	CHECK / REMEDY
ROOM HUMIDITY TOO HIGH (High room humidity alarm)	A) The parameter settings on the control panel are not correct.	Check room humidity settings; see the control panel instruction manual.
	B) Latent load higher than expected	Check: latent load, fresh air conditions and volume, external air infiltration
	C) The compressor does not function during dehumidification.	See “The Compressor Doesn’t Work”
	D) The control system is not working.	See control panel instruction manual; check that control panel and sensors work properly.
ROOM HUMIDITY TOO LOW (Low room humidity alarm)	A) The parameter settings on the control panel are not correct.	Check the room temperature setting; see also the control panel instruction manual.
	B) Latent load lower than expected.	Check: quantity of the latent load, fresh air conditions and volume, external air infiltration

FANS

PROBLEM	POSSIBLE CAUSE	CHECK / REMEDY
LACK OF AIRFLOW	A) No power to the fans	Check power supply to the fan motors
	B) The filters are dirty	Shake dust out of the cartridge and clean with a vacuum cleaner. Change filter if blocked. Check correct setting of the dirty filter pressostat.
	C) The airflow is obstructed	Read the section on Air Distribution
	D) Intervention of fan thermal protection.	Check the resistance of the fan windings. Re-set then measure voltage and current.
	E) The pressure drop in the air distribution system (grilles, ducts, etc.) is too high.	1) Check the air distribution system
		2) Increase fan speed (see Fan Speed Regulation)

REFRIGERANT CIRCUIT

PROBLEM	POSSIBLE CAUSE	CHECK / REMEDY
HIGH COMPRESSOR OUTPUT PRESSURE	A) Non-condensable air or gas in the circuit, with bubbles in the flow sight glass; supercooling of the liquid is high.	Evacuate the refrigerant circuit and re-charge
	B) Airflow is insufficient or air in the remote condenser is too warm.	1) Check fan operation and rotation direction in the remote heat exchanger. (See condenser/radiator instruction manual).
		2) Remove any obstructions from the remote condenser with compressed air or water.
	C) Too much refrigerant in the circuit; condenser partially flooded. Refrigerant supercooling too high at condenser output	Remove some refrigerant from the circuit.
HIGH PRESSURE PRESSOSTAT INTERVENES	A) The condensation pressure control system is not functioning efficiently	1) Check condenser fan; re-set or replace the faulty fans;
		2) Check setting and function of the RVC/e. speed regulator (see Regulation of condensation pressure)
	B) High system output pressure	See High compressor output pressure
LOW COMPRESSOR OUTPUT PRESSURE	A) The condensation pressure control system is not working (see microprocessor control instruction manual).	1) Check the function and setting of the condenser fan pressostat and speed regulator
	B) Intake pressure too low	See Low Compressor Intake Pressure.

REFRIGERANT CIRCUIT

PROBLEM	POSSIBLE CAUSE	CHECK/REMEDY
HIGH COMPRESSOR INTAKE PRESSURE	A) Heat Load greater than expected.	Check the consistency of the room thermal load; check, in the presence of strong dehumidification, the airflow and the external conditions; check the amount of outside air draw.
	B) Airflow pressure too high.	See "HIGH COMPRESSOR OUTPUT PRESSURE".
	C) Circuit refrigerant overload	Remove the refrigerant from the circuit.
	D)Return of liquid refrigerant to the compressor intake.	Check that the overheating of the thermostat valve is correct (approx 5-8°C); check that the valve sensor bulb has not lost its refrigerant charge and is well positioned, fixed and isolated.
LOW COMPRESSOR INTAKE PRESSURE (and formation of frost in the coil)	A) Room temperature is too low.	See "ROOM TEMPERATURE IS TOO LOW".
	B) Air flow is too low or absent.	SEE "LOW AIR FLOW".
	C) Refrigerant filter is blocked.	Check the refrigerant filter.
	D) Thermostat Valve is un-set or faulty.	Check that the overheating of the thermostat valve is correct (approx 5-8°C); check that the valve sensor bulb has not lost its refrigerant charge and that it is correctly positioned, fixed and isolated.
	E) Insufficient refrigerant load.	Check for any leakage and restore the load to measure a sub-cooling of the condensor liquid outlet of 3-5°C.
INTERVENTION OF THE PRESSOSTAT **BP** (low compressor intake pressure)	A) Thermostat valve is un-set or faulty.	Check that the overheating of the thermostat valve is correct (approx 5-8°C).
	B) filter cartridge is dirty. deidratore	Check that the cartridge dehydrator filter doesn't need to be replaced; the difference between the air temperature measured before and after the filter must be less than 2°C.
	C)Output pressure is too low.	see "LOW COMPRESSOR OUTPUT PRESSURE" .

COMPRESSOR

PROBLEM	POSSIBLE CAUSE	CHECK/REMEDY
THE COMPRESSOR DOES NOT WORK	A) Protection device against short circuit is switched on.	Restore the magnetic switch lever; check cause of the short circuit. *Before restarting the compressor check the. heating element and the winding continuity of the motor.*
	B)The internal protection of the compressor is switched on.	see 'COMPRESSOR INTERNAL PROTECTION DEVICE SWITCHES ON'
	C) The contactor doesn't work.	Check the contacts and the main switch coil.
COMPRESSOR INTERNAL PROTECTION DEVICE SWITCHES ON	A) Lack of phase (unit power supply 400V/3N/50Hz)	Check the compressor winding heating elements, after re-setting, measure the voltage and the absorption of the three phases.
	B) Motor overload.	Check that the unit is functioning within the pre-set limits.
	C) Power supply voltage is too high or too low.	Check the unbalance between the phases of the three phase power supply are within 2%.. For monophase components the voltage must be between -10% and +6% the nominal value.
	D)Blocked rotor.	Replace the compressor.
THE COMPRESSOR IS NOISY	A) The compressor is damaged.	Call the nearest Help Center to replace the compressor.
	B) Liquid return to the compressor.	Check the functioning and overheating of the expansion valve.

ELECTRIC HEATERS

PROBLEM	POSSIBLE CAUSE	CHECK/REMEDY
ELECTRIC HEATERS DO NOT	The safety thermostat of the heating elements is switched on.	Airflow is insufficient see "LOW AIRFLOW".
		Check the continuity of the safety thermostat connection to the control system.
	The contactor doesn't work.	Check the contactor contacts and the electric coil.
	Protection device against short circuit is switched on.	Check the cause of the short circuit and re-set the automatic switch lever IM.

FREE COOLING SYSTEM

PROBLEM	POSSIBLE CAUSE	CHECK/REMEDY
FREE-COOLING CYCLE DOES NOT START	A) The servomotor damper doesn't work.	Check the electrical of the and if it is necessary to replace or repare the motor.
	B) Control system setting is not correct.	Check the setting of the control system.
	C) The control system doesn't work.	Check the functioning of the sensors. *Cfr. mP20/W instruction manual.*
	D) the main board does not receive consent of free-cooling (only units with external control system *CDC*).	Check that the connection of external consent is correct (cfr. par.ELECTRICAL CONNECTIONS)
ROOM TEMPERATURE IS TOO HIGH (the high room temperature threshold alarm is switched on)	The free-cooling damper is open on the outside; hot and/or humid outside air flows through the evaporator.	1) The damper motor doesn't work; manually set the damper in the recirculating position to await replacement or repair. 2) the minimum set opening of the damper is excessive; recalibrate the minimum openingritarare (*Cfr. mP20/W instruction manual*); 3) the main board receives a wrong command of damper opening (only units with external control systems *CDC*).
ROOM TEMPERATURE IS TOO LOW (the low room temperature threshold alarm is switched on.**)**	A) The free-cooling damper is open on the outside; cold outside air flows through the evaporator.	see ROOM TEMPERATURE IS TOO HIGH
	B) The modulation of the damper does not work correctly with outside air that is too cold.	1) The setting of the control system is not correct: check the setting of the control system. 2) the base board receives a wrong command of damper opening **(**only units with external control systems *CDC***).**
ROOM HUMIDITY IS TOO HIGH (high room humidity threshold alarm is switched on**)**	The free-cooling damper is open on the outside; hot and/or humid outside air flows through the evaporator.	See "ROOM TEMPERATURE IS TOO HIGH"
HIGH COMPRESSOR CHARGE PRESSURE	The free-cooling damper is open on the outside; hot and/or humid outside air flows through the evaporator.	See "ROOM TEMPERATURE IS TOO HIGH"
LOW COMPRESSOR CHARGE PRESSURE (formation of frost in the coil)	The free-cooling damper is open on the outside; hot and/or humid outside air flows through the evaporator.	see "ROOM TEMPERATURE IS TOO HIGH"